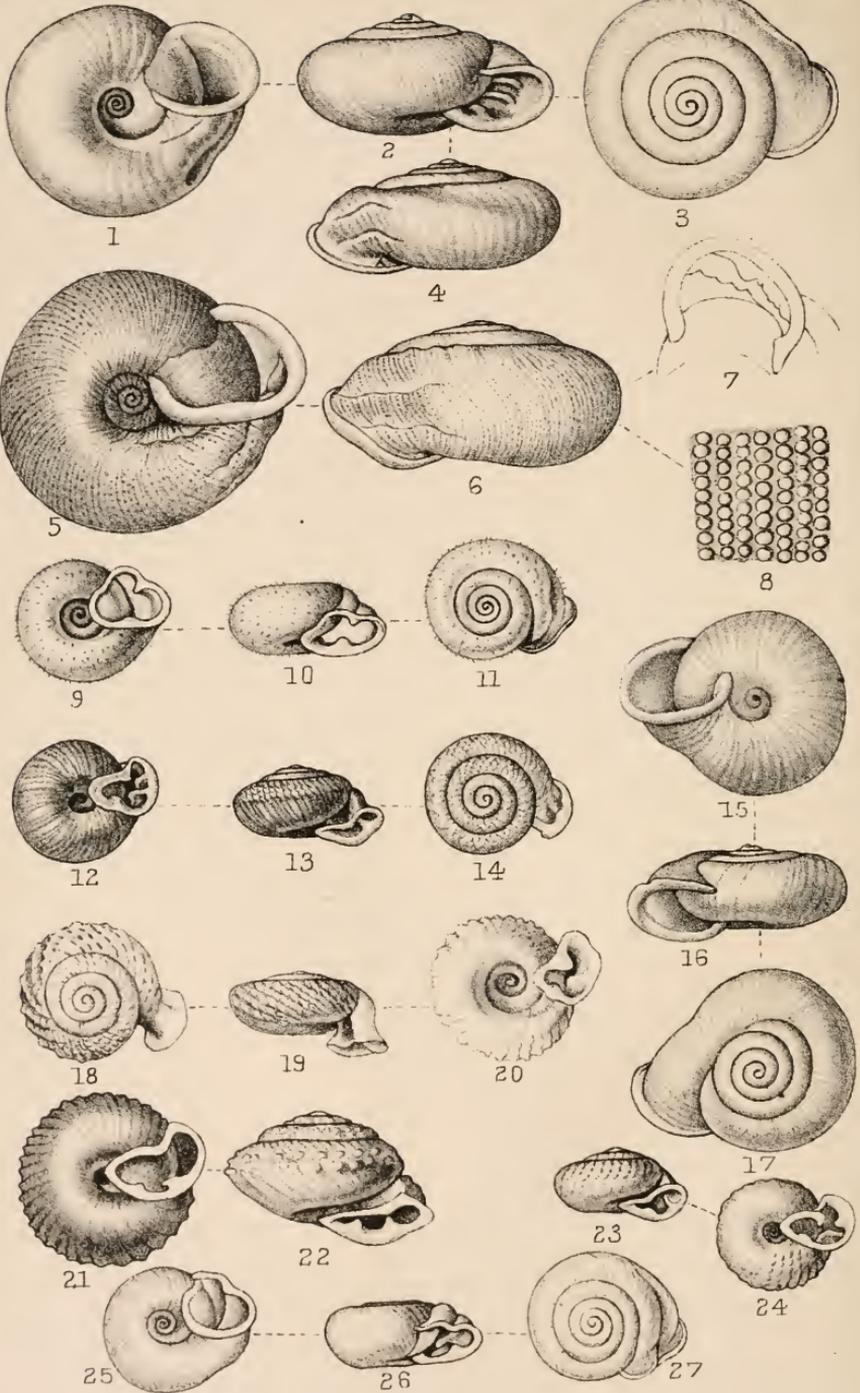


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SECOND SERIES: PULMONATA.

MANUAL

OF

CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUED BY

HENRY A. PILSBRY.

CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF
NATURAL SCIENCES OF PHILADELPHIA.

Vol. VI.

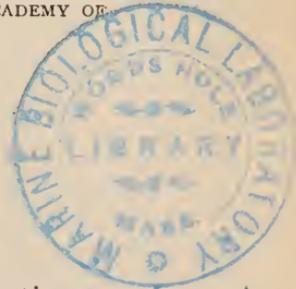
HELICIDÆ, Vol. IV.

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PREFACE.

The present volume is devoted to the oriental Helices, including the large species of Japan, China, the East Indies, Australia, Madagascar and Ceylon. First place has been given to *Stegodera*, a Chinese group of uncertain affinities, containing forms with curiously toothed and contorted apertures. *Pedinogyra* and *Ampelita* follow, each of these being apparently an isolated group, not united by known characters to other subgenera. A number of groups are then discussed which the writer has brought together on account of the novel character of their ova, which are relatively enormous, the embryonic shell often exceeding one-third the diameter of the adult. To this *macrembryonic* group, as it may be termed, belong *Helicophanta*, *Stylodonta*, *Acavus* and *Panda*—the largest of Helices. The great series of which *Hadra*, *Xanthomelon* and *Sphærospira* are leading forms is then considered; and finally are monographed *Planispira*, *Obba*, *Chloritis*, and the forms grouping around them.

Philadelphia, April, 1890.

H. A. P.



MANUAL OF CONCHOLOGY.

FAMILY *HELICIDÆ*, Vol. IV.

Genus *HELIX*, Linn. (Continued.)

Subgenus XV. *STEGODERA* (Martens) Pilsbry.

Under the above title may be grouped a number of peculiar *Helices*, figured on pl. I of this volume. They range from the Yangtze River in Central China to Cambodia. These shells have a certain similarity to the American groups *Cepolis* and *Polygyra*, and to the Indian and Ceylonese *Plectopylis* and *Corilla*. But they are in all probability a distinct phylum, which may be given the same rank as the assemblages called "groups" in the previous volume of this MANUAL.

The anatomy is unknown. The shells are depressed, umbilicated, dark colored, granulate, often with hairy cuticle. The aperture is very oblique, and always obstructed in some way; either by teeth or folds, or by a constriction of the last whorl. The systematic position of the subgenus can only be determined by a study of the soft parts. I have used Martens' name *Stegodera* in an extended sense, as it is the oldest proposed for a member of this group of forms now for the first time associated.

The species of the subgenus may be separated into two main divisions; (1) those with crescentic or rounded-lunar aperture, and (2) those with triangular mouth. Further than this, I do not think the several sections proposed have much taxonomic value. They may be grouped thus:

I. *Aperture crescentic or rounded-lunar; folds or teeth if present, not developed from the margin of peristome; parietal callus very light.*

a. Sinistral, the last whorl distorted; no teeth or folds within.

STEGODERA

- b. Dextral, whorls regular; lamellæ within outer lip.

TRAUMATOPHORA.

II. *Aperture trigonal or squarish; teeth or folds developed from the inner edge of peristome; the ends of which are joined by a parietal callus.*

- a. Parietal callus scarcely elevated, not toothed; spire flat or sunken,

TRIHELIX.

- b. Parietal wall elevated, toothed; peristome free, continuous.

MOELLENDORFFIA.

The characters of each of these subdivisions are given more in detail in the following.

Synopsis of Sections of the Subgenus Stegodera.

Section I. STEGODERA Martens, s. str.

Shell sinistral, discoidal, umbilicate; inner whorls slowly increasing, regular; latter half of the last whorl straightened, covering the preceding whorl above; aperture narrowly lunar, without teeth; peristome narrowly reflexed; throat very narrow. Type, *H. angusticollis* Mart.

Central China.

Section II. TRAUMATOPHORA Ancy.

Shell discoidal, umbilicate, spire low, whorls slowly widening; surface granulate; body-whorl rounded, deflexed in front; aperture rounded lunar, oblique, with three entering lamellæ within the outer and basal lips, their positions marked outside by long grooves. Type, *H. triscalpta* Mart.

Central China.

Section III. TRIHELIX Ancy.

Shell discoidal, with flat or sunken spire; umbilicus funnel-shaped, wide; surface granulate, hirsute; last whorl rounded, descending anteriorly; aperture trigonal, with a tooth on the basal and one on the outer-superior lip, their positions marked by external pits or grooves; peristome reflexed, continuous. Type, *H. horrida* Pfr.

China, Cambodia.

Section IV. MOELLENDORFFIA Ancy.

Shell depressed, the spire convex; umbilicus rather narrow; surface granulate, hirsute in the young; last whorl descending

anteriorly, then suddenly deflexed, becoming free from the preceding; aperture trigonal or squarish, nearly horizontal, with teeth on the basal and outer lips, and on the elevated parietal margin; peristome expanded all around. Type, *H. trisinuata* Mart.

South-eastern China, Tonquin.

Section I. STEGODERA Martens, *sensu stricto*, 1876.

Stegodera MART. in *Novitates Conchologicae* iv, p. 150, 1876.

Stegodera in the restricted sense comprises only one species of Central China, remarkable for its sinistral convolution, distorted last whorl, crescentic aperture and narrow throat. It may possibly be allied to such species as *H. arbusticola* and *rupelli* Desh., which are dark colored, granulate forms, but I regard this as doubtful. The affinity with *H. triscalpta* seems much nearer.

H. ANGUSTICOLLIS Martens. Pl. 1, figs. 15, 16, 17.

Shell sinistral, umbilicate, depressed, last whorl irregular, its latter half straightened, embracing and covering part of the two preceding whorls of spire.

Discoidal, solid, opaque, slightly shining, rich chestnut brown; surface densely, minutely granulated on the last whorl, the whorls of the spire arcuately striate, more shining, not granulate. Spire a little convex; apex blunt, whitish; whorls 5, quite convex, separated by well-impressed sutures, slowly widening, the last whorl very wide, its latter portion (nearly one-half) straightened, very tumid, embracing the preceding and part of the next inner whorl, deeply descending anteriorly to about the middle of the preceding whorl. Aperture extremely oblique, narrowly lunar, dark within, the peristome narrowly reflexed, brown above, white on the baso-columellar portion; parietal wall with a mere wash of transparent callus. Throat extremely narrow. Umbilicus deep, cylindrical.

Alt. 13, greater diam. 28–30, lesser 22 mill.

On the Lake Po-yang, Province of Kiang-si; Right bank of the Yang-tsze River, between Kiou-kiang and Hwang-tschou.

H. angusticollis MART., Sitz. Ges. nat. Fr. Berl., Jan. 1875, p. 2; Mal. Bl. xxii, 1875, p. 185.—PFEIFFER, Monographia vii, p. 449; Novitates Conch. iv, p. 149, t. 184, f. 7–10.—HEUDE, Moll. Terr. Vallée Fleuve Bleu, p. 36, t. 15, f. 8.

Heude mentions a rare form, corneous or pure white within. The animal is grayish-black, with a yellow dorsal line; the foot is blackish, bordered with white.

This is one of the strangest forms of *Helix*. The whorls are regular in increase until the latter half of the last, which is straightened, concealing part of the spire, and excessively narrow in the throat. The specimens before me are even more marked in these anomalous characters than those figured by Von Martens. They are also larger than the figures on pl. I.

Section II. TRAUMATOPHORA Ancey, 1887.

Traumatophora ANC. in the Conchologists' Exchange, April, 1887, p. 54.

H. TRISCALPTA Martens. Pl. 1, figs. 1, 2, 3, 4, 5, 6, 7, 8.

Shell depressed, umbilicate, obliquely irregularly striate above, pale; whorls 5, forming a slightly convex spire, slowly widening, the first smooth, obliquely protruding, the last rounded, inflated beneath, suddenly passing into the moderate umbilicus; before reaching the aperture the whorl is constricted and marked by three linear, angular, obliquely descending impressions, then it suddenly descends. Aperture small, very oblique to the axis, rounded-lunar; peristome thickened, reflexed, white, with two lip folds within, and a third basal fold, none of which extend to the edge of the peristome. (*Martens.*)

Alt. 14, greater diam. 31, lesser 25 mill.

Alt. 13-18, greater diam. 28-38, lesser 23-32 mill.

Between the Yang-tse-Kiang and its affluents, Han-Kiang and Hwai; Province of Hu-pe (Heude); around Lake Po-yang, Province of Kiang-si, China.

H. triscalpta MARTENS, Sitz. Ges. nat. Fr. Berlin, Jan. 1875, p. 2; Mal. Bl. xxii, 1875, p. 185.—PFR., Monographia vii, p. 443; Novitates Conch. iv, p. 148, t. 184, f. 1-4.—HEUDE, Notes sur les Moll. Terr. de la Vallée du Fleuve Bleu, p. 35, t. 15, f. 7.

It is not a common species, according to Heude, but inhabits a vast area. On the Yang-tse-Kiang River, between Hwang-tchou and Kiou-Kiang, Province of Hu-pe, there is a small variety, with flattened spire. The large variety prefers an altitude of 1200 to 1500 meters, it inhabits the triangle formed by the confluence of the Han-Kiang with the Yang-tse-Kiang.

The animal, according to Heude, is blackish-ashen above, livid white beneath; it is slender, the head more attenuated.

Section III. TRIHELIX Ancey, 1887.

Trihelix ANC. in The Conchologists' Exchange, May, 1887, p. 64.
—*Cepolis* (in part) of authors.

To the type of *Trihelix*, *H. horrida*, I have added two Chinese species which seem to belong here rather than with *H. triscalpta*. This section is closely related to *Möllendorffia*; the latter name has priority.

H. HORRIDA Pfeiffer. Pl. 1, figs. 9, 10, 11.

Shell broadly umbilicated, depressed, spire concave, aperture triangular, lip 2-toothed.

Discoidal, decidedly concave above, rather thin, light brown in color. Surface dull, with very minute and sparsely scattered granules, visible only under a lens, and small tubercles arranged in quincunx, standing about one mill. apart, each one bearing a stiff hair or bristle from $\frac{1}{2}$ to 1 mill. in length. Spire sunken, apex rather coarse, planorboid; whorls $4\frac{1}{2}$, very convex, the last more than double the width of the preceding, very convex above and below, deeply descending toward the aperture, having a deep pit behind the lip above, and another a short distance preceding it, both above the periphery; on the base there is a deep pit partly concealed by the expanded lip, and a groove running obliquely into the umbilicus from it. Aperture very oblique, subtriangular, liver-brown, peristome reflexed all around, parietal margin a little elevated, the upper lip bearing a large tubercular tooth, the straight basal lip a similar one; there is also a deep-seated tubercle within the mouth at the position of the second supra-peripheral pit of the outside. Umbilicus broad, funnel-shaped.

Alt. 8, greater diam. 19, lesser $14\frac{1}{2}$ mill.

Laos Mts., Cambodia.

H. horrida PFR. Proc. Zool. Soc. London, 1862, p. 272, t. 36, f. 15; Monographia v, p. 395; Novitates Conchol. iii, p. 399, t. 92, f. 17–19.—DOHRN, Continuation of Küster's Conchyl. Cab., p. 579, t. 170, f. 8–10.

A peculiar species, distinct in its concave spire, broad umbilicus and hairy cuticle. The single specimen before me agrees in all respects with Pfeiffer's original description.

H. BISCALPTA Heude. Pl. 1, figs. 25, 26, 27.

Shell moderately umbilicated, irregularly discoidal, the spire plane, apex subconcave, whorls 5, cylindrical, much compressed; epidermis

brown, minutely roughened at the apex, with long, spirally disposed, sparse, tubercles on the whorls; aperture very oblique, with two external sulci, dentate above and below; upper sulcus arcuate, almost equaling the diameter of the disc, the columellar excavated into the umbilicus, both appearing as palatal lamella inside; peristome thin, narrow, reflexed, continuous, nearly free; umbilicus open, conic. (*Heude.*)

Alt. 9, greater diam. 22, lesser 17 mill.

Tchen-K'eou, China.

H. biscalpta HEUDE, Moll. Vallée Fleuve Bleu, p. 113, t. 29, f. 10.

May be hairy when perfect; described from specimens in bad condition. The pit behind the baso-columellar lip is not represented in fig. 25. It is formed about as in *H. horrida* Pfr.

This species and the following seem to be nearer to *H. horrida* Pfr. than to *H. triscalpta* Mart.

H. FABERIANA Möllendorff.

Shell rather openly umbilicate, discoidal, solid, minutely granulated with transverse striæ and spiral lines, in the young with rather long, sparse hairs; purplish-brown; spire plane, apex scarcely projecting; whorls 5, nearly flat, the last flat above, obtusely angulated, inflated beneath, gibbous, a little distorted, obtusely angled around the umbilicus, and with two impressions near the aperture, the basal short, the upper one longer, forming lamellæ within; shortly deflexed anteriorly. Aperture very oblique, cordiform; peristome broadly expanded, labiate, a little reflexed, the margins remote, scarcely joined by a callus, outer margin sinuous, basal dentate. (*Müllff.*)

Alt. 7½, greater diam. 18, lesser 15 mill.

Mt. Omi, province Sytshuan, China.

H. faberiana MLLDFF. Nachrichtsbl. D. Mal. Gesell. 1888, p. 40.

Differs from *H. biscalpta* Heude in being smaller, the last whorl angular above, peristome scarcely continuous, the scrobiculations or grooves, especially the upper one, shorter, etc. (*Müllff.*)

Section IV. MOELLENDORFFIA Ancy, 1887.

Möllendorfia ANC. in the Conchologists' Exchange, May, 1887, p. 64.—*Proctostoma* MABILLE, Bull. Soc. Malac. de France iv, p. 102, 103, 104, 1887 (Received at Academy of Natural Sciences, Phila., Jan. 10, 1888).—*Polygyra* of Gredler and others.

H. TRISINUATA Martens. Pl. 1, figs. 12, 13, 14.

Shell umbilicate, depressed, the spire low; color dark brown, opaque; aperture very oblique, obstructed by four teeth, the peristome white, continuous, expanded and reflected.

The form is depressed convex above and below, obtusely carinated above the middle of the body whorl. It is solid, opaque, dark brown or sometimes yellowish-brown, darker on the latter third of the body-whorl. Surface lusterless, covered all over with a microscopic granulation, and with a rather coarse pattern of tubercles arranged in very oblique rows, often forming short folds at the periphery, and disappearing in the vicinity of the umbilicus. Spire low, rounded, flattened at apex; apical whorl large (commencing with a width of $\frac{2}{3}$ mill.), microscopically granulated. Suture slightly impressed, from apex to termination. Whorls $4\frac{1}{2}$, the inner slightly convex, the outer two flatter; they increase slowly in width, the last narrowing toward the aperture; last whorl obtusely carinated above its middle, descending anteriorly, becoming free from the preceding at the aperture, and deeply grooved or scrobiculate behind the outer lip by an oblique pit within the umbilicus, a deep narrow curved one below the periphery, and a small one just above it. Aperture subhorizontal, triangular, dark purplish-brown inside, the peristome pure white, broadly expanded all around, the basal margin bearing a square tooth, the outer margin a strong entering fold, with a smaller one above it, the parietal wall elevated, emarginate, with an inward-projecting tubercle or angle. Umbilicus deep, as wide within as at its opening.

Alt. 11, diam. maj. 19, min. 17 mill.

Alt. 9, diam. maj. 16 mill.

Island of Hong-Kong; Ma-aa-shan Mts., Province of Kwang-tung, China.

H. trisinuata MARTENS, Die Preuss. Exped. nach Ost-Asien, Landschn., p. 50 (1867).—PFEIFFER in Novit. Conch. iii, p. 352, t. 82, f. 16–18; Monographia v, p. 412; vii, p. 465.—MOLLENDORFF, in Jahrb. d. Mal. Gesell. viii, p. 302, 303; and l. c. xi, p. 309, 1884.—*Polygyra trisinuata* Mart., GREDLER, Mal. Blätt. 1887, p. 129.—*H. trisinuata var. sculptilis* MOLLENDORFF, Jahrbücher, 1884, p. 310, t. 4, f. 7.

Möllendorff says (Jahrb. d. D. Mal. Gesell. 1884, p. 310) that *H. trisinuata* is found only near Cape d'Aguilar near the village of Shekko, on the Island of Hong-Kong. It lives deep in rocky *debris*, and

is very scarce. Another locality is on the mainland around Mirs Bay. It is probably distributed throughout the central portions of the province Kwang-tung.

The nucleus consists of $1\frac{1}{2}$ rather wide, convex but planorboid whorls, which are very delicately microscopically shagreened. The whorl is a little narrowed where the nuclear whorls give place to the post-embryonic growth. The latter has a microscopic granulation and coarse tuberculation as described in the text.

Var. SCULPTILIS Möllendorff. Pl. 1, figs. 23, 24.

Smaller, the whorls more convex, tuberculation stronger, the granules and tubercles generally whitish. Alt. 8-9, diam. maj. 16-16 $\frac{1}{2}$ mill.

Lo-fou-shan Mts., back of Canton, China.

H. EASTLAKEANA Möllendorff. Pl. 1, figs. 21, 22.

Shell narrowly umbilicated, depressed-conoidal, with oblique ear-shaped aperture, the peristome free, continuous, basal margin with two teeth.

Low-conoidal above, convex below, rather thin but opaque, dark reddish-brown, the aperture liver-brown; surface lusterless, the whorls sculptured with tubercles which form backward directed obliquely descending folds above and below the periphery; spire rather elevated, conoidal, blunt at apex; nuclear whorl rather large, planorboid, convex; suture evenly impressed. Whorls $5\frac{1}{2}$, slowly, regularly widening, the last whorl scarcely wider than the penultimate, obtusely carinated, slightly convex below the periphery, slowly descending toward the aperture and then suddenly becoming free from the preceding whorl. There are two pits behind the basal lip, one near the umbilicus, the other near the periphery. Aperture triangular or ear-shaped, the peristome narrowly expanded, continuous; parietal wall elevated, emarginate, obtusely projecting inward; outer lip with an acute fold where it joins the basal lip; the latter with a smaller square tooth; umbilicus narrow, partly concealed by the inner angle of the peristome.

Alt. 14, greater diam. 20, lesser 18 $\frac{1}{2}$ mill.; umbilicus 2 $\frac{1}{2}$ mill. wide.

Alt. 15 $\frac{1}{2}$, greater diam. 23 $\frac{1}{2}$, lesser 21 mill.

In a ravine of Tai-mo-shan, mainland, opposite Hong-Kong.

H. eastlakeana MLLDFF., Jahrbücher D. M. Ges. ix, p. 185, 1882; l. c. xi, p. 311, 1884; l. c. xii, p. 391, 1885, t. 10, f. 18.—*Polygyra eastlakeana* Mlldff., GREDLER, Mal. Bl. ix, p. 129, 1887.

I have seen but a single specimen of this beautiful and rare species, and that without a cuticle. It differs from *H. trisinuata* in the higher spire, narrower umbilicus, and in lacking the upper lip-tooth of that species. Young specimens have pretty long bristle-like hairs upon the warts of the surface, which are lost in the adult.

H. LOXOTATUM Mabilie. Pl. 1, figs. 18, 19, 20.

Shell widely, deeply umbilicated, destitute of cuticle and color, rather solid, lusterless, covered above and below with a sculpture of large sharp tubercles arranged in rows; spire plane; apex small, scarcely projecting; whorls 5-5½, rounded, narrow, rapidly and regularly increasing, separated by a well-impressed suture; the last whorl large, above double the width of the preceding one, rounded, compressed below the periphery, convex around the umbilicus, a little descending in front and then abruptly deflexed, free from the preceding whorl, profoundly scrobiculate on the outer, basal and columellar margins behind the lip. The aperture is horizontal, with continuous toothed margins. There is a strong tuberculous but not entering tooth on the parietal wall; two somewhat entering folds on the outer wall, the upper one pointed, the other large, entering; and finally a deep-seated columellar tooth. The peristome is thin, well-expanded. Alt. 8, greater diam. 19, lesser 16 mill. (*Mabilie*.)

Tonquin.

Helix loxotatum MABILIE, Moll. Tonk. diagn., p. 5, May, 1887.—*Proctostoma loxotatum* MAB. Bull. Soc. Mal. France iv, p. 102, t. 1, figs. 1, 2, 3. (Received at Philadelphia Jan. 10, 1888.)

Allied to *H. trisinuata*, but with wider last whorl, wider umbilicus, and differently shaped aperture.

H. HENSANIENSIS Gredler.

The description of this form is not now accessible to me.

Subgenus XVI. PEDINOGYRA Albers, 1860.

Pedinogyra ALBERS, Die Heliceen, 2d ed., p. 162 (type *H. cunninghami* Gray).—PFEIFFER, Noment. Hel. Viv., p. 184.—*Macrocyclus* BECK, and of Pfeiffer and Cox, *olim*.

Shell large, discoidal, solid, opaque and colored; very broadly umbilicated; spire very low; whorls 5-6, the last very large, deeply deflexed anteriorly; aperture oblong, nearly horizontal, lip a trifle expanded; base compressed behind the baso-columellar lip. Type, *H. cunninghami* Gray.

A subgenus of doubtful affinities. The two known species are confined to Eastern Australia.

H. CUNNINGHAMI Gray. Pl. 2, figs. 28, 29, 30, 31.

Shell very broadly umbilicated, spire slightly convex; color yellowish or greenish, with brown spiral bands; body-whorl not distinctly carinated.

Discoidal, very broad, somewhat oblong or transversely inflated, solid and strong, opaque, greenish-yellow with numerous encircling bands and lines of brown; generally light (but sometimes dark) within the umbilicus. Surface with close, irregular fine growth-wrinkles, decussated above the periphery and within the umbilicus by numerous fine but indistinct spiral impressed lines. Spire a little convex, whorls $5\frac{1}{2}$; apex flattened, earlier whorls with distinct arcuate growth folds but no spiral lines. Whorls of the spire convex, slowly increasing; last whorl very wide, convex-sloping above, very convex beneath; its latter third rapidly widening; toward the aperture it descends nearly to the base of the preceding whorl, and behind the baso-columellar lip it is broadly constricted. Aperture horizontal, truncate-oblong, deep chocolate within; peristome thick, narrowly expanded, the margins joined by a shining callus, basal and upper margins white, the outer portion dark brown. Umbilicus broad and deep, showing all the volutions.

Alt. 23, greater diam. 64, lesser 47 mill.

Brisbane to Rockhampton, Queensland, Australia.

H. cunninghami GRAY, Proc. Zool. Soc., London, 1834, p. 64.—GRIFFITH'S Cuviers' Anim. Kingd., t. 36, f. 4.—PFEIFFER Monographia i, p. 374; Conchyl. Cab., t. 130, f. 11-13.—REEVE, Conch. Icon., f. 363.—COX, Mon. Austr. Land Sh., p. 52, t. 1, f. 5, 5a.—MOUSSON in Journ. de Conchyl. 1869, p. 60 (var. *minor*, alt. 18, diam. 52 mill., scarcely angled at periphery; *compressa*, more depressed, last whorl more acutely angled, compressed, olive with dark lines).—*Macrocyclus cunninghami* Gray, BECK, Index, p. 24.—FRAUENFELD in Verh. zool-bot. Ges. Wien, 1869, p. 876.—*H. tupinieri* EYDOUX, in Guerins' Mag. de Zool. 1838, pl. 114.—*H. (Pedinogyra, cunninghami* Gray, ALBERS, Die Heliceen 2d ed. p. 162.—HEDLEY, List Queensl. Land Sh. in Proc. Roy. Soc. Queensl. v, p. 62, 1888; loc. cit. vi, p. 63 (anatomy), 1889.

A very variable form in size and coloration. The lip is sometimes entirely black. The largest specimen before me measures, alt. 23, greater diam. 80, lesser 61 mill.; the smallest, alt. 18, greater diam. 47, lesser 37 mill.

H. MUHLFELDTIANA Pfeiffer. Pl. 2, figs. 35, 36.

Shell discoidal, smaller, duller, darker colored and more carinated than *H. cunninghami*.

Broadly umbilicate, convex above, solid, opaque, lusterless, chocolate-colored, lighter brown on the spire; sculpture as in *cunninghami* but less distinct. Whorls $5\frac{1}{2}$, a little convex, the last very broad, carinated at the periphery, compressed above and below the carina, descending about to the carina at the aperture, and flattened or excavated behind the columellar lip; aperture subhorizontal, truncate oblong, white within, the peristome not thickened, chocolate colored, scarcely expanded. Umbilicus very wide, showing all the whorls.

Alt. 19, greater diam. 58, lesser 42 mill.

Alt. 16, greater diam. 47, lesser 36 mill.

Richmond River, N. S. Wales, Australia.

H. mühlfeldtiana PFR., Proc. Zool. Soc. London, 1852, p. 156; Monographia iii, p. 157; Conchylien Cabinet, p. 393, t. 143, f. 26–28.—COX, Monogr. Austr. Land Sh., p. 53, t. 6, f. 2.—*H. rotabilis*, REEVE, Conch. Icon., f. 361.

Smaller than *H. cunninghami*, of a nearly uniform dull chocolate or chestnut-brown color. The mouth is white inside but the lip is broadly edged with dark brown. It is nearly allied to the *cunninghami*, but I have seen no intermediate specimens.

* * *

H. CANALICULATA Pfeiffer. Unfigured.

Shell orbicular-ovate, very widely umbilicate, depressed, a little convex, very thin, fragile, subhyaline, epidermis yellowish-brown, beneath yellowish-green; spire obtuse; whorls 5, convex; separated by a profound, channeled suture; obliquely very densely, deeply, undulately striate, the striæ wrinkle-like on the under surface, separated, irregular, very delicate; under a lens seen to be very densely concentrically striate; umbilicus large, dilated to the

apex; aperture ovate, whitish, a little reflexed; upper lip depressed outside. Alt. 20, diam. 47 mill. (*Guill.*)

Triton Bay, New Guinea. Very rare.

H. undulata LE GUILLOU, *Revue Zool.* 1845, p. 187 (not *H. undulata* Fér.).—*H. canaliculata* PFR., *Monographia* i, p. 199.—*H. (Pedinogyra) canaliculata* Pfr., ALBERS *Die Heliceen*, 2d ed., p. 162.—PFEIFFER, *Noment. Hel. Viv.*, p. 184.—TAPPARONE-CANEFRI, *Fauna Mal. della Nuova Guinea*, in *Ann. Mus. Civ. di Storia Naturale di Genova* xix, p. 160, 1883.

A species known only by Le Guillou's original description. It is a doubtful member of this subgenus; the description seems to indicate a shell resembling *Macrocyclus laxata*.

Subgenus XVII. AMPELITA Beck, 1837.

Ampelita BECK, *Index Moll.*, p. 30.—ALBERS, *Die Heliceen* (ed. Martens), p. 163.—PFR. *Nomentel. Hel. Viv.*, p. 184.

Plates 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 62 and 63 contain figures of *Ampelita*.

The subgenus *Ampelita* is one of the most numerous and characteristic groups of Madagascar land shells. The species may be divided into two sections: (1) AMPELITA, comprising shells of (generally) large size, depressed form, the umbilicus open, the aperture decidedly wider than high, periphery often angular or keeled, peristome expanded or reflexed, surface frequently granulate or sculptured; and (2) POECILOSTYLUS, including imperforate, globose, polished species, intensely colored, banded, the peristome very narrowly expanded, aperture as high or higher than wide.

The species are mostly known by but few examples; the extent of variation is therefore little understood, and the danger of multiplying species founded on inconstant characters correspondingly great. There are, nevertheless, a considerable number of undoubtedly well-defined specific forms, and probably many more to be discovered, as the island is still but imperfectly explored. Of the geographical distribution of the several forms, not much is known; I have given exact localities in the text when known to me.

The anatomy of *Ampelita* is unknown.

I have grouped the species by certain obvious and natural characters, around a number of characteristic types, as follows:

Group of H. sepulchralis Fér. Globose-depressed, carinated or rounded; upper lip of aperture broadly expanded and reflexed; basal lip narrower, reflexed.

Group of H. omphalodes Pfr. Depressed, often bluntly angled but not acutely keeled; peristome narrowly expanded and reflexed all around, scarcely more widely above than below.

Group of H. xystera Val. Periphery acutely keeled; peristome narrowly expanded all around, or not at all expanded above.

Group of H. lanx Fér. Shell large, depressed, usually malleated; umbilicus decussated inside; peristome narrowly reflexed below, upper margin scarcely expanded.

Group of H. duvallii Petit. Depressed; rounded or not acutely keeled; umbilicus moderate; peristome narrowly expanded all around, blunt; parietal callous heavy.

Species not grouped, including a number of diverse forms not seen by me, which do not seem to belong to any of the foregoing groups.

NOTE ON THE PHYSICAL FEATURES OF MADAGASCAR. This great island, says Wallace, is situated about 250 miles from the east coast of Africa, and extends from 12° to $25\frac{1}{2}^{\circ}$ S. lat. It is almost exactly 1000 miles long, with an extreme width of 360 and an average width of more than 260 miles. A lofty granitic plateau, from 80 to 160 miles wide, and from 3000 to 5000 feet high, occupies its central portion on which rise peaks and domes of basalt and granite to a height of nearly 9000 feet. There are also numerous extinct volcanic cones and craters (*Island Life*, p. 377).

The central elevated region is surrounded by extensive plains, lying much lower, and widest to the west and south. It is encircled by a continuous zone of dense forest, from six to fifty miles wide, and except in the northeast, about thirty miles inland. The entire island is well watered. The rivers are numerous but small. Many of those on the eastern slope cutting their way in magnificent gorges through the ramparts of the inland plateau.

Section AMPELITA s. s.

Group of H. sepulchralis Fér.

These shells have the upper part of the lip very broadly expanded and reflexed,—much broader than the basal margin. Most of the

species have a tendency toward the formation of a slightly saliant point in the middle of the upper lip, marked by a slight groove behind the revolute peristome. The following analysis of species may perhaps be of use.

(1.) Umbilicus constricted and narrowed within; upper surface of body-whorl with a spiral depression; parietal callus strong, opaque. *H. hova*, *lamarei*, *sakalava*, *watersi*.

(2.) Umbilicus wider; body-whorl not grooved above; parietal callus strong, opaque. *H. subsepulchralis*.

(3.) Umbilicus narrow; parietal callus thin. *H. stragulum*.

(4.) Umbilicus broad, open to the apex; parietal callous thin, subtranslucent. *H. sepulchralis*, *funebriis*, *atropos?*, *eurychila*, *excoriata*, *cadaverosus*.

H. SEPULCHRALIS Férussac. Pl. 3, figs. 38, 39, 40, 41, 42.

Shell widely perspectively umbilicate, broad and depressed, with a spiral depression ascending the spire on the upper surface.

Broad, subdiscoidal, solid, opaque, dark chocolate colored, lighter chestnut on the spire, and often with a light zone bounding the umbilicus. Surface shining, nearly smooth, with fine growth-striae and ill-defined fine spiral lines; under a lens seen to be very densely and minutely but obscurely granulate. Spire low, apex whitish; sutures deep. Whorls $4\frac{1}{2}$, convex, usually with a depression around the outer part; the last whorl very wide, concave and sloping above, but tumid just below the sutures, convex and slightly flattened on the base, a little descending at the aperture. Aperture very oblique, bluish inside, the outer and upper lips broadly expanded, reflexed, basal lip narrowly expanded and reflexed; terminations of the peristome approaching, connected by a thin translucent callous. Umbilicus broad, funnel-shaped, showing all the whorls to the apex.

Alt. 23, greater diam. 48, lesser 36 mill.

Alt. 20, greater diam. 39, lesser 30 mill.

Madagascar.

H. sepulchralis FER., Histoire, t. 75, f. 1; t. 75 C, f. 4, 5, 11, 12.—PFEIFFER Monographia i, p. 374 (description but not synonymy!); Conchylien Cabinet, p. 104, t. 14, f. 5, 6?—ANGAS in P. Z. S. 1877, p. 803, t. 80, f. 1, 2.—REEVE, Conch. Icon., 147a.—*H. labrella* LAM. An. s. Vert., p. 73.—CHENU, Illust. Conchyl. iii, t. 5, f. 14.

This species has a broader umbilicus than either *hova* or *lamarei*. The last whorl is obliquely waved or wrinkled in the spiral depres-

sion above, although sometimes not very obviously. The base is either unicolored, or has, as in Férussac's types, a spiral light zone around the umbilicus. It is a broader, larger species than either *hova*, *lamarei* or *subsepulchralis*, and in fact is perfectly distinct from either of these.

Typical SEPULCHRALIS is chocolate colored, with lighter brown spire, with or without a light circum-umbilical band.

A color-variety which may be called OLIVACEA is yellowish-olive or light olive-brown with darker (purple, pink or dark brown) spire, with or without a basal band (fig. 39).

Var. FUNEBRIS Martens. Pl. 3, figs. 43, 44, 45.

Broadly umbilicated, depressed, lightly striatulate and obsoletely spirally lined, blackish-brown, unicolored; spire scarcely projecting; whorls $4\frac{1}{2}$, rapidly increasing, the penultimate and last with a rather broad impressed spiral sulcus above, the last somewhat convex on the base, angulated around the funnel-shaped umbilicus, deflexed anteriorly; aperture very oblique, elliptical-oval, grayish-blue inside, margins approaching, the upper broadly reflexed, somewhat arched, the lower narrowly reflexed, arcuate, columella a little dilated above. Alt. 23, greater diam. 51, lesser $38\frac{1}{2}$ mill. Distinguished from the normal *sepulchralis* by the greater size, uniform blackish-brown color, without bands (only in places, especially on the penultimate whorl, there is a modification of the epidermis in the form of narrow grayish-white bands, similar to those of many *Cochlostylas*) and the malleated sculpture of the last whorl. (*Martens.*)

Von Marten's description is translated above. His figures, copied on pl. 3, are probably too highly colored.

H. CADAVEROSUS Pilsbry. Pl. 62, figs. 29, 30, 31.

Shell large, depressed, subdiscoidal, with a deep, funnel-shaped umbilicus; solid, opaque, dark chestnut colored, more or less covered with white or cream-colored bloom, like many *Cochlostylas*; this over-color is hydrophanous, disappearing if the shell be thoroughly wetted; it is irregularly diffused over the surface with narrow oblique streaks and spirals of more opaque creamy and of chestnut color; there is an indistinct yellowish zone around the umbilicus. Surface somewhat shining, scarcely striate, seen under a lens to be very finely, subobsoletely granulate all over, the granulation visible without a lens in the umbilical region. Spire very small and low, a trifle raised above the contour of the last whorl; apex minute, a

little sunken, light brown or yellowish ; sutures moderately impressed. Whorls $4\frac{1}{2}$, convex, rapidly widening, the last very wide, with a slight depression on the upper surface, extending upward on the penultimate whorl, but becoming obsolete toward the aperture ; periphery rounded, but the shoulder has an obtuse angle bounding the spiral depression ; the base has also a spiral depression or concavity, the surface somewhat malleated within it ; there is a projecting, very prominent but obtuse angle around the umbilicus ; the whorl descends gradually, but rather deeply in front, and the base has a slight constriction behind the baso-columellar lip. The aperture is very large, very oblique, of a livid grayish color inside and a changeable luster ; the peristome is very broadly expanded and rolled backward above, much more narrowly so below, the ends converging and connected by a bluish callus. The umbilicus is very much contracted as it penetrates, but opens rather widely.

Alt. 23 greater diam. 57, lesser 42 mill. ; aperture 34 mill. wide, measured outside of peristome.

Madagascar.

This is a larger species than *H. sepulchralis*, with the hydrophanous creamy markings much more prominent, the last whorl and aperture decidedly larger, the ridge around the umbilicus very much more prominent. The umbilicus is very much contracted within, and the surface is much more obviously granulated, especially within the umbilicus. Although larger, this shell has a half whorl less than *sepulchralis*. The spirally impressed base and top give a decidedly sunken and cadaverous appearance to the shell.

H. ATROPOS Férussac. Pl. 5, fig. 77 ; pl. 63, fig. 44.

Shell umbilicate, depressed, transversely dilated or oblong in circumference, rather solid, irregularly striate, chestnut colored with three white bands, one near the suture, two wider basal ones ; spire slightly convex, obtuse ; whorls 5, moderately increasing, the last compressed-rounded, deflexed in front, subcompressed around the chestnut colored umbilicus, somewhat constricted in front. Aperture very oblique, ovate-oblong ; peristome narrowly reflexed all around, its terminations approaching, joined by a thin callus. (*Pfr.*)

Alt. 18, greater diameter 39, lesser 32 mill.

Around bay of Diego Suarez, Madagascar.

H. atropos Fér., DESH. in FERUSSAC, Histoire, t. 69 H, f. 13, 14, p. 56.—PFR. Monographia iii, p. 239 ; iv, p. 288.—REEVE, Conch. Icon., f. 1347.

In the coloration of chestnut bands on a light ground, and the dark umbilicus, it is like *H. subsepulchralis*, but the form is more depressed and the parietal callus light, not strong and opaque as in that species. Pfeiffer mentions a variety in which the chestnut bands are much narrower.

H. EURYCHILA Crosse & Fischer.

Shell broadly and subperspectively umbilicated, depressed, sublenticular, rather thin, but somewhat solid, transversely obliquely rugate-striate, very delicately granulate-roughened, scarcely shining, brownish under a papery epidermis, blackish-brown, partly dull whitish, darker at the external margin; spire nearly plane, apex scarcely prominent; suture profoundly impressed; whorls $4\frac{1}{2}$, rather rapidly widening, the embryonic $1\frac{1}{2}$ plane, slightly shining, brown, the following a trifle convex, a little above the middle deflexed, sub-concave; the last whorl rapidly descending, then a little ascending, obtusely subangular above the middle, the angle becoming evanescent, base subplanate; umbilical area deep chestnut-brown, encircled by a rather prominent whitish narrow zone. Aperture large, very oblique, almost horizontal, elongate-lunate, livid-brown, paler inside; peristome very broadly reflexed, dull white, livid brown inside, the margins converging, joined by a very thin hyaline callous, columellar margin very short, partly covering the umbilicus, middle slightly gibbous, and slightly subdentate, outer margin very broad, subdentate in the middle and a little scrobiculate outside. (C. & F.)

Alt. 23, greater diam. 64, lesser 48 mill.

Madagascar.

H. (Ampelita) eurychila C. & F., Journ. de Conchyl. 1882, p. 324.

Variety *b.* smaller, paler, dull brownish-white under a fulvous epidermis; aperture dull brownish-white inside. Alt. 21, greater diam. 60, lesser 46 mill.

An unfigured species allied to *H. sepulchralis*, *Sganziniana funebris* and *watersi*, but larger, scarcely shining, and said to be readily distinguishable.

H. SGANZINIANA Crosse and Fischer.

Shell broadly and perspectively umbilicated, depressed, sublenticular, rather thin but solid, with distant suboblique striæ, very delicately granulose-roughened, pale olive-brown, darker at external margin; spire almost completely plane, apex scarcely projecting;

suture profoundly impressed, subcanaliculate; whorls $4\frac{1}{2}$, moderately rapidly widening, the embryonic $1\frac{1}{2}$ yellowish-white, plane, the following deflexed a little above the middle, subexcavated, the last whorl at first descending then ascending, obtusely angulated above the middle; base subplanate; umbilical area granulate-striate, deep chestnut-brown, bounded by a narrow whitish, brown-edged zone. Aperture almost horizontal, large, bluish-white within; peristome very broadly reflexed, bluish-white, margins joined by a very thin subhyaline callus; columellar margin very short, narrower, outer margin very wide. (C. & F.)

Alt. 17, greater diam. 44, lesser 33 mill.

Madagascar.

H. sganziniana C. and F., Journ. de Conchyl. 1876, p. 167.—
PFR. Monogr. vii, p. 593.

Intermediate between *H. lanx* and *H. sepulchralis*; the last whorl is deflexed and then rises again; spire planate; suture profound; aperture broad. *H. stragulum* and *H. subsepulchralis* are also closely allied. (C. & F.)

H. EXCORIATA Martens.

Shell umbilicated, depressed, radiately obliquely striatulate and lightly granulose, of a bay color variegated with whitish decorticated fascioles; spire almost plane; whorls $4\frac{1}{2}$, rapidly increasing, suture rather deep, last whorl flatly rotund, at the aperture at first descending and then ascending again; umbilicus rather broad, funnel-shaped, perspective; aperture very oblique, transverse-oblong, peristome reflexed, bluish-gray, margins converging, the outer much dilated, basal nearly straight, subcalloused. (Mart.)

Alt. 23, greater diam. 60, lesser 45 mill.; aperture, diam. 39, oblique alt. 27 mill.

South Betsileo, Madagascar.

H. excoriata MART. Jahrb. d. Deutsch. Mal. Ges. 1883, p. 82.

Evidently a member of the *sepulchralis* group. It has not been figured.

H. SUBSEPULCHRALIS Crosse. Pl. 3, figs. 46, 47; pl. 62, figs. 36, 37.

Shell broadly umbilicate, turbinate-depressed, solid, nearly smooth, or marked by very slight unequal oblique striae. Color white, with spiral zones of blackish-brown, under a very thin, rather evanescent fawn-yellow cuticle. Spire short. Suture impressed. Whorls of the spire moderately convex, very rapidly increasing; the last whorl

descending, rounded, flattened or subcompressed on the base, ornamented with three deep blackish-brown spiral zones, the upper and smallest one above, the second a little below the periphery, the third occupying the entire umbilicus, which is large and shows all the whorls of the spire. There is a fourth narrow subsutural band. Aperture very oblique, oval-elliptical, whitish inside, but two of the zones of the outside show through. Peristome broadly reflexed, edged with brown at the terminations of the zones. Lips united by a deposit of callus. (*Crosse.*)

Alt. 23, greater diam. $40\frac{1}{2}$, lesser 32 mill.; length of aperture (inclusive of peristome) 26, breadth $19\frac{1}{2}$ mill.

Madagascar.

H. subsepulchralis CROSSE, Journ. de Conchyl. 1868, p. 174; *l. c.* 1869, p. 391, t. 12, f. 3, and variety, f. 3a.—PFR. Monographia, vii, p. 436.—ANGAS, P. Z. S. 1877, p. 803, t. 80, f. 3.—*H. sepulchralis* (in part) REEVE, Conch. Icon., f. 147b.

Distinguished from *H. hova* Angas by its more turbinate form and broader umbilicus, as well as by the positions of the color bands. From *H. sepulchralis* by the more solid shell, elevated spire, number of whorls, the last lacking a spiral depression on the upper surface, and by the thick parietal coat of enamel. Another strongly marked character is that the bands of the outer surface color the lip; this is not the case in *H. hova*. The callus connecting the ends of the peristome is white and opaque, not transparent, as in *H. sepulchralis*.

Variety β . (figure 47). A little larger, the colors deep, with three broad zones.

Alt. 25, greater diam. $43\frac{1}{2}$, lesser 34 mill.; length of aperture 29, breadth 26 mill.

H. STRAGULUM Crosse and Fischer.

Shell narrowly umbilicated, much depressed, rather thin, with very delicate impressed incremental lines and minutely granose under a lens; chestnut-brown, spotted sparsely with buff maculations; spire nearly plane, apex obtuse; suture impressed; whorls 4, plane, rapidly increasing, the upper $2\frac{1}{2}$ violet-brown, the last margined at the suture with yellow, large, subdepressed above, angulate-carinated a little above the periphery; base convex, inflated, subangular around the umbilicus; umbilical area deep chestnut, bounded by a pale buff zone; aperture large, very oblique, elliptical-oval, bluish-white inside; peristome broadly reflexed, bluish-white, margins

joined by a thin callus, dilated on the outer lip and toward the insertion. (C. & F.)

Alt. 16, greater diam. 36, lesser 26 mill.

Variety. Olivaceous, obscurely and sparsely spotted with yellowish; umbilical area chestnut, bounded by a buff zone. Alt. 16, greater diam. 32, lesser 24 mill.

Madagascar.

H. stragulum C. & F., Journ. de Conchyl. xxi, 1873, p. 158.—PFR. Monographia vii, p. 453.

Allied, say Crosse and Fisher, to *H. sepulchralis* Fér., but distinguished by the nearly plane spire, the shell minutely granose, last whorl angulate-carinate above the periphery, base much inflated, and the narrow umbilicus.

H. HOVA Angas. Pl. 4, figs. 48, 49, 50, 51, 52.

Shell umbilicate, depressed, yellow with three conspicuous bands of dark brown, or sometimes bandless.

Depressed, the spire convex; solid, opaque, straw-yellow with dark brown bands at the suture, just above the periphery and on the middle of the base. Surface somewhat shining, smooth, with slight growth-striæ, and obscure spiral lines. Spire low conoidal; suture impressed. Whorls $4\frac{1}{2}$, the inner convex, the last large, with a depression or flattening around its upper face, descending anteriorly, and with a spiral furrow within the umbilicus. Aperture very oblique, white or bluish-white inside; peristome broadly expanded, and flaring above; the basal margin narrower, ends connected by an opaque white callus. Umbilicus rapidly narrowing to a small deep perforation, umbilical region light colored.

Alt. 23, greater diam. 38, lesser 28 mill.

Alt. 18, greater diam. 27, lesser 21 mill.

Madagascar.

H. hova ANGAS, Proc. Zool. Soc. Lond. 1877, p. 804, t. 88, f. 4, 5.—*H. sepulchralis* (in part) FERUSSAC, Histoire, t. 75 C, f. 1-3, 8-10.—REEVE, Conch. Icon., f. 147c.—PFEIFFER, Conchylien Cabinet, t. 15, f. 1, 2.—? *H. trivittata* Born (where?) vide VILLA, Disp. Syst. Conch. Terr. et Fluv. Coll. Villa, p. 15.

This species is separated from *H. lamarei* and *H. sakalava* by the different color-pattern and more widely perforated umbilicus; from *H. sepulchralis* by its smaller size, banded coloration, and very much more contracted umbilicus, as well as its strong parietal

callus; *H. hova* differs from *H. subsepulchralis* in the different distribution of the color-zones and in having a narrower umbilicus.

Several specimens before me have no dark spiral zones, being unicolored yellow or russet. The bands are present, but of a faint chestnut tint in some others.

I have figured on Pl. 64, figs. 64, 65, a color-variety of this species. It is chocolate-brown above, uniform in color except for irregular, radiating, creamy, hydrophanous, ragged-edged patches, and a narrow, indistinct trace of a spiral band. The basal brown zone is very wide. The specimen figured is from the museum of the Wagner Free Institute of Science, Philadelphia.

H. LAMAREI Menke. Pl. 5, figs. 65, 66, 67.

Shell rimate-perforate, depressed, conspicuously excavated above, unicolored greenish-yellow or banded with chestnut, or chocolate; when dark, freckled with whitish.

Depressed; low convex above, the last whorl convex just below the suture and then deeply concave, angulated or carinated above the middle, very convex and inflated below the angle; solid; color (typically) brownish- or greenish-yellow; surface shining, nearly smooth, obscurely granular under a lens. Spire low; whorls 4 to 4½, the last descending somewhat anteriorly, compressed around the base, and obtusely angular around the umbilicus. Aperture very oblique, rounded-lunar; upper and outer margins of peristome very broadly expanded and reflexed, baso-columellar margin very narrowly reflexed; terminations joined by an opaque white callus. Umbilicus a crescentic rimation ending in a minute perforation.

Alt. 16, greater diam. 34, lesser 26 mill.

Madagascar.

H. lamarei MKE. *mss.* in PFEIFFER, *Symbolæ* iii, p. 79; *Monographia* i, p. 392; *Conchylien Cabinet*, p. 272, t. 123, f. 22–24.—*H. sakalava* ANGAS, *Proc. Zool. Soc. London*, 1877, p. 804, t. 80, f. 6–11.—*H. sepulchralis* (in part) FER., *Histoire*, t. 75C, f. 6, 7.—*Ampelita lamarei* Mke. MOUSSON, *Journ. de Conchyl.* 1882, p. 39.

The typical *H. lamarei* has a thin greenish-yellow epidermis; the last whorl is rather acutely keeled; the umbilicus is a curved rimation ending in a perforation or entirely closed. In this character it differs wholly from unicolored yellow or brown specimens of *H. hova*, as that species has a narrow but decidedly funnel-shaped umbilicus.

Var. *SAKALAVA* Angas. Pl. 5, figs. 68, 69, 70, 71; pl. 63, fig. 45.

Entire surface chestnut or chocolate brown, freckled and zigzag-streaked with opaque yellowish; a light yellow zone on the angle surrounding the umbilicus, within which is a dark band; inside of the umbilicus light yellow.

Alt. 18, greater diam. 37, lesser 28 mill.

A color-variety having freckled brown zones on a pale green ground is figured on pl. 63, fig. 45.

H. WATERSI Angas. Pl. 5, figs. 72, 73.

Shell with a small, compressed umbilicus, discoidal, rather solid, obliquely closely striated with irregular somewhat undulating erect striæ, which are crossed by numerous concentric lines, exhibiting here and there a minutely reticulated appearance at the points of crossing; light purplish-brown, becoming darker behind the lip, partially covered with a pale straw-colored epidermis; spire depressed, whorls 4, rapidly increasing, somewhat convex, the last very wide, swollen, bluntly keeled, with a slight depression above the keel; aperture nearly horizontal, transversely lunately ovate, margined within with a broad band of purplish-black, interior pale lilac; peristome thickened, expanded and reflected, edged with white; margins approximating and joined by a callus. (*Angas.*)

Alt. 18, greater diam. 41, lesser 32 mill.

Ekongo, S. E. Coast of Madagascar.

H. watersi ANGAS, Proc. Zool. Soc. Lond. 1877, p. 527, t. 54, f. 3.

Distinguished from *H. sepulchralis* and its allies by its elaborate sculpture and by the expanded form of the aperture.

Group of H. omphalodes Pfr.

The form is depressed but not lenticular; bluntly carinated at times, but never acutely or conspicuously so, as it is in the closely allied group following. The peristome is narrowly reflexed all around, but a little more broadly above. The species are mostly banded; the umbilicus is moderately wide, circumscribed by a blunt angle.

(1.) Basal lip of the aperture nearly straight, the columellar lip short, narrowly expanded, forming a blunt angle where it joins the basal margin. *H. omphalodes, loucoubeensis, calypso, basizona, consanguinea, guillani.*

(2.) Basal lip arcuate, passing gradually into the columellar margin, not angled at their junction. *H. chlorozona*, *vesconis*, *robillardii*, *madagascariensis*.

H. OMPHALODES Pfeiffer. Pl. 4, figs. 58, 59, 60.

Shell broadly umbilicate, depressed, rather solid, finely striate, white under a light, deciduous yellow epidermis, with a reddish-brown girdle at the periphery and at the umbilicus. Spire very little elevated, with small obtuse apex; whorls 5, nearly flat, the last obtusely carinated, scarcely perceptibly descending in front, beneath somewhat more convex, indistinctly granulated by fine spiral-lines, somewhat compressed around the broad umbilicus, which is dark brown inside. Aperture very oblique, lunate-oval, white inside. Peristome narrowly reflexed, brownish, with converging margins. (*Pfr.*) Alt. 16, diam. 41 mill.

Madagascar.

H. omphalodes PFR., Proc. Zool. Soc. Lond., 1845, p. 64; Monographia i, p. 374; Conchylien Cabinet, p. 56, t. 75, f. 9-11.—PHILIPPI, Abbild. u. Beschreib. ii, p. 183, Helix t. 9, f. 1.—MOUSSON Journal de Conch. 1882, p. 40.—CROSSE (with var. *loucoubeensis*) Journ. de Conchyl. 1881, p. 195.

The more prominent characters are the thin but strong shell, with yellowish, rather deciduous epidermis, and the base finely granulated by close spiral lines.

The figures of Philippi and of Pfeiffer agree in representing the form described above.

Mousson says of the specimens of this species examined by him: They are a little more flattened than the figures, and have the peripheral angle a little more marked; they do not have the narrow dark line at the circumference. The other characters,—yellowish color, brown umbilicus, subsutural dark line and fine sculpture of the base are present. This species is closely allied to *H. calypso* Pfr., but that form is smaller, more compact, without sculpture, and having broad bands at periphery and suture, which fade into the ground-color at their edges.

Var. LOUCOUBEENSIS Crosse. Pl. 62, fig. 38.

Shell broadly and perspectivevely umbilicated, umbilicus about $\frac{1}{2}$ the diameter of the shell; rather thin, brown or nearly black, unicolored, opaque, the base shining; spire depressed-convex; apex plane; whorls 5, nearly plane, separated by slightly impressed

suture, striatulate and with indistinct spiral lines; last whorl somewhat distinctly carinated, a little descending in front, slightly more convex beneath, subangulated around the umbilicus and distinctly striated; slightly compressed at the aperture, not constricted. Aperture very oblique, transversely oval, a little excised; throat livid; peristome narrowly reflexed, brown, margins converging, the columella sub-retracted. Alt. $17\frac{1}{2}$ - $21\frac{1}{2}$, diam. 37-40 mill.; aperture, alt. $15\frac{1}{2}$ -16, breadth $18\frac{1}{2}$ - $19\frac{1}{2}$ mill. (*Boettger*.)

Forest of Loucoubé, Island of Nossi-Bé.

H. omphalodes var. *Loucoubensis* CROSSE, Journ de Conchyl. 1881, p. 195.—*H. omphalodes* PFR., REEVE, Conch. Icon., f. 184.—*Ampelita lucubeensis* CROSSE, BOETTGER, Nachrichtsbl d. Deutsch. Mal. Ges. 1889, p. 46.

I do not regard it as impossible for this to be a unicolor variety of *H. omphalodes*; the var. *intensor* of *H. calypso* is a parallel case. It is, however, restricted to the Island of Nossi-Bé, while the typical form inhabits Madagascar proper. I have taken Reeve's figure of *H. omphalodes* to represent Mr. Crosse's variety.

H. CALYPSO Pfeiffer. Pl. 2, fig. 37.

Shell umbilicate, depressed, rather solid, closely striate, tawny, with a rufous band at the suture; spire little elevated, obtuse; whorls 4, a little convex, regularly increasing, the last not descending in front; periphery subcarinated; below more polished, reddish-yellow, subangular around the funnel-shaped umbilicus, which is brown inside. Aperture very oblique, irregularly oval, whitish-pearly inside; peristome pale lilac, the margins converging, upper flexuous, expanded and a little reflexed, basal narrowly reflexed, columellar margin ascending nearly vertically. (*Pfr.*)

Alt. $14\frac{1}{2}$, greater diam. 36, lesser 29 mill.

Madagascar.

H. calypso PFR., Proc. Zool. Soc. London, 1861, p. 386, t. 37, f. 8; Monographia v, p. 403.

Var. *INTENSOR* Pilsbry. Pl. 4, figs. 61, 62, 63.

I refer to Pfeiffer's species, as a variety, the shells figured on my plate, fig. 63 representing the type. It is compact, solid, strong, opaque, of a deep chestnut or chocolate color all over, but lighter, tawny, on the inner whorls. The surface is slightly shining, with irregular wrinkles of increment, and under a lens a few minute, scattered granules may be seen; beneath it is more polished, with

slight indications of spiral lines. The spire is convex; low, very obtuse, apex planorboid, light brown; suture evenly but slightly impressed. Whorls 4, rapidly widening, a trifle convex, the last very obtusely angular at periphery, a little descending in front, the base with a rather flattened aspect. Aperture very oblique; bluish and shiny inside; peristome narrowly expanded all around, bluish, edged with brown, the upper lip moderately arched, basal lip straight, columella short, making nearly a right angle with the basal lip; parietal wall covered by a very thin transparent wash of callus. Umbilicus moderate, deeply penetrating, funnel-shaped.

Alt. 16, greater diam. 31, lesser 26 mill.

Other specimens are a little more elevated, and of a straw yellow, with a narrow deep chestnut sutural band, another wider one at and above the periphery, the umbilicus also dark inside (see figs. 61, 62 of pl. 4). The dark zones are not so sharply defined as shown in the figure, but fade into the ground-color at the edges.

H. BASIZONA Mousson. Pl. 9, figs. 22, 23.

Shell moderately umbilicated, depressed, obtusely conical, solid, irregularly striated, somewhat shining, deep brown. Spire depressed conical, regular; summit very obtuse, denuded, gray; suture moderately distinct. Whorls 5, moderately widening, the earlier nearly plane, the following somewhat convex, the last scarcely descending, obtusely angulated, less convex beneath, narrowly rounding at the perforating umbilicus, with a broad yellow zone in the middle of the base, umbilicus dark. Aperture oblique (45 degrees with the axis), obtusely triangular, violet-gray inside; peristome narrowly expanded and reflexed, whitish, the margins much converging, joined by a transparent, thin callus; upper margin curved, basal nearly straight, suddenly ascending at the columella, not invading the umbilicus. (*Mouss.*)

Alt. 22, greater diam. 35, lesser 31 mill.

Madagascar.

Ampelita basizona MOUSSON, Journ. de Conchyl. 1882, p. 41.

This is a form closely allied to *H. calypso* Pfr. The surface is dark all over except on the base, which has a broad zone of straw-yellow; the earlier whorls lose their epidermis, becoming whitish. The single specimen before me is smaller than Mousson's types, and has nearly the entire base occupied by the broad yellow zone.

H. CONSANGUINEA Férussac. Pl. 6, figs. 81, 82.

Shell orbiculate-depressed, smooth, brownish-white, two-zoned with brown above; whorls 5, slightly convex, closely coiled, the last whorl umbilicate; umbilicus blackish-brown inside; aperture oblique, transverse-ovate; lip reflexed, pale reddish-brown.

Alt. 15, diam, 28 mill. (*Desh.*)

The shell is orbicular-depressed, 5-whorled. Spire subconoid, obtuse at summit. Earlier whorls whitish, little convex, closely joining; it seems that the young are carinated or angular. The suture is superficial on the earlier whorls, impressed on the last two whorls. The last whorl is regularly convex at the circumference, cylindrical, a little depressed below, perforated by a funnel-shaped umbilicus bounded by an obtuse angle. The greater diameter of the umbilicus is a trifle more than a third that of the last whorl. The shell is smooth, with slightly growth lines. Aperture oval-transverse, wider than high; it is deflexed, the upper lip inflexed below the periphery, the lower lip prolonged a little above the umbilicus. The extremities of the lip are separated by a little less than half the circumference of the penultimate whorl. The plane of the aperture is inclined about 30 degrees to the vertical axis. Right margin quite thick, strongly reflexed at the base, a little reflexed above; the edge is chestnut brown, more or less dark in different individuals. The coloration seems to be pretty uniform; on a brownish or reddish-black ground there are two deep brown zones above, very distinct, equal; the first at the suture, the second above the circumference. Umbilicus brown inside, bounded by a white zone. (*Desh.*)

Near Bay of Diego-Suarez, Madagascar.

H. consanguinea Fér., *DESH.* in *FER.*, *Histoire*, t. 69H, f. 1, 2.—*PFR.* *Monogr.* iii, p. 239.—? *H. zonalis* *REEVE*, f. 94, not of Férussac.

The "*zonalis*" of Reeve is the same as a shell figured by Pfeiffer in the *Conchylien Cabinet*, pl. 149, figs. 8, 9, and described on p. 424 of the same work, under the name of "*H. consanguinea* Fér." I do not know what these figures really represent. They may belong to a distinct and undescribed species, or to a variety of the present form, which, for want of a name may be called var. *SUBCONSANGUINEA*. Pfeiffer's figures are copied on my pl. 63, figs. 46, 47.

H. GUILLAINI Petit. Pl. 4, fig. 64.

Shell suborbicular, solid, glabrous, depressed, olivaceous-yellow, narrowly umbilicated; umbilicus subangulate; whorls 4, plane, the

last somewhat convex beneath, carinated, the carina obtuse; aperture irregular, quadrangular; columella sub-calloused; peristome violet-white; lip reflexed. Diam. 30 mill. (*Petit.*)

Island of St. Marie, near Madagascar.

H. guillaini PETIT DE LA SAUSSAYE, Journ. de Conchyl. 1850, p. 169, t. 7, f. 3.—PFR. Monographia Hel. Viv. iii, p. 352.—(Not *H. guillaini* Pet., PFEIFFER, Monogr. iv, p. 302,=*cazenavetti* F. & B.)

Very imperfectly described.

H. CHLOROZONA Grateloup. Pl. 4, figs. 56, 57.

Shell umbilicated, conoid-semiglobose, rather solid, obliquely striate, a little shining, reddish-chestnut colored with three buff or white zones; spire conoidal, obtuse; suture bordered by a broad white band; whorls nearly 5, almost plane, the last obtusely angular, not descending in front; base convex; umbilicus funnel-shaped, pervious; aperture oblique, truncate-oval; peristome simple, narrowly expanded, the margins somewhat converging, columellar margin much dilated above. (*Pfr.*)

Alt. 17, greater diam. 31, lesser 26 mill.

Madagascar.

H. chlorozona GRAT., in Actes Soc. Linn. Bord. xi, p. 409, t. 1, f. 4.—PFR. Monogr. i, p. 331; iii, p. 225; iv, p. 263; Conchyl. Cab., p. 421, t. 148, f. 21, 22.—REEVE, Conch. Icon., f. 563.

H. VESCONIS Morelet. Pl. 4, figs. 53, 54, 55.

Shell umbilicate, orbicular-convex, solid, obliquely striate, reddish-chestnut, little shining, encircled by 3 whitish zones, one at the suture, the other median, the third around the umbilical region; umbilicus moderate, pervious; whorls 5, regularly increasing, the last more striate; base convex, descending in front; aperture oblique, oval, concolored within; peristome slightly thickened, margins subconverging, the upper nearly straight, columellar more arcuate, narrowly reflexed. (*Mor.*)

Alt. 20, greater diam. 30, lesser 25½ mill.

Port Léven, Madagascar at the foot of trees.

H. vesconis Morlt. Rev. Zool., p. 218, 1851; Séries Conchyl. ii, p. 49, t. 4, f. 5.—PFEIFFER, Monographia iii, p. 225.

Less globose than *H. chlorozona*, more inflated transversely, producing a broader aperture; umbilicus narrower; peristome more reflexed; last whorl with stronger striæ above. The two forms are nevertheless very closely allied, perhaps not separable specifically.

H. MADAGASCARIENSIS Lamarck. Pl. 8, figs. 15, 16.

Shell umbilicate, conoid-depressed, rather thin, striatulate, pallid, ornamented with two blackish-brown bands, the upper one wider, the other narrower, at the periphery; spire a little conoid; apex obtuse; whorls 4, a little convex, the last subdepressed, dilated and somewhat descending in front; base convex, suddenly passing into the funnel-shaped, narrow, scarcely pervious umbilicus. Aperture very oblique, oval; peristome somewhat thickened, narrowly expanded, the margins converging, basal narrowly reflexed, arcuately ascending at the umbilicus. (*Pfr.*) Alt. 14, greater diam. 29, lesser 23 mill.

Madagascar.

H. madagascariensis Lam., DESH. in LAMARCK, Anim. s. Vert., 2d ed. viii, p. 44.—PFR., Monographia i, p. 375.—REEVE, Conch. Icon., f. 1014.—*H. madecassina* FER. Histoire, t. 73A, f. 2.

An extremely rare species not seen by me, and probably allied to *H. robillardi* Angas.

H. ROBILLARDI Angas. Pl. 7, figs. 3, 4, 5.

Shell umbilicate, globose-depressed, rather solid, striate, white under a pale horn-colored deciduous epidermis, and ornamented with 3 narrow brown bands (one sutural, two around the periphery); spire convex, obtuse; whorls 5, somewhat convex, slowly widening, the last rather depressed-rounded, strongly and shortly deflexed in front, subcompressed around the funnel-shaped umbilicus. Aperture very oblique, ovate-oblong; peristome narrowly reflexed all around, somewhat thickened, its ends converging, connected by thin callus, the right margin arched, columellar margin dilated, impinging on the umbilicus. (*Dohrn.*)

Alt. 18, greater diam. 32, lesser 27 mill.; width of aperture, 17 mill.

Southwest Madagascar.

H. robillardi ANGAS, Proc. Zool. Soc. London, 1876, p. 489, t. 47, f. 6, 7.—DOHRN, continuation of Conchylien Cab., p. 596, t. 174, f. 14-16.

The brown bands sometimes disappear on the last whorl. The more prominent characters are the coloration, rounded or arcuate basal lip, and the narrow umbilicus impinged upon by the columellar lip.

Group of *H. xystera* Val.

The periphery is very acutely keeled; the peristome narrowly expanded or not expanded above, narrowly reflexed beneath. I have not seen sufficient material to properly analyze this group of species, some of which are narrowly, some widely umbilicated.

H. NOVACULA Martens. Pl. 6. figs. 75, 76, 77.

Shell broadly umbilicated, carinate, lens-shaped, somewhat striate, unicolored, brownish-black; spire planate; suture superficial; whorls scarcely 5, rapidly widening, the first very small and a little sunken, the following acutely keeled, the last whorl about equally convex above and below, only moderately convex, not descending in front, the keel becoming more obtuse toward the aperture; the base obtusely angular around the very wide umbilicus. Aperture very oblique, ear-shaped, leaden bluish within; peristome narrowly expanded, the upper margin curving a little forward in the middle, not expanded, the basal margin slightly arcuate, forming an angle with the short, obliquely ascending columellar margin. The aperture has two blunt angles; one at the periphery, the other at the base of columellar. (*Martens.*)

Alt. 16, greater diam. 45, lesser 35 mill.; aperture, width $21\frac{1}{2}$, oblique alt. 17 mill.

Madagascar.

H. novaacula Mts. Novitates Conch. v, p. 181, t. 152, f. 4-6.—“*H. lanx* var.” Férussac, Histoire, t. 62A, f. 8, 9, 10.

Of this species I have seen but one example. It is irregularly malleated on the last two whorls above, and the base has numerous spiral striæ about as coarse as the wrinkles of increment. Under a lens close microscopic spiral striæ became visible, both above and below. They are very superficial and rather unevenly developed. I refer to *novacula* the figures 83, 84, 85, of pl. 6 copied from Férussac.

H. XYSTERA Valenciennes. Pl. 11, figs. 36, 37, 38.

Shell umbilicate, orbicular, depressed, very acutely carinated, thin, diaphanous, olive-brown; suture not at all impressed; whorls 4, plane, the last convex beneath, subangular around the funnel-shaped umbilicus; aperture very oblique, depressed, irregular; per-

istome reflexed, the upper margin dilated, columellar margin short, forming an obtuse angle with the base.

Alt. $14\frac{1}{2}$, greater diam. 38, lesser 32 mill. (*Pfr.*)

Madagascar.

H. xystera VAL. in Paris Museum.—PFEIFFER, *Symbolæ* i, p. 41; *Monographia* i, p. 392; *Conchyl. Cab.*, p. 343, t. 61, f. 4-6.—REEVE, *Conch. Icon.*, f. 185.—FER., *Hist.*, t. 62A, f. 5-7.—*H. lanx* Desh. *olim.*

H. SHAVI E. A. Smith. Pl. 2, figs. 32, 33, 34.

Shell thinnish with a funnel-like umbilicus, orbicular, very flat above, very acutely keeled, sculptured with oblique subflexuous lines of growth and most minute spiral striæ, and exhibiting, especially on the upper surface an irregular fine granulation. Epidermis yellowish-olivaceous, thin. Spire very slightly raised, with the apex sunk below the penultimate whorl. Volutions 4, the 3 first feebly convex, the last very sharply carinated above the middle, visibly concave on each side of the keel, with a brown line at the suture and with or without a stripe of the same color upon the carina. Beneath it is only a little convex, and forms with the umbilicus which is stained with violet-brown a decided angulation. Toward the aperture it suddenly descends from the carina about $3\frac{1}{2}$ millimeters. Aperture transverse, horizontal, white exhibiting the sutural brown band and that at the periphery, when present. Peristome more or less stained with violet-brown, everywhere reflexed, the extremities much converging, upper margin oblique, straitish, lower regularly curved, forming an angle at the outer extremity. Columella slopingly arcuate, violet-brown.

Alt. 12, greater diam. 27, lesser 22 mill. (*Smith.*)

Tanala Province, Madagascar.

H. (Ampelita) Shavi SMITH, *Journ. of Conch.* ii, 1879, p. 339; *P. Z. S.* 1882, p. 382, t. 22, f. 1-3.

This species has the general *facies* of *H. xystera* or *H. cazenavetti*. The former is a larger species, more widely umbilicated, with a non-descending last whorl and a malleated upper surface; the latter also possessing the two last-mentioned characteristics, is more narrowly umbilicated, more solid, and in fact appears to differ but very slightly from *H. lancula*. (*Smith.*)

Specimens subsequently received by Mr. Smith are larger, greater diam. 35, lesser 28 mill.; all retain the character of the last whorl

descending in front, and have the labrum more or less (sometimes entirely) violet-brown.

H. STUMPFII Kobelt. Pl. 62, figs. 39, 40.

Shell not very widely but deeply umbilicate, lenticular, acutely keeled, thin but strong, with very fine lines of increment and still finer, close spiral lines, making the surface finely granulate, yellowish-green, whitish toward the suture, the apex lilac, encircled by two narrow intense chestnut-brown bands, one midway between suture and keel, and ascending the spire, the other is a little distance below the keel. The 4 whorls increase rapidly, and are scarcely convex; the upper whorls are a little impressed above the level suture; the last one is acutely keeled, and compressed both above and below the keel, which appears as an acute angle. The whorl does not descend in front, is unevenly swollen below, and is compressed into a blunt crest around the narrow, funnel-shaped, but perforating umbilicus. The aperture is irregularly rhombic, very oblique, rosy inside and showing the bands of the outer surface. The peristome is thickened, beautifully rosy; its terminations are not converging, not joined by a callus; the upper margin is expanded, concave above the carina, the basal margin is rounded, reflexed, the columellar margin shortly ascending, partly covering the umbilicus, but very little expanded. (*Kobelt.*)

Alt. 15, greater diam. 26, lesser 22 mill.; aperture 13 mill. long, $11\frac{1}{2}$ broad.

Forest of Loucoubé Island of Nossi-bé, off Madagascar.

H. stumpffii KOB. Nachrichtsbl. d. Deutsch. Mal. Gesellschaft, 1880, p. 31; Jahrbücher d. Deutsch. Mal. Ges. 1880, p. 332, t. 7, f. 3, 4.—CROSSE, Journ. de Conchyl. 1881, p. 196.

Closely allied to *H. cazenavetti*, but differs in the thinner, more shining shell, the flatter form, and the dark, contrasting, brown bands.

H. CAZENAVETTI Fischer & Bernardi. Pl. 63, figs. 48, 49.

Shell orbicular-depressed, rather solid, perforate, concentrically very minutely striate, with oblique, obsolete submalleated lines, shining, yellow; whorls $3\frac{1}{2}$, rapidly increasing, plane; suture scarcely impressed, tinged with violet; last whorl very large, carinated, very convex beneath; umbilicus violet-tinted; aperture triangular, angulate; peristome white, reflexed, not descending, violet at the

umbilicus; columella [parietal wall] scarcely calloused, violet colored. (*F. & B.*) Alt. 14, greater diam. 26, lesser 22 mill.

Madagascar?

H. cazenavetti F. & B., Journal de Conchyl. vi, p. 280, t. 10, f. 1-2, 1857.—*H. guillaini* PFR., Monographia iv, p. 302 (not *H. guillaini* Petit).—*H. cazenavetti* F. & B., PFEIFFER, Monogr. v, p. 402.

H. FULGURATA Sowerby. Pl. 8, figs. 12, 13, 14.

Shell umbilicate, depressed, acutely carinated, regularly decussated by close longitudinal and transverse lines, shining, whitish, elegantly marked with zigzag reddish lines; spire nearly flat; whorls 4, plane, the last ornamented with a single concentric red band; base inflated, angulated around the narrow funnel-shaped umbilicus; aperture subtriangular, shining inside, livid; peristome chestnut colored, the margins joined by a chestnut callus diffused inwardly on the parietal wall; upper margin subexpanded, basal reflexed, forming an obtuse angle with the short oblique columellar lip. (*Pfr.*) Alt. 14½, greater diam. 37, lesser 30 mill.

Madagascar.

H. fulgurata SOWB. in Malacol. and Conchol. Mag. i p. 47c, plate.—PFR. Symbolæ iii, p. 79; Monographia i, p. 393; Conchyl. Cab., p. 239, t. 112, f. 20-22.—REEVE, Conch. Icon., f. 1446.—CROSSE & FISCHER, Journal de Conchyliologie, 1873, p. 117.

An excessively rare species in collections, the habitat of which, formerly unknown, was discovered by Mr. Lantz, Director of the Museum of Natural History of Réunion, to be Madagascar.

H. LANCULA Férussac. Pl. 7, figs, 98, 9, 100.

Umbilicate, orbicular, depressed, obliquely striate decussated by very close concentric lines seen under a lens, shining olive-brown, carinate, the carina obsolete anteriorly; spire little raised, pale; whorls 4, plane, the last flattened around the base, angulated around the moderate non-pervious umbilicus; aperture very oblique, transversely lunate elliptical; peristome subthickened, narrowly reflexed, bluish-brown; margins joined by a dark purple callus, diffused inwardly, right margin dilated, depressed, basal margin straightened, forming a very obtuse angle at its junction with the columellar lip. (*Pfr.*) Alt. 14, greater diam. 32, lesser 28 mill.

Madagascar.

H. lanceola FERUSSAC, Histoire, t. 65, f. 4-6.—PFR. Symbolæ iii, p. 79; Monographia i, p. 394; Conchylien Cab., t. 61, f. 12-14 (copied from Fér.).—REEVE, Conch. Icon., f. 194.

The fine spiral sculpture and contracted umbilicus are characteristic.

H. TERVERIANA Grateloup. Pl. 14, fig. 66.

Shell orbicular, convex above and below, the periphery angular, acute. Color pale greenish-yellow. Spire elliptical, very obtuse and white at summit. Umbilicus well marked, but of moderate width, violet colored inside. Aperture very oblique, oval, plainly angular, the right margin dilated, white and reflexed, the columella violet. Whorls of the spire 4. (*Grat.*)

Madagascar.

Carocolla Terveriana GRAT., Actes de la Soc. Linn. de Bordeaux, xi, p. 404, t. 1, f. 16, 1839.—PFR. Monographia i, p. 394.

Grateloup's original description is translated above, and his figure copied on the plate. It has not been identified by subsequent authors.

H. UNICOLOR Pfeiffer. Pl. 5, figs. 74, 75, 76.

Shell umbilicate, depressed, acutely carinated, thin, brown, delicately striate above, with several elevated spiral lines beneath; spire depressed-conoidal; whorls 5, nearly plane, visibly increasing, the last not descending; base convex abruptly angular at the narrow umbilicus; aperture rhomboidal; peristome deep brown; margins joined by a very thin callus, upper margin dilated, expanded, basal ascending, straightened, the columellar margin short, dilated, half-closing the umbilicus, forming an angle where it joins the basal lip. (*Pfr.*) Alt. 16, greater diam. 32, lesser 28 mill.

Habitat unknown.

H. unicolor PFR., Proc. Zool. Soc. 1845, p. 64; Monographia i, p. 393; Conchylien Cabinet p. 343, t. 61, f. 1-3.—REEVE, Conch. Icon., f. 190.

Differs from *H. xystera* in the narrower umbilicus, higher spire, and number of whorls.

Group of H. lanx Fér.

The umbilicus is broad, seen to be decussately sculptured within under a lens; the aperture is oblong or oval, upper margin scarcely

expanded, basal narrowly reflexed; terminations of peristome converging, the ends joined by a very thin, translucent parietal callus.

H. LANX Férussac. Pl. 8, figs. 7, 8, 9.

Shell depressed, with a very broad umbilicus, chestnut-brown, darker below, often lighter around the umbilicus; last whorl deflexed below the peripheral carina at aperture; basal lip straightened or a little projecting in the middle.

The form is nearly discoidal, spire low, convex, periphery carinated, the carina becoming more obtuse on the latter part of the whorl. It is rather thin; brown and somewhat shining above, polished and of a rich chestnut color below the periphery, somewhat lighter around the umbilicus. The surface has obliquely-radiating low waves on the upper whorls, scarcely apparent in the typical form; it is lightly obliquely striate; within the umbilicus the surface is cut into a fine decussated pattern by incremental striæ and close, fine spiral incised lines. Whorls $4\frac{1}{2}$, almost flat, separated by slightly impressed sutures, the last whorl large, carinated, somewhat malleated or rugose near the aperture, descending below the periphery of the preceding whorl, and deeply constricted behind the basal lip. Aperture very oblique, purplish or bluish-white inside, the superior lip very slightly, narrowly expanded, outer lip expanded, basal lip straightened in the middle, columella expanded; parietal wall with a mere wash of transparent callus. Umbilicus very broad, funnel-shaped, showing all the volutions.

Alt. 27, greater diam. 60, lesser 50 mill.

Alt. 22, greater diam. 55, lesser 46 mill.

Madagascar.

H. lanx FER. Histoire, t. 65, f. 7.—PFEIFFER, Symbolæ i, p. 41; Monographia i, p. 392; Conchylien Cabinet, p. 209, t. 106, f. 1-3.—REEVE, Conch. Icon., f. 171.—*H. radama* LESSON, Voy. de la Coquille, p. 384, t. 7, f. 1, 1826; Cent. Zool., t. 9.

This is a rather thin, large species, more or less corrugated on the spire, finely decussated inside the broad umbilicus.

VAR. *RADAMA* LESSON. Pl. 8, figs. 10, 11.

More transversely inflated or oblong in contour, very distinctly corrugated above. Alt. 25, greater diam. 57, lesser 42 mill. The specimen figured by Lesson measures 90 mill. in diameter.

H. CAMPBELLIANA Pilsbry. Pl. 63, figs. 41, 42, 43.

Shell depressed, umbilicate, solid, opaque, light chestnut-brown in color, with a whitish zone encircling the umbilicus. Surface somewhat shining, slightly striate obliquely, and showing under a lens, traces of close microscopic spiral lines; the latter three-fourths of the last whorl is conspicuously malleated above and below the periphery. Spire low, convex; whorls $4\frac{1}{2}$ -5, convex, the inner slowly, the last two rapidly widening; sutures well impressed; last whorl depressed, almost rounded at the periphery, but with a slight keel or angulation; convex above and below, abruptly and deeply deflexed in front. Aperture oval, subhorizontal, flesh-colored within; peristome narrowly expanded, basal margin narrowly reflexed, upper lip scarcely expanded; terminations of the lip much converging, connected by a thin, transparent callus; there is a small, triangular white callus within the upper termination of the peristome. The umbilicus is deep, funnel-shaped, showing the whorls to the apex.

Alt. 21, greater diam. 46, lesser 39 mill.; aperture, oblique alt. 21, breadth 26 mill.; measured outside the peristome.

Alt. 21, greater diam. 50, lesser $41\frac{1}{2}$ mill.; aperture, oblique alt. 23, breadth 27 mill.

Madagascar.

An exceptionally well-marked form. The whorls are convex, not grooved above or below; the aperture is oval; peristome narrowly expanded, reflexed below. The color is a rich light chestnut brown. It is probably allied to *H. clotho* Fér., but does not have the strong parietal callus of that form, and is very conspicuously malleated on the last whorl. The umbilicus is obliquely dilated behind the columellar lip, and obscurely grooved. The two specimens before me agree in all respects, except that one has a slightly greater diameter.

The species is named in honor of Mr. John H. Campbell of Philadelphia.

H. LANCIFORMIS Boettger.

Shell broadly umbilicated, umbilicus perspective, $\frac{1}{4}$ to $\frac{1}{3}$ the diameter of the shell; depressed, not at all carinated, scarcely subangulated, at the place of the carina it is encircled by an obsolete thread; chestnut under olivaceous epidermis, base with a yellow or white band around the umbilicus; spire slightly convexly raised, apex plane; whorls $4\frac{1}{2}$ -5, slightly convex, separated by lightly impressed sutures, very minutely granulate, transversely striatulate, and with a broad tract at the periphery obliquely wrinkled or

malleated; penultimate more or less high proportionally to the breadth of shell, last whorl more convex beneath, base somewhat saccate and inflated toward the aperture, then transversely impressed and constricted; whorl above slowly, and for a long distance deflexed. Aperture much broader than high, very oblique, subrectangular-elliptical, a little excised; peristome all around reflexed, margins approximating, joined by a thin callus, right margin curved, either white or often smoked with brown; columellar margin straightened, white, subpreceding above.

Alt. 28, diam. $57\frac{1}{2}$ –63 mill.; aperture, alt. 24– $25\frac{1}{2}$, breadth $32\frac{1}{2}$ –35 mill. (*Boettger.*)

Northwestern Madagascar and Nossi-Bé.

H. lanciiformis BOETTGER *Nachrichtsbl. d. deutsch. Mal. Ges.* 1889, p. 47.

The prominent distinctive characters are the small spire; the inconspicuous thread which seems, so as to speak, to be laid upon the keel which is indicated upon the middle of the last whorl; the narrow, more elongated aperture, the constantly present oblique wrinkling of the middle part of the last whorl, and especially the broad yellow or white spiral band, usually sharply defined, which encircles the umbilicus.

Var. NOSSIBEENSIS *Boettger.*

Differs from the type in the subexcentric umbilicus, the last whorl planate-sloping above the middle, last whorl less inflated behind the aperture and less deeply constricted, aperture longer, narrower, more produced and rostrate, right margin curved, brown, columellar margin straighter, whitish.

Alt. 25–28, diam. 53–60 mill.; aperture, alt. 21–23, breadth, 31–34 mill. (*Boettger.*)

Rare, in the forest of Loucoubé, *Island of Nossi-Bé.*

Group of H. duvallii Petit.

Compact forms, with moderately wide umbilicus, narrowly expanded thick blunt lip, its terminations converging and joined by a heavy parietal callous. *H. schaerfiæ* and *H. pereyana* may perhaps belong near the following three species. *H. atropos* also seems to be similar. Of these forms I have seen only *H. duvallii*.

H. DUVALII Petit. Pl. 14, figs. 62, 63, 64; pl. 62, figs. 32, 33, 34, 35.

Shell with a deep, moderately wide umbilicus, depressed-globose, solid and strong, opaque, yellowish or reddish-brown above, more tinged with olive below, and with a narrow dark band at the periphery, with a light band bordering above; the suture edged below with dark brown. The surface is somewhat shining, finely obliquely striate above, smoother beneath; on the upper surface there are numerous spiral lines, which under a lens are seen to be composed of granules on the striæ of increment, as the detail drawing on pl. 62, fig. 34 shows. Spire low, somewhat conoidal, very obtuse; apical whorl minute, a trifle sunken; suture very deeply impressed. Whorls 4, very rapidly widening, the inner ones moderately convex, the outer whorl quite convex just beneath the suture, then sloping, somewhat flattened on the base, deeply descending in front to the aperture, and with a deep and broad constriction behind the basal lip, extending obliquely into the umbilicus. Aperture oblong, very oblique, livid-brown within, and showing the peripheral band of the outer surface; peristome thickened, and narrowly reflexed all around, brown, lighter above, upper and outer margins arched, baso-columellar lip straightened, oblique, reflexed; margins somewhat converging, joined by a thick brown callus. Umbilicus deep, funnel-shaped. Alt. 22, greater diam. 41, lesser 31½ mill.

Bay of St. Augustine, Southern Madagascar.

H. duvallii PETIT. Mag. de Zool. 1844, pl. 93.—PFEIFFER, Monographia i, p. 376; Conchyl. Cab., p. 334, t. 59, f. 7, 8 (copied).—REEVE, Conch. Icon., f. 178.

A very distinct species. The lip is equally, narrowly reflexed all around; the base has a deep constriction behind the columellar lip; the aperture is irregularly oblong, baso-columellar lip straightened, and the sculpture and coloration are peculiar. Figures 62–64, pl. 14 are from the original ones. The figures on pl. 62 are from a specimen before me.

H. LACHESIS Férussac. Pl. 10, fig. 29.

Shell umbilicate, subconoidal-depressed, rather solid, striatulate, chestnut-brown above, white beneath; spire short-conoidal, obtuse; whorls 5, scarcely convex, the last obsoletely angled in the middle, suddenly deflexed in front, turgid, the base somewhat flattened, distinctly radiately striate, obsoletely angulated around the conical,

brown umbilicus. Aperture nearly horizontal, truncate-oblong; peristome narrowly reflexed, the margins converging, joined by a slightly sinuous callus; basal margin straightened, dilated at the umbilicus. (*Pfr.*) Alt. 19, greater diam. 40, lesser 33 mill.

Near the Bay of Diego-Suarez, Madagascar.

H. lachesis Fer., DESH. in FERUSSAC, Histoire, p. 57, t. 69H, f. 3, 4.—PFR. Monographia iii, p. 239, and iv, p. 288, v, p. 375.

The species belongs near *H. duvalli*. The figured is copied from Férussac, and the description from Pfeiffer, who drew it from a specimen in the Albers collection. It has not been noticed by other authors.

H. CLOTHO Férussac. Pl. 6, figs. 78, 79, 80.

Shell orbiculate-subdiscoidal, depressed, with very obtuse apex; whorls $5\frac{1}{2}$, first depressed, angular at the periphery, the others slightly convex, the last very obtusely angled at periphery; base broadly umbilicated; aperture oblique, ovate-oblong, margins thickened, reflexed, joined on the parietal wall. (*Desh.*)

Alt. 26, diam. 48 mill.

Around the Bay of Diego-Suarez, Madagascar.

H. clotho DESH. in FERUSSAC, Histoire i, p. 57, t. 69I, f. 3.—PFR. Monographia iii, p. 238.

Known only by the original description and figures which were drawn from a dead, bleached specimen. It is evidently closely allied to *H. lachesis* and *H. duvalli*, but has a more curved basal lip than either.

Species not grouped.

H. PERCYANA E. A. Smith. Pl. 10, figs. 26, 27.

Shell rather thin, globose-depressed, moderately umbilicated, sculptured all over with granules arranged in transverse series, and very oblique lines of increment; olive-brown, sparsely zigzagly streaked with opaque white. Whorls 4, rapidly increasing, convex; the last large, inflated, descending in front. Spire rather prominent, obtuse at apex. Aperture large, transverse, oblique, nearly subhorizontal, lilac colored inside; peristome white, narrowly expanded and reflexed, margins approximating, columellar margin oblique, straightened, scarcely arcuate. (*Smith.*)

Alt. 18, greater diam. 31, lesser $22\frac{1}{2}$ mill.

Ankafana, Betsileo, Madagascar.

H. (Ampelita) pereyana SMITH, Proc. Zool. Soc. Lond., 1880, p. 485; pl. 48, f. 12, 12a; *l. c.*, 1882, p. 382.

The ornamentation of this pretty species is very peculiar. The narrow zigzag lines are irregular in their disposition, and of the same opaque creamy color as frequently adorns many of the Philippine Island *Orthostylus*. The granules which cover the entire surface are disposed in somewhat irregular closely-set transverse series, interrupted considerably by oblique lines of growth. The texture of the shell is thin, and so transparent that the fulgurations of the exterior are quite conspicuous through the lilac interior of the aperture. Sometimes the expanded outer lip is of a livid purple color. (*Smith.*)

H. GRANULOSA Férussac. Pl. 7, figs. 92, 93, 94.

Shell orbicular-depressed, with very obtuse apex, obtusely angled at the periphery, brownish-white, base perforated by a very broad umbilicus; whorls 6, convex, granulose, separated by a profound suture; aperture ovate, subhorizontal, margins much approaching, laterally inflexed. (*Desh.*) Alt. 17, diam. 45 mill.

Near Diego-Suarez, Madagascar.

H. granulosa Fér., DESH. in FERUSSAC, Histoire, i, p. 61, t. 69H, f. 7-10.—PFR. Monographia iii, p. 239.

Described from a single dead, discolored shell in the Férussac collection. The conspicuous granulation of the striæ will render its identification easy. Not seen by subsequent authors.

H. SCHAERFLÆ Pfeiffer. Pl. 7, figs. 95, 96, 97, 1, 2.

Shell moderately umbilicated, globose-depressed, rather thin, above closely subrugose striate, sparsely malleate, encircled by numerous reddish-brown bands, base shining, yellowish; spire scarcely elevated; whorls 4, slightly convex, rapidly widening, the last depressed-rounded, deflexed in front, somewhat contracted. Aperture very oblique, lunate-oval, bluish inside, the bands showing through; peristome white, thickened within, blunt, the terminations approaching, connected by a thin callus; upper margin arched, the basal elongated at the umbilicus (*Dohrn.*)

Oudebosch and Bredasbosch, Cape of Good Hope.

H. schærflæ PFR. Mal. Bl. viii, 1861, p. 73, t. 2, f. 1-3; Monographia v, p. 242.—BENSON, Ann. and Mag. N. H. 3d. ser., xiii, p. 494, 1864.—DOHRN, Conchylien Cabinet, p. 615, t. 178, f. 1-6.

A species of very uncertain systematic position. Benson says :

Mr. Layard sent a smaller whitish variety from Swellendam, and another variety (white with chestnut bands) from Bredasdorp, to the northeast of Cape Lagulhas. Mr. Layard reports that the eyes of those varieties are situated at the upper and inner side of a lengthened knob turning down from the summits of the upper tentacles. The foot, when the animal is withdrawn into the shell, looks like raw meat; and the animal greedily devours other living mollusks confined with it, but in the bush is attracted in numbers by pieces of water-melons placed as a bait.

The species is placed in both *Macrocyelis* and *Ampelita* by Pfeiffer, in *Ampelita* by Dohrn. It may prove to belong to the Agnatha, near *Rhytida* or *Aerope*.

H. GALACTOSTOMA Pfeiffer. Pl. 10, figs. 30, 31.

Shell umbilicate, convex-orbicular, solid, striate, granulate under a lens, brown; spire short, apex obtuse; whorls $4\frac{1}{2}$, slightly convex, slowly widening, the penultimate angulated, the last somewhat depressed, deflexed in front; base angular, descending into the moderate, open umbilicus (not exceeding $\frac{1}{2}$ the diameter). Aperture very oblique, lunar-oval, milk-white within; peristome simple, brown-edged, margins converging, joined by a callus; right margin very narrowly expanded, basal margin subreflexed, columellar margin white, dilated-reflexed above the umbilicus. (*Pfr.*)

Alt. 18, greater diam. 36, lesser 31 mill.

Madagascar.

H. galactostoma PFR. Proc. Zool. Soc. London, 1849, 130; Monographia iii, p. 238; Conchylien Cabinet, p. 550, t. 166, f. 8, 9.—REEVE, Conch. Icon., f. 192.

H. COVANI Smith. Pl. 7, figs. 89, 90, 91.

Shell broadly and openly umbilicated, moderately thick, orbicularly depressed, lightish brown, becoming more olivaceous upon the spire, decussately sculptured with fine spiral striæ and oblique lines of growth producing a subgranulated surface. Spire depressed with slightly convex outlines, and a somewhat raised apex. Whorls $5-5\frac{1}{2}$, rather convex, enlarging moderately slowly and separated by an impressed suture; last volution large, rounded at the periphery, a little descending and compressed anteriorly, more feebly sculptured beneath, except within the umbilicus, than above, and exhibiting no trace of an angulation around the umbilicus. The latter is open and perspective to the apex. Aperture oblique, white. Peristome

subsimpler, its upper margin prominent in the middle, thin, apparently scarcely expanded; columellar edge slightly thickened, expanded and reflexed. (*Smith.*) Alt. 16, greater diam. 36, lesser 30 mill.

Ankafana, Betsileo Province, Madagascar.

H. (Macrocyclus) covani E. A. SMITH, *Journal of Conchology* ii, p. 338, 1879; *Proc. Zool. Soc. Lond.* 1882, p. 381, t. 21, f. 10-12.

This species was originally described from a single specimen which did not illustrate the full size attained by adult shells. The largest, and apparently full-grown example, lately brought to England by Mr. Cowan, has a greatest diameter of 45 mill., is 33 across at the smallest diameter, and 20 high, resting upon its base. The peristome is not thickened or expanded on the upper margin, but is simple and arcuate. (*Smith.*)

H. GONOSTYLA Ancey, *Le Naturaliste*, iv, p. 119. This number of *Le Naturaliste* is missing in the Academy library.

Unfigured species of Ampelita.

The following diagnoses are translated from the original ones of Mr. Jules Mabille. In a group where the species are so critical as in these Madagascar Helices, good figures or careful comparisons with known species are *essential* for the recognition of new forms. Diagnoses without such comparisons are worse than useless. Conchologists should give such work precisely that measure of recognition which has been given by its author to the real needs of descriptive zoology. The practice of publishing such literature in this age of inexpensive illustration is obviously inexcusable. It would seem that in order to prevent, as far as possible, the identification of their species, Mr. Mabille and his colleagues invariably neglect to mention the subgenus or section of the immense genus *Helix*, to which their supposed novelties belong.

H. porcaria Mabille. Shell sub-broadly umbilicate, depressed-conical, solid, thick, hardly shining, white under a dull black epidermis, subregularly ribbed-striate; spire convex-conic, nearly destitute of epidermis; apex obtuse, rugose; whorls 5-5½, convexly sloping, very rapidly increasing, separated by a narrow, well-impressed suture; last whorl large, sloping above, impressed in the middle, all over obscurely malleated, slightly descending at the aperture, dilated, rounded-angular at periphery, planulate beneath, rounded

around the umbilicus ; aperture little oblique, lunate, oblong-ovate ; peristome subthickened, obtuse, expanded and somewhat reflexed ; margins approximating, the outer arcuate, broadly expanded, columellar thickened somewhat, patulous, nodiferous, reflexed at the moderate, pervious, umbilicus.

Alt. 18, greater diam. 37, lesser 29 mill. (*Mabille*, in Bull. Soc. Mal. France i, p. 139, 1884.)

Madagascar.

H. scotina Mabille. Shell rather broadly umbilicate (umbilicus pervious, funnel-shaped), conico-depressed, thick, opaque, of an intense chestnut-purplish color ; ornamented with a more or less conspicuous reddish zone behind the periphery ; very delicately striate, decussated by slightly visible longitudinal lines ; little shining ; spire conical, slightly prominent, apex obtuse, rugose, whitish ; whorls 5-5½, a little convex, rapidly increasing, separated by an impressed suture ; the last large, inflated above at the suture, delicately impressed in the middle, sometimes lightly malleated ; at the periphery rounded, beneath subcompressed, distinctly striate-costulate, slightly angular around the umbilicus ; aperture oblique, slightly lunate, ovate, whitish inside ; peristome thick, variegated white and rufous ; margins approximating, the outer patulous, lightly arcuate and excavated, columellar narrow, thickened, obliquely straightened, tinged with fulvous. Alt. 19½-20, greater diam. 36-38, lesser 29-31 mill. The shell is conic-depressed, solid, quite thick and opaque ; it is little shining, of a reddish-brown color, ornamented above with a clear red zonule ; there are some yellow vermiculations here and there on the first whorls ; the striæ are little apparent ; sometimes they are accompanied by irregular oblique malleations, much elongated, and assuming the form of folds. The peristome is edged with black, white within. The umbilicus, of a deep chestnut color, is encircled by a bright yellow zone. Its form is that of a broadly expanded funnel, suddenly contracted but very narrowly and deeply penetrating. (*Mabille*, l. c., p. 140.)

Madagascar.

H. omoia Mabille. Shell rather broadly and perviously umbilicated, depressed-conico-suborbicular, solid, shining, yellowish-tawny, very sharply striate and with decurrent lines, 3-banded. Spire conical, slightly prominent, apex rather large, obtuse, striatulate ; whorls 4½-5, a little convex, subregularly and very rapidly increasing, separated by an impressed suture ; the last whorl large, broadly

margined with rufous at the suture, tumid, impressed in the middle, encircled at the periphery by a narrow rufous zone, angulated and then rounded, slightly descending and broadly dilated at the aperture; convex below, angulated around the umbilicus and encircled by a broad rufous zone; aperture oblique, lunate, within bright white, ovate-subquadrate; peristome obtuse, expanded, reflexed, slightly thickened, the margins converging, joined by a shining white callous; outer margin at first nearly straight, then curved, sinuous, broadly expanded, reflexed, basal margin shortly arcuate; columellar obliquely descending, straightened, thickened, narrowly reflexed. Alt. 14, greater diam. 29, lesser 27 mill. The size and form resemble those of *H. thelica*; it is thicker, more solid, rather shining, ornamented with 3 clear chestnut bands; the first sutural, the second narrow at the periphery, bounded by a depression on the last whorl; finally the third, occupying the greater part of the base. The spire is very small, conic, mammillated; the umbilicus moderate, much covered relative to its size, yellow inside, and bounded by an appreciable angulation. (*Mabille*, l. c., p. 141.)

Madagascar.

H. thelica Mabille. Shell narrowly, subperviously umbilicated, conic-depressed, solid, little shining, rufous-yellowish, under a lens very minutely reticulate-decussate; spire subconvex, little prominent; apex obtuse, whitish; whorls 5, subregularly, rapidly increasing, first whorl plano-convex, whorls separated by impressed suture, the last large, somewhat turgid above at the suture, impressed in the middle, obtusely angulated at the periphery, dilated and shortly descending at the aperture, convex below, obscurely angled around the umbilicus; aperture oblique, lunate, irregularly ovate; peristome white, patulous, a little reflexed, a little thickened; margins subapproximating, the outer dilated, well curved, columellar a little incurved. Alt. 13, greater diam. 28, lesser 22 mill. A small *Helix*, in general form like *H. lamari*, but differing in the smaller size, more solid shell, less rapid increase in the earlier whorls, the last more descending, and with a well-marked circular depression; the umbilicus is more open than in the *lamari*. Finally, the base of *H. thelica* has the form of a truncated cone. (*Mabille*, l. c., p. 142.)

Madagascar.

H. monacha Mabille. Shell narrowly, perviously umbilicated, depressed-orbicular, shining, little thick, solid, closely and pretty irregularly striate, white under a deciduous epidermis, ornamented with

a broad brown zone ; spire a little convex, scarcely prominent, apex minute, obtuse, rugose ; whorls 5-5½, a little convex, visibly widening, separated by a narrow, well-impressed suture, the last sloping above, obscurely angular at the periphery, dilated and briefly deflexed at the aperture, somewhat tumid beneath, chestnut tinted at the umbilicus and rounded, a little constricted behind the peristome. Aperture very oblique, lunate ; peristome thickened, livid, narrowly reflexed, obtuse ; margins approximating, joined by a rather thick callus, outer margin subsinuous, basal broadly subappressed, columellar margin very short, concave, dilated. Alt. 19, greater diam. 44-45, lesser 36-37 mill. In the *H. monacha* the spire is relatively little developed, feebly convex-conic ; the whorls are little salient ; the last forms nearly two-thirds the entire shell, is feebly convex above, and a little sloping as far as the periphery ; it is rounded and then obliquely swollen below. The umbilicus is narrow, little spreading, penetrating, tinted with reddish-brown. The peristome is livid flesh-colored, a little reflexed, narrowly thickened, obtuse, nearly continuous in consequence of the presence of a callous uniting the insertions, feebly interrupted in the middle by the parietal wall. (*Mabille*, l. c., p. 143.)

Madagascar.

H. cyanostoma Mabille. Shell broadly umbilicated, depressed-orbicular, solid, little thick, subshining, more or less striate and often here and there malleate, white under a fulvous or blackish deciduous epidermis, rufous zoned at the suture ; spire convex, little prominent, apex valid, obtuse, costulate, whitish ; whorls 5-5½, subplanulate, rapidly and subregularly increasing, separated by impressed sutures, the last large, dilated and a little descending in front, obscurely angulated at the periphery, planulate beneath, tinted with black at the umbilicus, scarcely rounded ; aperture oblique, obscurely tetragonal-ovate ; peristome a little thickened, broadly expanded, reflexed ; margins converging, the outer arcuate, basal straightened somewhat, columella oblique, scarcely incurved. Alt. 16-18, diam. maj. 41-46, min. 33-41 mill. This large and beautiful form has a thin but quite solid shell, of a brown color verging a little on red ; it is distinctly striate ; the striæ a little spaced and oblique, are accompanied by some malleations. The aperture presents within a beautiful blue shade with brilliant reflections. The umbilicus is wide, quite open, regularly circular, little angular at its edge and widely penetrating. (*Mabille*, l. c., p. 144.)

Madagascar.

H. oomorpha Mabilie. Shell subrimate or imperforate, egg-shaped, little thickened, solid, subshining, fulvous, bifasciate with rufous, striate and densely decussated with minute tubercles in rows; spire small, semiglobose, apex subelevated, a little papillar; whorls $4\frac{1}{2}$ –5, convex, irregularly (the first minute, rapidly and regularly, the rest very rapidly) increasing, separated by an impressed (especially at last whorl) suture; the last whorl large, equaling $\frac{1}{10}$ the length of shell, convex, inflated, slowly and for a long distance descending at the aperture, a little ventricose beneath, lightly impressed around the columellar area; aperture nearly subvertical, broad-lunate, bifasciate inside, and bright fuliginous; peristome white, thickened somewhat, narrowly expanded-reflexed, margins joined by a very thin, shining callus; the outer margin long-arcuate, columellar slightly incurved, much dilated at the insertion, white, closing the umbilicus. Alt. 41–49, greater diam. 62–64, lesser 43–49 mill.; aperture, including peristome 41–42 mill. long, $32\frac{1}{2}$ –38 wide. In contour it forms a pretty regular oval, narrowed at the two extremities. The shell, of a brownish-red, a little shining, is solid, but not very thick, ornamented by a net-work of fine tubercles disposed in pretty regular series; in a fresh condition these tubercles are pilose. There are two dark reddish-brown zones on the last whorl, the upper one continued nearly to the apex of the spire, which is semiglobose, very small, the last whorl forming nearly the whole shell. The aperture is nearly parallel with the axis, large, oval, a little acute posteriorly, well rounded at the base; outer border gently curved, the columellar is thick at its insertion, widely reflexed at the umbilical region, white, and slightly tortuous.

(*Mabilie*, Bull. Soc. Mal. France, 1884, i, p. 146.)

Madagascar.

Probably belongs to *Helicophanta*.

H. catarella Mabilie. Shell moderately umbilicated (umbilicus funnel-shaped, subpervious, surrounded by an obtuse angle), depressed-suborbicular convex, a little thickened, solid, shining, white under a fulvescent or rufescent epidermis, regularly costulate-striate, and under a lens decussated by very delicate longitudinal lines; spire convex-conic, a little prominent, apex denuded, valid, subshining, obtuse, whitish; whorls 5, convex, subregularly (first rapidly, the rest very rapidly) increasing, separated by an impressed suture; last whorl large turgid around the suture, more or less impressed and obscurely angulated before the periphery, at the aperture very

shortly, rapidly descending, obliquely dilated; aperture oblique, lunate; peristome thickened, white, broadly reflexed, margins approximating, joined by a white lamina; the outer excavated, a little campanulate, basal arcuate, obscurely nodiferous, columellar very short. Alt. 19, greater diam. $33\frac{1}{2}$ –36, lesser 25–28 mill. The shell is depressed-convex, a little orbicular, of a russet color, sometimes without epidermis and white; ordinarily unicolorous, but sometimes ornamented with scarcely apparent bands. Shell covered with regular striæ and longitudinal lines, visible only under a lens. Whorls of the spire convex, the last with a more or less marked depression. Umbilicus quite wide, showing usually two-thirds of a volution, terminating in a minute, deep perforation. Peristome white, well expanded, especially on the outer side. (*Mabille*, l. c., p. 146.)

Madagascar.

Evidently close to *H. lamarei* Mke.

H. polydora Mabille. Shell moderately but profoundly subperviously umbilicate, depressed-orbicular, convex, a little thickened, very solid, shining, white, ornamented with purple-chestnut zonules; spire a little prominent, apex minute, obtuse, smooth, concolored; whorls 5, subregularly and very rapidly increasing, convex-depressed, separated by a distinct, linear suture; the last large, turgid at suture, impressed at periphery, then angulately rounded, convex beneath, a little angular around the umbilicus, at the aperture dilated and very shortly deflexed; aperture oblique, slightly lunate, irregularly oblong-ovate; peristome white, a little thickened, reflexed, margins approximating, joined by a thin callus; outer margin sinuate, broadly expanded; basal margin incurved, subnodose; columellar oblique, incurved and thickened. Alt. 16, greater diam. 32, lesser 25 mill. A very shining shell, of a beautiful porcelain-white color, ornamented with three purple bands, two above, one below. Striæ fine, scarcely visible; spire visibly convex; last whorl angular at its beginning, rounded at its termination, with a well-marked but narrow depression situated between the two superior bands; base convex, a little angular around the umbilicus, which is well opened, deeply penetrating, but more contracted than in *H. madera*. (*Mabille*, l. c., p. 148.)

Madagascar.

Allied to *H. hova* Angas.

H. madera Mabille. Shell moderately umbilicated (umbilicus subpervious), subconoid-depressed, pretty thin but solid, shining,

yellowish with three broad chestnut-reddish bands, vermiculated with yellowish; costulate-striate, especially at the sutures, and under a lens with spiral lines; spire conic, a little prominent, subacute, the apex obtuse, striatulate, shining; whorls $5\frac{1}{2}$, convex, pretty regularly and very rapidly increasing, separated by impressed sutures; the last whorl large, a little convex below the suture, then superficially impressed, then turgid-angulate; beneath rather convex, obtusely angulated around the umbilicus, at the aperture dilated and suddenly deflexed; aperture oblique, lunate, oblong ovate; peristome white, a little thickened, reflexed; margins subapproximating, joined by a thin callus, the outer incurved, then substraightened, with a tubercle in the middle, much dilated and projecting; columellar margin obliquely incurved, narrowly reflexed. Alt. 18, greater diam. 32, lesser $25\frac{1}{2}$ mill. A conic-depressed shell, solid, a little transparent, shining; ornamented with 3 blackish chestnut bands, on a bright yellow ground. Spire regularly conical, a little acuminate at summit. Shell striate, the striae being more apparent at suture than in the middle of the whorls; the last whorl is convex at the suture, then depressed, finally becoming inflated and rounded beneath, the base visibly compressed. Umbilicus middling sized, well opened, suddenly contracted and then penetrating. (*Mabille*, l. c., p. 148.)

Madagascar.

Doubtless either a synonym or at most a variety of *H. hova* Angas.

H. erythromorpha Mabille. Shell moderately and perviously umbilicated (umbilicus rounded), depressed-orbicular-convex, solid, slightly thick, white under a brown deciduous epidermis, costulate-striate, very minutely punctulate under a lens; bifasciate, spire regularly conic, prominent, apex valid, obtuse; whorls $5\frac{1}{2}$, a little convex, pretty regularly increasing, separated by a suture impressed around the last whorl; last whorl very large, flattened-sloping above, rotund-angular at the periphery, not descending at the aperture, encircled by a narrow purple zone at the suture and another wide one at the periphery, complanate beneath, angulated around the umbilicus and tinged with blackish-purple; aperture scarcely oblique, lunate, ovate; peristome shining, partly whitish, partly purple tinged, narrowly reflexed and thickened, obtuse, margins subapproximating, outer a little expanded, scarcely arcuate, nearly straightly descending, columellar very short, scarcely arcuate, basal

sub-straight, armed with a little-conspicuous lamina. Alt. 18, greater diam. 41, lesser 34 mill. In this species the shell is orbicular-depressed with a moderate, well-rounded umbilicus, not widened, and showing the whorls; the shell is thin, solid and strong, finely striate; the prominent spire is a regular, elevated cone; the apex is very obtuse, compressed; the suture is linear, quite superficial on the earlier whorls, becoming a little profound at the last. The last whorl is large, a little compressed-sloping, feebly angular at the periphery, not descending, and a little dilated at its termination, compressed-flattened below, and plainly rounded around the umbilicus. (*Mabille*, l. c., p. 150.)

Madagascar.

H. lychna Mabille. Shell subdepressed-orbicular, broadly and perspectively umbilicate, solid, subopaque, a little shining, rubescent, unicolored above, beneath ornamented with a more or less conspicuous whitish zone, densely striate, under a lens very minutely roughened, here and there malleated; spire a little convex, prominent; apex minute, obtuse, striatulate, concolored; whorls 6, convex, regularly and rapidly increasing, separated by impressed sutures, the last large, a little convex above, compressed and a little angulated at the periphery, descending at the aperture; beneath complanate-depressed, rubescent tinged around the umbilicus, and encircled by white, a little convex; aperture oblique, slightly lunate, obscurely ovate-trigonal; peristome narrow, reflexed, a little thickened, margins approximating, the outer obliquely descending, then arcuate, basal substraight, columellar arcuate, subpatulous. Alt. 21-22, greater diam. 45-48, lesser 39-40½ mill. The shell is large, orbicular-depressed, of a brownish-red, quite dark, unicolored above, but ornamented beneath with a white zone around the umbilical tract; the striae are quite strong, nearly regular, and are accompanied by malleations, visible especially at the periphery; and under a strong lens little points or striae longitudinally disposed, are visible. The spire is moderately salient, the apex small and obtuse; the last whorl is well-developed; it is convex above, a little compressed at the circumference, presenting at this place an inconspicuous angle; compressed beneath; this compression ceases at the white zone around the umbilicus; the aperture is oval, but visibly tetragonal; the peristome, very little thickened and obtuse, is feebly but narrowly reflexed. (*Mabille*, l. c., p. 151.)

Madagascar.

H. stilpna Mabilie. Shell umbilicate, subglobose-depressed, quite thick, coarsely striate, under a deciduous epidermis white, ornamented with three broad rufous-purplish zones, two above, one around the umbilicus; spire convex-globose, a little prominent, apex obtuse, reticulated; whorls $5\frac{1}{2}$, slightly convex, very rapidly increasing, separated by a linear quite distinct suture; last whorl large, rounded, without trace of angulation at periphery, descending and subdiluted at aperture; aperture oblique, whitish within, ovate; peristome obtuse, thickened, reflexed; margins approximating, columellar dilated; umbilicus moderate, a little widening, showing the whorls of the spire, a little impinged upon by the reflexed columellar lip. Alt. 17-19, diam. maj. 37-39, min. 30-32 mill. (*Mabilie*, l. c., p. 152.)

Madagascar.

H. lithida Mabilie. Shell broadly umbilicated (umbilicus funnel-shaped, pervious), depressed-convex, slightly thick, slightly shining, chestnut colored, lightly striate, under a lens very minutely more or less decussated, and especially at sutures, malleated; spire convex, little prominent, apex obtuse, submalleated, brown; whorls $4\frac{1}{2}$ -5, a little convex, subregularly, very rapidly increasing, separated by linear suture, the last whorl large, convex-rotund above, impressed above the periphery, rapidly descending and obliquely dilated toward the aperture, beneath a little convex, the umbilicus encircled by a buff zone, scarcely angulated; aperture oblique, slightly lunate, bluish inside, regularly ovate; peristome white, thickened, broadly reflexed-effuse; margins converging, joined by a very thin shining lamina, outer margin dilated, subexcavated-arcuate, columellar obliquely descending, substraight, a little thickened. Alt. 17-18, greater diam. 37-39, lesser 29-31 mill. The shell although not very thick, is solid and opaque; of a uniform reddish-brown color, at times interrupted on the last whorl by little yellow spots. The spire is little developed, regular but feebly projecting; on the contrary, the last whorl has great extension; it is well rounded, with a visible trace of a depression; the slightly irregular striæ are accompanied by some superficial malleations; and the broadly expanded but little reflexed peristome is very little thickened. (*Mabilie*, l. c., p. 153.)

Madagascar.

H. galactostomella Mabilie. Shell broadly, profoundly pervious-umbilicate, depressed-conic, solid, scarcely shining, covered with a rufous or chestnut-blackish epidermis; ornamented with dense, ir-

regular arcuate riblet-like striæ, sometimes a little crispate. Spire convex, little prominent, apex obtuse, shining, dull yellowish, destitute of cuticle. Whorls 5, a little convex, the first slowly, the rest rapidly widening, narrowly separated by a simple suture; last whorl large, angular at periphery, slightly descending in front, subdiluted, convexly sloping above, compressed and shining beneath, obscurely angulated around the wide, pervious umbilicus. Aperture oblique, lunate, obscurely triangular, outer margin at first straightened, then curved, basal margin rather straight, columellar margin oblique, dilated, calloused, not covering the umbilicus; peristome thickened, convolutedly dilated all around.

Alt. 14, greater diam. 36, lesser 29 mill. (*Mabille*, in Bull. de la Soc. Philomathique de Paris, 1885-'86, p. 124, 1886.)

Madagascar, coll. Ancy.

H. gaudens Mabille. Shell broadly and profoundly pervious-umbilicate, subdepressed-discoidal, a little thick, solid, scarcely ponderous, slightly shining, rufous; very minutely punctulate at the sutures, then crispate-malleate; irregularly striate; spire a little prominent, somewhat convex, apex large, vitreous-shining; whorls 5-5½, convex, rapidly widening, separated by a deeply impressed suture; the last whorl is large, convexly sloping above, irregularly angular at the periphery, deeply and rapidly descending in front, dilated and a little advanced; beneath it is subcompressed, ornamented with minute radiating striæ, roughened by small granules; around the umbilicus there is a yellowish zone. The aperture is subhorizontal, subquadrate, lunate, the margins approximating, livid inside; peristome slightly thickened, narrowly reflexed, the outer lip at first rather straight, then arcuate; basal margin somewhat straightened, moderately convoluted; columellar margin oblique, expanded, not covering the umbilicus.

Alt. 27, greater diam. 63, lesser 50 mill. (*Mabille*, l. c., p. 125.)

Madagascar, coll. Ancy.

H. campelica Mabille. Shell broadly and perviously umbilicate, discoidal-compressed, rather thick, solid, shining, yellowish, seen under a lens to be exceptionally decussated and punctulate; spire plane, apex strong; obscurely striatulate, buff, shining; whorls 5½-6, convex-depressed, earlier subregularly and visibly increasing, the rest rapidly, separated by a whitish, impressed suture; the last whorl large, complanate above, cylindrical at the periphery, rapidly descending and broadly dilated in front, subconvex below, obscurely

angulated around the umbilicus; aperture oblique, ovate-oblong, white inside, bright, blue-tinted, margins subapproximating; peristome white, thickened, broadly reflexed-convolute. Alt. 17, greater diam. 51, lesser 39 mill. (*Mabille*, l. c., p. 125.)

Madagascar, coll. Ancey.

H. paropta Mabille. Shell covered-subperforate, globose subturbinate, hardly shining, rather thick, solid, remarkably decussated-rugose, white at the apex; spire convex-subconic, rather prominent, apex well-marked, complanate, rugose and lyrate; whorls $4\frac{1}{2}$ –5, a little convex, very rapidly widening, separated by a ruddy, impressed suture; the last whorl is large, convexly sloping above, in front descends for a rather long distance and moderately, a little dilated, a little subcompressed, angular on the base, the angle disappearing towards the aperture; aperture oblique-lunate, ovate-oblong, the margin subparallel, not converging; peristome a little thickened, whitish within, edged with lilac; outer lip sinuous, substraightened, then incurved, emitting a white callus over the umbilical perforation. Alt. 18, greater diam. 35, lesser 30 mill. (*Mabille*, l. c., p. 126.)

Madagascar, coll. Paris Museum.

H. subfunnebris Mabille. Shell broadly umbilicated, depressed-convex, rather delicately solid, somewhat shining, purplish, clouded here and there with black; irregularly, coarsely arcuate-striate and rugate; spire convex, little prominent, apex large, complanate, shining; whorls 5–5½, slightly convex, the earlier concavely impressed on the lower part, visibly and subregularly increasing, separated by a distinct narrowly margined suture; last whorl large, convexly sloping at the periphery, obtusely angled, dilated in front and slightly descending, compressed beneath, with strong radiating striæ, angulated around the pervious umbilicus, scrobiculate behind the peristome; aperture oblique, trigonal-subovate, bluish inside; peristome thickened, patulous-dilated, little reflexed; outer lip well curved, joining the basal which is thickened, a little reflexed, tuberculate and straightened in a superficial angle; columellar margin oblique, subcurved, slightly reflexed. Alt. 17, greater diam. 48, lesser 40 mill. (*Mabille*, l. c., p. 126.)

Madagascar, coll. Ancey.

H. gaudiella Mabille. Shell very broadly umbilicated, depressed-subdiscoidal, a little thick, solid, slightly shining, blackish-reddish, with obscure grayish streaks, and arcuate, irregular striæ; spire

scarcely prominent, apex moderate, rugose rib-striate; whorls $4\frac{1}{2}$ –5, convexly plane, depressed at the sutures, rapidly widening; suture profound, margined by an obtuse carina; last whorl large, a little swollen above at first, and then sloping, cylindrical at the periphery, beneath a little compressed, marked by a wide white zone around the umbilicus, descending and broadly dilated in front; aperture oblique, ovate, margins subapproximating, peristome whitish, dilated and reflexed; columellar margin obliquely reflexed, outer incurved, broadly dilato-reflexed.

Alt. 15, greater diam. $59\frac{1}{2}$, lesser 50 mill. (*Mabille*, l. c., p. 127.)
Madagascar, coll. Ancey.

Section PÆCILOSTYLUS Pilsbry, 1890.

Eurystyla ANCEY, in *The Conchologists' Exchange* ii, p. 39, Sept., 1887, type, *H. cerina* Morel. (not *Eurystylus* Stal, 1871).—*Cochlostyla*, in part, of authors.

These beautiful shells are like some forms of *Ampelita* in facies, but are very compactly convoluted, the umbilicus being a mere perforation closed in the adult. The surface is glossy and vividly painted. The anatomy is unknown. There are but two species known at present—*H. viridis* Desh., not an uncommon form in collections, but usually classed as a *Cochlostyla*; the other, *H. cerina* Morel., is still rare. I have seen but a single specimen of it.

H. VIRIDIS Deshayes. Pl. 63, figs. 50, 51, 52.

Shell imperforate elevated-globose, solid, strong, opaque, bright or dark green, with three broad encircling dark brown zones, one at periphery, one above, and one on the base; the suture is narrowly edged with brown; on the spire the green ground-color is replaced by yellow and then white, and the zones become light chestnut brown. Surface smooth, polished, scarcely striate; spire elevated, blunt; apex very obtuse, corneous; whorls 5, convex, the last descending in front. Aperture very oblique, rather small, obscurely quadrangular, opaque white within, not showing the bands; peristome dark purplish-brown, obtuse, very narrowly expanded all around, dilated and appressed over the umbilical tract, and whitish there; parietal callus thin, transparent.

Alt. 29, greater diam. 28 mill.; aperture, oblique alt. 20, breadth $17\frac{1}{2}$ mill.

Alt. 29, greater diam. 23 mill.; aperture, oblique alt. 18, breadth 15 mill.

Madagascar.

H. viridis DESH., in Lam., An. s. Vert., p. 102.—PFR. Monographia i, p. 225; Conchylien Cabinet, p. 297, t. 50, f. 9–12.—REEVE, Conch. Icon., f. 182.—*Bulimus viridis* Dh., PFR. Monogr. iii, p. 298.—*Orthostylus viridis* of Albers and Beck; *Orusta viridis* Mörch.—*Cochlodryas viridis* Dh., in Pfeiffer's Noment. Hel. Viv., p. 206.

The principal variations are illustrated on my plate. The ground-color is sometimes chestnut or olive-brown all over, unicolorated or with dark brown zones; in these the lip is of a light flesh-color. Some shells have the dark zones very wide, almost concealing the green ground color. Figure 50 represents a shell of normal proportions and coloration. The relationship of this species to *H. cerina* was first pointed out in Novitates Conchologicae, vol. v.

H. CERINA Morelet. Pl. 63, figs. 53, 54, 55.

Shell covered-perforate, very narrowly perforate when immature, globose, thin but solid, opaque, of a rich smoky chestnut color, shading into bright yellow at the umbilical region and on the next to the last whorl, the inner whorls porcelaneous bluish-white, the apex deep purple; a narrow black band margins the suture below, and a wider one encircles the periphery. The surface is polished, glossy, under a lens faint, fine incremental and spiral striæ appear. The spire is rather elevated, blunt; apex not raised, the apical whorl dark purple; sutures slightly impressed. Whorls 4–4½, convex, the last globose-depressed, convex above, below and at periphery, a trifle deflexed in front. Aperture oblique, semilunar, opaque white and showing the band inside; peristome a little thickened and expanded, dark, margins distant; columellar margin straightened, narrowly reflexed above. Alt. 18, greater diam. 23, lesser 18 mill.

Madagascar.

H. cerina MOREL. Journ. de Conchyl. 1877, p. 217.—PFR. in Novit. Conch. v, p. 180, t. 153, f. 4–6.

In its compact, subglobose form, glossy surface and beautiful coloration, this species is very distinct. The contour is different from the larger, elevated *H. viridis*, and the banding is peculiar.

Subgenus XVIII. MACROÖN Pilsbry, 1890.

This subgenus is proposed for a number of sections which comprise most of the largest known Helices. The group as a whole is

characterized by the relatively great size of the egg, and the correspondingly large embryonic or nuclear shell, which is in most of the species from one-fourth to over one-third the total diameter of the adult shell. It is in most cases sculptured differently, more regularly and elaborately, than the post-embryonic portion of the shell. The termination of the embryonic or nuclear shell is distinctly marked by the change of sculpture, or color, and by an oblique streak or wrinkle of the surface. The adult shell is either imperforate or umbilicate; but the umbilicus when open, does not penetrate deeper than the last whorl. The contour of the adult shell varies from depressed-globose, heliciform, to elevated and bulimiform. The various modifications of shell and nucleus will be discussed more fully under the several sectional heads.

I have offered a new name because the group is wholly new, both in the collocation of its contents and the characters upon which it is founded.

Four well-marked sections may be recognized:

(1.) **HELICOPHANTA**, large Madagascar shells, with a distinct line marking the junction of the nucleus with the post-embryonic growth, the latter consisting of one and a half whorls *or less*; form varying from heliciform to bulimiform; whorls 4 to 5, very rapidly widening; lip expanded or reflexed, narrow; the columellar margin somewhat dilated at its insertion at the axis.

(2.) **PANDA**, globose-bulimoid shells of great size and variegated coloration, the nucleus not marked off from the after-growth nor different from it in any way; whorls $4\frac{1}{2}$ or less, rapidly widening; lip simple, not expanded, dilated and reflexed on the columella. The two species inhabit Australia.

(3.) **ACAVUS**, a Ceylonese group of brightly colored species; the junction of the nuclear and post-embryonic whorls not strongly defined generally, but visible; whorls less than 5 in number, rapidly increasing; lip broadly expanded, the columellar margin long, obliquely descending, very broadly flattened and adnate to the base.

(4.) **STYLODONTA** having a brown helicoid shell with about $5\frac{1}{2}$ *slowly widening* whorls, the nucleus differently sculptured and easily distinguishable from the post-embryonic growth, the latter consisting of more than two whorls; lip expanded or reflexed; the columella very short, vertical, convex or toothed. Habitat, Seychelles Islands.

Section I. HELICOPHANTA (Beck) Albers.

Helicophanta (in part) BECK, Index Molluscorum, p. 46, 1837.—ALBERS-MARTENS, Die Heliceen, 1st edit., p. 148.—PFR. Noment. Hel. Viv., p. 169.

This Madagascar group contains more very large Helices than any other. The shells are characterized by their great size, either lengthened, bulimiform, or depressed, and of an oblong, transversely inflated shape. The volutions increase very rapidly in size; the last one descends deeply in front. The surface is nearly always finely granulate or malleated; the nuclear whorls are several in number, and attain a size exceeding one-third the greatest diameter of the adult shell. The post-embryonic growth consists of not more than one and one-half whorls, frequently less.

The species vary from depressed, broadly heliciform, to elongated, Bulimus-shaped. They fall into groups as follows:

- I. Heliciform species, either umbilicated or imperforate, much broader than higher; the columella proper consisting of a very short curve and a small pad of white callus spread upon the base,

Group of H. cornugiganteum.
- II. Bulimiform species; imperforate, generally nearly as high or higher than broad; the columella rather long, straight or gently arcuate, not terminating in a little pad, but more or less deeply entering.
 - a. Shell broader than high, rather thin. *Group of H. magnifica.*
 - b. Shell broader than high, thick and ponderous.

Group of H. gloriosa.
 - c. Shell decidedly higher than broad, columellar lip reflexed.

Group of H. goudotiana.
 - d. Shell lengthened, bulimiform, thick, columellar lip obtuse, not reflexed,

Group of H. farafanga.

Group of H. cornugiganteum Chemn.

This is a group of closely allied forms, very variable and difficult to distinguish. I have not seen the true *H. vesicalis*, nor *H. questieriana*. The other species lie before me. Of these, *cornugiganteum* and *betsileoensis* are openly umbilicate, the former having smooth, the latter decidedly granulate parietal callus and columellar lip. *H. questieriana*, *bicingulata* and *ibaraensis* are imperforate

or very narrowly rimate; the first two are finely obliquely indented or wrinkled on the body-whorl and *bicingulata* has granulate columella when adult; *H. ibaraoensis* is not wrinkled by oblique indentations, and the columella is smooth, although the thin parietal callus is granulate. *H. vesicalis* is remarked upon under *H. bicingulata*.

H. CORNUGIGANTEUM Chemnitz. Pl. 14, figs. 59, 60, 61.

Shell large, umbilicate, depressed, solid and rather thick, opaque, brownish-yellow, streaked with chestnut; surface shining, with irregular, obliquely arcuate growth-wrinkles, and a number of inconspicuous, low, cord-like spirals, a little darker colored than the ground-color; more closely examined, the surface is seen to be covered with a fine malleation or oblique wrinkled pattern; and in some places it is microscopically granulate, notably on the inner whorls when not worn. The spire is small and very obtuse; apex minute, flat; suture narrowly impressed. Whorls about $4\frac{1}{2}$, the first 3 of a uniform fleshy-brown color; last whorl depressed, its last third rapidly descending, rather flattened beneath. Aperture very oblique, oval-truncate, bluish-white inside; peristome white, rather thick and obtuse, narrowly expanded all around, dilated and projecting in a rounded lobe partly over the umbilicus; parietal wall with a white callus, heavy at its edge. Umbilicus rather wide, but scarcely penetrating deeper than the last whorl.

Alt. 45, greater diam. 75, lesser 58 mill. Oblique alt. between basal and upper lips 40, greatest width of aperture 50 mill.

Alt. 36 greater diam. 75, lesser, 54 mill. Oblique alt. from basal to upper lip 38, greatest width of aperture 48 mill.

Id. of Agalega, N. E. of Madagascar (teste Sir David Barclay).

Helix cornu giganteum CHEMNITZ, Syst. Conchyl. Cab. ix, p. 247, t. 208, f. 2051, 2052.—PFR. Monographia i, p. 16.—REEVE, Conch. Icon., f. 173.

This species may be known by its depressed form, solid texture, light yellow color, streaked obliquely with chestnut, and especially by the rather broad umbilicus, which is usually more than half covered by the expanded lobe of the columellar lip. The parietal callus shows no trace of granulation.

The measurements given above show how the species varies in elevation. There is, however, but little change in the general features of the shell. The umbilicus is always wide, even when nearly covered

by the lip; the base is decidedly flatter than in any other species. I do not believe that the *H. vesicalis* of Lamarck, figured by Férussac and Chenu, is the same.

H. BETSILEOENSIS Angas. Pl. 10, figs. 32, 33.

Shell large, umbilicate, very broad and depressed, solid, opaque, chestnut shading to chocolate color, the inner whorls and first part of the last closely dotted with golden yellow. Surface shining, smooth, the inner whorls granulate, the granulation extending upon the body-whorl for a distance along the suture; under a high power a pattern of excessively minute close scratches may be seen upon the apparently smooth surface. The spire is very much depressed, almost plane; suture impressed. Whorls $4\frac{1}{3}$, rapidly increasing, the last very large, very convex, broad and transversely inflated, its last third descending; base very convex, deeply, broadly excavated around the open umbilicus. Aperture oblique, oval-truncate, blue inside; peristome scarcely thickened, white, narrowly expanded all around, the terminations converging, joined by a closely granulate callus, the columellar termination expanded, dilated somewhat over the umbilicus.

Alt. 45, greater diam. 83, lesser 62 mill. Greatest width of aperture 51 mill.

S. E. Betsileo; Tanala country, Madagascar.

H. (Eurycratera) betsileoensis ANGAS, Proc. Zool. Soc. Lond. 1879, p. 728, t. 57, f. 1, 2.

This species is easily distinguished from *H. cornugiganteum* by its more depressed upper surface, much less oblique aperture, darker coloration, and less concealed umbilicus. The epidermis is rather thick and strong, and the surface free from the fine oblique wrinkling or malleation shown by the *cornugiganteum*. The parietal callosity, upper and columellar lips are rather coarsely granulated.

H. IBARAOENSIS Angas. Pl. 13, figs. 49, 50.

Shell large, depressed-globose, imperforate or very narrowly rimate, solid, opaque, olive-yellow, with dark chocolate-brown spiral bands, the entire surface becoming deep chocolate on the latter part of the body-whorl, almost black just back of the lip, all of the whorls except the last one (in the specimen before me) eroded, destitute of epidermis and of a dull reddish-brown color. Surface shining, the first part of the body-whorl minutely granulate both above and below, the granulation becoming obsolete on the latter

two-thirds of the whorl, which is marked above and below by rather coarse wrinkles of growth; the whorl is encircled by numerous girdles of a brown color and a trifle raised. The spire is low, convex; suture impressed; whorls nearly $4\frac{1}{2}$, rapidly increasing, the first three forming the nuclear or embryonic shell, the last whorl very large, descending in front, convex beneath, and impressed around the narrowly rimate or imperforate axis. Aperture oval-truncate, dark violet-bluish and with a silky luster inside. Peristome white, narrowly expanded all around, narrowly dilated at the columellar insertion; columellar margin smooth, not granulate; terminations of peristome connected by a thin callus which extends inward on the penultimate whorl, and is conspicuously granulate.

Alt. 50 greater diam. 77, lesser 58 mill. Greatest breadth of aperture 54 mill.

Southeast Betsileo and Tanala country, Madagascar.

H. ibaraoensis ANGAS, Proc. Zool. Soc. 1879, p. 728, t. 57, figs. 3, 4.—SMITH, P. Z. S. 1882, p. 381.

This is a species of a dark chocolate color, light olive-yellow between the spiral dark girdles. The columellar and upper lips are smooth, but the thin whitish callus which is spread upon the penultimate whorl within the mouth is studded with whitish granules. The outer surface lacks those small oblique impressions or wrinkles so characteristic of *H. bicingulata* and its varieties, and the columellar lip is uniformly though slightly concave, not bending a little forward or outward as in the *H. bicingulata*. The figure on my plate is incorrect in showing the spiral girdles extending upon the penultimate whorl—this portion being eroded and bandless in the specimen from which the drawing was made.

H. GUESTIERIANA Crosse. Pl. 9, figs. 18, 19.

Shell narrowly subrimate, depressed, ovate-subglobose, rather thin, scarcely ponderous, obliquely closely plicate-striate, spirally encircled by unequal blackish-brown, very slightly raised girdles, on an olive-fulvous ground. Spire obtuse, terminating in a rather flat apex; suture deeply impressed. Whorls of the spire 4, rapidly increasing, the two first nearly smooth, the penultimate covered by a peculiar, close granulation, the last whorl descending, large, much inflated, granulated in the vicinity of the suture, then strongly malleated as far as the umbilical region, which presents only low striæ, and is of a deeper color than the base. Aperture very oblique, diagonal, broad-

ly oval-lunar, somewhat pearly and of a livid whitish-brown inside, and shows, by its transparence, the stronger girdles of the outside. Peristome somewhat thickened, narrowly reflexed, soiled whitish, the terminations united by a thin callus. Columellar margin dilated, almost wholly closing the umbilical chink.

Alt. 37, greater diam. 63, lesser 49 mill.

Madagascar.

H. guestieriana CROSSE, Journ. de Conchyl. 1868, p. 268, t. 9, f. 4.

The above description is from the original one of Crosse. The species (which has not been seen by English authors), is very similar to *H. bicingulata*, but differs, apparently, in the less oblique mouth, more globose body-whorl, and lack of granulation upon the columellar lip.

H. BICINGULATA Smith. Pl. 11, figs. 34, 35.

Shell large, ovate, ventricose, imperforate or narrowly rimate, light olive-brown above, darker brown towards the lip, with the lower surface beneath the periphery still deeper in tint, encircled by two dark brown, slightly raised narrow bands, one at the periphery, the other and more distinct one above it. Spire depressed, convex, only a little raised above the body-whorl. Volutions 4, very rapidly increasing, convex, separated by a deepish suture; two upper ones striated by simple arcuate lines of growth, the third coarsely granular, the lines of growth being but feebly expressed; the last whorl very large, much descending in front, granular at its commencement, the granules gradually disappearing and replaced by close, oblique, short indentations, also exhibiting 5 or 6 *nearly obsolete* concentric ridges above the upper brown zone, and 2 or 3 between it and the lower one, the lines of increase being more distinct upon this than the preceding whorl. Lower surface swollen around the umbilical region, marked with arcuate lines of growth and oblique, close, short indentations like the upper surface, rounded at the periphery. Aperture obliquely elongate, bluish-lilac within. Lip whitish, expanded, reflexed. Columella thickened, *arched forward* a trifle just beneath the umbilicus, *very granular*, expanded and reflexed over the perforation, sometimes not quite closing it, united to the outer lip by a very thin granulated callosity, coating the whorl within the aperture. (*Smith.*)

Greatest diam. 76, smallest 58, height (resting on its base) 35 mill.

Ekongo, Southeast Madagascar.

H. (Helicophanta) bicingulata E. A. SMITH, Proc. Zool. Soc. Lond. 1882, p. 380, t. 21, f. 13, 14.—*H. cornu-giganteum* ANGAS, P. Z. S. 1877, p. 527 (not of Chemnitz).—*H. guestieriana* ANGAS, P. Z. S. 1878, p. 312 (not of Crosse).

This is the species erroneously considered by Mr. Angas to be the *H. guestieriana* of Crosse, which much more closely resembles *H. ibaraoensis* of the former author. *H. guestieriana* is a more globose shell, with a higher penultimate whorl, a shorter aperture, a smooth columella, and a smooth callosity upon the body-whorl, which is encircled by several slightly raised ridges of more equal size than in *H. bicingulata*. The granular, slightly arched-forward columella in the latter species, the obliquely indented surface of the body-whorl, and the two very conspicuous brown slightly raised girdles distinguish this from the allied forms, *H. cornu-giganteum*, *betsileoensis*, *ibaraoensis*, and *guestieriana*. The first two are openly umbilicated, the third generally imperforate (in about 50 specimens I have seen a few with a narrow perforation); and the last is said to be "narrowly subrimate." *H. betsileoensis* has the columella granular, as in the present species; in the other three it is smooth. In *H. ibaraoensis* the callus uniting the columella and the outer lip and spreading over the whorl within the aperture is conspicuously granulated, and the epidermis is nearly black toward the lip. (*Smith.*)

Smith's description and comments are given above. It is scarcely necessary to add any further distinguishing marks. The species has, however, so great a range of variation that certain of its forms may embarrass the student. One of these is figured on pl. 64, fig. 63. This is a chestnut-brown shell, becoming olive-brown on the penultimate and earlier part of the last whorl, darker beneath. The two girdles are not nearly so well marked as in the type; the form is less depressed. Alt. 40, greater diam. 68 mill.

Another form (pl. 64, fig. 62) is very much smaller, and the spiral girdling quite different, being multicingulate, like *H. guestieriana*.

Alt. 35, greater diam. 60 mill.

It is altogether likely that *H. vesicalis* Lam. (*Vide* Férussac, Histoire, t. 10, figs. 3*a*, *b*, and Chenu, Illust. Conchyl., Helix, t. 1, figs. 1, 2, 3) is a form of this same species. It is certainly not correctly placed in the synonymy of *H. cornu-giganteum* Chem.

[NOTE. Since the foregoing part of the MANUAL was issued, Messrs. Crosse and Fischer's *Histoire Naturelle des Mollusques*, being vol. xxv of Grandidier's *Histoire Physique, Naturelle et Politique de Madagascar*, has been received. The part of the work before me consists of 26 plates of land-shells. It is not accompanied by text, and there are numerous errors in the lettering on the plates. I shall notice in the appendix the species of *Ampelita* figured.]

Crosse and Fischer figure (*Hist. Nat. Moll. Madag.*, pl. 2, figs. 1-4 under the name of *H. vesicalis*), two forms referable to *H. cornugiganteum*, although fig. 4 has the umbilicus more nearly closed than in the specimens I have seen of that species. Whatever the *H. vesicalis* of Lamarck may have been, the *H. vesicalis* of Chenu and the *H. cornugiganteum* of Deshayes (in Férussac, *Histoire* i, p. 284, = *vesicalis* of Lam. teste Desh.) are undoubtedly the species lately called *H. bicingulata* by E. A. Smith.

The same authors figure (*Moll. Madag.*, pl. 9, figs. 2, 3) two shells as varieties of *H. guestieriana*. These figures seem to correspond with the shells I have mentioned on page 64 as small varieties of *bicingulata*. The aperture is more oblique than in *guestieriana*; there is frequently a narrow umbilical rimation. This form (pl. 64, fig. 62) may be called var. *minima*.

Group of H. magnifica Fér.

H. MAGNIFICA Férussac. Pl. 9, figs. 16, 17.

Shell imperforate or with a very narrow chink behind the reflexed columellar lip; globose-depressed; diameter a trifle exceeding the height. It is rather thin but strong and solid; opaque; ground color yellow, more or less suffused with chestnut, and with a broad dark brown spiral zone above, one at periphery, and a third upon the umbilical area. These bands are generally split into very numerous narrower bands and spiral lines. Surface shining, obliquely striate, under a lens seen to be minutely granulate, except the last one-half of the body-whorl which is obscurely or not at all so. Spire very little raised above the penultimate whorl, almost flat; the inner $1\frac{1}{2}$ whorl increase slowly, the rest very rapidly. The embryonic shell is extremely large (greatest diam. 23-25 mill.) and finely, densely granulated under a lens; its inner whorls are deep purplish-brown, the last one-half whorl dull reddish, lighter at periphery, not distinctly banded. The post-embryonic growth consists of a little more than one volution; upon this whorl the color-bands are dis-

inct, the microscopic granulation becomes obsolete, the striæ of growth are far more distinct; and numerous low, irregular, inconspicuous spiral cords appear on the surface. The whorl is very large; it descends rapidly from its beginning, and is slightly but distinctly impressed at the place of the umbilicus. Aperture oblique, oblong truncated, pinkish white and distinctly showing the bands inside. Peristome very narrowly expanded and subreflexed on the outer and basal margins; columella straight, vertical, deeply inserted, its edge reflexed backward in a small triangular callus over the umbilical fissure, and continued in a rather strong brown callus across to the superior lip. This parietal callus shows an excessively minute, regular granulation under a strong lens.

Alt. 53, greater diam. 60, lesser 45 mill.

Alt. 56, greater diam. 64, lesser 47½ mill.; oblique alt. of aperture, 53 mill.

Madagascar.

H. magnifica Fér., Histoire, t. 10, f. 4.—PFR. Monographia Hel. Viv. i, p. 17; Conchyl. Cab., p. 116, t. 86, f. 1, 2.—REEVE, Conch. Icon., f. 175.—CROSSE & FISCHER, Moll. Madag., t. 3, f. 1, 2.—*H. polyzonalis* LAM. An. s. Vert., p. 66.—CHENU, Illust. Conch., Helix, t. 1, f. 3, 4.—*Helicophanta polyzonalis* BECK, Index, p. 46.

In *H. magnifica* the shell is almost as high as broad; the inner whorls of the spire are either almost flat or a trifle raised above the penultimate whorl. The color pattern varies in the details of banding, scarcely two specimens being alike. From all the species of the *cornuiganteum* group, it differs in the longer, more deeply inserted, more straightened columella, and in the much more broadly expanded last whorl. Viewed from above, *H. magnifica* and *Souverbiana* have the apex more excentric than the species allied to *gues-tieriana*, *cornuiganteum*, etc. Crosse and Fischer have figured a specimen measuring 78 mill. alt. It is far larger than any I have seen.

H. SOUVERBIANA Fischer. Pl. 12, figs. 44, 45, 46.

Shell imperforate, globose-depressed, broad, strong and solid but rather thin, opaque, chestnut colored, lighter and yellowish on the earlier part of the body whorl, dark chestnut on the later part, the inner whorls dark purplish-brown; the earlier half of the last whorl has several spiral bands denuded of epidermis. Surface somewhat shining, lightly, irregularly marked by growth wrinkles, and

under a strong lens seen to be minutely granulate; the granulation is indistinct on the last whorl, but dense and distinct on the inner ones. Spire flat, tip of the apex a trifle sunken. Whorls 4, the inner three forming the nucleus, which is densely, microscopically granulate. The post-embryonic portion is composed of one whorl or a little less; this widens rapidly, descends throughout its latter two-thirds, and has a very slight indentation around the umbilical region. The aperture is oblong-truncate, very broad, the upper and lower margins straightened, subparallel; inside it is whitish flesh colored, with an opalescent luster; the lip and a broad margin inside is dark brown; it is very narrowly expanded, reflexed at the columella, dilated over the umbilical fissure; parietal wall covered with a milky or bluish callus edged with brown.

Alt. 45, greater diam. 70-80, lesser 52-55 mill.; aperture, alt. from basal to superior lips, 34, oblique breadth 53 mill.

Eastern Madagascar.

H. souverbiana FISCHER, Journ. de Conchyl. 1860, p. 210, t. 4, f. 8. PFR. Monogr. v, p. 305.—DOHRN in Küster's Conchylien Cabinet, p. 624, t. 179 f. 6, 7.—*Helicophanta Souverbiana* Fischer, MOUSSON, Journ. de Conchyl. 1882, p. 38.

A beautiful species. The color is a rich chestnut-brown, with narrow zones extending part way around, denuded of epidermis. The form is more depressed than *H. magnifica*, more inflated transversely, flatter above. It is best shown in fig. 46 of the plate. The embryonic shell measures about 28 mill. in greatest diameter; its junction with the body-whorl is at a point in advance of the aperture.

VAR. AUDEBERTI MOUSSON. Pl. 10, fig. 28.

Shell large, covered rimate, depressed auriform, rather thin, strongly transversely obtuse-striate, and indistinctly encircled by obsolete interrupted sulci, partly irregularly and lightly granulate, pale fulvous or yellowish, ornamented with a single blackish-brown band, paler beneath. Spire very short, apex plain or a little impressed; suture moderate. Whorls 4, very rapidly increasing, the first convex, the last very large, descending, sloping above, narrowly curving at the periphery. Aperture oblique (50° with axis), transverse, long-oval, whitish-gray inside, the band showing. Peristome not thickened, narrowly reflexed, blackish, margins subparallel or some-

what converging, straightened, joined by a brown-edged callus. Columellar lip reflexed, almost covering the perforation. (*Mouss.*)

Alt. 43, greater diam. 77, lesser 45 mill.

Eastern Madagascar.

Helicophanta (Helix) Audeberti MOUSSON, in Journ. de Conchyl. 1882, p. 38, t. 3, f. 1.—*H. souverbiana* CROSSE & FISCHER, Moll. Madagascar, t. 5, f. 1, 2; t. 6, f. 2, 2a.

This beautiful species is seen at a glance to belong with *H. souverbiana*; differing however in the following characters: the shell is more depressed and more transverse; the whorls of the spire are less convex; the last, especially, descends, beginning at the suture, in a slightly swollen surface, whilst at the back it is more strongly curved, sometimes almost angular; the coloration is lighter, more yellowish, and especially remarkable for the girdle of brown, a color which also is seen on the peristome and edges the parietal callus. (*Mouss.*)

Notwithstanding the differences indicated above by Mousson, I regard the *H. audeberti* as a mere variety, distinguished principally by the persistent epidermis, not evanescent in zones as in typical *souverbiana*.

Group of H. gloriosa Pfr.

H. GLORIOSA Pfeiffer. Pl. 11, fig. 40.

Shell imperforate, depressed-ovate, thick, ponderous, obliquely closely plicate-striate and encircled by close, obtuse subregular liræ; tawny, marked with paler and darker oblique streaks; spire convex, obtuse, denuded of epidermis, granulate under a lens; apex very small. Whorls $3\frac{1}{2}$, rapidly widening, the last much inflated. Aperture oblique, lunate-oval, reddish inside; peristome very thick, narrowly expanded, margins joined by a thick callus, the columellar margin adnate. (*Pfr.*) Alt. 39, greater diam. 64, lesser 50 mill.

Madagascar.

H. gloriosa PFR. Proc. Zool. Soc. Lond. 1856, p. 385; Monographia iv, p. 205; Novitates Conch. i, p. 107, t. 30, f. 1, 2.

Group of H. Goudotiana.

H. OVIFORMIS Grateloup. Pl. 66, fig. 60.

Shell ovoid, ventricose, imperforate, greenish-fulvous, a little rugose; spire short, obtuse; last whorl large, encircled by two

scarcely noticeable zones; aperture ample, obliquely oblong; lip subacute, subreflexed; inner lip dilated above.

Alt. 45-48, diam. 35-38 mill. (*Grat.*)

I do not think that this *Helix* is the *Goudotiana*. The comparison I have made with Férussac's figure causes me to regard it as a distinct species. It is much larger, less globulose, more elongated, and consequently of a *Bulimus* shape. The aperture is very large, oblong, inclined, smooth within, a little translucent, and notwithstanding the greenish-fawn color, traces of the two spiral zones of the last whorl are visible within. Last whorl very large, elevated, ventricose, and at least four times longer than the short, obtuse spire. (*Grat.*)

Madagascar.

H. oviformis GRATELOUP, Actes Soc. Linn. de Bordeaux, xi, p. 396, t. 2, f. 2, 1839.—? *H.* . . . FER., Histoire, t. 10B, f. 1, 2; t. 10A, f. 6.—? *H. amphibulima* FER., in Mus.; and *Helicophanta amphibulimea* BECK, Index, p. 46?—(Not *H. oviformis* of REEVE'S Conch. Iconica, t. 38, f. 172a, b!)

I have translated above Grateloup's original diagnosis and comments, and given on pl. 66, fig. 60 a fac-simile of his figure. From these it will be seen that Reeve and Pfeiffer are in error in their identifications of this form.

Grateloup's description and figure were probably drawn from rather immature specimens. I have on the strength of this supposition, considered the following form a variety; it has however, apparently good claims to specific rank.

Var. PHENAX Pilsbry. Pl. 66, fig. 61 (type); pl. 11, fig. 39.

Shell oval or oblong, imperforate, but with a narrow, deep chink or rimation behind the reflexed columellar lip; solid but not thick; opaque; rich chestnut-brown, sometimes a trifle tinged with olive, and encircled by two dark brown bands, one at periphery, the other above it. The surface is slightly shining, and shows when closely examined, a very fine, dense granulation all over. The granulation is produced by the decussation of growth-striae by close, fine spiral impressed lines. Spire short, obtuse; apex a trifle sunken; suture impressed. Whorls $4\frac{1}{2}$, convex, the last very rapidly increasing, oval, descending, somewhat depressed in the baso-umbilical region. Aperture oblique, egg-shaped, rather acute above, rounded beneath, livid-flesh-colored inside and showing the two bands. Peristome

dirty white, narrowly expanded and subreflexed, the columellar margin more broadly reflexed, becoming adnate at the umbilical region, where it expands into a broad whitish callus plate, a thinner continuation of which extends across the body to the upper angle of the aperture. The inner edge of the columella is concave.

Alt. 57, greatest diam. 50 mill. Oblique alt. of aperture, including peristome, 46½, greatest width 35 mill.

Madagascar.

H. goudotiana REEVE, Conch. Icon., t. 38, f. 174*a, b*, not of Férussac!

The specimen described above is drawn on pl. 66, fig. 61; Reeve's illustration of the same form is given on pl. 11, fig. 39. Comparisons should be made with *H. oviformis* Grat. (pl. 66, fig. 60), and *H. Goudotiana* Fér. (pl. 9, fig. 21). The former I have assumed to be a shell of immature growth, although it is obvious that Grateloup had more than one specimen before him. It is narrower than my *H. phenax*, with decidedly different columella; the true *Goudotiana* Fér. (*non* Reeve *nec* Pfr.) is a smaller shell, with more tortuous columella, and as Deshayes states and the figures plainly show, the columellar lip is more narrowly reflexed than the outer lip. The wrinkling of the surface also separates it,—*phenax* being entirely free from malleation or wrinkling.

Another shell which may be referred to *H. oviformis* or *H. phenax* as a variety is figured on pl. 66, fig. 59; it agrees with *phenax* except in the following characters: it is more lengthened, proportionally narrower, the body-whorl less ventricose, and convex instead of flattened on the umbilico-basal portion. The columella is more suddenly dilated at the umbilical region.

Alt. 62, greatest width 47½. Oblique alt. of aperture 50, greatest breadth 37 mill.

Pfeiffer's figures (in the Conchylien Cabinet, plate 54, figs. 1, 2, "H. Goudotiana") are evidently drawn from a shell of this variety.

Crosse and Fischer figure under the name "*oviformis*," a specimen of my *H. phenax*. (Vide Moll. Madagascar, pl. 1, figs. 5, 6.)

H. GOUDOTIANA Férussac. Pl. 9, fig. 21.

Shell oblong-ovate, imperforate; spire very short, composed of 4½ whorls, very rapidly increasing; color reddish-brown or yellowish, with two narrow encircling zones of deep dark brown. Surface finely granulate all over, and with obliquely descending wrinkles (visi-

ble especially on the back of the shell opposite the aperture). Last whorl oblong, convex, much higher than broad. Aperture oval, much higher than broad; peristome whitish, thick, strongly and uniformly reflexed all around except on the columellar margin, which is narrowed somewhat, and becomes nearly cylindrical, and noticeably tortuous. A straight parietal callus unites the ends of the peristome, and covers the umbilical region with a small callus.

Alt. 50, diam. 35 mill.

Madagascar.

H. Goudotiana FER., Histoire iii, t. 10 A, f. 4, 5; vol. i, text, by DESHAYES, p. 286 (not *H. goudotiana* of REEVE, Conch. Icon., t. 38, f. 174 *a, b*, nor of PFR. Conchylien Cabinet, t. 54, f. 1, 2).—*H. oviformis* Grat., REEVE, Conch. Icon. f. 172 *a, b*.

Reeve and Pfeiffer have confused this species with *H. oviformis* and its variety *phenax*. From these it differs entirely in the more tortuous columella, smaller size and the obliquely descending wrinkles of the surface.

Boettger (Nachrichtenblatt d. Deutschen Mal. Ges. 1889, p. 44) reports it from the island of Nossi-Bé; but whether he had the true *Goudotiana* or not I do not know.

I have not seen the species, my description being compiled from Deshayes' account of the original specimen. All doubtful references have been purposely omitted in the above synonymy.

H. ECHINOPHORA Férussac. Pl. 9, fig. 20; pl. 42, figs. 31, 32.

Shell ovate-oblong, imperforate, reddish-chestnut colored, encircled by a broad light zone, with 2 narrower zones bordering it. Epidermis yellowish, bristling with a great number of stiff, suberect but minute scales, disposed longitudinally in series coincident with the growth-striæ. Spire short, conoid, apex obtuse. Whorls 4, slightly convex, the last large, ovate. Aperture ovate-oblong, subquadrangular; peristome white, thickened and expanded; columella arcuate, base calloused, above entirely covering the umbilical tract. (*Desh.*)

Alt. 40, diam 34 mill.

Madagascar.

H. echinophora Fér. in Mus.; Histoire, t. 10 A, f. 7-9.—DESH. in Histoire, i, p. 287.—PFR. Monographia iii, p. 27.—CROSSE & FISHER, Moll. Madag., t. 4, f. 1, *a, b, c, d*.

Has not been described by any authors except Férussac and Deshayes. Pfeiffer copies the original diagnosis. Crosse and Fisher have given good figures of the shell, two of which are reproduced on pl. 42, figs. 31, 32.

H. GRANDIDIERI Crosse & Fischer. Pl. 42, fig. 30.

Shell scarcely covered subrimate, globose-oviform, solid, longitudinally granulate-rugose, pale reddish-chestnut; spire short, apex obtuse, planate; suture impressed; whorls 5, convex, embryonic first $1\frac{1}{2}$ scarcely striate longitudinally, pale chestnut-rosy, the last whorl large, inflated, longer than spire, spirally bifasciate with blackish-brown, base rounded, aperture subvertical, ovate-pyriform, livid white inside, the bands of the last whorl showing through; peristome reflexed, dull white; margins connected by a thin callus, the columellar dilated, thick, vertical, straight, basal and outer margins reflexed, thickened. (*C. & F.*)

Alt. 49, greater diam. 35 mill. Aperture, alt. 35, breadth 26 mill.

Madagascar.

H. grandidieri C. & F. in Journ. de Conchyl. 1875, p. 226.—Pfr., Monogr. vii, p. 579.—*Helix Goudotiana* CROSSE & FISCHER, Moll. Madagascar, t. 1, f. 1, 2.

A species allied in form and coloration to *H. Goudotiana* Fér., but much smaller, more globose, the aperture subvertical, not oblique, and the columellar margin much more broadly dilated.

H. PARTULIFORMIS Boettger.

Shell imperforate, bulimiform, ovate, compressed on the back, rather solid, brown, obscurely quadri-fasciate, bands little distinct; spire rather elevated, convex-conical, apex a little acute. Whorls $4\frac{1}{2}$, slightly convex, very rapidly increasing, the upper whorls very elegantly reticulated with spiral and transverse lines, the last inflated; incremental striæ subwrinkle-like, gathered at the suture, and numerous oblique wrinkles or malleations; last whorl descending to the aperture, thrice the size of spire. Aperture substraight, auriform, rather narrow, livid and showing the bands inside; columella long, straight, with a knife-shaped callus in the middle; peristome thickened, all around expanded and reflexed, margins joined by a thin callus, the columellar margin broadly dilated above.

Alt. 58, greater diam. 42, lesser 31 mill.; alt. of aperture (with peristome) $38\frac{1}{2}$, width $26\frac{1}{2}$ mill.

Forest of Loucoubé, Island of Nossi-Bé (one specimen).

H. (Helicophanta) partuliformis BOETTGER, *Nachrichtsbl. Deutsch Mal. Gesellsch.* 1889, p. 44.

This new form is separated from the allied *H. Goudotiana* Fér. by the more slender shell, more produced spire, the two little bands lying between those which encircle the middle part of the shell, the oblique wrinkles of the last whorl, and the narrower, ear-shaped aperture with much more thickened and reflexed peristome. *H. farafanga* H. Ad., also a Madagascar species, is narrower, has higher spire, finer apex, and numerous dark spiral bands. *H. partuliformis* is separated, moreover, from all known species of the group by the thickened, quite rectilinearly ascending columella, which bears in the middle a distinctly convex, long, knife-shaped, sharpened callus. (*Boettger.*)

I refer with some doubt to this species, the "*H. amphibulima*" of Crosse & Fischer's *Moll. Madag.*, pl. 1, figs. 3, 4. One of these figures is copied on pl. 42, fig. 29. There seems to be no warrant for reviving the name *amphibulima*; it has never been properly characterized, and has certainly been applied to several distinct species.

Group of H. farafanga Ad.

H. FARAFANGA H. Adams. Pl. 15, fig. 71.

Shell large, bulimiform or pointed-ovate, imperforate, solid and rather thick, pale brown, encircled by very many dark brown bands; surface dull, with irregular growth wrinkles; spire short, conical, a little obtuse at apex; suture impressed. Whorls $4\frac{1}{2}$, convex, the last forming the greater part of the shell, oval. Aperture ovate, angled above, whitish-lilac colored and banded with dark purplish inside, and having an opalescent luster; peristome white, thickened, obtuse, a trifle expanded all around, a little dilated at the place of the umbilicus, the terminations connected by a rather thick white callus.

Alt. 92, diam. 70 mill.; aperture, alt. 67, width 50 mill.

Ekongo, on the Farafanga (or Farafangane) River, S. E. Madagascar.

Eurycratera farafanga H. AD., *Proc. Zool. Soc. Lond.* 1875, p. 389, t. 45, f. 1, 1a.—DOHRN, in Küster's *Conchyl. Cab.*, p. 622, t. 179, f. 1, 2.—*Bulinus farafanga* PFR. *Monographia*, viii, p. 17.—*H. farafanganensis* CROSSE & FISCHER, *Journal de Conchyliologie*, 1881, p. 161; *Moll. Madag.*, t. 6, f. 1; t. 10, f. 1.

A magnificent species. The shell before me lacks epidermis, and this is the case I believe with all known specimens; it is probably constantly deciduous, as in the Ceylonese *Acavus*. The embryonic shell is very large, as in the other species of *Helicophanta*. It is of a tawny color, bandless, and shows rather prominent and regular wrinkles of growth; under a lens very minute granulation is visible. The last $1\frac{1}{4}$ whorls are banded.

* * *

H. FOLLIS Férussac. Pl. 15, fig. 76.

Under the above name Férussac gives a figure of a gigantic *Helix* belonging to the collection of the museum of Paris. There is but a single individual known, it being one of the rarest specimens in the collection. It is nearly the size of a man's fist, is quite globose; the spire is short and obtuse; it is formed of 4 convex, rapidly increasing whorls; the last one enormous, forming most of the shell, is globose, its diameters nearly equal. Umbilicus none. Aperture very large, obrotund, semilunar, a little oblique, a little higher than wide; peristome simple, not very thick, obtuse. The shell is thin, somewhat transparent, smooth, with a few slight marks of increment. Color milky-white, with a broad reddish-yellow zone around the axis, upon which there are three equidistant brown bands, formed of a multitude of close, fine longitudinal lines.

Alt. 88, diam. 83 mill.

Habitat unknown.

H. follis FER., Histoire, t. 17, f. 4.—DESH. in Fér., Hist., p. 268.—PFR. Mon., i, p. 191.

A portion of Deshayes' description of this unique shell is given above.

Section II. PANDA Albers, 1860.

Panda Albers, Die Heliceen (edit. Martens), p. 149.—PFR. Nomen. Hel. Viv., p. 170.—FISHER, Manuel de Conch., (as sect. of *Helicophanta*).

Shell very large, globose-ovate, umbilicate or imperforate, higher than wide, thin but solid; spire short, obtuse; body-whorl very large, yellowish, variegated and spirally zoned with chestnut. Whorls $4\frac{1}{2}$. Aperture higher than wide, ovate; peristome simple, not expanded. Columella subvertical, sinuous, dilated and reflexed; parietal callus thin. Type *H. falconeri* Reeve.

In *Panda* the embryonic whorls are not different from the adult part of the shell in texture or sculpture. The surface has very fine, close, spiral incised lines. On the inner whorl the color-markings fade out leaving a light uniform flesh tint.

Like the other groups which I have assembled under Macroön, *Panda* has an aspect of individuality that precludes the inclusion of its species in any other section. Its mode of reproduction is still unknown. It is not, therefore, certain that the section belongs in Macroön.

H. FALCONERI Reeve. Pl. 19, fig. 33.

Shell very large, globose, umbilicated, thin but strong, opaque, light yellow, very closely marked all over by narrow, irregular rich chestnut-colored lines in the direction of growth-striae, and encircled by a number of girdles formed of dark chestnut spots, one girdle below the suture, most of the others on the lower part of the whorl. Surface very densely marked all over by close, fine spiral incised lines. Spire short, obtuse; suture impressed; whorls $4\frac{1}{2}$, the last very large, globose, deeply impressed around the umbilicus. Aperture scarcely oblique, flesh-colored inside; lip thin, simple, the columellar margin sinuous, broadly expanded above. Umbilicus deep, narrow.

Alt. 85, greater diam. 82 mill. Alt. of aperture 65, width 52 mill.

Manning, Bellinger, Clarence, Richmond and Tweed Rivers, N. S. W.; Ipswich and Muggerraba, Queensland, Australia.

Helix Falconeri REEVE, in Conch. Syst. ii, t. 163, f. 4; Conch. Icon., f. 355.—PFEIFFER, Monographia i, p. 16; Conchyl. Cab., p. 385, t. 12, f. 11, 12.—*Euryeratera Falconeri* BECK, Index, p. 45.—*Helicophanta Falconeri* ALBERS, Die Hel. ed. 1, p. 110.—*Cox*, Monogr. Austr. Land Sh., p. 5, t. 6, f. 6.—*Panda Falconeri* ALB-MART. Heliceen 2d. ed.—SEMPER, Reisen im Arch. Phil. ii, p. 104, t. 12, f. 20; t. 16, f. 10 (Anatomy).—*H. (Panda) Falconeri* Rve., HEDLEY, Proc. Roy. Soc. Queensl., v, p. 63, 1888; loc. cit., p. 152.

The largest Australian *Helix*. The ground-color of light yellow is so closely marked by chestnut lines as to appear of a brown color; but specimens are not infrequently found of a clear straw color, without dark markings. Mr. Hedley gives his experience in collecting this species as follows: Only two immature living examples rewarded my exertions, though the scrubs were full of dead and broken shells. They probably hide during the dry

weather in the nooks and crannies of the giant fig trees. The rubbish among the buttressed roots of the great scrub trees is capital hunting grounds for a naturalist, but too often he finds himself forestalled by that enthusiastic conchologist and able collector, the scrub turkey.

H. MACONELLI Reeve. Pl. 19, fig. 26.

Shell imperforate, lengthened-ovoid, bulimiform, thin but strong; surface shining, microscopically spirally striate. Color light yellow, covered with fine close longitudinal broken lines of chestnut and encircled by a number of girdles formed of dark chestnut or chocolate spots. Whorls $4\frac{1}{2}$, the last very large; spire short, obtuse. Aperture ovoid, angled above, flesh-colored inside; peristome thin, simple; columella sinuous, reflexed and appressed over the umbilical region. Alt. 75, diam. 58 mill.

Brisbane, Queensland, Australia.

Bulimus Maconelli REEVE, Proc. Zool. Soc. Lond. 1851, p. 198, t. 12.—*Helix maconelli* RVE., PFR., Monogr. iii, p. 380.—COX, Monogr. Austr. Land. Sh., p. 6, t. 3, f. 5.—*H. (Panda) maconelli* RVE., HEDLEY, List Queensl. Land Shells, in Proc. Roy. Soc. Queensland, p. 63, 1888.

Just like *H. falconeri* in color and sculpture, but narrower and imperforate.

Section III. ACAIVUS Montfort, 1810.

Acaivus MONTF. Conch. Systematique, ii, p. 234; 1810. Type, *H. hæmastoma*.—*Acaivus Montf.*, of ALBERS, BECK, MORCH, PFEIFFER, and authors generally.—*Otala* (in part) SCHUMACHER, Essai, p. 191, 1817.—*Oligospira* ANCEY, in The Conchologists' Exchange ii, p. 22, 1887. Types *H. waltoni* and *H. skinneri*.

The section *Acaivus* comprises Ceylonese helices of large size and superb painting. The capacious shell is either globose-conical or depressed in contour; pink predominates in the color-scheme of the outer surface, combined with chestnut and white; and the broad polished lip and columella are intensely black, vivid red, or of a lilac tint.

The lusterless surface is seen under a strong lens to be very minutely cut by oblique, decussating scratches; in *waltoni* and *skinneri* it is granulated. The epidermis is very thin, yellowish; in most species it is deciduous, being wholly absent. Such shells are covered

(when fresh) by a thin greenish coat, composed probably of algæ, which almost entirely obscures the conspicuous hues of the underlying shell-substance. Cabinet specimens are generally denuded of this extraneous layer. The two species (*waltoni* and *skinneri*) which retain the epidermis in part, do not possess this dull outer coat.

The axis is hollow, but closed in adult shells by the broadly expanded columellar lip. The aperture is very oblique, truncate-oblong; the lip broadly expanded and revolute; the entire length of the columellar lip is reflexed and adnate to the base of the shell, spreading into a broad flat or excavated plate. The young shell is subglobose, with rounded periphery. The egg, as in all other members of the subgenus *Macroön*, is large (about $\frac{1}{3}$ the diameter of the adult shell). It is calcareous. Sarasin says: In moist places in Ceylon, under the mould around the roots of large trees, one often finds white hard-shelled eggs, the size of a small bird's egg. The people know them well, and enjoy opening them to find the young snail which each contains. The sight is indeed unusual enough to a European; for the young snail stays, like a chicken in its egg, so long as it has room to grow; and its shell shows remarkably fresh and varied colors. These are the eggs of *H. hæmastoma*, and allied species such as *H. waltoni*, everywhere abundant in the southwestern part of the island.

I have excluded those species from New Guinea which Messrs. E. A. Smith and Tapparone-Canefri refer to *Acavus*. I have examined several of them and find that the embryonic shell (and consequently the egg) is small. This character at once removes them from the vicinity of *Acavus*, and shows them to belong to the *Papuina* (*Geotrochus*) series. Of these excluded species, *H. brumeriensis* Forbes, is figured on Pl. 12, figs. 41, 42, 43. *H. comriei* Angas on Pl. 16, figs. 8, 9. *H. coraliolabris* Smith, Pl. 17, fig. 13, and *H. latiaxis* Smith, Pl. 17, fig. 16. The descriptions will be found under the subgenus PAPUINA (*Geotrochus* of authors).

Groups of *Acavus*.

Group of H. hæmastoma. The shell is conoidal, the spire elevated, its whorls convex. The surface is wholly deprived of cuticle or epidermis, except just back of the lip where it sometimes is preserved; but the outer surface has, in living or fresh shells, a thin coating of greenish algæ, which hides the bright underlying colors. The post-embryonic growth comprises about $1\frac{1}{2}$ whorls.

Group of H. waltoni. Shell depressed-globose, oblong, spire very short and obtuse, scarcely projecting above the body-whorl. The surface retains a thin epidermis, deciduous in places, not concealed in life by any foreign growth. There are numerous more or less perceptible low girdles on the shell, easily seen when it is worn. The post-embryonic growth consists of only one whorl, or a little more or less. *H. waltoni* and *H. skinneri* are the only species of this type.

Group of H. hæmastoma Linn.

H. HÆMASTOMA Linné. Pl. 18, figs. 22, 23, 24, 25.

Shell globose-conical, white, brown above and usually brown around the umbilicus; aperture very oblique; columella not truncated where it joins the basal lip.

The shell is solid and opaque, with rounded periphery and conoidal spire. It is porcelaneous white, but dull, not polished when in a natural condition; the whole surface above the periphery is usually of a reddish-brown hue, becoming paler of a brownish-flesh-color on the embryonic three whorls, and pink on the inner two; at and below the periphery there is a white zone, which covers the base, or is limited by a brown tract upon the umbilical region; the suture is often edged by a white line. The surface has rather rude but inconspicuous lines of growth, and under a strong lens is seen to be covered by a dense minute pattern of incised criss-cross scratches; the embryonic whorls have radiating subregular striæ, cut by subobsolete spiral engraved lines. Whorls nearly 5, convex, the last flattened and sloping above, a little descending in front. Aperture very oblique, oblong-truncate, white inside, showing faintly the bands of outer surface. Entire peristome broadly reflexed, of a bright pinkish-red color typically; columellar margin long, oblique, very broadly expanded and adnate to the base, flat, with a curved excavation at the place of the umbilicus; parietal wall covered by a heavy callus of the same color as the lip.

Alt. 37, diam. 43 mill.

Ceylon.

Helix hæmastoma LINN. Syst. Nat. edit. x, p. 773.—PFR., Monographia i, p. 247.—REEVE, Conch. Icon., f. 366.—HANLEY & THEOBALD Conch. Indica, t. 127, f. 2 and of authors generally.—*H. hæmatragus* BORN, Ind., p. 400.—*H. melanotragus* BORN, Ind., p. 400; Test. Mus. Cæs. Vindob., p. 388.—*H. senegalensis* Encyc.

Méth., t. 462, f. 4.—*H. acava* VALENCIENNES in Paris Mus.—*Acavus hæmastomus* MONTE, Conch. Syst., p. 235, t. 59.—SEMPER, Reisen im Arch. Phil., Land Mollusken ii, p. 99, t. 12, f. 8–10 (Anatomy).

This species is smaller and less globose than *H. phœnix*, and has clearly defined dark encircling zones. There is great variation in banding, as the figures on plate 18 show; and very rarely bandless specimens occur (fig. 23).

It may be noted that the columella is entirely red in the typical form having no white spot at its insertion such as occurs in all other species.

The synonymy given above includes only references which may be of use to modern students. Pfeiffer cites many additional authors in the Monographia.

Benson collected this shell at Point de Galle, Ceylon. He says: The trunks of the mangoe trees were literally encrusted with living specimens of *hæmastoma*, with its gorgeous red peristome and chestnut and milk-white bands, the splendor of which was invariably concealed by a coating of green fæcula, which served in some measure to screen the shells, which otherwise by the contrast of colors would have been too conspicuous to their enemies. On a single tree I counted thirty specimens within reach.

Var. MELANOTRAGUS Born. Pl. 18, fig. 24.

Peristome and a broad band across the parietal wall black; a white spot at the insertion of the columella.

This variety is nearly as abundant as the typical red-lipped form.

Var. CONUS Pilsbry. Pl. 16, fig. 7.

More elevated and conical than the type, with which it agrees in the color of the outside. The entire peristome, columella and a broad band across the parietal wall are a beautiful lilac or purple color; a rather deep excavation at the place of the umbilicus.

Alt. 36, diam. 35 mill.

H. FASTOSA Albers. Pl. 16, figs. 5, 6.

Shell imperforate, globose-conical, regularly, closely striate, whitish, obliquely streaked, and multifasciate with tawny; spire conic, rather obtuse; whorls $4\frac{1}{2}$, a little convex, rapidly increasing, the last descending in front; periphery most obsoletely subangulated; aperture diagonal, obliquely oblong, white inside; peristome liver-

colored, the terminations joined by a shining, entering, blackish-chestnut callous; superior margin slightly arched, expanded and a little reflexed, columella sloping, flat, much dilated, adnate. (*Pfr.*)

Alt. 27, greater diam. 38, lesser 30 mill.

Ceylon.

H. fastosa ALBERS, Mal. Bl. i, 1854, p. 213.—PFR. Novit. Conch. i, p. 40, t. 11, f. 1, 2; Monographia iv, p. 197.—HANLEY & THEOBALD, Conch. Indica, t. 127, f. 5.

Pfeiffer notes a variety which is white, peristome very pale rose, parietal callus purple.

I have not seen this species. It seems nearest to *H. hæmastoma*, but differs in having many encircling bands, etc.

H. PROSPERA Albers. Pl. 17, figs. 14, 15.

Shell imperforate, conoid-globose, solid, distinctly striate, unicolored, purplish-chestnut; spire inflated-conoidal, apex rosy; whorls 4, convex, moderately increasing, the last ventricose, subdescending in front; aperture diagonal, truncate-oblong, rounded below, milk-white inside; peristome purple, expanded, its terminations joined by a purple callus, right margin a little bent in the middle, upper margin arcuate, columellar margin straightened, dilated, a little excavated, passing gradually into the basal margin. (*Pfr.* from specimen in coll. Albers.)

Alt. 25, greater diam. 44, lesser 34 mill.

Ceylon.

H. prospera ALB. in Malak. Bl. 1857, p. 93, t. 1, f. 7, 8.—PFR. Monographia iv, p. 197.

Differs from all other species in its globose form, etc. I have not seen specimens.

H. PHENIX Pfeiffer. Pl. 17, figs. 10, 11, 12.

Shell globose-conoidal, dull chestnut colored, or when rubbed yellowish or pink with wide indistinct light brown or pink oblique streaks; never distinctly spirally banded; lip black (rarely brown or pink); columella a little truncated at its lower end or not perceptibly so.

The shell is globose conoidal, rounded at the periphery; solid; last whorl reddish-brown, upper whorls yellowish or pink; but when worn or rubbed the body-whorl is light with oblique streaks of yellowish-brown or pink. The surface is lusterless, rather rudely striate, and shows under a strong lens a very faint, very minute pat-

tern of criss-cross scratches, less distinct, even on well-preserved specimens than in *H. hæmastoma*. Whorls $4\frac{3}{4}$, convex, the last descending in front, rounded at the periphery. Aperture bluish-white inside, the lip and a broad band across the parietal wall deep black. The entire peristome is broadly expanded and revolute; the columellar margin straight, broad, adnate to the body, and generally visibly truncated at its junction with the basal lip. Parietal callus strong and polished.

Alt. 51, diam. maj. 64 mill. Alt. 41, diam. maj. 50 mill.

Ceylon.

H. phoenix PFR., Mal. Bl. 1854, p. 53; Monographia iv, p. 194.—HANLEY & THEOBALD, Conch. Indica, t. 127, f. 6.—*H. hæmastoma* var. PFR., Monogr. i, p. 248.—*H. melanotragus* REEVE, Conch. Icon. f. 367; and of others, not *H. melanotragus* Born.—*H. senegalensis* LAM. in Encyc. Méth., t. 462, f. 4.—*H. seposita* ZIEGL. mss. teste STROBEL, in Giorn. di Malac. 1854, p. 70.

This is easily distinguished from *H. hæmastoma* by its larger size, rather less elevation, and especially the lack of encircling bands, which are always present in the *hæmastoma*. The peristome is rarely pink or brown; and I have seen an albino form with pure white lip. It differs from *H. superba* and *H. grevillei* in having a more globose body-whorl, not distinctly bluntly angled at the periphery as those forms are; the columellar plate of the *superba* and *grevillei* is more strongly truncated than in *phoenix*.

H. SUPERBA Pfeiffer. Pl. 16, figs. 3, 4.

Shell globose-conoidal, bluntly but quite distinctly angular at the circumference; lip white, broadly edged with rich orange-chestnut color.

The form is decidedly conoidal above, the earlier whorls rounded, the last flat and sloping to the obtusely angular periphery. It is chestnut-brown all over, covered when fresh with a thin yellowish-green coat, which is rubbed off below in front of the aperture. The upper whorls are delicate pink. The surface of the last whorl shows a few very indistinct shallow spiral furrows above and beneath the periphery, and is obscurely, very coarsely malleated, or sometimes has obliquely descending low folds above the peripheral angle, visible on the back of the shell; both this sculpture and the spiral furrows are frequently obsolete or nearly so. The aperture is very oblique, rather dark bluish-white inside, and of an oblong-truncate

shape, the upper and lower margins subparallel. The peristome is very broadly expanded and revolute, its face white, shading toward the outer edge into a beautiful reddish-chestnut color; the back of the reflected lip is white, or when not denuded of the very thin epidermis it is yellowish. The broad columellar plate is generally very distinctly truncated at the base; it is white. The parietal callus is usually bordered with chestnut-color.

Alt. 40, diam. 49 mill.

Ceylon.

H. superba PFEIFFER, Zeitschrift für Malak. 1850, p. 71; Monographia iii, p. 185; Küster's Conchyl. Cab., p. 342, t. 133, f. 1, 2.—REEVE, Conch. Icon., f. 368*a, b*.

A beautiful shell, separated from *H. phoenix*, *hæmastoma*, *fastosa* and *prospera* by its decidedly more angulated periphery. It is more or less malleated or obliquely plicate on the back of the body-whorl. The lip is white toward the inner side, shading into a lovely carnation hue on the outside edge, and the back of the recurved portion is white.

The following forms are distinguishable as varieties.

Var. ROSEOLABIATA Nevill. Pl. 16, figs. 1, 2.

This form is somewhat larger than the typical *superba*. The surface is scarcely malleated, and not obliquely plicate. The peristome is more broadly expanded than in *superba*; the lip, columella and a band across the parietal wall of a deep rose color. There is a white spot at the insertion of the columella. The columellar plate is abruptly truncated at its base.

Alt. 42, diam. 60 mill.

Ceylon.

H. superba in HANLEY & THEOBALD'S Conchologia Indica, t. 127, f. 4.—*H. superba* var. *roseolabiata* NEVILL, Journ. Asiatic Soc. Bengal, vol. 50, pt. ii, p. 134, 1881.

In its pristine condition this magnificent shell does not have so pink an outer surface as the figures on the plate show. It is of a chestnut or pinkish-purple color, covered, like all *Acavus*, with a dull greenish coating.

Var. GREVILLEI Pfeiffer. Pl. 12, figs. 47, 48.

A little more elevated than the average *superba*; dark chestnut-brown, with pink spire; the face of the peristome and a parietal band is black, the columella having a white spot at its insertion.

The reverse or back of the reflected lip is blackish-brown, not light as in the *superba* and *roseolabiata*. The surface is more or less prominently corrugated on the back of the body-volution by obliquely descending folds, generally less regular than in my figure 47.

Alt. 44, diam. 52 mill. Alt. 36, diam. 44 mill.

Ceylon.

H. grevillei PFR. Proc. Zool. Soc. Lond. 1856, p. 387; Monographia iv, p. 105; Novitates Conch. i, t. 30, f. 6, 7.—HANLEY & THEOBALD, Conch. Indica, t. 127, f. 7.

This form has the same angular contour shared by *superba* and *roseolabiata*. The surface is more corrugated by oblique folds than the majority of specimens of *H. superba*, but not more than the rougher examples of that form before me. The lip and parietal band, as well as the greater part of the columellar plate are black, as in *H. phœnix*.

I may safely say that *H. grevillei* is not more distinct from the typical *superba* than *roseolabiata* is; and the three constitute in my opinion nothing more than varietal manifestations of a single specific type.

Group of H. waltoni Reeve.

H. WALTONI Reeve. Pl. 18, figs. 20, 21.

Shell globose-depressed, the spire very low and small; lip expanded and revolute, not thickened, blackish-brown.

The shell is of a globose form, much depressed, and transversely inflated so that it is oblong seen from above or below. The spire is small and short, very obtuse; whorls about $3\frac{3}{4}$, the first $3\frac{1}{2}$ forming the embryonic shell, which is separated from the after-growth (of a little over one volution) by a distinct line and a change of color, the nucleus being darker than the part following. The last whorl is much inflated, and descends deeply in front. The color is pinkish, banded with chestnut-brown; the bands rather wide, 3 to 6 in number, fading into the ground-color at their edges. The whole shell is covered with a very thin yellowish epidermis, which comes off in angular patches and flecks, leaving pinkish markings; or remaining on these tracts becomes separated from the shell substance, and appears as white or cream colored angular hydrophanous patches. The surface is obliquely striate, and under a lens is seen to be cut into granules in places by fine incised spiral lines. The aperture is very oblique, of a lovely pink tint inside; the broadly reflected per-

istome, the entire columella and a broad band across the parietal wall are blackish-brown. Alt. 33, greater diam. 52, lesser 37 mill.

Ceylon.

H. waltoni REEVE, Proc. Zool. Soc. Lond. 1842, p. 49; Conch. Syst. ii, t. 166, f. 23; Conch. Icon., f. 372.—PFR. Monographia i, p. 19; Küster's Conchyl. Cab., p. 267, t. 121, f. 1-3.—P. & F. SARASIN, Ergebnisse naturwissensch. Forschungen auf Ceylon i, 2tes Heft, 1888. (*Embryology.*)

A lovely shell, of peculiarly beautiful and effective coloration. The angular patches of hydrophanous epidermis are characteristic, but unfortunately my artist did not reproduce this feature in the figures.

H. SKINNERI Reeve. Pl. 18, figs. 17, 18, 19.

Shell depressed-globose, the spire very low, small, obtuse; peristome very greatly thickened, violet or lilac in color.

The shell is much smaller than that of *H. waltoni*, of an inflated-depressed form, the spire flat and obtuse, projecting but slightly above the body-whorl. Whorls $3\frac{1}{2}$, the earlier $2\frac{1}{2}$ forming the nucleus or embryonic shell, the post-embryonic growth consisting of a little less than one volution. This body-whorl is globose-depressed, descending in front, inflated beneath. The color is dull chestnut-brown, the thin epidermis worn off on the base, showing the pinkish-gray substance of the shell. The epidermis, where not worn, is seen to be closely flecked with golden specks. The surface is lusterless; there are numerous little-raised encircling ridges or cords on the body-whorl, and under a strong lens the surface is minutely granulate; the whorls of the spire are decussated by subobsolete spiral lines crossing growth-striae. The aperture is very oblique, the interior, the parietal wall, the columella and lip of a violet or lilac color. The outer lip is slightly expanded, its face thickened by a callous growth extending 5 millimeters or more in front of the expansion. Alt. 21 greater diam. 36, lesser 26 mill.

Ceylon.

H. skinneri REEVE, Conch. Icon., f. 1387.—PFR. Monographia iv, p. 219.—HANLEY & THEOBALD, Conch. Ind., t. 111, f. 1.—*Acavus skinneri* FFLD. in Zool-bot. Ges. Wien 1869, p. 876.—SEMPER, Reisen in Archip. Philippinen, Land Moll. ii, p. 100, t. 12, f. 7; t. 16, f. 5. (*Anatomy.*)

In the peculiar thickening or duplication of the peristome this species stands alone. It is the smallest of the Ceylonese *Acavus*.

Section IV. STYLODONTA Cristofori & Jan.

Stylodonta C. & J., Catal., p. 2, 1832; type, *H. unidentata*.—PFEIFFER (in part) Nomencl. Hel. Viv., p. 170, 1881.—FISCHER Manuel (as sect. of *Acavus*).—TRYON, Manual of Conchology, 2d Series, ii, p. 5, 26 (as sect. of *Rotula*, a subg. of *Nanina*).—*Stylodon* BECK, Index Moll., p. 46.—ALBERS (in part) Die Heliceen, edit. Martens, p. 149.—*Columplia* HARTMANN, Gastropoden Fauna Schweiz, p. 187 (as subg. of *Helix*).—*Pachya* ALBERS (in part) Die Heliceen, p. 107, 1850.

The shell in *Stylodonta* is imperforate, the axis a solid pillar, not perforated even in the young. In contour it is globose-depressed, wider than high, with conoidal blunt spire. The texture is strong and solid, opaque; the surface peculiarly sculptured. Color chestnut-brown or yellowish; whorls about $5\frac{1}{2}$, very gradually widening, somewhat descending in front. Aperture wide-lunate, oblique, the peristome expanded, reflexed; columella short, nearly vertical, and either convexly lobed or strongly toothed. The terminations of the peristome are remote, joined by a translucent callus.

Most authors have included the *H. cepoides* Lea in *Stylodonta*. That species is, however, far more closely allied to *Cochlostyla*, and will be considered in connection with that group, in the next volume of the MANUAL. The late Mr. Tryon (Man. Conch. ii, p. 26) included Albers' group *Erepta* (type *H. stylodon*) as a synonym under *Stylodonta*. This grouping is obviously unnatural, for the species of *Erepta* do not exhibit the large embryonic shell nor the reflexed peristome of the present group, and are besides wholly diverse anatomically, being correctly placed in the genus *Nanina* (*sensu latiore*), whilst the true *Stylodonta* belongs to the *Helicidae*.

Dufo's account of the reproduction of these snails is of the greatest interest. He says of *H. unidentata*: "Sixty days after impregnation the young are born. They lie in the oviduct one after another, enveloped in a glairy mass, thicker at the aperture where the head is. The animal of the mother is not protruded from the shell during the birth of the young. After they have left the oviduct they pass by their own movements out between the shell and the body of the mother. There are usually two, rarely three; and in the latter event one of them is much smaller than the two

others. During the period of gestation the animal becomes thin, having lost over a half of its volume by the end of that time. I have always noticed that those individuals having shells of a less dark color are the only ones bringing forth young." The same observations apply to *H. studeriana* also. This species, however, bears only one or two young at a time.

H. UNIDENTATA Chemnitz. Pl. 61, figs. 21, 22.

Shell depressed, imperforate; spire low-conoidal, blunt; body-whorl keeled; aperture very oblique, the short vertical columella with a strong, acute, twisted tooth.

The shell is solid, strong and opaque, of a chestnut-brown color all over, sometimes yellowish-brown; the surface is slightly shining, the inner $3\frac{1}{2}$ whorls very minutely granulated and marked by impressed spiral lines; the following whorls lightly marked by growth-lines and covered with fine, close, obliquely descending wrinkles; this corrugation is often almost obsolete above, but is always distinct below the periphery. A strong lens reveals a microscopic decussation, over all the coarser sculpture, like that described under *H. studeriana*. The spire is elevated-dome-shaped; the suture superficial at first, becoming impressed around the last volution. The body-whorl is acutely keeled at its origin, but becomes more rounded at periphery as it approaches its termination. It descends below the peripheral keel in front. Aperture very oblique, broader than high, flesh-colored or livid-brown inside; peristome narrowly expanded, thickened within; columella short, vertical, formed of a strong, acute fold.

Alt. 33, greater diam. 49, lesser 42 mill.

Alt. 27, greater diam. 41, lesser 35 mill.

Alt. 24, greater diam. 34, lesser 29 mill.

Mahé, Silhouette, etc., Seychelles Islands.

Helix unidentata CHEMNITZ, Syst. Conchyl. Cab. xi, p. 273, t. 208, f. 2049, 2050.—FER., Histoire, t. 104, f. 8, 9.—PFR., Monographia i, p. 303; Conchylien Cabinet, p. 30, t. 2, f. 6, 7.—DUFO, Ann. Sci. Nat. xiv, p. 199, 1840.—SCHACKO, in Beiträge zur Meeresfauna der Ins. Mauritius und der Seychellen, p. 342, 1880 (Anatomy).—REEVE, Conch. Icon., t. 39, f. 156.—*Nanina (Stylodonta) unidentata* Chem., TRYON, Manual of Conchology ii, p. 26.—*H. microdonta* DESH., Encyc. Méth. ii, p. 266.—*H. ventricosa* JAN, Mantissa, p. 1.—*Columpica uniplicata* HARTM. Gastrop. Schweiz i, p. 187,

t. 67, f. 3-5.—*Helix militaris* PFR. Proc. Zool. Soc. Lond. 1855, p. 111; Monographia iv, p. 245.

The strong columellar fold is not paralleled in any other *Helix* except *H. cepoides* Lea. The surface-sculpture of *unidentata* is just like that of *studeriana*. The uniform brown color is usually relieved by an indistinct lighter peripheral girdle. The granulation of the embryonic whorls is finer and less regular than in *H. studeriana*. We are indebted to M. H. Dufo for many important observations upon the mollusks of the Seychelles, made by him during a residence there of four years. He says of this species: "It inhabits the middle region of the mountains, sometimes upon large trees, but usually on bushes or climbing vines. During the pleasant season they hide under the soil or in rock-crevices, and do not come out except in winter or during rain storms of several days duration. They feed upon green leaves. Movements slow."

The figures on Pl. 61 as well as fig. 85 of pl. 5, vol. ii of the Manual, were drawn from specimens in the collection of the Academy. These figures and fig. 84, pl. 5, vol. ii of the Manual, show the great mutation in form and degree of elevation of the species. The *H. militaris* of Pfeiffer is merely an elevated specimen.

H. STUDERIANA Férussac. Pl. 61. figs. 18, 19, 20.

Shell large, depressed, imperforate; spire low-conoidal and blunt; aperture very oblique, the columella nearly vertical, its inner edge convex; periphery not keeled.

The shell is solid, of a compact, depressed form, not keeled at periphery but encircled by an inconspicuous sulcus and usually a line or thread there; it is opaque, and either chestnut brown, becoming olive-brown on the spire and flesh-colored on the earlier two whorls, smoky below just around the axis, or else of a clear light olive-yellow tint, the spire darker. The surface is nearly lusterless; the earlier (embryonic) $3\frac{1}{2}$ whorls are cut by close oblique and spiral impressed lines into a beautifully regular decussated pattern of squarish granules; the following whorls have rather blunt, rude wrinkles of increment, and are covered by a close fine corrugation of irregular wrinkles, obliquely descending in a direction at right-angles to the growth-lines. Under a strong lens there is seen over this coarser sculpture, an excessively minute, close decussation, like that produced by pressing a woven fabric upon plastic clay. The apex is plane; earlier whorls scarcely convex, with linear, superficial suture;

upon the last whorl the suture becomes deeply impressed, the whorl convex above and below, descending a little below the periphery in front. Aperture very oblique, rounded-lunate, white or flesh-colored inside; the entire peristome rather broadly reflexed, white; columella convex on its inner edge, deeply, vertically inserted; parietal wall washed with transparent callus.

Alt. 40, greater diam. 62, lesser 51 mill.

Alt. 36, greater diam. 51, lesser 43 mill.

Island of Praslin, Seychelles.

Helix (Helicostyla) Studeriana FER., Histoire, t. 103, f. 6.—PFR., Symbolæ i, p. 36; Monographia i, p. 243; Conchylien Cabinet, t. 41, f. 1, 2.—*Stylodon Studeriana* BECK, Index, p. 46.—*Nanina (Stylodonta) Studeriana* FÉR. TRYON, Manual of Conchology, 2d. Ser., vol. ii, p. 26.—*Helix Studeriana* FÉR. REEVE, Conch. Icon., t. 39, f. 153.—DUFO, Obs. sur les Moll. marins, terrestres et fluviatiles des îles Seychelles et des Amirantes, in Annales des Sci. Nat., 2d Ser., vol. xiv, p. 199.—STEENSTRUP, Om Ovo-vivipariten hos *Helix Studeriana*, etc., in Videnskabelige Meddelelser 1879–80, p. 301.—VIGUIER, Obs. sur la viviparité de l'*Helix studeriana* FÉR., in Arch. de Zool. Expér. et Générale viii, 1879–80, p. 529, plate 40.

A large species having much the aspect of *H. illustris* Pfr., but readily distinguishable by the beautifully clear-cut granulation of the upper whorls and the short almost vertical columella. The young shells are acutely keeled. It is an ovo-viviparous species, as Dufu observed as long ago as 1840.

The abrupt change in surface-sculpture which takes place at birth is shown in the enlarged detail-drawing, pl. 61, fig. 18.

Dufu says: "Inhabits the mountain tops, on bushes and lianas. Feeds upon green leaves. Movements slow."

Subgenus XIX. CAMÆNA Albers, 1850.

The name *Camæna* may be used in an extended sense, to include a number of sections containing most of the larger helices of the regions lying between Japan on the north and Australia on the south. Until more knowledge of the soft parts is obtained, it is impossible to indicate the rank and classification of the several minor groups with certainty. In the formation of sections I have not hesitated to discard certain characters heretofore used for this purpose, in favor of new and original ones. This course has inevitably led me to change the limits and contents of the groups of previous authors.

It should be understood that I do not claim that every species is herein correctly grouped. Many of them I have not seen; these are interpolated into the sections to which in my judgment they belong. It is often essential to examine specimens, because in descriptions important characters are frequently omitted.

Three main divisions or supersections may be recognized; synopses of the sections are given under each of these divisions.

Supersection I. *THERSITES* Pfr.

Nucleus small, its junction with the aftergrowth not distinct; whorls keeled; aperture triangular, the outer lip markedly sinuous just above the peripheral carina.

Supersection II. *HADRA* Albers.

Nucleus small, consisting of less than two whorls; aperture lunar, outer lip not sinuous; surface striate or decussated, not malleated.

Supersection III. *CAMENA* Albers.

Nucleus comparatively large, about one-fifth the diameter of the shell, composed of 2-2½ whorls; surface generally malleated or finely wrinkled.

Supersection I. *THERSITES* Pfeiffer.

Under the above name may be grouped two Australasian sections, *Thersites* and *Anoglypta*, which agree in being carinated, more or less trochoidal, with small nucleus, 5 to 6 whorls, the last suddenly deflexed below the carina in front. The aperture is subtriangular or irregularly oval, terminations of the peristome distant, its upper portion sinuous just above the termination of the peripheral carina.

These sections may have, possibly, affinities with *Geotrochus* or *Papuina*

Two sections may be admitted:

(1) *THERSITES* Pfr. Upper and lower surface not conspicuously different in sculpture; peristome expanded, reflexed over and closing the umbilicus.

(2) *ANOGLYPTA* Martens. Upper surface spirally ridged and tuberculate, base smooth, polished; peristome not expanded; umbilicus open.

Section I. THERSITES Pfeiffer, 1856.

Thersites PFR. Malak. Blätter ii, 1856, p. 141; Nomencl. Hel. Viv., p. 178, 1881. First species *H. Richmondiana*.—ALBERS, Die Heliceen (edit. Martens) p. 157, 1861 (restricted to *H. Richmondiana*).—*Merope* (in part) of ALBERS and many other authors.

Shell perforate when young, closed in the adult, trochoidal or lens-shaped, acutely keeled, moderately solid, dark chestnut-brown, or light with dark bands at suture, periphery and umbilicus. Surface covered (at least on the base) with a minute, dense sculpture of fine wrinkles, generally zigzagged or irregular, often cut into granules in places. Whorls 5 to 6, flat or nearly so, the last whorl on its latter half pinched or furrowed above and below the keel, or with a visible tendency to be flattened or modified there; deflexed in front. Aperture triangular, very oblique, angular, the outer lip expanded, sinuous above, columellar lip reflexed, adnate.

This section, like *Pedinogyra*, is restricted to eastern Australia. Its more prominent shell-characters are the narrowly perforated axis closed in the adult, the trochoidal acutely keeled form, the flattened or furrowed surface of the last whorl in the region of the periphery, and especially *the finely, irregularly wrinkled surface-sculpture*. Any one who will carefully compare the two species I have grouped in *Thersites* and examine them under a lens, will, I doubt not, agree with me in associating *H. novæhollandiæ* with *H. richmondiana*, and in dismembering the section *Merope* of Albers, as that section is constituted in Die Heliceen, and in Pfeiffer's Nomenclator Helicorum Viventium, restricting it to *H. fringilla*, the type species.

Since the above paragraph was written I have noticed with pleasure that Dr. Dohrn has already separated *H. novæhollandiæ* from *fringilla*, and placed the former in *Thersites*.

H. RICHMONDIANA Pfeiffer. Pl. 20, figs. 34, 35, 36.

Shell large, trochiform, flat below, acutely carinated at the periphery, imperforate.

It is solid, strong, opaque, dark brown all over; the surface rather smooth, growth-striæ light; under a lens there may be seen a very peculiar pattern of fine zigzag wrinkles on the base and just above the keel. The spire is conical, terminating in an obtuse rounded apex. Suture linear. Whorls 6, flat, the last compressed into an acute projecting flange or keel at the periphery; the latter half of the whorl distorted by a deeply impressed furrow above and one be-

low the keel. In front the whorl descends a little below the keel of the preceding one. Aperture very oblique, triangular, bluish-white inside; peristome thick, dark brown, upper margin expanded, basal and columellar margins reflexed, the latter closing the umbilical perforation.

Alt. 35, greater diam. 50 mill.

Alt. 32, greater diam. 52 mill.

Richmond River, N. S. Wales; Albert River and Muggerraba, Queensland, Australia.

H. Richmondiana PFR. P. Z. S. 1851, p. 252; Monographia iii, p. 178; Conchyl. Cab., p. 371, t. 140, f. 3, 4.—REEVE, Conch. Icon., f. 365.—COX, Monog. Austr. Land. Sh., p. 62, t. 8, f. 5, 6.—HEDLEY, Proc. Roy. Soc. Queensland v, 1888 p. 62; and *Thersites Richmondiana* Pfr. HEDLEY, l. c. vi, 1889, p. 62, plate 3. (Anatomy.)

There is a light yellowish or reddish variety, with the suture and carina edged by dark brown bands, the peristome and a small umbilical patch also dark brown. It may be called forma *decolorata*.

The microscopic wrinkles are usually but not always obsolete on the upper surface. The basal lip often has a callous swelling where it joins the short subvertical columellar insertion, corresponding to the callous on this part in the *H. novæhollandiæ*.

H. NOVÆHOLLANDIÆ Gray. Pl. 13, figs. 51, 52; pl. 42, figs. 24, 25.

Shell lens-shaped or trochiform, carinated at the periphery, the base quite convex; imperforate.

Moderately solid, opaque, chestnut-brown, with narrow bands a little lighter on the carina, surrounding the umbilical dark tract, and bordering the dark margin below the suture; there is also a darker band just above the keel. Surface slightly marked by growth-lines, and showing under a lens a very beautiful pattern of fine, close, wavy wrinkles, covering the surface both above and below; these wrinkles are usually cut more or less into granules, and on the base are very irregular. The spire is scarcely more convex than the base, conoidal, apex obtuse, sutures scarcely impressed. Whorls about 5, almost flat, the last acutely keeled, the keel becoming more obtuse on the last half of the whorl, which is there more gibbous beneath; often there is a slight furrow parallel with the keel just below it on the latter part of the last volution. In front the whorl abruptly descends below the carina of the preceding whorl. Aperture subtriangular, purplish inside, very oblique; peristome dark brown, upper margin expanded, a little sinuous and often toothed just above the

angle of the carina; columellar margin reflexed, appressed over the axis; parietal callus thin, brown.

Alt. 17, greater diam. 33 mill. (Specimen.)

Alt. 17, greater diam. 28 mill. (Specimen.)

Alt. 20, greater diam. 32 mill. (Pfr.)

Ash Island, Hunter River, Wingham, Manning River, Scone, New England, Port Macquarie, Macleay, Nambuccra and Bellengen rivers, N. S. Wales, Australia.

Carocolla Novæ Hollandiæ GRAY P. Z. S. 1834, p. 67.—*Helix* (*Geotrochus*) *novæ hollandiæ* Gray, COX, Monog. Austr. Land Sh., p. 68.—*H. (Merope) novæ hollandiæ* Gray, BRAZIER, Proc. Zool. Soc. Lond. 1872, p. 805.—PFEIFFER Nomencl. Hel. Viv., p. 178.—*H. dupuyana* PFR. P. Z. S. 1852, p. 159; Monographia iii, p. 177; Conchyl. Cab., p. 280, t. 124, f. 15, 16.—REEVE, Conch. Icon., f. 354.—*H. depugana* JAY, Cat. 1850, p. 135.

The species is rather variable in size and in the degree of elevation of the spire. There are also some mutations in coloration. One specimen before me is light brown all over, the peristome white; suture bordered by a dark band. Mr. Brazier says: Specimens from the Bellengen are very large, a few that I collected measuring 17 lines (35 mill.) in the greater diameter. A variety is also met with of a dirty yellow color, with a dark chestnut band on the periphery. The specimens from the other localities are of smaller size and of a dark chestnut color. At Port Macquarie it is found on high hills near the sea under logs.

The basal lip usually exhibits a callus like a long low tooth, nearer to the columella than to the outer angle; but this, like the sinuosity just above the outer angle, is often nearly obsolete.

Section II. ANOGLYPTA Martens, 1860.

Anoglypta MART. Die Heliceen, p. 312 (nachträge) 1860. Type *H. launcestonensis* Rve.

This section was proposed for an extremely peculiar *Helix*, differing from nearly all others in having the upper and lower surfaces totally dissimilar in sculpture and coloration. It is lusterless and tuberculate-lirate above, polished beneath; the umbilicus is open; the last whorl acutely keeled, suddenly deflexed in front. The aperture is very oblique, the peristome scarcely at all expanded, and just above the carina it is sinuous, projecting forward and downward in a little point.

The last feature mentioned corresponds to the similar but less developed sinuosity of the upper lip in the two species of *Thersites*, and also to that shown by various forms of *Papuina*.

In having the spiral sculpture continued to the very apex, *Anogypta* is unique; almost all other *Helices* having the nucleus smooth or differently sculptured from the rest of the whorls.

H. LAUNCESTONENSIS Reeve. Pl. 20, figs. 37, 38, 39.

Shell depressed, conoid, umbilicated, acutely carinated, lusterless and prominently tuberculate-lirate above, polished and banded below the carina.

The color above is light olive-green, the spiral beaded ribs being brown; beneath it is polished chocolate colored (sometimes somewhat suffused with yellowish and having scattered yellow dots), and about midway between periphery and umbilicus there is a broad, sharply defined yellow zone. The surface above is dull, sculptured with 4 to 6 principal spiral beaded or tuberculate spiral cords, and numerous smaller threads between them. Spire conoidal, apex obtuse; sutures scarcely impressed. Whorls $5\frac{1}{2}$, nearly flat, the last acutely keeled, very abruptly and deeply deflexed at the aperture. Aperture subhorizontal, irregularly oval; peristome simple, not expanded, the upper margin sinuous and projecting downward just above the periphery; baso-columellar margin somewhat thickened. Umbilicus deep, funnel-shaped, with a more or less obvious spiral groove inside. Alt. 19–20, diam. 30–32 mill.

Tasmania.

H. Launcestonensis REEVE, Proc. Zool. Soc. 1852, p. 31, t. 13, f. 11; Conch. Icon., f. 968.—PFR. Monographia iii, p. 159; Conchyl. Cab., p. 491, t. 161, f. 1, 2.—COX, Monog. Austr. Land Shells, p. 31, t. 7, f. 4.

A species so peculiar in sculpture that it is approached by no other form. The *H. semicarinata* Ancy does not belong near *launcestonensis*, but in *Nanina*, sect. *Rotula* (see Le Naturaliste iii, p. 293).

Most specimens show short folds just below the suture, and sometimes these are continued as far as the periphery, making the surface radiately corrugated.

Supersection II. *HADRA* Albers.

The shells of this great branch differ from the species of *Camaena* in having the nucleus small, the point of its junction with the after-

growth often not distinguishable. The surface is either striate or decussated, not malleated or obliquely wrinkled.

Synopsis of Sections.

Section I. EUHADRA Pilsbry, 1890.

Shell depressed, the spire depressed or low-conoidal; rather thin; umbilicus moderate, rarely covered; surface striate, and decussated by fine spiral lines; aperture oblique, lunar, broader than high, the peristome expanded, dilated and reflexed at the columellar insertion. Type *H. peliomphala* Pfr. Species mostly inhabiting Japan, China and the adjacent islands.

Section II. HADRA Albers, 1850 (restricted).

Shell umbilicate or imperforate, globose turbinate, the spire more or less conical; solid; surface nearly smooth, obliquely striate, sometimes hirsute, but *without spiral striae*. Aperture rounded-lunar; peristome expanded, generally reflexed.

New Guinea, Australia, etc.

Subsection HADRA (*sensu stricto*). Shell narrowly umbilicate, obliquely striate or hirsute, unicolored brown or brown below, yellow above; never having numerous bands. Spire conoidal; peristome expanded, reflexed. Type *H. bipartita* Fér.

Australia, etc.

Subsection BADISTES Gould, 1862. Shell globose-depressed sometimes carinated moderately solid or thin, chestnut colored, yellowish or greenish, often subtranslucent; *surface microscopically densely granulated all over*. Aperture oblique, rounded-lunate; peristome a little thickened and *very narrowly* expanded, suddenly dilated at the columella, covering or almost covering the narrow umbilicus. Type, *H. grayi* Pfr. *Australia*.

Differs from *Sphaerospira* in the less expanded peristome and tendency to be carinated.

Subsection SPHÆROSPIRA Mörch, 1867. Shell globose, elevated, chocolate colored, or yellowish with numerous brown spiral bands and lines; umbilicate or imperforate; surface smooth or nearly so; spire hemispherical or dome-shaped; peristome broadly expanded, often reflexed. Type *H. frazeri* Gray.

Australia; New Guinea.

Section III. RHAGADA Albers, 1860.

Shell rather small, depressed-globose, solid, white and calcareous, generally encircled by numerous bands. Aperture very oblique; peristome a little expanded, reflexed nearly over the umbilicus. Type, *H. reinga* Gray.

Australia.

Section IV. XANTHOMELON Martens, 1860.

Shell large, *globular*, the spire very short, body-whorl large, globose, descending in front; aperture semioval, oblique; peristome narrowly expanded, thickened within, columellar lip broad, flattened, reflexed over and covering the umbilicus in whole or in part. Surface roughened, covered by a yellow epidermis. Type, *H. pomum* Pfr.

Australia.

Section I. EUHADRA Pilsbry.

Hadra and *Camæna* in part, of authors.

Helix peliomphala may be taken as the type of a group of helices numerous in species throughout Japan, and also well represented in China and Formosa. To this group or section (which represents in the northern hemisphere the sections *Hadra* and *Sphærospira* from south of the equator) I have given the name *Euhadra*.

Group of H. peliomphala Pfr. Surface of shell obliquely striate, and seen under a lens to be decussated by very close minute, incised spiral lines.

Group of H. succincta Ad. Shell conical above, convex below, carinated at periphery; *umbilicus* narrow, deep, *cylindrical*; surface obliquely striate, often with shallow spiral grooves; color brown or yellowish, with a dark band just on and above the periphery.

Group of H. mandarina Gray. Shell solid, compact, globose-conic; *axis* solid, imperforate.

Group of H. peliomphala Pfr.

H. SIMODÆ Jay. Pl. 41, figs. 1, 2, 3.

Shell depressed, deeply umbilicate, light buff, with a narrow supra-peripheral chestnut band; surface microscopically decussated; spire very obtuse, slightly convex, not at all conoidal.

The shell is about the size of *H. peliomphala*, and like that species in general form, but *more obtuse and lower in the spire*. It is moderately thin, moderately solid. The surface is scarcely shining, with very fine growth-striae (not nearly so coarse and irregular as in *peliomphala*, *nipponensis* or *brandti* and even less unequal than those of *amaliae*); these striae are decussated by excessively minute spiral striae (which are not regular and well defined as in *peliomphala* and its varieties, but are irregular, rather undulating, and are more minute and closer than in *amaliae*,—far closer than in the circle of *peliomphala*, etc.). The spire is a little convex, the inner two whorls nearly plane. The apical whorl is large, obviously larger than in *peliomphala*. The suture is moderately and evenly impressed from apex to its termination. Whorls $5\frac{1}{2}$, all of them somewhat convex, the last rather deeply deflexed in front. Aperture oblique, broad-lunar, white inside; peristome reflexed all around, white, the terminations converging, joined by a scarcely perceptible callus. Umbilicus rather narrow, very deeply penetrating and showing the whorls to the apex.

Alt. 17, greater diam. 33, lesser $27\frac{1}{2}$ mill.; oblique alt. of aperture 16, width $19\frac{1}{2}$; width of umbilicus $4\frac{1}{2}$ mill.

Simoda, Japan.

Helix simodae JAY, in Perry's Narrative of the Exped. of an American Squadron to the China Seas and Japan, in 1852-'54, ii, p. 294, t. 5, f. 1, 2, 3, 1856. (Exclusive of the "var., t. 5, f. 4-6," which is *H. peliomphala* Pfr.)

I have received, through the courtesy of Prof. R. P. WHITFIELD of the American Museum of Natural History, Central Park, New York City, the type specimen of *H. simodae*. It proves to be quite distinct from other described Japanese species. It is figured and described above. The spiral sculpture is more minute than in any other species of *Camæna*, and appears under the lens to consist of tiny wrinkles which descend somewhat as well as revolve, taking the direction of tangents from the suture. The umbilicus, while it is not wider at its opening than in *peliomphala*, does not suddenly contract to a mere perforation as it does in the allies of *peliomphala*, but is a cylindrical tube of sufficient size to enable one to see each whorl as far as the apex, if a little care be taken.

H. CONNIVENS Pfeiffer. Pl. 37, figs. 41, 42.

Shell depressed, rather broadly umbilicate, solid and strong, whitish straw-colored, with a narrow chestnut band (rarely indistinct or

lacking) just above the periphery. Surface hardly shining, rather coarsely obliquely striate, seen under a lens to have excessively fine close spiral striæ. Spire low-conic; sutures impressed; whorls 6, somewhat convex, slowly increasing, the last *not descending in front*. Aperture oblique, white and showing the band inside. Peristome somewhat expanded, decidedly widened by a white callous thickening or rib within, margins all curved, converging, the upper margin scarcely expanded toward its insertion. Umbilicus funnel-shaped, penetrating deeply. Alt. 15, diam. 24 mill.

Liu-kiu Is.

H. connivens PFR. P. Z. S. 1849, p. 130; Monographia iii, p. 232; Conchyl. Cab., p. 465, t. 156, f. 26, 27.—REEVE, Conch. Icon., f. 404.—ANCEY, Bull. Soc. Mal. France, 1888, p. 345.

Allied to *H. herrmannseni*, but smaller, having a brown band; the last whorl not descending at the aperture, and the peristome strongly labiate or calloused within.

Var. PHÆOGRAMMA Ancey.

Shell smaller (diam. 22 mill.), less depressed, ornamented with a rather wide deep brown peripheral zone; whorls 5; aperture less oblique; umbilicus minute; last whorl subangular at its beginning. Form and color recalling the Formosan *H. succincta* H. Ad. (*Ancey*.)

Liu-kiu Is.

H. MELLEA Pfeiffer. Pl. 26, fig. 7.

Shell umbilicated, depressed, carinate, rather thin, seen to be very minutely granulated, under a lens; oily-shining, pale fulvous; spire little elevated, apex obtuse; whorls nearly 5, nearly plane, regularly increasing, the last descending only a trifle in front, sub-inflated under the rather acute carina; umbilicus moderate, profound; aperture little oblique, subangularly lunar, peristome whitish, margins scarcely converging, the upper narrowly expanded, basal subreflexed, columellar shortly ascending, subdilated above. (*Pfr.*) Alt. 9, greater diam. 22, lesser 20 mill.

Formosa.

H. mellea PFR. P. Z. S. 1865, p. 830, t. 46, f. 4; Monogr. v, p. 406.

This form I have not seen. It belongs either in the present group or in *Cathaica*. My reason for not placing it next to *H. pyrrohozona* (the type of *Cathaica*) is that the surface is *granulated*, not simply striate as in the species named.

H. HERRMANNSENI Pfeiffer. Pl. 37, figs 38, 39, 40 ; pl. 31, figs. 33, 34.

Shell depressed, umbilicated, rather strong and solid, covered with a thin straw-colored epidermis. Surface obliquely striate, and covered with microscopic close spiral striæ. Spire low-conoidal ; suture impressed ; whorls $5\frac{1}{2}$, a little convex, the last one decidedly deflexed in front. Aperture very oblique, rounded, white inside ; peristome white, expanded all around, rather broadly reflexed on the basal and columellar margins. Umbilicus funnel-shaped, not very deeply penetrating, showing only two whorls.

Alt. 19, greater diam. 29 mill.

Alt. 18, greater diam. 33 mill.

Corea (Pfr.) ; Liukiu Is. (specimen).

H. Koreana PFR. Zeitschr. f. Mal. 1850, p. 72 (supposed to be preoc.).—*H. Herrmannseni* PFR., Zeitschr. f. Mal. 1852, p. 63 ; Mon. iii, p. 223 ; Conchyl. Cab., p. 347, t. 134, f. 5, 6.—*H. connivens* var. REEVE, Conch. Icon., f. 406.

This shell is larger than *H. connivens*, with more oblique aperture, more expanded lip (which is not labiate within), and much less profoundly penetrating umbilicus. The figures on pl. 31 are colored much too brightly, and entirely incorrectly. Those on pl. 37 are drawn and colored from the specimen described above.

H. EOA Crosse. Pl. 30, figs. 12, 13.

Shell openly umbilicated, orbicular, a little lens-shaped, subdepressed, rather thin, nearly translucent, marked with slightly oblique, irregular, strongly-marked rough striæ. General color fawn-brown. Spire depressed, short, little exerted and terminating in a rather obtuse apex. Suture well marked. Whorls 6, flattened, the embryonic $1\frac{1}{2}$ violet-white ; last whorl descending, presenting a narrow blackish-brown band a little above the periphery, and rather a sharp carina ; base quite convex, noticeably inflated. Umbilicus quite wide, deeply penetrating, and lined by a blackish-brown band. Aperture oblique, of a rounded semi-lunar form, livid whitish-violet, shining and almost iridescent inside, and showing the blackish band to the edge of the lip. Peristome reflexed, violet-brown ; margins subconverging, the columellar margin broader at its insertion, and colored by the umbilical dark band ; outer margin narrower at its upper insertion. (*Crse.*) Alt. 16, greater diam. 37, lesser $31\frac{1}{2}$ mill.

Japan.

H. eoa CROSSE, Journ. de Conchyl. 1868, p. 278; l. c. 1871, p. 60, t. 2, f. 2.—PFR. Monogr. vii, p. 454.—MARTENS, Mal. Blätter 1872, p. 153.

This form is certainly closely allied to *H. luchuana* Sow., but seems to be flatter above.

H. BLAKEANA Newcomb. Unfigured.

Shell unicolorous yellowish-white, rounded, semiglobose, shining, translucent; umbilicus large, deep and slightly covered; apex obtuse; whorls 6, convex, the first three nearly on the same plane, the balance rapidly increasing, the last swollen; suture well marked; aperture roundly lunar; lip thin, flatly reflected, at the columella broadly dilated but not adherent. (*Newc.*)

Alt. $17\frac{1}{2}$, greater diam. $27\frac{1}{2}$, lesser 25 mill.

Nippon, Japan.

H. Blakeana NEWC., Proc. California Acad. Sci. iii, p. 179, Jan. 1875.—VON MARTENS, Sitzungs-Bericht Ges. Naturforsch. Freunde zu Berlin 1877, p. 105.—MOLLENDORFF, Journ. Asiat. Soc. Bengal, LIV, p. 60, 1885.—KOBELT, Faun. Jap., p. 23, t. 7, f. 10, 11.

In general form and color this species makes a nearer approach to *H. candida* Moricand [*Streptaxis (Artemon) candidus* Spix], than to any species with which I am acquainted. It varies in the less elevation, in the form of the spire, and in some other respects. (*Newc.*)

Dr. von Martens has identified with this species specimens collected by Hilgendorf at Mohedsi, not far from Hakodate. Dr. Anderson obtained it at Chitose, Yesso, according to Möllendorff. I have not seen Dr. Kobelt's work, which is said to contain figures of this shell.

H. PELIOMPHALA Pfeiffer. Pl. 30. figs. 1, 2, 3, 4, 5, 6.

Shell depressed, rather thin and light, openly umbilicate, straw-colored, encircled by 1 to 3 chestnut zones, which are usually flecked or interrupted by whitish streaks. The umbilicus is generally dark chestnut inside. The surface is shining, rather coarsely obliquely striate, microscopically and most densely striate spirally. The spire is low, conoidal; suture impressed; whorls $5\frac{1}{2}$ –6, convex, the last convex, descending a little in front; aperture oblique, rounded-crescentic, showing the bands within; peristome expanded, some-

what reflexed, flesh-colored; the columellar margin a little dilated, impinging a trifle upon the umbilicus.

Alt. 19, greater diam. 34 mill.

Alt. 20, greater diam. 39 mill.

Alt. 18½, greater diam. 30 mill.

Yeddo, Yokohama, Simoda, Mososaki, etc., Japan.

H. Japonica FER. mss. Histoire, t. 69 H, f. 5, 6.—DESH. Ibid., in text, i, p. 58 (about 1850).—*H. peliomphala* PFR. Zeitschr. f. Mal. 1850, p. 150; Monographia iii, p. 233.—MARTENS, Mal. Blätter vii, 1860, p. 35; Ostas. Conch., p. 25, t. 15, f. 1-5.—*H. Simodæ* var. JAY in Narrative of Perry's Exped. ii, t. 5, f. 4, 5, 6.

This is a protean species, very variable in size, width of the umbilicus and coloration. The ground-color is usually buff, but often a paler straw-color, or tinged with reddish. Some examples are of a light tint all over, two before me entirely lacking bands or umbilical spot. The bands when all present number 5; the first very narrow bordering the suture; the second and third are above the periphery; the fourth is wider and below the periphery; the fifth occupies the interior of the umbilicus. The most constant of these bands are the 3d, 4th and 5th. The 2d, when present, is generally narrow. The bands above the periphery are generally crossed by opaque whitish or buff streaks, or have light flecks upon them; and sometimes these streaks so break the color-pattern that forms like *H. brandti* are produced. Only one of the banded specimens before me lacks the umbilical brown tract.

The number of described forms of this group which will be found to be connected by series of intermediate varieties, still remains an open question. Possibly *H. amalice* on one hand and *senckenbergiana* on the other mark the extremes of a continuous series which includes *nipponensis*, *congenita*, *callizona*, *nimbosa*, *brandti*, etc. Compare Kobelt's remarks in Jahrbücher D. M. Gesellsch. 1876, p. 32, and von Martens in the same volume, p. 357.

Var. LUCHUANA Sowerby. Pl. 30, figs. 14, 15, 16.

Shell a little larger, umbilicus somewhat narrowed, less abruptly excavated; whorls a little more convex; brown, with a single peripheral band, peristome violaceous. Alt. 22, greater diam. 38, lesser 31½ mill. (*Mart.*)

Southern Japan, island of Kiusiu; Dagelet Id.; in the neighborhood of Nagasaki; Liu-kiu Is.

H. luhuana SOW. Beechey's Voyage, Zool., p. 140, t. 35, f. 4.—PFR. Monogr. i, p. 354; Conchyl. Cab., p. 436, t. 151, f. 15-17.—REEVE, Conch. Icon., f. 382.—*H. luhuana* Sow., AD. Ann. & Mag. N. H. i, 1868, p. 461.—*H. peliomphala* var. *luhuana* Sow., MARTENS, Ostas. Zool., p. 27, pl. 15, f. 4.

Differs from *H. peliomphala* in being of a chestnut brown color, yellowish at suture, around the brown umbilical tract and on each side of the distinct peripheral zone.

Var. BRANDTI Kobelt. Pl. 28, figs. 15, 16.

Shell similar to *H. peliomphala* but somewhat smaller, the spire a little more elevated, the umbilicus rather narrower. Surface nearly lusterless, sculptured as in the type; ground-color yellowish or corneous, almost wholly concealed by broad irregular obliquely descending opaque white or buff streaks, which interrupt the three blackish-brown spiral zones, making them appear as spots or streaks. Umbilicus dark inside; lip broadly expanded of a pinkish-purple color. Alt. 17, greater diam. 26, lesser 23 mill., often larger.

Interior of Nippon.

H. brandti KOB., Nachr.-Bl. D. M. Ges. 1875, p. 55; Jahrb. D. M. Ges. 1875, p. 328, t. 12, f. 5, 6.

The specimens before me show this to be a form intermediate between typical *peliomphala* and *nimbosa*.

Var. NIMBOSA CROSSE. Pl. 28, figs. 8, 9.

Form and sculpture as in the closely allied *H. peliomphala*. Epidermis deep brown, with oblique, irregular yellowish streaks; aperture violet-brown inside, the peristome the same color.

Alt. 16, greater diam. 35, lesser 31 mill.

Japan.

H. nimbosa CROSSE, Journal de Conchyl. 1868, p. 277; ibid. 1871, p. 59, t. 2, f. 1.

Probably as von Martens says, a color-variety of *H. peliomphala*.

H. HERKLOTSI Martens. Pl. 26, figs. 10, 11, 12.

Shell rather narrowly umbilicated, conoid-depressed, subgradate, rough-striate and most subtly spirally lined, buff, painted with 3 chestnut bands, the middle one narrow, the upper double, the lower triple its width, the upper edge of the upper band and the lower edge of the basal one fading into the ground color. The umbilicus is only a trifle darker than the rest of the shell. Whorls $5\frac{1}{2}$, a little

convex, the last about equally convex above and below, descending in front. Aperture very oblique, truncate-ovate; peristome pale flesh color, showing the bands, margins converging, the upper narrowly expanded, the basal more broadly reflexed, thickened; the umbilicus rapidly narrowing, the antepenultimate whorl not visible within it. Alt. 19, greater diam. 33, lesser 26 mill.

—*Kioto, Japan.*

H. herklotsi MART., Mal. Blätter vii, 1861, p. 38; Landschnecken der Preuss. Exped. nach Ostasien, p. 27; Novit. Conch. v, p. 177, t. 150, f. 1-3.—PFR. Monogr. v, p. 358.—*H. Sandai* KOBELT, Faun. Jap., p. 39, t. 6, f. 10, 11.

This form holds the same relation to *H. peliomphala* that *perryi* bears toward *quæsitæ*. It should probably be considered a color-race of the protean *peliomphala*. With *H. simodæ*, the present species has nothing to do. The conic spire and rapidly narrowing umbilicus show it to be allied to *peliomphala*.

H. SENCKENBERGIANA Kobelt. Pl. 28, figs. 10, 11.

Shell large, broadly umbilicated, orbicular-depressed, solid, striate, very minutely granulated under a lens; reddish-brown, with irregular yellow streaks in the direction of growth-lines, interrupting the three dark bands. Whorls $5\frac{1}{2}$, rounded, slowly increasing. Aperture broadly lunate; peristome reflexed, thickened, margins joined by a thin callous, livid purple; throat showing three bands on a lighter ground. (*Kob.*) Alt. 30, greater diam. 56, lesser 47 mill.

—*Interior of Nippon.*

H. senckenbergiana KOB. Nachr.-Bl. D. M. Ges. 1875, p. 55; Jahrb. D. M. Ges. 1875, p. 326, t. 12, f. 1, 2.

This form also may prove to be a variety of *H. peliomphala*, with which it agrees in all its characters except the larger size. It has a great resemblance to the *H. (Campylæa) pouzolzi* of Europe.

VARIETY (pl. 28, fig. 12). A form referred by Kobelt to *senckenbergiana* is figured. This shell is dark greenish-brown, with a peripheral band, having scarcely visible light bands above and below it.

H. NIPPONENSIS Kobelt. Pl. 29, figs. 3, 4; pl. 41, figs. 4, 5, 6, 7.

Shell depressed, with conoidal spire; umbilicate; sculptured with strong, unequal thread-like whitish striæ on a ground of straw-color mottled and clouded with chestnut.

The shell has much the general form of *H. peliomphala*, and the umbilicus is about as wide as in that species. The surface is shining, very roughly, irregularly marked by thread-like growth-striæ, which are very unequal in size, and are mostly of an opaque whitish-color. Under a lens the close microscopic spiral striæ characteristic of this group become visible. The ground-color is straw-yellow or whitish-corneous, more or less clouded and streaked with chestnut, the latter color often forming a narrow band (interrupted by the striæ) above the periphery; whorls $5\frac{1}{2}$, convex, slowly increasing, the last rather strongly deflexed in front. Aperture very oblique, broad-lunate, pinkish-brown inside; peristome expanded, reflexed, dark purplish-brown or rosy in color, thickened within, the thickening white or brown. Basal margin somewhat straightened and horizontal; terminations of peristome approaching, joined by a thin transparent callus.

Alt. 20, greater diam. 30, lesser 26 mill.

Alt. 18, greater diam. $27\frac{1}{2}$, lesser 23 mill.

Kobe, Japan.

H. nipponensis KOB. Jahrb. D. M. Gesell 1876, p. 31, t. 1, f. 2.—
H. congenita SMITH, Proc. Zool. Soc. Lond., 1878, p. 496 (wood-cut).

This species although closely allied to *H. peliomphala* may probably be distinguished by its stronger striation, by the greater deflexion of the whorl at the aperture, by the more straightened and horizontal basal lip, and by the peculiarly mottled or stained coloration. The umbilicus is either light or dark inside. I have figured on pl. 41, figs. 4–7, three specimens from the suite before me, showing variations in color-pattern. Figures 3, 4, of plate 29 are Kobelt's typical *nipponensis*. Fig. 5 of the same plate is copied from Smith's cut of *congenita*. The coloration of *congenita* as Smith describes it, applies so well to part of the shells before me that I quote him:

The coloration of this species is not easily definable. The ground-colour is pale straw, the oblique raised liræ being more opaque and yellower. The body-whorl below the periphery is stained with brown, or looks as if it were scorched. The coloring takes the form of a very broad interrupted transverse band, or, in other words, of wide blotches or stripes. The latter are sometimes continued upon the upper half of the whorl, and are also here and there faintly observable on the upper volutions. One specimen has

a narrow peripheral brown band. The body-whorl is stained with brown outside the lip; and this owing to the thinness of the shell, produces a brownish labrum, which in some places, particularly at the extreme edge and in the columellar region, is somewhat whitish. It is rather widely expanded at the base and columella, and is a trifle reflexed everywhere. The aperture is very transverse, in fact almost horizontal; it is of a livid white color within, exhibiting the brown marking of the exterior.

H. PLATYSOMA Pilsbry. Pl. 41, figs. 16, 17, 18.

Shell much depressed, discoidal, perspective umbilicated, thin but moderately strong, white (lacking epidermis). The surface has strong oblique, rib-striae, which are rather unevenly developed, and rather weaker below; and very minute close spiral striae are visible in the intervals between the growth striae, under a lens. The spire is almost plane; apex obtuse, the first whorl smooth, polished, convex, the following whorls of the spire flat, acutely keeled at circumference, the keel filling the suture; there is a "margined" appearance above the suture. Whorls $5\frac{1}{2}$; the last whorl is wide, becoming more convex on its last half and deeply descending below the periphery in front. The periphery is obtusely carinated. The aperture is extremely oblique, oval-truncate; white inside; peristome somewhat expanded, white, narrowly reflexed on the basal margin, dilated at the insertion. Umbilicus deep, broad, perspective.

Alt. 12, greater diam. 31, lesser 27 mill.; width of umbilicus 6 mill.

Habitat unknown.

This is a shell of anomalous characters, but apparently allied to the Liu-kiu Island and Japanese group of *Camæna*. The whorls of the spire are flat, showing that the young are acutely keeled at periphery. The spiral microscopic lines are about as fine and near together as in *peleomphala*. The umbilicus is broad; the lip slightly expanded above, reflexed below.

H. MIRANDA A. Adams. *Unfigured.*

Shell depressed-globose, broadly perforate, spire turbinate, rather elevated, apex obtuse; whorls 6, convex, with conspicuous oblique streaks and close decussating revolving striae; last whorl rounded at the periphery, convex on the base; aperture oblique, lunate; per-

istome expanded, reflexed, thickened within. Straw-colored, ornamented with reddish-brown bands at periphery and at suture. (*Ad.*)
Alt. 18, diam. 32 mill.

Id. of Rifunsiri, Japan.

H. miranda Ad., Ann. & Mag. N. H., 4th ser., i, p. 461, 1868.

A handsome species, of a deep straw color, adorned with a red-brown band at the periphery and another at the suture. I found several specimens adhering to the stems of a gigantic species of *Archangelica*, in the little island of Rifunsiri near the Straits of La Perouse. (*Ad.*)

This species may be an *Acusta*. I have not seen it.

H. CALLIZONA Crosse. Pl. 28, figs. 1, 2, 3, 4, 5, 6, 7; pl. 29, figs. 1, 2.

Shell dextral, narrowly, partly covered umbilicate, globose-conoidal, thin and light. Surface slightly shining, lightly striatulate, under a lens seen to be extremely finely marked by spiral striæ all over, except the inner two whorls. The color is pale buff, more or less tinged with greenish or bluish, encircled by several distinct deep chestnut zones, usually three in number; the first a narrow line edging the suture, the second encircling the whorl just above the periphery, the lower one wider, sometimes occupying the entire central tract of the base and the umbilicus. The spire is elevated, conoidal; apex a little obtuse; whorls 6, very slowly widening, the last deflexed in front, rounded at the periphery. Aperture oblique, rounded-lunar; peristome expanded, a little thickened within, basal and columellar margins reflexed, the latter partly covering the umbilicus. Alt. 23-25, greater diam. 25-30 mill.

Hada and Idsumo, Western Japan; Id. of Nippon, in the interior.

H. callizona CROSSE, Journal de Conchyl. 1871, p. 226, 319, t. 13, f. 3.—MARTENS, Jahrb. D. M. Gesell. iii, p. 358, 1876; Sitzungsber. der Gesellsch. naturforsch. Freunde zu. Berl. 1877, p. 102; Novit. Conch. v, p. 31, t. 143, f. 24-27.—*H. amalie* KOBELT, Jahrb. D. M. Gesell. ii, 1875, p. 327, t. 12, f. 3, 4; Nachr. D. M. Ges. vii, 1875, p. 55; Jahrb. iii, p. 149, t. 5, f. 2.—PFR. Monogr. vii, p. 587.—*H. congener* E. A. SMITH, Proc. Zool. Soc. Lond. 1878, p. 105 (figs. in text).

H. callizona may be distinguished from *peliomphala* and its varieties by the more elevated, conoidal form, narrower umbilicus and *continuous* bands, not interrupted by opaque whitish flecks or

streaks. The forms included in the above synonymy do not seem to possess even varietal characters. Figure 4 of plate 28 is from the original illustration and Crosse. Figures 6 and 7 represent *H. amalie* Kobelt. Figures 1, 2, plate 29, are *H. congener* Smith.

The specimens before me are from the Hakone Mountains.

H. SEROTINA A. Adams. Unfigured.

Shell subglobose, broadly perforate; spire elevated-turbinata, apex obtuse; whorls 6, convex, obliquely grooved (grooves unequal) and decussated by most minute close revolving striæ; base convex; aperture lunate; peristome expanded, reflexed, white within, thickened, dilated at the umbilicus, straw-colored, sometimes ornamented with a transverse reddish-brown band. (*Ad.*)

Sagaleen, near Cape Noto, Japan.

H. serotina AD. Ann. Mag. N. H. 1868, 4th ser., vol. i, p. 461.—
PFR. Monogr. vii, p. 374.

A pretty species, orange or deep straw-colored, very much resembling in general appearance the bright yellow varieties of *H. hortensis*. I found it living in the dense thickets of bamboo near the shore. (*Ad.*)

H. LEWISII E. A. Smith. Pl. 29, fig. 6.

Shell dextral, conoidal-globose, narrowly umbilicate, obliquely striate, white covered by a thin buffish-olivaceous epidermis, and encircled at the periphery by a narrow brown band. Whorls $6\frac{1}{2}$, a little convex, sensibly increasing, the last rounded, descending a short distance in front; aperture oblique, white within; peristome expanded all around; columellar margin tinged with dull rose, broadly expanded and reflexed above. (*Smith.*)

Alt. 24, greater diam. 35, lesser 29 mill.

Japan.

H. lewisii SMITH, P. Z. S. 1878, p. 495 (wood-cut).

Perhaps the most closely allied Japanese species to this one is *H. miranda*, A. Adams. From it *H. lewisii* differs in having a more conical spire, a narrower umbilicus, finer oblique striæ, and no spiral sculpture. The oblique striæ at the suture are rather deeply incised and more crowded than on the other parts of the whorls, many of them extending only about a line from the suture and then gradually fading away. The first four whorls differ from the last two in being obliquely punctato-striate, instead of exhibiting an ordinary striation.

The brown band is situated a very little above the middle of the body-whorl, and passing just above its suture, is visible on two or three of the preceding volutions. The umbilicus is very deep and penetrable to the apex of the shell, but rather narrow, occupying about one-seventh of the smallest diameter. Peristome rather broadly expanded and white, with the exception of the columellar and basal margins, which are stained with a dirty pinkish color. Over the umbilicus it is broadly expanded, reflexed and joined to the upper margin by a thin callosity. This species is quite distinct from *H. myomphala*, Martens, and, although agreeing in the style of coloration, differs in form and the umbilicus.

The single example in the British Museum was presented by Mr. George Lewis. (*Smith.*)

H. MYOMPHALA von Martens. Pl 29, figs. 7, 8, 9.

Shell dextral, *umbilicus closed*, depressed conoidal-globose, obliquely striate, decussated by very subtle close spiral lines, buff, with a single peripheral chestnut band, the umbilical region concolored; whorls $6\frac{1}{2}$, scarcely convex, slowly increasing, the upper ones angulate at the periphery, the last rounded, a trifle deflexed in front; aperture a little oblique, obliquely-lunar, peristome expanded, white, margins distant, connected by a scarcely visible callus, upper and basal margins well arched, columellar margin reflexed and adnate at the insertion. (*Martens.*)

Alt. 32, greater diam. 43, lesser 38 mill.; aperture, length 27, breadth 22 mill.

Hagi and Nagasaki, Japan.

H. myomphala MARTENS, Monatsberichte der Berl. Akad. 1865, p. 53; Preuss. Exped. nach Ost-Asien, Zool. ii, p. 29, t. 15, f. 6.—PFR. Monographia v, p. 268.—*H. daimio* ADAMS, mss. in Cuming collection.

In form and size this species is nearest to *H. quiesita* but is always dextral, with closed umbilicus, more numerous and more slowly widening whorls, and finer sculpture. The single band is narrower than in *H. quiesita* or *H. peliomphala*. A young specimen with only 5 whorls shows a pronounced keel (while a *quiesita* of equal size has a very blunt one) and a narrow but not closed umbilicus. (*Mart.*)

H. QUÆSITA Deshayes. Pl. 29, figs. 11, 12, 13.

Shell sinistral, umbilicated, rather thin and light, straw-yellow, encircled by a chestnut band at the periphery and inside the umbilicus; rarely unicolored.

The shell has a deeply penetrating narrow umbilicus which expands and is somewhat funnel-shaped at its opening. It is somewhat shining, opaque; the surface marked by rather strong growth-striæ, generally a little malleated in places, and showing under a strong lens excessively close, fine spiral striæ all over except upon the inner two whorls. Spire low-conoidal; apex obtuse, polished. Whorls $5\frac{1}{2}$, convex, the last wide, a little descending in front, inflated on the base; aperture oblique, broad-lunate, whitish-flesh-color inside and showing the band; entire peristome expanded, basal and columellar margins reflexed, the latter dilated and impinging a little upon the umbilicus; the brown bands at periphery and umbilicus are continued upon the expanded peristome. The ends of the peristome converge, and are joined by a scarcely perceptible callus.

Alt. 31, greater diam. 42 mill.

Alt. 25, greater diam. $37\frac{1}{2}$ mill.

Alt. 21, greater diam. 32 mill.

Yokohama, Simoda, Tabusima and Awasima, etc., Japan.

H. quæsita DESH, in Fér., Hist., t. 10B, f. 10–12; texte, i, p. 179.—PFR. Monographia iv, p. 262.—REEVE, Conch. Icon., f. 1355.—FORTUNE, Japan and China, p. 215.—MARTENS, Ostas. Zool. Land-Moll., p. 28, t. 15, f. 5.—*var. montium* MARTENS, Novit. Conch. v, p. 178, t. 151, f. 1–3.—*H. perryi* JAY, Commodore Perry's Narrative of the Exped. of an American Squadron to Japan ii, p. 294, t. 5, f. 7, 8, 9, 1856.

This species frequently lacks the peripheral band and the brown lining of the umbilicus, being then of a uniform straw-yellow or olive-tinged yellow color. The size varies much, and the umbilicus may be either quite wide at its opening or narrow.

Var. *PERRYI* Jay. Pl. 41, figs. 8, 9.

Shell similar in form to *H. quæsita*; somewhat more solid; three-banded with tawny; middle or supra-peripheral band narrow, bordered on each side with yellow; upper and lower bands wide, fading into the ground-color toward suture and umbilicus; interior of umbilicus dark.

Yeddo.

The shell figured is Jay's type specimen, which has been loaned to me by Prof. R. P. Whitfield, curator of the American Museum of Natural History, Central Park, New York City. It is somewhat abnormally elevated. The *var. montium* of Martens is a synonym. The figures given by Martens are copied on pl. 30, figs. 9, 10. The description is as follows:

Var. montium Martens (pl. 30, figs. 9, 10). Brownish, 3-banded, the middle band narrow, bordered above and below with yellow, the upper and lower bands wider, fading at their edges into the ground-color. Alt. 27, greater diam. 43, lesser 35 mill. (*Mart.*)

Mts. of Tsukuba-San, Hakone and Hatta, Japan.

Resembles *H. herklotsi* and *H. luchuana* in color, but does not differ in form from the normal *quesita*.

H. LATILABRIS Möllendorff. Pl. 41, figs. 10, 11.

Shell sinistral, umbilicated, depressed-conoidal-globose, rugulose-striate, thin, yellow, with a single narrow reddish peripheral band; whorls $5\frac{1}{2}$, a little convex, the last inflated beneath, very briefly descending in front; aperture wide-lunar, very oblique; peristome reflexed, broadly expanding, white, margins distinct, joined by a scarcely visible callus, the upper margin arcuate toward the insertion, the columellar dilated. Alt. 16, greater diam. 26, lesser 22 mill.; aperture including peristome 14 mill. long, 15 wide, $11\frac{1}{2}$ high. (*Mldff.*)

Kiukiang, China.

H. latilabris MOLLEND. in Jahrb. D. M. Gesell. i, p. 79, 1874.—See also VON MARTENS, *loc. cit.*, p. 129; and GREDLER, Mal. Bl. 1882, p. 174.—Nachr.-Bl. D. M. Ges. 1890, t. 1, f. 3 a, b.

Doubts have been expressed of the specific distinctness of this form from *H. quesita*. The smaller size, lack of an umbilical dark patch and the different *locality* separate it from the Japanese species, at least varietally.

* * *

H. CECILLEI Philippi. Pl. 31, fig. 29.

Shell umbilicated, orbicular-conoid, solid, striate and obsoletely granulate, tawny brown, ornamented with two chestnut bands, the upper one ascending along the suture; spire short-conic; apex rather obtuse, paler. Whorls $6\frac{1}{2}$, somewhat convex, the last subangular at the periphery, deflexed in front; perforated by a moderate um-

bilicus (about equaling $\frac{1}{2}$ the diameter of the shell); aperture rounded-lunar, livid inside, with pellucid bands; peristome livid-flesh-colored, margins joined by a callus, the right margin much arched, expanded and a little reflexed, columellar and basal margin reflexed. (*Pfr.*)

Alt. 26, greater diam. 48, lesser 40 mill.

Tien Tong, China; Region of Ningpo, Central China.

H. cecillei PHIL. Zeitschr. f. Mal. 1849, p. 82.—PFR. Mon. Hel. Viv. iii, p. 221.—REEVE, Conch. Icon., f. 1431.—MARTENS, Ostas. Landschn, p. 48.

H. ORIENTALIS Adams & Reeve. Pl. 27, figs. 13, 14.

Shell umbilicated, conoid-semiglobose, solid, striate and microscopically granulated, tawny with two encircling blackish-chestnut bands; spire short conoid, the apex a little acute; whorls 6, scarcely convex, the last rounded, shortly deflexed in front; umbilicus moderate ($\frac{1}{2}$ the diameter), open; aperture oblique, lunate-rounded, with a pearly luster within; peristome brownish-violet, margins approaching, the right margin expanded and a little reflexed, the basal and columellar margins reflexed. (*Pfr.*)

Alt. 25, greater diam. 46, lesser 38 mill.

Borneo.

H. orientalis A. AD. & RVE., Voyage of the Samarang, Moll, p. 61, t. 16, f. 4 (not *H. orientalis* Gray, Annals of Philos., new ser., ix, 1825, p. 412, and Reeve, Conch. Icon., f. 409, a species of *Nanina*).—*H. germanus* REEVE, Conch. Icon., f. 385.—PFR. Monog. Hel. Viv. iii, p. 222; Conchyl. Cab., p. 383, t. 142, f. 1, 2.

I have restored the original name to this species, since the *H. orientalis* of Gray belongs to a distinct genus and family.

H. MORELETIANA Heude. Pl. 24, figs. 78, 79, 80.

Shell umbilicated, large, thick, depressed conoid-globose, tawny-reddish or blackish, shining, three-banded, the middle or peripheral band is broad, whitish, more or less tinged with fawn color, the upper and lower bands are blackish, rather ill-defined at the edges; obliquely strongly and closely striate, spire depressed, convex; whorls 5-6, the last rapidly increasing, convex, separated by moderately impressed sutures, the last inflated, convex, descending; aperture very oblique, elliptical; throat blackish-violet, with a white band; peristome strongly reflexed, somewhat thickened; columellar margin reflexed partly over the umbilicus, joining the upper margin by a smooth parietal callus; umbilicus moderate, but little enlarged

at its opening, nearly cylindrical within, and permitting one to see the earlier whorls. (*Heude.*)

Alt. 37, greater diam. 53, lesser 44 mill.

Ning-guo-fu and Guang-de-dshou, province of An-hui, China.

H. moreletiana HEUDE, Moll. Terr. Fl. Bleu, p. 38, t. 16, f. 1.—
MLDF. in Jahrb. D. M. Ges. 1884, p. 380.

This is a large two-banded species, comparable to *H. cecillei* Phil. It is said to be the largest *Helix* of Central China.

H. PERCUSSA Heude. Pl. 24, figs. 86, 87, 88.

Shell umbilicate, orbicular-conoid, thin but solid, shining, amber-colored; decussated by delicate oblique and concentric striæ forming a latticed pattern; spire obtuse, convex; whorls 5½, convex, regularly increasing, joined by a narrow, little deepened suture, the last whorl large, very convex, with a mere suggestion of a carina, not deflexed in front. Aperture very little oblique, oblong, lunar, sinuous; peristome somewhat thickened, a little extended, erect, notably sinuous at the extremity of the false-carina; right margin short, the columellar elongated and dilated at the base, covering some of the umbilicus. Umbilicus small, perspective. (*Heude.*)

Alt. 19, greater diam. 30, lesser 26 mill.

On Rocks of the Wu-tang Mts., Province of Hupe, China.

H. percussa H., Moll. Terr. Fl. Bleu, p. 39, t. 16, f. 4, 1882.

H. BAIRDI H. Adams. Pl. 31, fig. 28.

Shell umbilicated, turbinate-depressed, solid, obliquely plicatostriate, tawny, ornamented with a blackish-chestnut, yellow margined peripheral band. Spire short conoidal; whorls 6, a little convex, slowly increasing, the last descending in front; umbilicus moderate, profound; aperture diagonal, ear-shaped-lunar; peristome brownish flesh-colored, expanded and narrowly reflexed, the margins remote, both the upper and the lower flexuous in the middle and obsoletely tubercled, indented on the outside; columellar margin dilated. (*Ad.*) Alt. 23, greater diam. 41, lesser 36 mill.

Tamsui, Formosa.

H. (Camæna) Bairdi Ad. P. Z. S. 1866, p. 316, t. 33, f. 3.

H. BATANICA Adams & Reeve. Pl. 27, figs. 11, 12.

Shell sinistral, umbilicate, conoid-subglobose, rather solid, striatulate, olivaceous-buff, 3-banded with chestnut; spire conoid, apex rather obtuse; whorls 5, a little convex, the last rounded, scarcely

descending in front; aperture oblique, lunar, whitish inside; peristome white, a little expanded, the margins remote, columellar margin reflexed above into a plate which half covers the very narrow umbilicus. (*Pfr.*) Alt. $12\frac{1}{2}$, greater diam. 18, lesser 16 mill.

Island of Batan, Bashee group.

H. batanica AD. & RVE. Voy. Samarang, Moll., p. 60, t. 15, f. 5.—RVE., Conch. Icon., f. 588.—PFR. Monog. Hel. Viv. iii, p. 218; Conchyl. Cab., p. 384, t. 142, f. 5, 6.

H. FORMOSENSIS Pfeiffer. Pl. 13, fig. 56; pl. 29, fig. 10.

Shell sinistral, umbilicate, subturbinately-depressed, rather thin, obliquely finely striate, waxen white under a very thin epidermis; spire short turbinately, apex obtuse; whorls $5\frac{1}{2}$, regularly increasing, slightly convex, the last obsolete unifasciate and subangulated at the periphery, slightly descending in front, convex beneath, sculptured with very minute spiral striæ, not compressed around the moderate, profound umbilicus; aperture oblique, broad lunar; peristome somewhat thickened, margins remote, the upper one sinuous, a little expanded, basal margin reflexed, dilated at the insertion. (*Pfr.*) Alt. 12–13, greater diam. 26, lesser $22\frac{1}{2}$ mill.

Formosa.

H. formosensis PFR. P. Z. S. 1865, p. 829, t. 46, f. 7; Mal. Bl. 1866, p. 41; Monogr. v, p. 340.

H. BOCAGEANA Crosse. Pl. 32, figs. 40, 41.

Shell narrowly umbilicated, depressed-globose, longitudinally rugose-striate, with very obsolete decussating spiral striæ, pellucid, dull yellowish, with a single chestnut band; apex rather obtuse; whorls 6, a little convex, the last scarcely descending in front, moderately subdepressed around the umbilicus; aperture transversely dilated, lunar; peristome pale brownish-violet, columellar margin dilated above partly closing the umbilicus, outer margin subattenuated; throat white, showing the brown band. (*Crse.*)

Alt. 19, greater diam. 25, lesser 22 mill.

China?

H. bocageana CRSE. Journ. de Conchyl. 1864, p. 284; 1866, p. 58, t. 1, f. 4.—PFR. Monogr. v, p. 342.

H. BACCA Pfeiffer. Pl. 32, fig. 49; pl. 26, fig. 8.

Shell umbilicate, depressed-globose, solid, very lightly striate, whitish-buff, ornamented with three chestnut bands, the peripheral

one wider; spire shortly turbinate, apex minute, flesh-colored; whorls $5\frac{1}{2}$, moderately convex, the last not descending, base subinflated, sculptured with very obsolete spiral striæ, very narrowly impressed around the umbilicus; aperture slightly oblique, lunar, white inside, with pellucid bands; peristome white, narrowly reflexed all around, the margins remote, basal margin dilated at the insertion, subangulated. (*Pfr.*)

Alt. 14, greater diam. $23\frac{1}{2}$, lesser $20\frac{1}{2}$ mill.

Formosa.

H. bacca PFR. P. Z. S. 1865, p. 829, t. 46, f. 8; Mal. Blätter 1866, p. 42; Monogr. Hel. Viv. v, p. 342.

H. DELICIOSA Pfeiffer. Pl. 32, fig. 50.

Shell umbilicated, depressed turbinate-globose, rather thin, subdistinctly plicatulate-striate, slightly shining, isabella-colored, elegantly girdled with reddish lines; spire conoidal, rather acute; whorls nearly 6, a little convex, the last not descending, having a thread-like angle and a broader band above the middle, the base convex; umbilicus narrow, pervious, aperture nearly vertical, rounded-lunar; peristome pale rose-color, expanded, margins scarcely converging, the right one subangularly produced in the middle, columellar dilated, partly covering. (*Pfr.*)

Alt. $15\frac{1}{2}$, greater diam. 26, lesser 23 mill.

Loas Mts., Cambodia.

H. deliciosa PFR. P. Z. S. 1862, p. 271, t. 36, f. 3; Mon. Hel. Viv. v, p. 342.

H. PEGUENSIS Benson. Pl. 31, fig. 22.

Shell narrowly umbilicated, globose-depressed, rather solid, obliquely rugose-striatulate, a little shining, translucent, rufous-corneous, obscurely unifasciate; spire conoidal, apex obtuse, suture rather profound, rough-submargined; whorls 5, scarcely convex, slowly increasing, the last rounded, obtusely angulated above the periphery, slightly descending in front, a little compressed around the umbilicus; aperture oblique, rounded-lunar, peristome a little expanded, livid violet-whitish, margins remote, subconverging, columella expanded, a little reflexed, partly closing the umbilicus. (*Bens.*) Alt. 13, greater diam. 20, lesser 18 mill.

Sheoay-Gheen, Pegu.

H. peguensis BENS. Ann. Mag. N. H. 1860, vi, p. 192.—PFR. Mon. Hel. Viv. v, p. 346.—HANL. & THEOB. Conch. Ind., t. 58, f. 6.

The umbilicus is wider in some specimens than in others, and the angle above the periphery is variable and occasionally more pronounced. In dead specimens the livid violaceous color of the aperture is changed into white, and the obscure fuscous band at the periphery is scarcely to be detected. (*Bens.*)

H. PILIDION Benson. Pl. 31, fig. 20.

Shell narrowly umbilicated, subglobose-conoid, very thin, smooth, lightly striate, striæ rather remote, elevated, corneous-brown, and with very close decussating spiral ones; translucent, whitish ornamented with a single peripheral rufous band; spire conoidal, apex somewhat obtuse, suture lightly impressed. Whorls $4\frac{1}{2}$, sensibly widening, a little convex; the last scarcely descending in front, convex beneath; aperture oblique, quadrate-lunate, peristome acute, thin, expanded a little all around, margins remote, subconniving, joined by a delicate callus, columella wider, triangularly expanded. (*Bens.*) Alt. 9, greater diam. 16, lesser 13 mill.

Pegu.

H. pilidion BENS. in Ann. Mag. N. H. 3d ser., vi, p. 191, Sept., 1860.—PFR. Mon. Hel. Viv. v, p. 347.—HANLEY & THEOB., Conch. Ind., t. 53, f. 6.

A small species which I have not seen. It is perhaps allied to *H. hemiopta*.

H. PHAYREI Theobald. Pl. 32, fig. 53.

Shell moderately umbilicated, orbicular-conoid, somewhat solid, with corneous epidermis, shining; obliquely flexuously, rudely plicate-striate under the epidermis, the periphery obtusely angulated. Spire depressed-conoid, apex obtuse, suture scarcely impressed; whorls 6, a little convex, slowly increasing, the last descending and rotund toward the aperture, convex beneath, compressed around the open profound umbilicus. Aperture subcircular-lunate, diagonal; peristome white, slightly expanded all around, the margins approximating, joined by a callus. (*Blanford.*)

Alt. 8, greater diam. 18, lesser $15\frac{1}{2}$ mill.

Ava.

H. phayrei THEOB. in Journ. Asiat. Soc. Beng. 1859, p. 306.—BLANF. Contrib. to Ind. Malacol. v, p. 26, 1865.—PFR. Monogr. v, p. 346.—HANLEY & THEOBALD, Conch. Indica., t. 15, f. 1.

* * *

The following are shells agreeing with the group of *H. peliomphala* in the fine spiral sculpture and rather light texture. They are brown in color; the umbilicus is moderately open; the periphery is prominently keeled.

H. SWINHOEI Pfeiffer. Pl. 20, figs. 40, 41; pl. 30, fig. 8.

Shell moderately umbilicated, turbinate-depressed, rather solid, obliquely and rather coarsely striate and sculptured with very close fine spiral striæ, which give the surface a silky luster; reddish-brown finely and obscurely marbled with lighter; spire low-turbinate, rather obtuse; whorls nearly $5\frac{1}{2}$, the first $1\frac{3}{4}$ convex, polished, forming the nucleus; the several following ones nearly plane, the last whorl slightly descending in front, a little convex above, encircled by a prominent keel in the middle, inflated beneath. Aperture diagonal, rounded-lunar, bluish-pearly inside; peristome fleshy-brown, margins converging, joined by a thin callus, the upper margin narrowly expanded, basal somewhat reflexed, dilated at the insertion. Alt. 27-30, greater diam. 50-58, lesser 43-48 mill.

Formosa.

H. swinhoei PFR., P. Z. S. 1865, p. 829, t. 46, f. 6; Mal. Blätter xiii, p. 41, 1866; Monographia v, p. 338.—DOHRN in Conchyl. Cab., Helix, p. 581, t. 171, f. 6, 7.

Pfeiffer mentions a variety which is smaller, fulvous, the peristome pale rose, aperture white inside; diam. maj. 46, min. 39, alt. 25 mill.

The figures on plate 20 are very characteristic. The spiral sculpture is visible on close inspection without a lens. Excessively close, crowded spiral lines cover the whole surface, except the apex and inside of the umbilicus.

H. CASPARI Möllendorff. Pl. 25, figs. 92, 93.

Shell openly umbilicated, depressed-globose-conoid, solid, with curved radiating coarse striæ, shining, dark chestnut-brown, with a narrow lighter band at the periphery, which is distinctly angular, almost carinated. Whorls 6, but slightly convex, the last deflexed a short distance in front. Aperture diagonal, lunate-elliptical, violet-brown inside, the peristome rather expanded, somewhat reflexed, a little thickened, the margins joined by a very thin callus,

columellar margin dilated, partly covering the umbilicus. (*Muldff.*)

Alt. 30, greater diam. 47, lesser 38 mill.

Alt. 26, greater diam. 43, lesser 35½ mill.

Southern part of the province Hunan, China.

H. caspari MOLLENDORFF, Jahrb. D. M. Ges. 1884, p. 381, t. 9, f. 1, 2.

H. VULPIS Gredler.

Shell thin, openly umbilicate, depressed, the spire applanate-convex, irregularly and unequally tuberculate-striate, granulate, slightly shining, brown, paler beneath, ornamented with a broad brown band under the peripheral carina and many wide and narrow lines around the umbilicus, carinate at the periphery; whorls 5½, slightly convex, sensibly widening, separated by impressed sutures, the last whorl inflated below, scarcely deflexed in front. Aperture oblique, lunate-oval, ashen-violet; peristome little expanded, quite narrowly reflexed, flesh-colored, margins distant, joined by an extremely thin callus. (*Gredler.*)

Alt. 21-23, diam. 44-48.

Near Hensan, Southwestern Hunan, China.

H. (Hadra) vulpis GRED. Jahrb. D. M. Ges. xiv, 1887, p. 352.

Allied to *H. caspari*, but greater in circumference, and although the spire is more depressed, yet the whorls are higher; the color is lighter (cinnamon-brownish), and below there are numerous reddish spiral bands such as adorn most species of *Hadra*. The blunt angle at the periphery of *caspari* is here formed into a perfect keel, almost projecting above, and not whitish. The last whorl is much more inflated below the keel, and continues along the keel, not being deflexed in front as it is in *caspari*. The sculpture is wholly different: it has furrow-like, wavy oblique striae, especially on the penultimate whorl, and above and below is distinctly granulate. The aperture is little oblique, not diagonal, the lip-margins not approaching, and the columellar margin scarcely widened at its insertion. The shell is fragile, nearly as thin and light as paper. The species is named in honor of Mr. P Lorenz Fuchs.

H. PANTHEIA Mabille. Pl. 31, figs. 17, 18, 19.

Umbilicate, depressed, rather solid but not thick, opaque, yellowish-olive-brown; surface somewhat shining, obliquely irregularly striate, under a lens seen to be covered with an *extremely dense, close, distinct sculpture of spiral lines*, all over except in the umbilicus and

on several of the inner whorls; spire low-conical, obtuse at apex; sutures scarcely impressed. Whorls 5, the first two smooth, shining, corneous; last whorl rapidly widening, angular at the periphery, convex beneath, scarcely deflexed at the aperture; aperture oblique, rounded-truncate, of a livid-bluish tint inside; peristome expanded, not thickened, flesh-colored, its margins converging, the basal dilated; parietal callous light; umbilicus funnel-shaped.

Alt. 25, diam. maj. 43, min. 35 mill.; umbilicus 4 to 5 mill. wide.

China.

H. pantheia MABILLE, Bull. Soc. Philomathique de Paris 1888, p. 74.

Described and figured from a specimen in the collection of L'abbé A. Vathelet. The deflection of the last whorl shown in the figure is caused by an injury received by the specimen. It would be very slight in an uninjured shell. The species is allied to *H. swinhoei* and *H. caspari*.

H. AMMIRALIS Pfeiffer. Unfigured.

Shell umbilicate, turbinate-depressed, rather solid, rather rudely striate all over, tawny or yellowish, generally ornamented with a peripheral blackish-chestnut band; spire regularly conoidal. Whorls $6\frac{1}{2}$, a trifle convex, slowly widening, the last a little descending in front; periphery carinated, base convex, subcompressed around the narrow chestnut umbilicus. Aperture oblique lunate; peristome liver-colored, narrowly expanded, the columellar margin reflexed above. (*Pfr.*) Alt. 20, greater diam. 36, lesser 33 mill.

China.

H. ammiralis PFR. P. Z. S. 1856, p. 328; Mon. Hel. Viv. iv, p. 262.

An unfigured form, probably grouping here.

Group of H. succincta Ad.

The shells of this group are depressed, conical above, convex below, carinated at the periphery. *The umbilicus is narrow but deep and cylindrical*, and partly covered by the reflexed columellar lip. The surface is obliquely striate, and in some species there are superficial spiral striæ. In fact, the sculpture in certain of the forms here grouped reminds one of that of *Camæna s. s.*; in others of the group of *H. peliomphala*; and in *H. caliginosa* it is microscopically granulated. The nucleus is minute; the whorls are

narrow, increasing slowly; and the aperture is not so oblique as in most helices. The species all have a *narrow dark band just on and above the periphery*. They range from Central China to Formosa and the Liu-kiu Islands.

H. SUCCINCTA H. Adams. Pl. 25, figs. 94, 95.

Shell narrowly, profoundly umbilicated, depressed, convex below, the spire low-conical, periphery rather sharply keeled; it is rather thin but solid, of a light brownish or pale yellow color, with a narrow distinct reddish peripheral girdle visible on the whorls of the spire at the suture; this girdle is bordered both above and below with whitish; the suture also is bordered below with whitish. Surface slightly shining, obliquely finely striate, encircled by numerous fine irregular spiral lines on the base, very finely obliquely but obsolete malleated on the upper surface. Spire conic; apex shining, minute; whorls $5\frac{1}{2}$, a little convex, slowly widening, the last keeled, not descending in front. Aperture a little oblique, broad-lunate; peristome white, narrowly expanded, subreflexed and flattened, dilated half over the umbilicus, marked by the termination of the band on the outer lip.

Alt. 13, greater diam. $19\frac{1}{2}$, lesser 18 mill.

Alt. 16, greater diam. 24, lesser $21\frac{1}{2}$ mill.

Alt. 18, greater diam. 27, lesser 23 mill.

Formosa.

H. succincta H. AD. P. Z. S. 1866, p. 316, t. 33, f. 4, 4a.—PFR. Monog. Hel. Viv. vii, p. 388.—MOLLENDORFF, Jahrb. D. M. Ges. 1884, p. 383, t. 9, f. 7, 8.

This species is abundant at Da-gou (Takow or Takao), Formosa. It varies considerably in size.

H. FRIESIANA Möllendorff. Pl. 25, figs. 96, 97.

Shell narrowly umbilicated, globose-conoid, obliquely striatulate and decussated by rough spiral lines, brown, marked at the periphery with a blackish-brown very narrow band. Spire conoid, apex rather acute; whorls 6, subplane, separated by a scarcely impressed suture, the last whorl acutely carinated, scarcely descending in front, compressed beneath, flattened behind the aperture on the base. Aperture oblique, lunate-elliptical; peristome expanded, slightly reflexed, margins joined by a very thin callus, the basal margin nearly

horizontal, thickened by a callus, columellar margin dilated, thickened, partly closing the narrow umbilicus. (*Müllff.*)

Alt. 21, greater diam. $27\frac{1}{2}$, lesser 25 mill.

Da-gou, Southern Formosa.

H. friesiana MLLDFF. Jahrb. D. M. Ges. 1884, p. 385, t. 9, f. 3, 4.

Very near to *H. succincta*, but more conic with flatter whorls, the last one very acutely keeled, much more compressed beneath, and remarkably flattened behind the mouth, causing the basal lip to be horizontal instead of arcuate. Described from a single specimen.

H. STENOZONA Möllendorff. Pl. 27, figs. 4, 5.

Shell umbilicated, conoid-depressed, thin, obliquely arcuately striatulate, decussated by very delicate spiral lines, straw colored, painted with a very narrow brown peripheral band. Whorls $5\frac{1}{2}$, a little convex, the last obtusely angulated at the periphery, slightly deflexed in front, subcompressed on the base, subangulated around the umbilicus. Aperture oblique, rotund-lunar, the peristome narrowly expanded, a trifle reflexed, whitish, margins joined by a very thin callus, the basal margin subhorizontal, callously thickened, the columellar margin dilated. (*Möll.*)

Alt. $14\frac{1}{2}$, greater diam. 23, lesser 19 mill.

Fu-dshou, province of Fu-dshien, China.

H. stenozona MOLL., Jahrb. D. M. Ges. 1884, p. 385, t. 9, f. 5, 6.

A species closely allied to *H. succincta* H. Ad., especially to its smaller forms, but smaller, thinner, somewhat more widely umbilicated, the last whorl much more bluntly angulated, the spiral striæ finer and more regular. The color is simply straw-yellow, with a very narrow reddish brown girdle. (*Möll.*)

H. HÆMATOZONA Heude. Pl. 24, figs. 81, 82.

Shell globose or globose-depressed, imperforate or half-covered umbilicate, thin, somewhat solid, greenish-amber-colored encircled at the periphery by a narrow red zone; cancellated by broad, conspicuous oblique and concentric striæ; shining; spire subelevated or much compressed; whorls 4 to 5, a little convex, separated by linear sutures; the last whorl large, and angulated below the color-band, convex, not descending in front; aperture little oblique, oblong-lunar, sinuous; peristome white, thickened, straight, scarcely reflexed,

the columella vertical, its margin reflexed, and wholly or half covering the umbilicus. (*Heude.*)

Alt. 19–11, greater diam. 27–19, lesser 22–17 mill.

Southwestern part of the province Gui-dshou, China.

H. hæmatozona HEUDE, Moll. Terr. de la Vallé du Fleuve Bleu, p. 40, t. 20, f. 14.

This species has two forms, one perforated, the other imperforate; they are considered to be specifically identical by Heude, who examined a great number of specimens.

H. BATHYMOPHORA Mabile. Pl. 15, figs. 72, 73.

Shell partly covered umbilicate, depressed conical, solid, a little thick, white under a deciduous epidermis, shining, radiately delicately striate and crispate-malleate; spire convex, prominent; apex large, a little obtuse, shining; whorls $5\frac{1}{2}$, regularly and rapidly increasing, convex, the suture narrow, little impressed, margined by a purple line; last whorl large, rounded above, sloping, angulated at the periphery and narrowly zoned with red, scarcely descending at the aperture, not dilated, convex beneath; aperture irregularly ovate, lunate; peristome a little thickened, patulescent, scarcely reflexed; columellar margin short, oblique, a little thickened, dilated in a slightly thickened callus half covering the umbilicus; basal margin sinuous, tuberculose; outer margin incurved, obscurely angulated in the middle. (*Mab.*) Alt. 19, greater diam. 33, lesser 29 mill.

Tonquin.

H. bathymophora MABILLE, Bull. Soc. Mal. Fr. 1887, p. 83, t. 2, f. 6, 7.

Allied to *H. friesiana* Mlldff., but with nearly covered umbilicus, whorls more inflated, etc.

H. JACULATA Mabile. Pl. 42, figs. 20, 21.

Shell nearly covered perforate, conic-globose, rufescent under a hydrophanous deciduous epidermis, a little thick, solid, striatulate, longitudinally impressed and crispate-malleate, under a lens, shining; spire strong, conic-globose, the apex obtuse, corneous, shining; whorls 5– $5\frac{1}{2}$, the first costulated, the rest convex, regularly and sensibly increasing, separated by a quite distinct suture narrowly marked with white; last whorl large, not descending in front, seen from above equalling nearly the moiety of the width of the penultimate, swollen, obscurely angulated toward the base; aperture

oblique, irregularly ovate, lunate; peristome thickened, white, a little reflexed; margins distant, the columellar margin oblique, dilated into a rather thick callus which almost entirely covers the umbilicus, joining the basal margin in a tuberculiform prominence; the basal margin nearly straight, the outer arcuate and excavated. (*Mabille.*) Alt. 21, greater diam. 31, lesser 26 mill.

Tonquin.

H. jaculata J. MAB., Moll. Tonk. Diagn., p. 5, May, 1887; Bull. Soc. Mal. Fr. 1887, p. 86, t. 1, f. 8, 9.

This species belongs to the same group as *H. bathymophora*, but differs from that form in its more globose outline, more elevated but more obtuse spire, etc.

H. MERCATORINA Mabille. Pl. 15, figs. 67, 68.

Shell umbilicated, globose-subdepressed, solid, shining, buff, radiately ribbed-striate, and a little crispate; spire strong, convex-mamillated, apex, obtuse, shining, ruddy; whorls 6, convex, rapidly and regularly increasing, separated by a distinct linear suture; the last whorl large, convex-rounded, a little dilated and descending in front, a little convex beneath; aperture oblique, lunate, oblong-rounded; peristome expanded, a little thickened, white, reflexed, the margins distant, outer margin excavated and incurved, columellar margin nearly straight, dilated in a pretty thick callus which is not appressed but projects a little over the umbilicus; columella thick, oblique, with a strong tubercle at its base. (*Mabille.*)

Alt. 17, greater diam. 31, lesser 25 mill.

Tonquin.

H. mercatorina MAB. Bull. Soc. Mal. Fr. 1887, p. 88, t. 2, f. 10, 11.

H. MERCATORIA Gray. Pl. 31, figs. 26, 27.

Shell with a narrow, deep umbilicus, of a depressed form, convex below, conoid-convex above the obsoletely subangular periphery; thin but moderately strong, chestnut-brown, encircled at the periphery by a narrow darker girdle, which is bordered above and below by light yellowish bands; the dark girdle is visible at the suture of penultimate whorl; the inside of the umbilicus is perceptibly darker than the color of the base. The surface is nearly lusterless, with strong curved striæ, more prominent above. Spire low-conoidal, apex obtuse; suture evenly impressed; whorls 6, slightly convex, slowly widening, the last obsoletely angular at the periphery, de-

scending a trifle or not at all in front. Aperture slightly oblique, lunate; peristome expanded and reflexed, purplish-brown.

Alt. 21, greater diam. 32, lesser 28½ mill.

Alt. 25, greater diam. 38, lesser 34 mill.

China (Pfr.); *Liu-Kiu Islands* (Phil. Acad. Coll.)

H. mercatoria Gray (in British Mus.), PFEIFFER in Zeitschr. f. Mal. 1845, p. 154; Monogr. Hel. Viv. i, p. 331; Conchylien Cabinet, p. 336, t. 132, f. 1, 2.—REEVE, Conch. Icon., f. 383.

This is a pleasing species, allied to *H. succincta* somewhat, and like that species in general outline, closely coiled whorls and in the aperture, which is not so oblique in these forms and in the generality of depressed helices. The nearly lusterless surface sometimes shows *in places* very fine spiral incised lines, when viewed under a strong lens; but such sculpture is neither frequent nor characteristic. The largest specimen before me measures 37 mill. in diameter; the smallest is of a light russet-tinged yellow color, the umbilicus a shade darker, and banded like the usual form. It measures alt. 16, greater diam. 26, lesser 23½ mill.

H. SUBMANDARINA Pilsbry. Pl. 42, figs. 33, 34, 35.

Shell narrowly umbilicated, somewhat turbinated, conoidal above, flattened below; yellowish, with a narrow brown peripheral band; periphery rounded; lip a little expanded, labiate within.

The shell has a narrow but deep and tubular umbilicus; it is somewhat trochoidal in outline, very solid and strong, opaque; spire elevated, composed of 6 very convex, slowly widening whorls, the last one rounded at the periphery, scarcely descending in front; apex a little obtuse; suture deeply impressed. Aperture slightly oblique, small, showing the band within and upon the face of the lip; peristome slightly expanded, strongly labiate or thickened inside; columellar margin a little dilated, impinging upon the narrow umbilicus.

Alt. 18, greater diam. 21 mill.; width of umbilicus 1¼ mill.

Liu-kiu, Is.?

This is a species belonging to the *H. succincta* group, but much more trochoidal than that species and of a solid, heavy texture. In the elevated spire, rounded periphery and heavy texture there is some resemblance to *H. mandarina*; but it differs wholly from that species, having the axis perforated. Two specimens are before me; one received from J. G. Anthony, labelled "China"; the other is

from the Swift collection, marked "Loò-Choo Is." The last locality is probably correct. Both specimens were in trays containing *H. mandarina*.

H. CALIGINOSA Adams & Reeve. Pl. 27, figs. 9, 10, 10a.

Shell globose depressed with conoidal spire, the umbilicus narrow but deep, circular, and somewhat impinged upon by the reflexed columella; rather thin but solid; color fawn-brown, encircled by a narrow red band, the upper whorls yellowish-white. Surface sculptured by close, oblique arcuate striæ, conspicuous both above and below, the whorls of the spire showing under a strong lens minute, delicate separated granules or little elevated points. Spire rather elevated, apex minute, shining, whitish; sutures well impressed from the apex to its termination. Whorls $6\frac{1}{2}$, convex, slowly widening, the last slightly descending in front. Aperture oblique, lunate; peristome expanded, the basal margin sinuous (being arched forward, seen from below), the columellar margin suddenly dilated and partially covering the umbilicus.

Alt. 25, greater diam. 32, lesser 29 mill.

Mindanao, Philippines.

H. caliginosa A. AD. & REEVE, Zool. Voyage of the Samarang, Moll., p. 62, t. 16, f. 6.—REEVE, Conch. Icon., f. 525.

This species is said by Reeve to belong to the group of which *H. unguina* is the type. The only published figures represent base and top views, so I am not absolutely certain that the specimen before me (from which fig. 10 of pl. 27 was drawn) is correctly named. The original description is as follows: "Shell subglobose, perforate, concentrically marked by oblique, slightly elevated streaks, yellowish-white; whorls 6, the last spadiceous-brown, surrounded by a narrow rufous band; aperture depressed-lunate, peristome reflexed."

The specimen drawn in fig. 10 probably a little abnormally elevated.

H. PHILIPPINENSIS Semper. Pl. 60, figs. 1, 2, 3, 4.

Shell large, depressed, very solid and strong, narrowly umbilicated, opaque, of a beautiful reddish-fawn color, somewhat darker on the spire, and encircled just above the periphery by an indistinct darker band. The surface is nearly lusterless, nearly smooth below, oblique, rather coarsely striate above. Spire low, depressed; suture impressed; whorls $5\frac{1}{2}$, slightly convex, the last very obsoletely angulated

at the periphery, which is slightly above the middle of the whorl; it does not descend in front. The aperture is broadly lunar, whitish inside, oblique; peristome flesh-colored, thickened, its face flattened on the upper and outer margins (which are expanded), the baso-columellar margin very convex on its face, reflexed, somewhat straightened, dilated partly over the umbilicus. The umbilicus is narrow, but deep and cylindrical.

Alt. 31-32, diam. 47-49, lesser 39-40 mill.

Island of Tablas, Philippines.

? *Hadra philippinensis* SEMPER, Reisen im Archipel der Philippinen iii, Landmollusken, iv Heft, t. 10, f. 7a, b, 1877.

A beautiful tawny species, of which two specimens lie before me. Both lack epidermis,—a peculiarity I am disposed to believe may be constant in the species. It seems to me to be allied to *H. caliginosa*, *mercatoria*, etc., although the texture is decidedly heavier and stronger, and the whorls widen more rapidly.

Judging from Hidalgo's remarks (Journal de Conchyliologie, 1887, p. 110) I am disposed to believe that the true *philippinensis* was not before him.

Group of H. mandarina, Gray.

Shell solid, compact, globose-conical, elevated, the top obtuse; axis or pillar solid at all stages of growth; lip obtuse, thickened, slightly expanded.

H. MANDARINA Gray. Pl. 31, fig. 32.

Shell globose-conical, the spire elevated, obtuse; imperforate; solid; reddish-brown, with a light peripheral band, or sometimes yellowish, lightly streaked with reddish, encircled at periphery by a narrow deep brown band which is bordered above and below by whitish bands. Surface rather rudely but inconspicuously obliquely striate. Spire elevated, conical, obtuse; suture well impressed. Whorls $5\frac{1}{2}$, the inner $1\frac{1}{2}$ scarcely convex, the others convex, slowly widening, the last convex below, not indented around the axis, slowly descending or not descending in front. Aperture semicircular, very oblique; lip flesh-colored, blunt, slightly expanded, evenly arched all around, the columellar margin much thickened.

Alt. 23, diam. 26 mill.

Alt. 23, diam. 29 mill.

Alt. 20, diam. 23 mill.

Liu-kiu Islands.

H. mandarina GRAY, Zool. of Beechey's Voyage, p. 143, t. 38, f. 2, 3.—PFR. Monog. Hel. Viv. i, p. 255; Conchyl. Cab., p. 375, t. 140, f. 15, 16.—REEVE, Conch. Icon., f. 401.

A solid, turbinate shell, peculiar in its elevated contour and solid axis. Two of the trays before me are marked "Bonin Is.," probably erroneously. All of the shells I have seen (13 specimens, received from five sources) are devoid of epidermis. Several of them have been inhabited by hermit crabs.

(*Species of doubtful position.*)

H. PRIMEANA Crosse. Pl. 31, figs. 30, 31.

Shell umbilicated, depressed, little thickened, somewhat solid, longitudinally rugose-striate, unicolored, pale brown; spire little elevated, obtuse; suture light, impressed. Whorls 5, a trifle convex, slowly widening, the last not descending in front; periphery acutely carinated, more convex beneath the carina, obsoletely rugate-striate; umbilicus moderate, subcylindrical; aperture oblique, rounded-lunar, subangulated at the position of the carina, dirty white inside; peristome whitish, upper margin narrowly expanded, basal and columellar thickened, reflexed. (*Crosse.*)

Alt. 12, greater diam. 26, lesser 23½ mill.

China?

H. primeana CROSE., Journ. de Conchyl. 1864, p. 284; l. c. 1866, p. 57, t. 1, f. 3.—PFR. Monogr. v, p. 403.

Compared by Crosse to *H. (Oxytes) pallasiana*. It is placed by Pfeiffer in *Camæna*, but is probably an *Oxytes*. It differs from *H. connivens* and its allies in lacking the fine spiral lines characteristic of that group of species.

Section II. HADRA Albers, 1860.

Hadra ALB. Die Heliceen, edit. Martens, p. 165. Type *H. bipartita* Fér.

This section is accepted with nearly the original limits, except that a part of the species included here in *Die Heliceen* belong, in my opinion, to *Camæna* and *Euhadra*. The residue form a group of closely allied forms, distributed throughout the Australasian zoological province (Australia, New Guinea, Salomon Is., etc.), and very characteristic of those regions. The subsections *Hadra* (restricted), *Sphærospira* and *Badistes* do not seem to have much in-

dividuality when the entire series is seen together; I have retained them as a matter of convenience.

Subsection HADRA (restricted).

Group of *H. bipartita* Fér.

H. BIPARTITA Férussac. Pl. 21, figs. 43, 44.

Shell large, globose-conoidal, narrowly umbilicated, solid and strong, yellow or russet-yellow above, the suture margined by a brown line, deep chocolate beneath. Surface rather smooth, but with low, coarse wrinkles of growth, and under a lens showing an obscure microscopic reticulation on some of the whorls of the spire. Spire conical, apex somewhat obtuse; whorls 7, slightly convex, the last swollen, deflexed in front, tumid around the umbilicus. Aperture oblique, whitish inside; peristome white, expanded, reflexed, the margins converging and joined by a thin callus, baso-columellar margin dilated half over the narrow, deep, funnel-shaped umbilicus.

Alt. 52, diam. 60 mill.

Cape York, Cape Direction, Cape Grenville, Daintree River and Albany Island, N.-E. Australia.

H. bipartita FER., Hist., t. 75A, f. 1.—WOOD, Ind. Test. Suppl., t. 7, f. 59.—REEVE, Conch. Icon., f. 359.—PFR. Monogr. i, p. 319; Conchyl. Cab., p. 320, t. 56, f. 9, 10; Novit. Conch. iii, p. 494, t. 107, 1, 2 (varieties).—COX Monog. Austr. Land Sh., p. 54, f. 5, f. 7.—HEDLEY, Proc. Roy. Soc. Queensl. v, 1888, p. 57.—*Hadra bipartita* Fér. SEMPER, Reisen im Archip. Phil. iii, p. 160 (Anat.).—*H. semibadia* ALBERS, teste Pfr.

This is a large, solid shell, with elevated spire, and conspicuous in coloration. It varies exceedingly in size; the smallest specimen before me (var. *minor* pl. 21, fig. 44) measuring alt. 26, diam. 31 mill. Specimens of a nearly uniform yellow are before me. In these the base is only slightly darker than the upper surface.

Var. SEMICASTANEA Pfr. Pl. 35, figs. 1, 2, 3, 4, 5.

Generally smaller, *the entire shell more depressed*. Color either light russet-yellow above, chocolate beneath, or dark both above and below, having a light line at the periphery.

Alt. 35, diam. 46 mill.

Alt. 20, diam. 28 mill.

Islands of Torres Sts., Australia, from Lizard Id. to Stephen's Island.

H. semicastanea PFR. Zeitschr. f. Mal. 1849, p. 77; Monographia iii, p. 222; Conchylien Cabinet, t. 56, f. 3-5.—REEVE, Conch. Icon., f. 1348.—HEDLEY, Proc. Roy. Soc. Queensl. v, p. 61.—COX, Monogr. Austr. Land Shells, p. 56, t. 5, f. 10.—*H. bipartita* var. DESHAYES.—*H. funiculata* PFR. P. Z. S. 1854; Monogr. iv, p. 186.—REEVE, Conch. Icon., f. 1363.—COX, Monogr. Austr. L. Sh., p. 46, t. 11, f. 15.

This extremely variable form is, as Dr. Cox says, unquestionably a modified *bipartita*. A number of the leading forms are shown on plate 35. Many of the smaller specimens are unicolored chocolate-brown all over; others have a light line at the periphery. *H. funiculata* Pfr. should undoubtedly be included in the synonym. Tryon has followed Pfeiffer in placing it under *Dorcasia* (see Manual, Vol. III, p. 214, pl. 49, fig. 16). This small form is distinctly angulated at the periphery. A specimen before me measures alt. 17, diam. 27 mill.

H. FORSTERIANA Pfeiffer. Pl. 21, figs. 50, 51; pl. 66, fig. 66.

Shell depressed, umbilicated, rather thin, microscopically granulated, yellowish-fawn color with brown bands above and below a light peripheral zone, and a narrow dark margin to the suture; lip narrowly expanded.

The form is more depressed than *H. semicastanea*, and the texture thinner; the spire is low, scarcely conoidal, a little obtuse at the apex; the periphery often has the mere suggestion of a keel. The color is pale yellowish; below and above the peripheral light zone there are rather broad brown bands, fading into the light ground-color on the base and near the narrow sutural band; the inside of the umbilicus is a little darker than the base. The surface is shining, very densely and regularly granulated, the granulation obsolete or wanting on the base; whorls 6, slightly convex, slowly widening, the last a little descending in front. Aperture broad lunate, oblique, banded inside; peristome narrowly expanded, not thickened, dilated and impinging upon the umbilicus at the insertion.

Alt. 19, diam. 30 mill.

Barrow, Howick and Percy Islands, Northeast Australia.

H. Forsteriana PFR., Proc. Zool. Soc. Lond. 1851, p. 254; Monogr. iv, p. 174; v, 377; Conchylien Cabinet, p. 373, t. 140, f. 9, 10.—COX, Monogr. Austr. Land Sh., p. 42, t. 4, f. 8.—DOHRN, Mal. Bl. ix, 1862, p. 210; and in continuation of Conchyl. Cab., p. 582, t. 171, f. 8-12.—HEDLEY, Proc. Roy. Soc. Queensl. v, p. 58, 1888.—*H. hetæra* PFR. P. Z. S. 1860, p. 154.

A species allied to *H. semicastanea*, but thinner, lighter, with a different color-pattern and denser, more obvious and regular granulation. There is a great variation in size, as in *Hadra bipartita* and the other species. The type form measures, alt. $10\frac{1}{2}$, diam. 19 mill. The measurements following the description are those of a "var. major" of Dohrn.

H. DARWINI Brazier. Unfigured.

Shell umbilicated, depressedly globose, very thin, finely granulated and radiately striated; spire moderately elevated, obtuse; whorls 5, slowly increasing, convex, last roundly convex, slightly descending in front, dirty yellow; base convex, *sculptured the same as the upper surface*; umbilicus rather small, deep; aperture diagonal, ovately lunate; peristome very little reflexed, white; margins approximating and joined by a thin callus, columellar margin reflected and half covering the umbilicus. (*Brazier.*)

Alt. 8, greater diam. 14, lesser 11 mill.

North coast of Australia.

Helix (Hadra) darwini BRAZIER, Proc. Zool. Soc. Lond. 1871, p. 639.

Allied to *H. forsteriana* Pfr.

Group of H. bougainvillei Pfr.

H. BOUGAINVILLEI Pfeiffer. Pl. 22, figs. 55, 56.

Shell narrowly rimate, globose-depressed, solid, opaque, uniform dark chestnut-colored all over. Surface rather smooth, but mal-leated obliquely coarsely but superficially above and below the periphery, and having shallow concentric sulci on the base. The spire is low, obtuse; sutures impressed; whorls 5, the inner ones reddish, nearly flat, the outer ones convex, the last one descending in front, having a cord-like keel at the periphery, much swollen behind the columellar lip and around the umbilicus. Aperture very oblique, rounded lunate, flesh-colored inside; peristome expanded, white, columellar margin dilated over and covering or nearly covering the umbilicus. Alt. 36, diam. 57 mill. Alt. 39, diam. $62\frac{1}{2}$ mill.

Bougainville Island, Salomon Group.

H. Bougainvillei PFR. P. Z. S. 1860, p. 133, t. 50, f. 7; Mal. Bl. 1860, p. 235; Monog. Hel. Viv. v, p. 275; Conchylien Cabinet, p. 557, t. 167, f. 1, 2.—*H. Angasiana* NEWCOMB, Ann. Lyc. New York vii, p. 283, May, 1860.

The systematic position of this form, I must freely confess, is unknown to me. In its slowly widening whorls and obscure malleation it resembles the sections *Camæna* and *Phania*; from these it differs notably in the aperture and lip. The characters of the latter are more like *Hadra semicastanea*; and the prominent gibbosity or swelling around the umbilicus confirms to some extent, this disposition of the species. Compare also *H. majuscula* Pfr.

Subsection BADISTES Gould, 1862.

Badistes GOULD, Otia Conchologica, p. 243.—*Pomatia*, *Hadra*, *Camæna*, *Fruticicola*, *Dorcasia*, *Galaxias* etc., etc., of PFEIFFER, COX, ANGAS, and other writers on Australian shells.

The type of *Badistes* is *H. gulosa* Gould.

This is the earliest name proposed for any division of the Australian *Hadra*, antedating *Sphærospira* by several years. It may be distinguished from *Hadra* (*bipartita* etc.) by a number of unimportant characters, chiefly the less effaced granulation and more pronounced peripheral keel. *Badistes* may, in fact, be considered a half-way-house in the great *Hadra* group,—on the one side developing into carinated forms which culminate in *Thersites novæhollandiæ* and *richmondiana*, on the other leading toward and all but into the globular *Sphærospira* and *Xanthomelon*.

It will be noted that I now rank *Thersites* as a mere section of *Hadra*, holding about the same relation to the normal forms that *Chilotrema* (*H. lapicida*) bears to *Campylæa* (*H. planospira* etc.); or that '*Aglaia*' *infumata*, *fidelis* etc., bear to '*Arionta*' *californiensis* and the allied globose forms.

The primitive color-pattern of *Badistes* consists of a subsutural dark band, another above the periphery, and an umbilical dark patch or girdle. Many of the species, however, depart from this arrangement.

The number of species will be reduced nearly one-third, possibly more, when critical comparisons are made of good series. The characters are mostly slight and variable.

Badistes is divisible into two groups of species:

(1.) Carinated; or if rounded at periphery, revealing traces of a distinct though obsolescent keel; unicolorous, or with a dark band at suture and umbilicus. Group of *H. grayi*.

(2.) Not at all carinated at periphery; body-whorl with two or three bands above, with or without an umbilical dark patch.

Group of *H. biteniata*.

Group of H. grayi Pfr.

This group comprises the more prominent Helices of New South Wales, representing there the *Sphaerospira* of the warmer portions of Australia.

H. GRAYI Pfeiffer. Pl. 43, figs. 42, 43, 44.

Shell nearly imperforate, depressed-globose with low-conoidal spire, the periphery girdled by an indistinct carina; clear light yellow with a sutural margin and small umbilical patch of chestnut; surface densely and very minutely granulated, smoother and shining toward the umbilicus, which is closed except for a narrow chink.

The form varies somewhat in respect to elevation of spire and prominence of the peripheral keel. It is rather thin but strong, a little translucent. The ground-color is yellow or pale greenish-yellow. Whorls 6, convex, the last somewhat descending in front. Aperture oblique, rounded-lunar, pinkish or brownish inside; outer lip blunt, not expanded; baso-columellar lip rose-colored, narrowly reflexed, suddenly dilated at the umbilicus and almost closing it.

Alt. 22, greater diam. 27, lesser 24 mill.

Brisbane Water; Ash Island; Hunter River; Clarence River etc., as far north as Brisbane; South of Sydney as far as Ulladulla, but never far from the sea coast.

H. grayi PFR., Symbolæ iii, p. 68.—REEVE, Conch. Icon. f. 755.—COX, Monogr. Austr. L. Sh. p. 35, t. 6, f. 5; t. 1, f. 4, 9; t. 10, f. 7.

The typical form is easily known by its straw-yellow or citron-yellow ground, banded with brown at suture, and with a brown umbilical patch. Numerous specimens, however, have a broad brown girdle covering most of the body-whorl, its edges fading into the ground-color on the base and above. A specimen of this form is figured. The peripheral keel is almost obsolete on some examples. The smallest specimen I have seen measures alt. $16\frac{1}{2}$, diam. $20\frac{1}{2}$ mill.

Var. BEDNALLI Brazier.

Shell perforated, rather conoidly globose, very thin, fragile, obliquely rugose at the upper part, granulated under the lens, subdiaphanous, light horny green, with a fine reddish ring encircling the suture, and a rather broad one of the same colour encircling the perforation; spire conoid, somewhat obtuse; whorls 5 to $5\frac{1}{2}$, moderately convex, the last very much inflated, rounded; base convex, much smoother than the upper surface; aperture obliquely lunar,

rather large ; peristome thin, of a pinkish colour ; margins distant, right expanded, columellar margin reflected and covering one quarter of the perforation. (*Brazier.*)

Alt. 5, greater diam. 8, lesser $6\frac{1}{2}$ lines.

Near Adelaide, S. Australia.

H. Bednalli BRAZIER, P. Z. S. 1871, p. 641.—ANGAS, Quart. Journ. of Conch. i, p. 135.

Considered by Mr. Angas a variety of *H. grayi*.

H. PATRUELI Adams and Angas. Pl. 58, fig. 16.

Shell umbilicated, orbicularly-depressed, rather coarsely rugosely ribbed, especially at the suture, rather thin, moderately shining, reddish-chestnut with a pale spiral band under the suture ; spire widely and obtusely conical ; whorls 5, convex, last whorl sometimes indistinctly angulated, not descending in front ; base smoother and more glossy than above, with a wide yellowish patch surrounding the dark circumference of the umbilicus, which is moderate and deep ; aperture diagonal, lunately-ovate ; peristome simple, thin, straight, the dark columellar margin dilated above and reflexed, to cover $\frac{1}{2}$ of the umbilicus. (*Cox.*)

Alt. $12\frac{1}{2}$, greater diam. 25, lesser 20 mill.

Port Lincoln, under dead logs ; Flinders Island.

H. patruelis AD. & ANG. P. Z. S. 1863, p. 520.—Cox, Monogr. Austr. L. Sh., p. 49, t. 3, f. 8.

A very variable species ; an examination of a series collected by Mr. Masters shows the ground color to range from pale reddish-horny to very dark reddish chestnut, the band is seldom very well defined, is often very indistinct, and occasionally wanting ; and the yellow patch on the base may be indistinct or absent. Two specimens from Flinders Island are of a smaller variety ; but there can be no doubt as to specific identity, for one shows very plainly, not merely, in addition to similarity of sculpturing, &c., the pale patch on the lower surface, but also the spiral band below the suture. (*Cox.*)

H. GULOSA Gould. Pl. 33, figs. 66, 67.

Shell sub-globose, strong, coarse, obtusely keeled at the periphery, of a pale chestnut-brown which is here and there diluted so as to form large, irregularly disposed clouds, and sometimes bands, the shades blending with each other ; the region of the apex is generally

pale, and that of the umbilicus dusky. Whorls six, well rounded, with coarse irregular striæ of growth, the suture deeply impressed. The aperture is large, rounded, its diameters about equal; throat livid, becoming darker near the lip; peristome slightly reflexed, whitish, the basal portion nearly horizontal, and the extremities widely separated, columella rapidly widening, so as to leave a mere chink of the umbilicus uncovered; a very thin coating of enamel unites the two lips. (*Gould.*)

Diam. about one inch, axis four-fifths inch.

Illawarra, New South Wales, Australia.

H. gulosa GLD. Proc. Bost. Soc. N. H. ii, p. 165, August 1846; U. S. Expl. Exped. Shells, p. 65, t. 3, f. 43; Otia p. 243.

See Gould (*l. c.*) for notes on the animal and its peculiar mode of progression. The observations on this last point need confirmation. The periphery is marked by a trace of the keel, so obtuse as to escape superficial observation, in the specimens before me. This species has been considered a synonym of *H. lessoni* Pfr., but on wholly insufficient grounds. It is the type of Gould's group *Badistes*. *H. coriaria* Pfr. is in all probability a synonym for *H. gulosa*.

H. CORIARIA Pfeiffer. Pl. 43, figs. 48, 49, 51.

Shell almost imperforate, globose-depressed with low-conoidal spire, obsoletely keeled at the circumference; uniform chestnut colored all over, or a little darker at suture and umbilicus; surface densely and very minutely granulate, smoother around the umbilicus.

The color is darker than in *H. grayi*, and the granulation has a somewhat different pattern. There are rather rude, coarse, oblique wrinkles of growth, most obvious at the suture. The upper whorls of the spire are lighter in color. Whorls $5\frac{1}{2}$, convex, the last descending below the blunt carina in front. Aperture oblique, flesh-colored inside, of a rounded-lunar form; outer lip a mere trifle expanded, pink; columellar lip reflexed, dilated, covering the umbilicus except for a narrow chink.

Alt. 25, greater diam. 30, lesser $25\frac{1}{2}$ mill.

Clarence River; Kiama; Ulladulla; Merimbula; Nulla Mts.; Ash Island, N. S. Wales, Australia.

H. coriaria PFR. Zeitschr. f. Mal. 1847, p. 145; Monogr. Hel. Viv. i, p. 445; Conchyl. Cab., t. 120, f. 1, 2.—Cox Mon. Austr. L.

Sh., p. 36, t. 2, f. 7; t. 8, f. 10, t. 10, f. 5.—REEVE, Conch. Icon., f. 417.—*H. mastersi* COX Cat. Austr. L. Sh., p. 19, 1864.

A chestnut-colored shell, very variable in size and degree of carination. The smallest specimen before me (see pl. 43, fig. 51) measures alt. 16, diam. $20\frac{1}{2}$ mill. The color of the lip varies from pink to nearly white; the color of the surface from dark chestnut to yellowish-brown.

This species is probably a synonym or mere variety of *H. gulosa* Gould, described a year previous. *H. scotti* COX is perhaps a local variety.

H. SCOTTI COX. Pl. 43, figs. 47.

Shell narrowly umbilicated, turbinately-globose, radiately roughly striated, minutely granular throughout, sub-pellucid, chestnut coloured, paler at the apex; whorls 6, slightly convex, the last tumid and rounded; aperture lunately sub-circular; peristome moderately thickened, straight, partly reflected, white within. (COX.)

Alt. 0.90, greater diam. 1.50, lesser 1.25 inch.

Mt. Keera, Wollongong, N. S. Wales, Australia.

H. scotti COX, Cat. Austr. L. Sh., p. 36, 1864; Monog. Austr. L. Sh., p. 39, t. 10, f. 4, 4a.—PFR. Monog. v. p. 340.

Closely allied to *H. coriaria* (= *gulosa* Gld.), of which it is probably a variety.

H. MONACHA Pfeiffer. Pl. 43, figs. 39.

Shell imperforate, globosely-conical, solid, roughly striated, and under the lens, minutely granulated, of a chestnut color; spire conoidly elevated, rather obtuse; whorls $5\frac{1}{2}$, moderately convex, gradually increasing in size, the last slightly decending in front, obsoletely sub-angled in the middle; aperture for the most part diagonal, rotundately-lunar, livid within, shining, peristome flesh-colored, shortly expanded throughout; margins separated, the columellar margin being expanded at its insertion into a triangular adnate plate. (COX.) Alt. 19, greater diam. 27, lesser 23 mill.

Ash Island, Hunter River; also Mulgoa, near Penrith, and at the Kurrajong, N. S. Wales, Australia.

H. monacha PFR. P. Z. S. 1859, p. 25, t. 43, f. 7; Monogr. Hel. Viv. v, p. 278.—COX, Monogr. Austr. L. Sh. p. 38, t. 18, f. 13.

More elevated than *H. coriaria*, with dark specimens of which it is likely to be confused.

H. MOROSA Morelet. Pl. 34, fig. 10.

Shell covered perforate, turbinate-globose, depressed, thin, plicate-striate, granulated when under a lens, unicolored deep chestnut; spire conoid-depressed; whorls 6, but slightly convex, moderately increasing, the last not descending; base rather flattened; aperture oval, concolored, the peristome scarcely thickened, narrowly reflexed, purple, margins joined by a callus; columellar margin dilated in a triangular lamina covering the umbilicus. (*Morelet.*)

Alt. 20, greater diam. 31, lesser 26 mill.

Moreton Bay, Australia.

H. morosa MOR. Journ. de Conchyl. 1853, p. 369, t. 11, f. 15.—
PFR. Monogr. iv, p. 248.

Compare *H. coriaria* Pfr.

H. DAINTREEI Brazier. Pl. 38, fig. 59.

Shell umbilicated, somewhat depressedly globose, very thin, rugosely striated, minutely granulated, pale yellowish brown; spire conical, obtuse; whorls $5\frac{1}{2}$, convex, last large, inflated, base convex, nearly smooth; aperture oblique, lunate; peristome thickened, white, margins approximating, right descending in front, columellar reflected and partly covering the umbilicus. (*Brazier.*)

Alt. $9\frac{1}{2}$, greater diam. 12, lesser $9\frac{1}{2}$ lines.

Muggerabaa, Moreton Bay, Queensland.

H. daintreei BRAZ., P. Z. S. 1875, p. 33, t. 4, f. 8.

H. DUNKIENSIS Forbes.

This species was described by Mr. Tryon in Vol. III of the MANUAL, p. 215, pl. 50, figs. 22, 23, 24, in the Subgenus *Dorcasia*. It is very closely allied to *H. coriaria*, differing in the habitat and less covered umbilicus.

Dunk Island, N. Australia.

H. dunkiensis FORBES, Voyage of H. M. S. Rattlesnake ii, p. 378.—
COX, (as *Galaxias*), Monogr. Austr. L. Sh., p. 43, t. 8, f. 9.—TRYON (as *Dorcasia*) Manual, 2d. Ser., vol. iii, p. 215.

Cox says that the *H. dunkiensis* of Reeve is a different shell.

H. PRUNUM Férussac.

See the MANUAL, vol. iii, p. 215, pl. 50, figs. 25, 26, where this species has been described under *Dorcasia*. It is however a *Badistes*, very close to *H. gulosa* and *H. dunkiensis* in characters. It is doubtful whether Cox has rightly identified the form. I have not identi-

fied the species. The differential characters of species of the *H. grayi* group are largely a matter of personal opinion. No exact locality is given by Férussac, whose figures should be consulted if the identification of the form be attempted.

Prof. Ralph Tate records it from Arnhem Land, N. Australia, at Port Essington and Palmerston. He remarks that the periostracum of the young shell is raised into short bristles and traces of them may be seen in some individuals just prior to attaining their full size; except in the larger size and deciduous bristles, he fails to note any other difference between this species and *H. Coxeni* from Queensland.

The synonymy I do not vouch for; it is as follows:

H. prunum FER., Histoire iii, t. 26, f. 7, 8.—DESH. in FER. Hist., texte, p. 255.—COX, Mon. Austr. L. Sh., p. 43.—TATE, Proc. Roy. Soc. S. Austr. v, p. 49.—*H. argillacea* GRAY, not Fér.—*H. pelodes* PFR. P. Z. S. 1845, p. 126.

Brazier considers *H. coxeni* Cox (P. Z. S. 1871, p. 54, t. 3, f. 2) a variety. It has been described and figured by Mr. Tryon in vol. iii of the MANUAL, p. 216, pl. 50, fig. 30.

H. BENNETTI Brazier. Unfigured.

Shell umbilicated, depressedly globose, very thin, finely rugosely striated and minutely granulated, dark-yellowish horny; spire rather conoid, obtuse; whorls 6, moderately convex, rapidly increasing, last convex and inflated in front, slightly descending; umbilicus large, deep, and slanting; aperture oblique, lunately ovate, interior of aperture of a bright flesh tinge; peristome simple, white, straight; margins approximating and joined by a thin callus, right margin dilated, columellar margin broadly expanded and reflected, covering one-third of the umbilicus. (*Brazier.*)

Alt. 10, greater diam. 16, lesser 13 mill.

Ipswich, Queensland, inland 50 miles from Brisbane.

H. (Hadra) Bennetti BRAZIER, P. Z. S. 1871, p. 639.

I possess two specimens of this species, which approaches near to *H. prunum* Fér., from Port Darwin and Port Essington; also to *H. Greenhilli* Cox, from the Dawson Biver. I have named it with great pleasure in honor of Dr. George Bennett, F. L. S. whose indefatigable exertions in the cause of science have made us acquainted with many new and rare specimens of natural history from Australia and the Polynesian Islands. (*Brazier.*)

H. MULGOÆ COX. Pl. 40, figs. 98, 99.

Shell subglobose, perforated, with conoidal spire, obsoletely keeled at the periphery; thin, light, reddish-brown or pale greenish-yellow, not banded; obliquely, rather rudely striated, especially at the sutures, microscopically granulated, smooth beneath.

The form is slightly more globose and swollen beneath than *H. grayi*, and it is thinner, lighter, without brown bands at suture and umbilicus. The spire is low-conoidal, apex obtuse; whorls $5\frac{1}{2}$ to 6, convex, the last a little descending in front, swollen below, obsoletely keeled at circumference. Aperture oblique, round-lunar, purple inside; peristome very slightly thickened, white, baso-columellar margin expanded, half closing the narrow umbilicus.

Alt. 20, greater diam. 22, lesser 20 mill.

Mulgoa, near Penrith, N. S. Wales, Australia.

H. mulgoæ Cox, Mon. Austr. L. Sh., p. 38, t. 1, f. 3, 7, 7a.

Although closely allied to *H. grayi*, and even more near to *H. corneovirens*, this species has certain characters peculiar to it.

H. CORNEOVIRENS Pfeiffer. Pl. 40, figs. 1, 2, 3.

Shell globose, somewhat depressed, half-covered umbilicate, the periphery obsoletely keeled; of a light greenish-yellow color, somewhat translucent, thin and light, rather rudely obliquely striated, microscopically granulated, smooth below.

The shell is inflated, thin and light, pale greenish horn-colored or yellowish. Apex whitish, obtuse; whorls $5\frac{1}{2}$, the last a little descending in front. Aperture rounded-lunar, light purplish inside, peristome simple, not expanded or thickened, white; at the umbilicus suddenly dilated, half concealing it.

Alt. 17 greater diam. $20\frac{1}{2}$, lesser 19 mill.

Picton, (46 miles S. W. of Sydney) N. S. Wales, Australia.

H. corneovirens PFR., Zeitschr. f. Malak. 1851, p. 25; Monographia iii, p. 41.—REEVE, Conch. Icon. f. 1366.—COX, Monogr. Austr. L. Sh., p. 46.—WOLLASTON, Testacea Atlantica, p. 505.

Formerly supposed to inhabit the Cape Verde Is. It is thinner and lighter than *H. mulgoæ* or the other allied species. Fig. 3 is typical; I have figured a more globose specimen.

H. LÆSA Reeve.

A species of *Hadra* described by Tryon under *Dorcasia*, MANUAL iii, p. 214, t. 49, f. 15.

H. CAILLETI Crosse.

Is a member of this group of species. See MANUAL, vol. iii, p. 216, pl. 50, figs. 27, 28.

H. MABELLEI Crosse.

Undoubtedly a *Hadra* of the *Badistes* type. See MANUAL, iii, p. 216, pl. 50, fig. 29.

H. SUBGRANOSA Le Guillou.

Shell subglobose, umbilicate, thin pellucid, pale rufous spadiceous, whitish brown below, longitudinally and transversely delicately striated, almost granulated; whorls 4, convex-depressed; lip acute; at the umbilicus angulated; inner lip straight, reflexed over the wide, deep umbilicus. (*Guill.*) Alt. 23, diam 28 mill.

Northern Australia.

H. subgranosa GUILL. in Revue Zool., p. 137.—PFR. Mon. Hel. Viv. i, p. 83.

It is doubtful where this unfigured species belongs. It may be a *Xanthomelon*.

H. BLACKMANI Cox. Pl. 40, figs. 6, 7.

Shell umbilicated, globosely-turbinate, thin, not shining, everywhere obscurely radiately striated, and, under the lens, minutely granulated, yellowish-horny; spire conical, apex obtuse, suture rather deep; whorls 5, convex, quickly increasing, last very large, inflated, regularly rounded throughout, strongly constricted behind the mouth; aperture diagonal, lunately-roundly-oval; peristome simple, straight, thin, much expanded, white, margins very slightly converging, joined by a very thin callus, columellar margin expanded above and $\frac{1}{2}$ concealing the moderately sized umbilicus. (*Cox.*)

Alt. 0.45, greater diam. 0.65, lesser 0.55 inch.

Warroo, Port Curtis, Queensland.

H. blackmani Cox, Mon. Austr. L. Sh. p. 45, t. 11, f. 7, 7a.

The only two specimens I have seen are in the collection of the Australian Museum and have a striking resemblance in form to *Dermatocera vitrea*. It may also in some manner be looked upon as connecting such shells as *H. pachystyloides* and *H. aridorum*. (*Cox.*)

H. PLETHORICA Crosse. Pl. 40, figs. 4, 5.

Shell umbilicated, globose-turbinate, rather thin, diaphanous, longitudinally rudely costulate-striate; straw-buff; spire moderately

elevated, suture impressed; whorls 5, convex, the embryonic $1\frac{1}{2}$ smooth, the last not descending, rounded, at the periphery indistinctly subangulated, the base less strongly striated. Aperture rotund-lunar, white within; peristome simple, whitish, the margins distant, columellar margin dilated, reflexed in a vaulted manner, partly closing the narrow umbilicus, basal margin a little reflexed, outer margin thin, rather acute. (*Crosse.*)

Alt. 11, greater diam. $14\frac{1}{2}$, lesser 12 mill.; length of aperture 8, greatest width 7 mill.

Habitat unknown.

H. plethorica CROSSE, Journ. de Conchyl. 1868, p. 175; *l. c.* 1869, p. 392, t. 12, f. 2,

H. GREENHILLI COX. Pl. 43, figs. 45, 46.

Shell umbilicated, globosely-turbinated, smooth, obsoletely striated, under the lens are manifested minute undulating lines, closely packed together, reddish-chestnut above, greenish-yellow below; whorls 6, the last very large, convex, the others only slightly convex, aperture lunately-sub-circular; peristome thin, moderately reflected, columellar margin dilated at the base, almost covering the umbilicus; lip white within, greenish yellow without. (*Cox.*)

Alt. 0.90, greater diam. 1.20, lesser 1 inch.

Upper Dawson River, Queensland.

H. greenhilli COX., Journ. de Conchyl. 1865, p. 46; Monogr. Austr. L. Sh., p. 40, t. 9, f. 1; t. 18, f. 8.

In general appearance, says Cox, very like *H. pachystyloides*, but differing from that species and all other Australian land shells by the wavy lines of sculpture.

H. COXENÆ BRAZIER. Pl. 33, fig. 70.

Shell umbilicated, somewhat turbinately globose, obliquely striated, minutely granulated, shining, thin, dirty yellow; whorls 6, convex, suture impressed, the last whorl large, obtusely carinated at the periphery, base roundly convex, with the striæ running into the deep funnel-shaped umbilicus; aperture oblique, ovately lunate, interior white; peristome white, thickened, margins approximating and joined by a thin white callus, the right thin and descending below the center, columellar reflected slightly over the umbilicus. (*Brazier.*)

Alt. 10, greater diam. $14\frac{1}{2}$, lesser 13 lines.

Johnstone River, Queensland, in the scrubs.

H. coxenæ BRAZIER, P. Z. S. 1875, p. 32, t. 4, f. 5.

More carinated than the preceding forms.

H. EXOCARPI Cox. Pl. 40, figs. 100, 101.

Shell umbilicated, depressedly orbicular, nearly discoid, solid, obscurely, irregularly and sometimes coarsely striated, everywhere finely granulated, not shining, pale yellowish-brown, spire low, widely-convexly-conical; whorls 5, very gradually increasing, flatly convex, last bluntly angular at the periphery, roundly convex below, descending in front; base paler and smoother, and less finely granulated than above; aperture diagonal, lunately rounded; peristome simple, regular, slightly expanded, margins approximating, columellar margin triangularly dilated above, and reflected, partially covering the moderately sized umbilicus. (Cox.)

Alt. 0.35, greater diam. 0.70, lesser 0.65 inch.

Cherry Tree Hill; Mudgee and Ryalstone, N. S. Wales, Australia.

H. exocarpi COX Monogr. Austr. L. Sh., p. 44, t. 2, f. 2.

H. LEUCOCHEILUS Cox. Pl. 40, figs. 10, 11, 12.

Shell small, depressed, umbilicated, the spire low-conoidal, periphery keeled; thin and rather translucent, of a pale brown color, with a light chestnut girdle around the umbilicus, and generally another above the carina and at the suture also; aperture much wider than high; lip thin, expanded all around; surface all over densely microscopically granulated.

The form is depressed, thick lens-shaped; spire low, composed of nearly 5 whorls, which are not very convex, separated by evenly, distinctly impressed sutures. Last whorl distinctly carinated, slightly, rather abruptly descending in front, a little constricted behind the narrowly reflexed white lip. Aperture brown within; columella triangularly dilated partly over the deep umbilicus. The base is as distinctly granulated as the upper surface.

Alt. $6\frac{1}{2}$ greater diam. 12, lesser $10\frac{1}{3}$ mill.

Clarence and Richmond Rivers, N. S. Wales; Brisbane, Queensland, Australia.

H. marie Cox P. Z. S. 1864, p. 593 (preoc.).—*H. leucocheilus* Cox, Monogr. Austr. L. Sh., p. 54, t. 8, f. 7, 7a, 7b.—TRYON (as *Trichia*) Manual, iii, p. 183.

A small carinated species, densely granulate above and below, pale brownish-horn color, with pallid brown girdles at umbilicus, periphery and suture, the first more constant than the others.

Var. *LISMORENSIS* Pilsbry. Pl. 40, figs. 13.

Like the type in contour, but larger, with a fraction over 5 whorls; the color a uniform dark chestnut approaching black; nearly lusterless; without bands; lip bluish-white.

Alt. 10, greater diam 15, lesser 13 mill.

Lismore, Richmond River, N. S. Wales.

A beautiful variety which I owe to the liberality of my valued correspondent John Brazier.

H. BELLENGERENSIS Cox. Unfigured.

Shell deeply, rather narrowly umbilicated, turbinately depressed, lenticular, thin, dark claret-brown, not shining; whorls $5\frac{1}{2}$, coarsely obliquely striated, very gradually increasing in size, last whorl rather sharply keeled at the periphery and depressed in front; base convex; aperture rotundately lunar; last whorl suddenly contracted behind an everted peristome, which is white and slightly thickened; margins approaching; anterior margin inserted below the carina; columellar margin only slightly dilated. (Cox.)

Alt. 0.35, greater diam. 0.55, lesser 0.48 inch.

Bellenger River, east coast of New South Wales.

H. bellengerensis Cox, P. Z. S. 1871, p. 54.

A simple, lenticular species, allied to *H. leucocheilus* Cox, from which it differs in being more conical and more sharply keeled. (Cox.)

Compare *H. leucocheilus* var. *lismorensis*.

H. YATALAENSIS Cox. Pl. 34, fig. 12, 13.

Shell with a moderately large open umbilicus, depressedly orbicular, rather solid, obsoletely striated, coarsely granular above, pale chestnut below, ornamented around the umbilicus with a broad chestnut ring; spire slightly raised; whorls $5\frac{1}{2}$ to 6, convex, gradually increasing in size, rounded at the periphery, obsoletely carinated; aperture lunately ovate, oblique; peristome pink, narrow, slightly thickened, expanded, and very slightly reflected in front at the insertion; columellar margin triangularly dilated, overhanging the umbilicus. (Cox.)

Alt. 0.18, greater diam. 0.30, lesser 0.20 inch.

Yatala River, Queensland, Australia.

H. yatalaensis Cox, P. Z. S. 1873, p. 149, t. 16, f. 3a, 2b.

Evidently very close to *H. leucocheilus* Cox.

H. JERVISSENSIS Quoy & Gaimard. Pl. 40, figs. 90, 91.

Shell perforate, depressly conoidly-globose, thin, fragile, obliquely striated with some irregularity, and granulated under the lens transparent, of a pale horny tint, generally red about the suture, and the umbilical region; spire conical, and somewhat obtuse; whorls 5, somewhat convex, the last inflated and slightly keeled at the circumference; aperture large, oblique, rotundately-lunate; peristome with a thin rose-colored lip, and with margins apart; columella dilated above, into a somewhat broad plate, half covering the perforation. (*Pfr.*) Alt. 15, diam. 21 mill.

Jervis Ray; Brisbane Water; Botany Bay Swamps; Lane Cove, N. S. Wales.

H. jervisensis Q. & G., Voy. de l'Astrol., Zool., ii, p. 126, t. 10, f. 18–21.—PFR. Monogr. i, p. 79.—Cox Mon. Austr. L. Sh. p. 30, t. 1, f. 2, 2a.—? *H. sutilosa* FER. Prodr. 263.

Possibly *H. bocageana* Crosse is allied to this species.

H. LIVERPOOLENSIS Brazier. Unfigured.

Shell perforate, globularly conical, thin, rather strongly rugosely and plicately striated, under the lens finely granulated, covered with a horny yellow epidermis, with a small narrow chestnut spiral band below the suture; spire conoid, obtuse; whorls $4\frac{1}{2}$, convex, the last large and inflated, descending in front, base convex, smoother than the upper surface; perforation small, more than half covered, encircled with a faint broad chestnut band; aperture oblique, roundly lunate; peristome moderately straight, thin on the upper part, thickened and reflected at the columellar margin, which is white. (*Brazier.*) Alt. 13, greater diam. 16, lesser $13\frac{1}{2}$ mill.

Liverpool Range, interior of New South Wales.

H. (Galaxias) liverpoolensis BRAZIER, P. Z. S. 1872, p. 618.

This shell was obtained by Mr. George Masters during his visit to the above locality. It approaches nearly to *Helix leptogramma*, Pfr., but differs in having a narrow chestnut band just under the suture, with a faint one of the same color round the perforation.

H. DURALENSIS Cox.

Described under *Dorcasia* in vol. iii of this work, p. 215. The only specimen I have seen is immature.

H. duralensis Cox, Monogr. Austr. L. Sh. p. 46, t. 8, f. 8, 8a.

H. GILBERTI Pfeiffer. Pl. 43, fig. 41.

Shell umbilicated, depressed, distinctly striated, very minutely granulated, thin, of a pale-horny tint, ornamented by a red line at the suture; whorls $4\frac{1}{2}$, somewhat convex, the last convex at the base; umbilicus moderate and pervious; aperture rotundately-lunar; peristome simple and straight, with the columellar margin very little dilated and reflected. (*Pfr.*)

Alt. 9, greater diam. 16, lesser 14 mill.

Darling Downs, Queensland; Brisbane Water; Hunter River, Australia.

H. gilberti PFR., P. Z. S. 1845, p. 127; Mon. Hel. Viv. i, p. 108.—
COX Mon. Austr. L. Sh., p. 30, t. 1, f. 8.

The above description was drawn from immature examples. Adults, it is stated, are extremely like *Jervisensis*, measuring, alt. $13\frac{1}{2}$, greater diam. 22, lesser 18 mill. The right margin of the peristome is somewhat expanded; the columella of a violet tint, and reflected over the umbilicus. It differs from *Jervisensis* in being more solid, the whorls more gradually increasing, the last one less inflated.

H. MARCESCENS Cox. Pl. 58, figs. 17, 18, 19.

Shell narrowly and deeply umbilicated, depressedly-orbicular, thin, translucent, rather shining, very slightly rugosely striated and under the lens, very finely granulated, horny-yellowish; spire convex, obtuse, suture moderate, margined with a narrow reddish streak; whorls 5, slowly increasing, slightly convex, last roundly convex; aperture lunately-rounded; peristome straight, thin, margins somewhat approaching, columellar margin above dilated and reflected. (*Cox.*) Alt. 0.30, greater diam. 0.63, lesser 0.57 inch.

Clarence River, about South Grafton, under bark and logs.

H. marcescens Cox, Proc. Zool. Soc. Lond. 1867; Monogr. Austr. L. Sh., p. 37, t. 4, f. 5, t. 18, f. 6, 6a.

A thin, horny, semitransparent shell, like a starved miniature of *H. grayi* and to be placed next to *H. aridorum*, a much more globose shell with a deeply impressed suture. The reddish streak along the suture is not always present. (*Cox.*)

H. EVANDALEANA Pfeiffer. Pl. 40, figs. 8, 9.

Shell umbilicated, depressed, rather thin, rugosely striated, and under the lens granulated and furnished with short hairs, dirty-yellowish or blackish-brown; spire slightly elevated, obtuse, suture

rather deep; whorls 4, convex, last more or less obtusely carinated; base convex, the striae and granulations gradually becoming fainter; umbilicus moderate, deep; aperture lunately-ovate; peristome simple, thin, more or less angular externally, at the columella triangularly dilated above. (*Cox.*)

Alt. 0·30, greater diam. 0·55, lesser 0·47 inch.

Evandale, North Rhine and Barrier Ranges, S. Australia.

H. evandaleana PFR., P. Z. S. 1863, p. 528; Monographia v, p. 258.—COX, Monogr. Austr. L. Sh., p. 51, t. 9, f. 8.—ANGAS Quart. Journ. of Conchol. i, p. 135.

I have not seen in any other species the same kind of rugose striation, granulation, and pilosity, the last often obsolete, which seems to be characteristic. Angas speaks of a "large umbilicus," while Pfeiffer writes of the same shell "subanguste umbilicata." (*Cox.*)

H. TOMSETTI Tate. Pl. 58, figs. 13, 14, 15.

Shell conoidly depressed, rather thin, widely and deeply umbilicated; spire slightly elevated, widely conical, obtuse; whorls five, flatly convex, narrowly concavely depressed near the anterior suture, and margined at the suture; last whorl rounded, rather depressed above, and bluntly angled at the periphery; posterior to the angulation at the periphery the surface is slightly depressed, thence convex to the suture; base rather abruptly convex; aperture not descending in front, oblique to the vertical axis, rotundately lunate; peristome simple, thin, disunited; columella very slightly reflected over the umbilicus.

The ornamentation consists of coarse, irregular, oblique striations and distant granulations; the one and a half apical whorls granulose only; under surface striated. Colour of the living shell unknown. (*Tate.*)

Alt. 7, greater diam. $14\frac{1}{2}$, lesser $12\frac{1}{2}$ mill.; alt. of apert. 6; diam. of umbilicus $2\frac{1}{2}$ mill.

Cape Borda, Kangaroo Island, S. Australia.

Helix Tomsetti TATE, Trans., Proc. and Rep. Roy. Soc. S. Austr., ix, p. 63, t. 5, f. 13a-c. 1887.

Somewhat intermediate between *H. bordaensis* and *H. evandaleana*, having the shape of the former with the sculpture of the latter. It is flatter and has a larger umbilicus than *H. evandaleana*. (*Tate.*)

H. LINCOLNENSIS Pfeiffer. Pl. 43, fig. 36.

Shell umbilicated, somewhat conoidly-depressed, rather thin and moderately glossy, pellucid, very closely, coarsely and irregularly rugosely striated, and finely granulated, of a rich deep-chestnut throughout; spire slightly elevated, widely conical, obtuse, suture pale; whorls 5, rather flattened, last rounded, rather depressed above, and sometimes indistinctly angular at the periphery, descending in front; base less strongly striated than above, smoother and more glossy, umbilicus small; aperture lunately ovate; peristome simple, thin, straight, margins moderately approximating, columellar margin rather widely expanded above, and reflected over $\frac{1}{2}$ of the umbilicus. (*Cox.*) Alt. 0·35, greater diam. 0·80, lesser 0·70 inch.

Port Lincoln, S. Australia.

H. lincolniensis PFR. P. Z. S. 1863, p. 527.—COX Mon. Austr. L. Sh., p. 51, t. 6, f. 9.—ANGAS, Quart. Journ. of Conch. i, p. 135.

H. LUTEOFUSCA Cox. Pl. 40, figs. 93, 94.

Shell openly umbilicated, depressed, obliquely rugosely striated, and obsoletely granulated, thin, yellowish-brown or dark chestnut; spire rather prominent; whorls $4\frac{1}{2}$, regularly increasing, last whorl depressed throughout, on which the elevation of the spire depends, periphery blunt, slightly angled, base convex; aperture diagonal, lunately rounded; peristome simple, lip thin, margins approaching, columellar margin but little everted, the opposite margin inserted beneath the angulation of the second whorl. (*Cox.*)

Alt. 0·33, greater diam. 0·65, lesser 0·50 inch.

Flinder's Range, S. Australia.

H. luteofusca Cox, Monogr. Austr. L. Sh. p. 52, t. 12, f. 1, 1a.

This species, *H. lincolniensis*, *H. tomsetti* and *H. evandaleana* may be more correctly placed in the group of *H. biteniata*.

* **

Group of H. biteniata Cox.

Species of this group are characteristic of the fauna of South Australia.

H. BITÆNIATA Cox. Pl. 38, figs. 66, 67, 68.

Shell globose, narrowly umbilicated, straw-colored with two brown bands, one at the suture the other and wider one above the periphery; surface rather rudely strongly striated, especially above; lip obtuse, not expanded.

The shell is globose, rather thin but strong, of a yellow tint, or tinged with green or brown, having two purple-brown bands. Spire obtusely conoidal; whorls nearly 5, convex, the apical whorl shining, smooth; last whorl globose, rather deeply descending in front. Aperture rounded-lunar, oblique, white within, showing the brown band; peristome blunt, not expanded, white; the columella expanded, reflexed nearly over the narrow umbilicus.

Alt. 16, greater diam. $17\frac{1}{2}$ mill.

Port Augusta; Tillowie, near the western slopes of Flinder's Range, S. Australia.

H. biteniata COX, Mon. Austr. L. Sh., p. 50, t. 4, f. 9.—ANGAS, P. Z. S. 1876, p. 268, t. 20, f. 15, 16.—*H. flindersi* Ad. and Ang. P. Z. S. 1863, p. 521; ANGAS in Quart. Journ. of Conch. i, p. 135.

This is the most globose of the present group of two-banded forms. It may besides be known by its narrow, half-covered, but deep umbilicus, strong striation, etc.

The name *flindersi* has precedence, but was described briefly, from dead examples, and not figured. I have preferred the first really recognizable description, that of Dr. Cox.

H. LORIOLIANA Crosse. Pl. 13, fig. 55.

Shell globose-depressed-conoidal, imperforate or nearly so, rather thin but strong, yellowish, with two brown bands, one at suture, the other above the periphery, and a small *brown umbilical patch*. Surface not granulate, lightly obliquely striate; outer lip a little expanded, obtuse; columella reflexed over or nearly over the umbilicus.

The shell is less globose than *H. biteniata*, and not nearly so deeply cut by the oblique striæ. Spire bluntly conoidal; whorls 5, scarcely convex, separated by superficial sutures; the last whorl descending in front, not at all keeled at the periphery. Aperture oblique, white and bifasciate within; peristome gradually but only slightly expanded, columella triangularly reflexed over the umbilicus, rose-tinted; terminations of peristome approaching slightly.

Alt. 18, diam. $23\frac{1}{2}$ mill.

South Australia.

H. lorioliana CROSSE Journ. de Conchyl. 1863, p. 273, t. 9, f. 6.—ANGAS, P. Z. S. 1863, p. 520; Quart. Journ. of Conchol. i, p. 135.—not of Cox.

The specimen from which my description was taken corresponds exactly with Crosse's figures and description except that it is more solid (not "tenuis"), and the umbilicus is not completely closed, although the shell is completely adult. The species described and figured by Cox as *H. lorioliana* is a distinct form.

H. BROUGHAMI Angas. Pl. 34, figs. 2, 3.

Shell narrowly perforate, conically globose, rather thin, obliquely striated and obscurely minutely granulated, very pale brown above, white below, with three narrow reddish brown bands—one at the suture, one above and one below the periphery of the last whorl; spire obtusely and depressedly conical; whorls $5\frac{1}{2}$, slightly convex, the last rounded, descending in front; aperture oblique, circularly lunate; peristome slightly expanded and reflexed, the margins approximating, the columellar margin almost straight, dilated above, and nearly covering the perforation. (*Angas.*)

Alt. 10, greater diam. 12, lesser 10 lines.

Port Lincoln, S. Australia.

H. broughami ANGAS, P. Z. S. 1875, p. 390, t. 45, f. 4, 4a.

Allied to *H. cassandra*, but more elevated, the columella straightened, dilated and reflexed, nearly concealing the perforation.

H. RUFOFASCIATA Brazier.

Shell moderately umbilicated, globosely depressed, thin, minutely rugosely granulated; pale brown, marked with dark chestnut spiral bands; whorls 5, slightly convex, regularly increasing, the last large and inflated in front, roundly convex, below the periphery the chestnut band becomes broader and runs spirally into the aperture; base white with chestnut brown around the umbilicus; aperture roundly lunate, slightly angular, peristome thin, acute, margins rather distant, the columellar margin dilated partly over the umbilicus, interior of aperture white or pink, the brown bands are seen through the shell. (*Brazier.*)

Alt. 7, greater diam. $12\frac{1}{2}$, lesser $9\frac{3}{4}$ lines.

Yardea, 360 miles north of Adelaide, S. Australia.

H. (Hadra) rufofasciata BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 17, 1875.

This fine shell approaches near to *H. cassandra* Pfr. It differs very much from that species in having dark chestnut bands above and below with a large broad white band on the base, and chestnut

brown round the umbilicus. I am indebted for it to Mr. Waterhouse, the curator of the South Australian Museum. (*Brazier.*)

H. SUBLORIOLIANA Pilsbry. Pl. 58, figs. 10, 11, 12.

Shell depressed, narrowly umbilicated, rather thin, light yellowish with a chestnut band at the suture, another just above the periphery, the interior of the umbilicus also chestnut colored; surface striatulate, not granulate; outer lip simple, suddenly dilated at columella into a small triangle partially covering the umbilicus.

The contour is considerably like *H. cassandra*, but the spire more conoidal; whorls 5, moderately convex, the last rounded at the periphery, a trifle descending in front. Aperture oblique, rounded lunar, delicate flesh-colored within, showing the bands; peristome simple, white, the columellar triangular dilation flesh-colored. The surface is delicately obliquely striatulate but not at all granulated.

Alt. 14, greater diam. $23\frac{1}{2}$, lesser 20 mill.; width of umbilicus $1\frac{1}{2}$ mill.

Flinder's Range, S. Australia.

H. lorioliana Cox, Monogr. Austr. L. Sh., p. 52, t. 3, f. 4a, 4b, not of Crosse!

Far more depressed than the true *H. lorioliana* Crosse, with specimens of which I have compared it.

H. CASSANDRA Pfeiffer. Pl. 58, figs. 7, 8, 9.

Shell depressed, moderately umbilicated, the spire low; whitish, with two pale brown bands above; surface delicately striatulate and densely microscopically granulate all over, save the polished apical whorl. Columella triangularly dilated half over the umbilicus.

The shell is depressed, spire broadly convex and low; rather thin; nearly white beneath, pale isabelline above, with a pale brown band at suture and another above periphery. Whorls 5, the inner one polished, convex; suture at first impressed, then becoming shallower. Last whorl depressed, rounded at the periphery, slightly descending in front; aperture round-lunar, white within; peristome simple, the columella suddenly expanded, half covering the umbilicus.

Alt. 13, greater diam. 23, lesser $19\frac{1}{2}$ mill.; width of umbilicus 2 mill.

Lower Murray River, S. Australia, in bushy patches amongst sandstone cliffs.

H. cassandra PFR. P. Z. S. 1863, p. 527; Mon. Hel. Viv. v, p. 243.—ANGAS, P. Z. S. 1863, p. 520.—COX, Mon. Austr. L. Sh., p. 50.

The low spire, delicate whitish color, with pale bands, and densely granulate surface will distinguish this form. The specimen figured may not be quite adult. A young shell before me shows an additional band just below the periphery.

H. STUTCHBURYI Pfeiffer. Pl. 43, fig. 50.

Shell with the umbilicus nearly covered, turbinately-globose, thin, minutely granulated above, seen under a lens; pale tawny, banded with rufous at the suture, and above the middle; spire convex-conoid, rather obtuse; whorls 5, a little convex, the last rotund, scarcely descending in front, the base smooth; aperture diagonal, round-lunar; peristome thin, narrowly reflected, dilated above the very narrow umbilicus and almost closing it. (*Pfr.*)

Alt. 10, greater diam. $15\frac{1}{2}$, lesser $13\frac{1}{2}$ mill.

Drayton Range and Upper Dawson River, Queensland.

H. Stutchburyi PFR. P. Z. S. 1856, p. 386; Mon. Hel. Viv. iv, p. 168.—COX, Monogr. Aust. L. Sh. p. 39, t. 10, f. 10.

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Doubtful Species of Hadra or Badistes.

H. MUCIDA Pfeiffer.

Shell umbilicated, turbinately depressed, rather thin, finely striated, deep red, appearing as if spread over with mould; spire conoid, rather blunt; whorls 5, convex, gradually increasing, last rounded, descending in front, sub-angular around the funnel-shaped umbilicus; aperture nearly diagonal, roundly lunar, shining flesh color within; peristome briefly expanded, margins scarcely converging, columellar margin triangularly dilated above and spreading. (*Pfr.*)

Alt. 11, greater diam. 20, lesser $16\frac{2}{3}$ mill.

Percy Isles, northeast coast of Australia.

H. mucida PFR. P. Z. S. 1856, p. 329; Monogr. iv, p. 264.—COX Monogr. Austr. L. Sh. p. 59.

May belong to the group of *H. aridorum*, *porteri*, etc. A smaller form measures, alt. $7\frac{1}{2}$, greater diam. 15, lesser 13 mill.

H. MURINA Pfeiffer.

Shell umbilicated, turbinately-globose, thin, regularly striated, granular, somewhat roughened, deep red; spire shortly conoid,

slightly obtuse; whorls nearly 5, convex, last inflated, scarcely descending in front, somewhat compressed about the moderate, previous umbilicus; aperture diagonal, lunately rounded, pearly within; peristome brownish, fleshy, everywhere shortly expanded, margins somewhat converging, columellar margin dilated above, reflected in a vaulted manner. (*Pfr.*)

Alt. 9, greater diam. 15, lesser 12 mill.

Admiralty Is.; var. β. in North Australia.

H. murina PFR. P. Z. S. 1856, p. 384; Monogr. iv, p. 268.

Var. *β.* Paler, brownish-horn colored, peristome white.

A species of doubtful position, not yet identified by Australian naturalists.

H. Pliculosa Pfr. (MANUAL iii, p. 216), *H. victoriæ* Cox, and some other species may prove to belong in this group.

Subsection SPHÆROSPIRA, Mörch, 1867.

Sphærospira MORCH, Journ. de Conchyl. 1867, p. 256, for *H. fraseri*, *lessoni*, *appendiculata*.

The Australian *Sphærospira* form a natural group of very closely allied species. It seems obvious to me that a considerable number of the described forms—say 25 per centum—are merely geographic races or color-varieties, not really entitled to specific rank. (Compare *croftoni* with *coxi*; *gratiosa* with *blomfieldi*, etc., etc.). I have preferred to *indicate*, rather than actually make, many of the more apparent reductions, as my material is not extensive enough to show the actual coalescence of many forms which I have reason to believe belong together. This work of revision should be done by some Australian student. The genitalia as well as the shells must be examined, as in many groups of *Helix* they offer excellent specific characters.

The primitive coloration, toward which all the species tend, is as follows: the suture is narrowly edged with white, followed by a dark brown band; another dark band encircles the whorl above the periphery, and the inside of the umbilicus is dark. This pattern is chiefly modified by the addition of numerous narrow lines, or by their coalescence, resulting in either a multilined or a uniformly dark shell.

Fuller knowledge of the forms of *Hadra* has convinced me that the division of that section into three subsections (see p. 94) is attended with difficulties. *Badistes*, *Sphærospira* and *Hadra* proper,

seem to be separated by only trifling characters, hardly worthy of names, except so far as such divisions may aid one in understanding so numerous a group of species. The sphaerospira are all inhabitants of Queensland most of them of the subtropical northern portion. Their western distribution is apparently checked by the arid sandstone region of North Australia.

The *Sphaerospira* proper may be most naturally divided into two groups: (1) *imperforate* and (2) *umbilicated* forms.

Imperforate Sphaerospira.

H. FRASERI Gray. Pl. 33, figs. 58, 59, 60.

Shell imperforate, subglobose, spire subconoidal or depressed, brownish-yellow with numerous spiral lines and bands of chestnut, suture edged by a light line and a dark band; aperture light within, lip broadly reflexed, dark brown, appressed over the umbilicus.

Solid, globose, varying much in height of spire. Back of the lip dark brown, this color suffusing often the latter part of the body-whorl. Spiral bands and lines very numerous and inconstant in number, width and position. Surface seen under a lens to be minutely, almost obsoletely granulated or wrinkled, and sometimes fine, close spiral lines are apparent. Whorls 6, slightly convex, the last deflexed in front, convex below, and a little impressed at the place of the covered umbilicus. The lip is broadly expanded and reflexed except at its upper junction with the body-whorl. Parietal wash of callus transparent.

Alt. 33, greater diam. 39, lesser 34 mill.

Alt. 35, greater diam. 37, lesser 32 mill.

Alt. 42, greater diam. 48, lesser 38 mill.

Clarence and Richmond Rivers, N. S. W.; Brisbane and Wide Bay, Queensland, Australia.

H. fraseri GRAY, Zool. Beechey's Voyage, Moll. p. 143, t. 38, f. 6, 1839.—GRIFF. Anim. Kingd. t. 36, f. 6.—PFEIFFER in Conchyl. Cab. p. 308, t. 52, f. 9, 10; Monographia i, p. 246.—COX, Monog. Austr. Land Sh. p. 64, t. 10, f. 6.—REEVE, Conch. Icon. f. 360.—HEDLEY, Proc. Roy. Soc. Queensl. 1888, p. 58, 151; *l. c.* 1889, p. 103, plate vii, (anatomy).

One of the largest species of *Sphaerospira*. The closed umbilicus, broadly reflexed blackish lip, light interior of the aperture and large size will distinguish it from the numerous allied multilineate forms. The granulation of the surface is not perceptible to the touch, and

only becomes visible under a lens. Some specimens are almost devoid of it. Hedley has figured the anatomy.

Var. FLAVESCENS Hedley.

Shell bandless, of a uniform light yellow, lip pure white. Differs from the type in nothing but coloration.

Corumbin Creek, Queensland.

H. COARCTATA Férussac. Pl. 43, figs. 37, 38.

This is a species of *Sphaerospira* very closely allied to *H. fraseri*; and I would unite it to that species were it not for the blade-like callus on the columella, a character not seen in the *H. fraseri*. It has not been identified or mentioned by writers on Australian shells. The type, Deshayes states, is a dead and discolored specimen.

It is globose, about the size of *H. pomatia*; Spire elongated, conoidal; whorls $4\frac{1}{2}$, slowly increasing, convex. Last whorl convex, imperforate, deflexed below the periphery of the penultimate whorl, and constricted behind the peristome. Surface smooth, with irregular growth-striæ. Aperture relatively small, a little wider than high, white; peristome regularly arcuate, strongly reflexed, at the columella bearing a tooth-like callus, and reflexed over the entire umbilicus. Obliquity of aperture 55° to the axis. Color (as far as preserved) wide bands and narrow lines of reddish-brown on a whitish-yellow ground. A line of deeper color follows the suture.

Alt. 40, diam. 47 mill.

Habitat unknown.

H. coarctata FER. Hist. t. 10b f. 6, 7.—DESH. in Fér. Hist. (texte) p. 216.—Pfr. Monogr. iii, p. 185.

Compare *H. fraseri*. The above details are from Deshayes.

H. ZEBINA Brazier. Pl. 47, fig. 89.

Shell imperforate, rather solid, somewhat globosely-conical, whole surface transversely granulated with lengthened grains (as seen under the lens), towards the apex they become finer; pale straw-yellow with numerous spiral chestnut lines and bands; suture ornamented with a rather broad band; spire rather large, broadly conical, obtuse; whorls $5\frac{1}{2}$, rather convex, last large, dilated and produced in front, deflected above; aperture diagonal, ovately-lunate, whitish within; peristome straight, expanded and slightly reflected; margins approximating, joined by a thin callus; columellar light brown,

thickened and expanded covering the whole of the umbilicus; (*Brazier.*) Alt. $13\frac{1}{2}$, greater diam. 19, lesser 13 lines.

Ranges about the Douglas River, Queensland, Australia.

H. zebina BRAZIER, Proc. Linn. Soc. N. S. W. iii, p. 78, t. 8, f. 2, 1878.

H. MOSSMANI Brazier. Pl. 34, fig. 14.

Shell imperforate, globosely turbinated, very faintly obliquely striated, exhibiting minute spiral lines and granulations (only seen under the lens); reddish yellow, with numerous spiral chestnut lines and bands; spire conical, apex obtuse; whorls $6\frac{1}{2}$, slightly convex, suture slightly crenulated; aperture oblique, ovately lunate; peristome black, reflected, margins approximating, the right descending at the upper part, columellar thickened, with a black callus round the umbilical region. (*Brazier.*)

Alt. $19\frac{1}{2}$, greater diam. 19, lesser 15 lines.

Dawson River, Queensland, Australia.

H. mossmani BRAZ., P. Z. S. 1875, p. 33, t. 4, f. 6.

Comes near to *H. fraseri* in its markings, but differs in being more turbinated and in the lip being thinner.

H. COXI Crosse. Pl. 23, figs. 74, 75; pl. 40, fig. 92.

Shell imperforate, globose, light buff with few lines and narrow bands of chestnut, fading out on the latter part of the body-whorl. Interior of the aperture and the broadly expanded lip pure white.

A compact, globose shell, the outline of the spire convex; solid, smooth; sutures superficial; whorls $6\frac{1}{2}$, slightly convex, the last globose, its latter part of a clear buff tint, the few brown lines fading out. It descends strongly to the aperture; the base convex, not impressed or excavated at the place of the closed umbilicus. The aperture is rounded lunar, oblique, outer and basal lips broadly expanded, somewhat reflexed, columellar lip expanded in a triangular white plate, closely appressed over the umbilicus.

Alt. 32, greater diam. 35, lesser 30 mill.

Alt. 38, greater diam. 32, lesser 29 mill.

Port Molle and Port Denison, Queensland, Australia.

H. Forbesi Cox, P. Z. S. 1864, p. 40 (preoc.).—*H. cerea* Cox, Catal. Austr. Land Sh. 1864, p. 36 (preoc.).—*H. Coxii* CROSSE, Journ. de Conchyl. 1866, p. 195.—PFR. Monogr. v, p. 276; Conchyl. Cab., p. 534, t. 163, f. 5, 6.—TAPPARONE-CANEFRI Zool. del Viaggio della Fregata Magenta, Malac., p. 92, t. 2, f. 7.—BRAZIER, P. Z. S.

1872, p. 806.—*H. cerata* COX, Mon. Austr. Land Sh., p. 58, t. 8, f. 4.—*Hadra cerata* SEMPER, Reis. Archip. Philippinen, Landmoll. iii, p. 160.

A beautiful species, known by its light buff color, with fewer spiral brown bands than the majority of banded *Sphaerospira*.

It is very numerous, according to Brazier, on the trunks of the native fig trees.

An elevated form is figured on pl. 40, fig. 92.

H. CROFTONI COX. Pl. 21, fig. 52.

Shell imperforate, globose-conoidal; buff, with two broad dark chestnut zones above, one just under the suture, the other a short distance below it, fusing with it on the latter part of the body-whorl, and generally a circular umbilical dark patch, the intervening space with several brown lines. Aperture of a livid-whitish color inside, flesh-colored or bluish-white on the broadly expanded lip, callus over the umbilicus dark livid brown.

Compact, solid; the ground-color is buff; suture edged by a narrow white or buff line, bordered by a broad chestnut zone, below which there is another broad zone, separated from the first by a light space in which a brown line revolves. These two supra-peripheral zones coalesce on the last third of the body-whorl, and this part often is suffused with brown, all over the light buff ground. There is usually a brown basal band or tract around the axis. The spire is elevated, outlines convex; whorls $6\frac{1}{2}$ to 7, slightly convex, the last deflexed in front, not impressed at the place of the closed umbilicus. The aperture is broad, oblique; the lip expanded, sub-reflexed, dilated over and closing the umbilicus, passing into a glossy wash of parietal callus, which is stained with brown around the axis.

Alt. 34, greater diam. 34, lesser 29 mill.

Hydrometer River, West of Port Mackay, Queensland, Australia.

H. Croftoni COX, P. Z. S. 1872, p. 18, t. 4, f. 1.—PFR. Monog. vii, p. 320; Conchyl. Cab. p. 533, t. 163, f. 3, 4.—HEDLEY, List Queensl. Land Sh., p. 58.

Curiously intermediate between *Coxi* and *Blomfieldi*, decidedly darker than the first (of which it should perhaps be considered a color-variety) but not nearly so dark as the latter species. It is very local in habitat. Found inside the hollow trunks of Quang-dong trees.

H. BLOMFIELDI COX. Pl. 23, fig. 67.

Shell imperforate, globose elevated, unicolored deep chestnut on the body-whorl, lighter on the whorls of the spire and showing spiral bands or lines there; aperture purplish or purplish-brown inside, the broadly expanded lip brown or purplish.

The form is elevated-globose, spire short with convex outlines; it is solid, dark chestnut (according to Cox, deep, purplish chestnut), with a yellow margin below the suture from $\frac{1}{2}$ to one millim. wide. Earlier whorls light fawn colored, with inconspicuous darker stripes or lines. Surface showing sometimes very close, fine, subobsolete, spiral striæ. Sutures superficial. Whorls $6\frac{1}{2}$, slightly convex, the last deeply descending anteriorly. Aperture oblique; lip broadly expanded and subreflexed, suddenly dilated at the umbilicus and closely adhering to the base of the shell over it. In immature shells the umbilicus is not covered, and the lip is deep brown; in adults a whitish layer is deposited over the brown, giving a purplish effect.

Alt. 39, greater diam. 36, lesser 31 mill.

Port Curtis, Queensland, Australia.

H. Blomfieldi COX, Catal. Austr. Land Sh. p. 19, 1864; Monog. Austr. Land Sh. p. 57, t. 1, f. 1.—PFR. Monog. Hel. Viv. v, p. 284; Conchyl. Cab. t. 163, f. 1, 2.—TAPPARONE-CANEFRI, Zool. Viaggio della Fregata Magenta, p. 92, t. 2, f. 5.—HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 103, pl. vii, (anatomy).

With the general contour of *H. coxi* and *H. croftoni*, this species has a decidedly more lengthened aperture, the basal lip being produced downward very much as in *Cochlostyla* or *Bulimus*, whilst in the other species named it is more transverse. Moreover, in *blomfieldi* there is a distinctly salient angle where the concave, triangular and dilated columella joins the basal lip, a structure not so plainly shown in *coxi* or *croftoni*. There is no trace whatever of darker or lighter bands on the body-whorl, save only the subsutural yellow line.

H. MITCHELLÆ COX. Pl. 47, figs. 92, 93.

Shell imperforate, globosely-turbinated, solid, striated with the lines of growth, under the lens universally reticularly or irregularly linearly granulated, deep reddish chestnut, with four yellow bands, one broad in umbilical region, another narrow along the periphery, with a blackish band above it, a third, broader and separated by a dark band from a very narrow fourth at the suture; spire roundly

convex, obtuse; whorls $6\frac{1}{2}$, very regularly increasing, convex, last deflected in front, convex below; aperture very oblique, truncately elliptical, within of a pearly bluish tint; peristome thickened, lipped within, reflected, inner edge glossy, chestnut black, margins connected with a thin dark callus, anterior rather sinuated near the periphery, columellar margin flattened, with a very prominent inner lip, having an obsolete tooth-like callosity near the centre. (Cox.)

Alt. 1·20, greater diam. 1·80, lesser 1·50 inch.

Clarence River, N. S. W.; Beach Hut, Emigrant Creek, Richmond River, under masses of dead leaves.

H. mitchellæ Cox, Cat. Austr. L. Sh., p. 19, 1864; Ann. Mag. N. H. 3d ser., xiv, p. 181; Mon. Austr. L. Sh., p. 65, t. 9, f. 9.—PFR. Monog. Hel. Viv. v, p. 279.

Differs from most of the true *Sphærospira* in the distinctly granulate or reticulate surface-sculpture; most of the species being nearly smooth.

H. GRATIOSA Cox. Pl. 40, figs. 88, 89.

Shell imperforate, globose-elevated, yellowish brown or purple-brown, with two rather broad dark bands, one just below the sutural yellow lines, the other above the periphery; a dark umbilical patch; whorls of the spire lighter, bifasciate with chestnut.

This is a form very similar to *H. blomfieldi* in general contour, and form of the basal lip and columella; but smaller and differently colored. It has a yellowish-brown ground-color, typically; but on the body-whorl this is sometimes of a very dark brown, almost black. The dark bands described above are dark chestnut on light examples, but become black on dark ones, and even then are scarcely visible on the deep brown ground-color. There are sometimes a few dark oblique streaks also, and the subsutural yellow or whitish stripe is conspicuous. Whorls $6\frac{1}{2}$, the last less deeply deflexed in front than most *blomfieldi*. Aperture oblique, blackish-brown inside, with a pearly luster; lip very dark colored, well expanded, suddenly dilated at the columella and covering the umbilicus with a closely adherent, triangular shiny callus.

Alt. 33, greater diam. 27, lesser 25 mill.

Whitsunday Island, off Port Denison, Queensland, Australia.

H. gratiosa Cox, P. Z. S. 1871, p. 53, t. 3, f. 1, 1a.—PFR. Monog. Hel. Viv. vii, p. 322; Conchyl. Cab. p. 545, t. 165, f. 4, 5.

Pfeiffer figures as a variety of this species a form which is larger, more elevated, unicolored chestnut brown except for the sutural band, becoming lighter above. (see pl. 22, fig. 57).

Compare *H. blomfieldi*, a form from the mainland of which *gratiosa* may prove to be a variety.

H. ETHERIDGEI Brazier. Unfigured.

Shell imperforate, rather thick, somewhat globosely turbinated, finely striated, having minute transverse lengthened grains, blackish chestnut, ornamented at the periphery with one narrow white line, contiguous to the suture, broad yellow-brown band above, running spirally to the apex, the third encircling the imperforation, and running spirally inwards; spire rather conoid, apex striated, white, whorls $5\frac{1}{2}$, slightly convex, the last large and moderately ventricose, base convexly rounded, suture encircled with a white line, broader above the last whorl, aperture ovate, diagonal, violet-tinged within, peristome white, expanded and reflected, very much thickened, margins approximating, the right descending, columellar expanded, dark purple beneath a white callus, and joined to the upper part of the peristome. (*Brazier.*)

Alt. $14\frac{1}{2}$, greater diam. 17, lesser 13 lines.

Andromache River, between Bowen and Cape Palmerston, N.-E. coast of Australia.

H. (Calliocoehlias) Etheridgei BRAZIER, Proc. Linn. Soc. N. S. W. ii, p. 25, 1877.

The first specimen I saw of this species, I was inclined to regard as a variety of *Helix gratiosa* Cox. I have seen three specimens since then,—one in Dr. Cox's collection, one in Mr. Hargraves, and the specimen in my own which I exhibit to-night to the Society, and for which I am indebted to Mrs. Coxen, of Brisbane. It differs from *H. gratiosa* in being a heavier and thicker shell, in having a thick, white, and reflected peristome, and in being of a violet colour within the aperture. I have named it after my friend, Mr. R. Etheridge, Jr., of Edinburgh, F. G. S. (*Brazier.*)

H. MACLEAYI Cox. Pl. 19, figs. 28, 29, 30.

Shell globose, imperforate; epidermis very thin, light grayish, tinged with yellow or green; encircled by a distinct narrow chestnut band just above (almost upon) the periphery, and another narrower and subobsolete one just below the white-margined suture; lip, columella and parietal wall deep chestnut.

Smaller, lighter colored and more depressed than *H. gratiosa* and most other species of *Sphærospira*, the surface often appearing denuded of cuticle, and of a pinkish tint; spire low; whorls $5\frac{1}{2}$ to $5\frac{3}{4}$, slightly convex, the last deflexed in front, convex all over. Aperture rounded, pinkish-fawn-color inside, showing the band; lip expanded, dilated at the columella, closely adherent over the umbilicus and spreading in a deep brown callus over the parietal wall and into the mouth. Alt. 23, greater diam. 25, lesser $22\frac{1}{2}$ mill.

Whitsunday Island, and Port Denison, Queensland, Australia.

H. macleayi COX. P. Z. S. 1864, p. 486, figs. 1–3; Cat. Austr. L. Sh., p. 36, 1864; Monog. Austr. Land Sh., p. 45, t. 8, f. 3.—PFR. Mon. Hel. Viv. v, p. 278; Conchyl. Cab. p. 547, t. 165, f. 10, 11.—TAPPARONE-CANEFRI, Zool. Magenta, Malac., p. 93, t. 3, f. 1.

The greatest circumference of this shell is higher on the whorl than in most of the species, and the body-whorl is notably convex in every part. The coloration is lighter than in *Sphærospira* generally.

H. ANDERSONI COX. Pl. 23, fig. 68.

Shell imperforate, rather thin, depressedly globose, finely striated, yellow brown, with three or more rather narrow dark chestnut bands round the center and lower part of the body-whorl, and one beneath the suture; whorls $6\frac{1}{2}$, almost flat, gradually increasing in size; aperture diagonal, elongately lunately rounded, lip dark, as is also the covered umbilicus; margins converging, thin, slightly expanded, columellar margin triangularly dilated, adnate, occluding the umbilicus and sunk below the marginal line of the aperture, causing the latter to be sharply angled. (Cox.)

Alt. .80, greater diam. 1.34, lesser 1.10 inch.

North end of Expedition Range, Rockhampton, Queensland, Australia.

H. andersoni COX, P. Z. S. 1871, p. 644, t. 52, f. 4.

Differs from *H. yulei* in having the umbilicus closed.

* * *

Umbilicated species of Sphærospira.

H. RAINBIRDI COX. Pl. 23, figs. 72, 73; pl. 39, figs. 84–87.

Shell with a funnel-shaped umbilicus, narrow within but expanding and excavated behind the dilated basal lip which half covers it; depressed below, the upper surface elevated; deep chestnut colored, with (typically) two light yellow zones revolving above the periphery,

one of which continues up the spire, and a light band or lines around the umbilicus; sutural light line very narrow, or almost obsolete; lip broadly expanded, deep brown in color.

The shell is compact, the base depressed, spire convex and more or less elevated; suture superficial; whorls $5\frac{3}{4}$, those of the spire with a light band in the middle, the body-whorl more or less compressed and sloping above, broadly excavated around the funnel-shaped umbilicus, deflexed in front. Aperture very oblique, livid and showing the bands within; lip broadly expanded, deep brown, baso-columellar margin dilated over and half covering the umbilicus.

Alt. 29, greater diam. 38, lesser 31 mill.

Alt. 27, greater diam. 34 mill.

Mount Dryander, Port Denison, Queensland, Australia.

H. Rainbirdi COX, P. Z. S. 1870, p. 170, t. 16, f. 1.—PFR., Monogr. Hel. Viv. vii, p. 365; Conchyl. Cab., p. 545, t. 165, f. 6, 7.—*H. basalis* MOUSS. in Mus. God. Cat. v, p. 95.—HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 120, t. 7 (Anatomy.)

The typical form described above is figured on pl. 39, figs. 86, 87.

A variety is figured on pl. 35, figs. 6, 7. It is more depressed than the type, with only one suprapерipheral yellow zone, the whorls of the spire dark, bandless.

The light bands are often split by dark lines. This is shown in a specimen before me labelled "*H. basalis* MOUSS., Port Mackay" which seems to be a small form of *rainbirdi*. It is figured on pl. 39, figs. 84, 85.

The species is less flattened on the base than *H. rockhamptonensis*, and more depressed. It differs from *H. oconnellensis* in being larger and differently banded.

H. OCONNELLENSIS COX. Pl. 23, figs. 69, 70, 71.

Shell with a funnel-shaped umbilicus, depressed globose, unicolored deep chestnut except for a sharply defined subsutural white border.

The shell is compact, flattened on the base, broadly excavated at the umbilicus, which is half-covered by the overhanging baso-columellar lip. Unicolored deep chestnut all over, except for a white band at the suture about a millimeter in width. Whorls $5\frac{1}{2}$ –6, scarcely convex except the last one, which is well-rounded and descends rather deeply in front. Aperture very oblique, lilac or purple inside, becoming darker on the broadly expanded lip. Columel-

lar lip half-covering the broadly opening umbilicus.

Alt. 22, greater diam. $26\frac{1}{2}$, lesser diam. 22 mill.

The O'Connell River, Port Denison, Queensland, Australia.

H. O'Connellensis Cox, P. Z. S. 1871, p. 55, t. 3, f. 4, 4a.—Pfr. Monographia, vii, p. 385; Conchyl. Cab. p. 547, t. 165, f. 12-14.—*H. albofilata* MOUSS. Mus. God. Cat. v, p. 94.

Smaller than *H. rainbirdi*, and differently colored.

H. ARTHURIANA COX. Pl. 36, figs. 21, 22.

Shell globosely depressed, largely and openly umbilicated, very dark chestnut, almost black, lighter at the apex, transversely finely striated; whorls 6, very gradually increasing in size, last sharply depressed in front; suture conspicuously margined below with white; spire bluntly convex; base somewhat flattened; aperture ovately lunate, livid within, margins closely approximate, joined by a thin callus; peristome straight, expanded and reflexed, of an intensely dark livid purple color; columellar margin triangularly dilated, overhanging the umbilicus. (Cox.)

Diam., greatest 1.28, least 0.90; height 0.77 of an inch.

L. Island, near Broadsound, lat. 20° 52', E. long. 149° 37'.

H. (Camæna) arthuriana Cox, P. Z. S. 1873, p. 564, t. 48, f. 1, 1a.—PFR. Mon. Hel. Viv. vii, p. 393.—HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 102.

More closely allied to *H. oconnellensis* than to any other species. It is more globose, and it has not the excavated base round the umbilicus so characteristic of that species; the aperture is also more round, with the margins more approximated. (Cox.)

H. ROCKHAMPTONENSIS COX. Pl. 21, figs. 48, 49.

Shell umbilicated, globose-trochoidal, the spire convexly elevated, base decidedly flattened; of a dark chestnut color, encircled on periphery and base with a number of narrow yellowish bands and lines; sutural light margin indistinct or wanting, lip deep purplish-brown, dilated half over the funnel-shaped umbilicus.

The form is elevated, like *H. croftoni* etc., but distinctly flattened on the base,—much more so than in *H. rainbirdi* etc. Whorls 6, scarcely convex, the last one descending in front. Aperture very oblique, lilac within, the broadly expanded lip dark purplish-brown, very much dilated at the columella, more than half covering the umbilicus, which is deep and funnel-shaped.

Alt. 32, greater diam. $34\frac{1}{2}$, lesser $29\frac{1}{2}$ mill.

Rockhampton, North-eastern Australia.

H. Rockhamptonensis COX, P. Z. S. 1873, p. 150.—PFR. Monog. Hel. Viv. vii.—BRAZIER, Proc. Linn. Soc. N. S. W. v, p. 445.—*H. planibasis* COX, ms. olim, teste Brazier.—*H. moresbyi* ANGAS, P. Z. S. 1876, p. 267, t. 20, f. 8, 9.

A more elevated shell than *H. rainbirdi*, flatter beneath, and with the umbilicus less excavated. It is more elevated than *H. appendiculata* or *H. lessoni*, and the base is flatter. My esteemed correspondent John Brazier has fully discussed the synonymy in the place cited above.

Var. MORESBYI Angas. Pl. 36, figs 25, 26.

Form more elevated, and light stripes more numerous, distributed over the whole surface. Alt. 45, diam. 45 mill.

Port Denison, Northern Queensland.

H. INFORMIS MOUSSON. Pl. 34, fig. 4.

Shell nearly covered umbilicate, oblong-globose, thick, obtusely widely striated, under a lens seen to be covered with close, oblique, very minute lines, somewhat silky, purple-black, unicolored or obscurely unifasciate. Spire obtuse, conoid; summit obtuse, denuded; suture linear, impressed, whorls $6\frac{1}{2}$, moderately widening, the earlier less, later more convex, at the suture somewhat broadly plicated. Last whorl large, slowly descending, somewhat swollen above and below, subinflated on the base. Aperture oblique (40° to the axis), equaling the spire, lunate-ovate, purplish inside. Peristome obtuse, reflexed, somewhat thickened, margins distant, joined by a purplish callus, straight, above and below more arcuate; columellar margin straight, elongated, deep, half closing the umbilicus by a broad arcuate dilation. (*Mouss.*) Alt. 54, diam. 50 mill.

Port Mackay, Queensland.

H. informis MOUSS., Journ. de Conchyl. 1869, p. 59, t. 4, f. 3.—PFR. Monogr. vii.

This large species I have not seen. In its uniform dark color it resembles *H. blomfieldi*, but that species is imperforate.

H. PALMENSIS BRAZIER.

Shell umbilicated, globosely turbinated, finely striated, the whole surface marked with minute zigzag and lengthened grains, giving the shell a granulated appearance, reddish yellow, with numerous spiral chestnut lines and bands, very dark at the mouth, whorls 6, slightly convex, the last convex above, deflected in front, suture

crenulated and encircled with a dark blackish band ; spire conical, apex obtuse, base rounded, marked as above, having coarser lines entering the umbilicus, with a dark broad band round it, aperture somewhat diagonal, ovately lunate, within shining livid hue, peristome blue-black, thick, and broadly expanded and reflected, margins approximating, the right descending at the upper part, and connected by a thin callus ; columellar margin very much thickened and expanded half over the umbilicus.

Variety: Yellowish, with one band one line wide on the periphery, running spirally to the apex, with another broad one at the suture, nearly obsolete on the second whorl, peristome lightish brown, very dark behind ; dark reddish brown round the umbilicus. (*Brazier.*)

Alt. 17, greater diam. 23, lesser 18 lines.

Great North Palm Island, North-east Australia ; found under stones and rocks in the thick jungle.

H. palmensis BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 105 ; *var. meridionalis* BRAZIER, l. c., v, p. 458.

Var. MERIDIONALIS Brazier.

Shell very thin, transparent, brownish yellow ; suture with a dark reddish brown band about half a line broad on the two lower whorls ; four upper having it continued in a fine thread spirally to the apex ; periphery with seven or eight faint nearly obsolete chestnut lines contiguous to the suture ; umbilicus encircled with dark chestnut ; peristome thin, slightly reflected, internal edge dark, nearly black. (*Brazier.*)

Diam. maj. 20, min. 15, alt. 14 lines.

Large South Palm Island, northeast Australia.

H. BELLENDENKERENSIS Brazier. Pl. 34, fig. 1.

Shell deeply umbilicated, globosely turbinated, obliquely striated and minutely transversely lined with small lines resembling grains, reddish brown, with two spiral chestnut bands, one on the center and the other above ; whorls 6, slightly convex, last large ; base convex, striated as above ; spire conical, obtuse ; aperture oblique, ovately lunate, interior blue-black ; peristome thickened and reflexed ; margins approximating, right descending a little, columel-

lar broadly expanded and bent inwards, forming a long callus tooth. (*Brazier.*)

Alt. 17, greater diam. 22, lesser 17 lines.

Bellenden-Ker Mts., northeast Australia.

H. bellenden-kerensis BRAZIER, P. Z. S. 1875, p. 32, t. 4, f. 4.

The locality given is near the Endeavor River. The three specimens seen by Mr. Brazier are of the same color.

H. PARSONI COX. Pl. 35, figs. 11, 12, 13.

Shell with a deep, open umbilicus, globosely conical, uniform dark purplish chestnut on the body-whorl, the spire becoming yellowish with fine indistinct chestnut lines, suture bordered by a distinct narrow white line; lip dark.

The shell is compact, elevated, microscopically striated spirally like most species of *Sphaerospira*. Spire elevated, lighter than the dark chestnut body-whorl, and having spiral brown lines. Suture superficial. Whorls $6\frac{1}{2}$, slightly convex, the last deflexed in front, somewhat flattened beneath. Aperture quite oblique, purplish with a satin-like luster within, becoming darker on the lip, which is broadly expanded, triangularly dilated at the columella, overhanging the umbilicus, more than half concealing it.

Alt. 30, greater diam. 33, lesser $27\frac{1}{2}$ mill.

Gayndah, Queensland, Australia.

H. Parsoni COX, P. Z. S. 1872, p. 18, t. 4, f. 2.—PFR. Monographia vii.—HEDLEY, Proc. Roy. Soc. Queensl. v, p. 60, 1888.

Flatter beneath than *H. blomfieldi*, differently colored, and differing fundamentally in being umbilicated. It is like *H. lessoni* in having the body-whorl dark, spire lighter, but it is a decidedly more elevated shell, with more widely expanded dark edged lip. It does not have the color-pattern of *H. rockhamptonensis*, nor is the base so flat as in that form.

H. LESSONI Pfeiffer. Pl. 33, figs. 61, 62, 63.

Shell half-covered umbilicate, depressed globose; body-whorl dark chestnut colored, the spire yellowish or lighter brown, often showing spiral brown lines; lip expanded, becoming lighter toward its white edge; suture with an inconspicuous pale margin.

The shell is compact, base depressed, spire convex-conoidal. The body-whorl is typically of a uniform purplish-chestnut color, but specimens occur in which it is of a lighter brown, with numerous rather obscure darker bands and lines. The base in these banded

examples is still lighter. The spire is always lighter in tint, and usually lineated with brown as shown in figure 63 of the plate. Whorls $6\frac{1}{2}$, closely coiled, but slightly convex, the last descending in front. Aperture oblique, dark within, becoming lighter toward the white-edged lip which is expanded on its outer and basal margins, dilated at the columella in a triangular plate, purplish in color, overhanging and more than half covering the umbilicus.

Alt. 27, greater diam. 33, lesser 28 mill.

Alt. 26, greater diam. 30 mill.

Port Curtis, Queensland, Australia.

H. lessoni PFR. Symbolæ iii, p. 71; Monographia i, p. 233, v, 500; Conchyl. Cab. p. 363, t. 138, f. 9, 10.—REEVE Conch. Icon. f. 754.—COX Mon. Austr. L. Sh. p. 55, t. 4, f. 10.—*H. Rangii* LESSON, Voy. de la Coquille, p. 305 (probably; not *H. Rangii* Fér.).—*H. seminigra* MORELET Journ. de Conchyl. 1864, p. 289.—*Callicochlias lessoni* FFLD. Verh. zool.-bot. Ges. Wien, 1869, p. 875.—*Hadra lessoni* SEMPER, Reisen in Arch. Phil., Landmoll. iii, p. 160.

From *H. parsoni* this species is distinguished by its more depressed stature and constantly white-edged lip. The lighter, banded forms connect it with *H. appendiculata*, which seems to be merely a variety. *H. incei* is generally smaller, much lighter colored, the ground-color being buff. Finally in *H. yulei* the lip is dark, not white-edged.

The shells described and figured agree with what is universally recognized as *H. lessoni*. Pfeiffer's description indicates a smaller form, differing somewhat in coloration; his figures are copied on pl. 35, figs. 14, 15.

Var. APPENDICULATA Pfr. Pl. 33, figs. 71, 72.

Shell half-covered-umbilicate, globose, depressed on the base, brownish-yellow with numerous spiral reddish-chestnut bands and lines. Whorls $6\frac{1}{2}$, the last suffused with deep chestnut behind the expanded peristome. Aperture dark within, or light and showing the bands. Lip white, darker and purplish-brown at the expanded columella.

Alt. 27, greater diam. 32 mill.

Alt. 30, greater diam. 34 mill.

Port Denison, Queensland.

H. appendiculata PFR. P. Z. S. 1854, p. 149; Monographia Hel. Viv. iv, p. 261.—COX, Mon. Austr. L. Sh. p. 56, t. 5, f. 11.—

REEVE, Conch. Icon. f. 1353.—*Hadra appendiculata* SEMPER, Reisen im Arch. Phil., Landmoll. iii, p. 160.

A very variable form, generally with a greater number of narrow bands and lines than fig. 71 shows. It is very variable in size and contour. Another locality given by Pfeiffer is "Drayton Range" (small variety.) Specimens before me are marked "Port Curtis."

H. THATCHERI Cox. Pl. 36, fig. 24.

Shell deeply and openly umbilicated, depressedly globose, rather solid, finely obliquely striated, dull horny yellow, ornamented with a broad, dark chestnut band below the suture, with five or six fine dark lines round the center of the whorls, and also a dark undefined zone round the umbilicus, which is of the same color; this dark coloration extends across the last whorl in a broad undefined band along the margin of the aperture, and joins the band beneath the suture; spire flatly conoid; whorls $6\frac{1}{2}$, flattened, the last becoming much inflated, rapidly enlarged and a little depressed in front; base flat; aperture oblong-oval, large, oblique, livid white within; lip slightly thickened and everted, of a lighter color than the interior; margins approaching, joined by a thin dark callus; columellar margin much dilated, half concealing the umbilicus. (Cox.)

Alt. 1.15, greater diam. 1.60, lesser 1.20 inch.

Mount Bersaker, Rockhampton, Queensland.

H. thatcheri Cox, P. Z. S. 1870, p. 170, t. 16, f. 2.—PFR. Monogr. vii.

Intermediate between *H. appendiculata* and *H. incei*, says Dr. Cox, but easily distinguished from either by the marked inflation of the last whorl.

H. HILLI Brazier. Pl. 36, fig. 27.

Shell umbilicated, turbinately globose, thick, dark chestnut, spirally lined with darker lines; whorls $6\frac{1}{2}$, convex, the three forming the apex of a light yellow, with a dark broad band below the suture, base convex, lined as above; aperture oblique; peristome thickened and reflected, white; margins approximating, the right slightly descending, columellar thickened and partly expanded over the umbilicus. (Brazier.) Alt. 12, greater diam. 17, lesser $14\frac{1}{4}$ lines.

Mt. Elliott, Queensland, Australia.

H. hilli BRAZ., P. Z. S. 1875, p. 32, t. 4, f. 3.

Compare *appendiculata*, *incei*, etc.

H. RAWNESLEYI COX. Pl. 34, fig. 7.

Shell broadly coniform, openly umbilicated, obliquely finely striated throughout, very dark chestnut, lighter towards the apex, which is ornamented with very narrow spiral bands; spire raised, bluntly conoid; whorls $7\frac{1}{2}$, convex; margin of suture faintly lined with white below; last whorl deflexed in front, base flattened; umbilicus large, half closed by the reflexed expansion of the columellar margin; aperture ovately lunate; margins much approximated, joined by a thin purple callus; peristome everted, of a dark livid purple, as is also the interior of the aperture; columella triangularly dilated. (Cox.) Alt. 1.58, diam., greatest 1.68, least 1.25 inch.

Mt. Elliott, near Port Denison, Queensland, Australia.

H. rawnesleyi COX, P. Z. S. 1873, p. 564, t. 48, f. 2.—PFR. Monographia, vii.

Seems to be close to *H. lessoni*, but the lip is dark colored.

H. BARNEYI COX. Pl. 34, fig. 6.

Shell with deep open umbilicus, orbicularly conoid, obliquely finely concentrically striated, of a brown yellow color, shining, having a broad chestnut band below the suture, and a second narrower band below the subcarinated periphery with an undefined lower margin; spire bluntly convex; whorls 7, convex, the last considerably deflected for about $\frac{6}{10}$ of an inch in front; peristome simple, straight; lip everted, margins approximating, joined by a dark-colored callus; columella irregularly dilated and broadly reflected, half covering the umbilicus; margin of the aperture black within. (Cox.) Alt. 1.15, greater diam. 1.30, lesser 1.10 inch.

Barney Island, near New Guinea, Torres Straits.

H. barneyi COX, P. Z. S. 1873, p. 148, t. 16, f. 2.—PFR. Mon. Hel. Viv., vii.

May be a typical *Hadra* near *H. semicastanea*.

H. MAZEE Brazier. Pl. 47, fig. 84.

Shell with the umbilicus nearly covered, globosely turbinated, rather thick, minutely granulated, obliquely striated, ornamented with spiral chestnut lines and bands, darker and more rugose at the suture; whorls $5\frac{1}{2}$, slightly convex, last large and descending in front; spire conical, apex obtuse; aperture diagonal, ovately lunate; peristome thickened and rather broadly reflected, interior of aperture blue black, margins approximating and joined by a thin cal-

lus, the right deflected above near the center; columellar margin rounded and expanded into a broad plate partly over the umbilicus. (*Brazier.*) Alt. 15, greater diam. 19, lesser $14\frac{1}{2}$ lines.

Waterview Scrubs, near Cardwell, Rockingham Bay, Herbert River, Queensland.

H. mazei BRAZIER, Proc. Linn. Soc. N. S. Wales, iii, p. 79, t. 8, f. 5, 1878.

H. BAYENSIS Brazier. Pl. 47, fig. 83.

Shell with the umbilicus covered, depressedly globose, finely obliquely striated, marked with numerous spiral yellow and reddish chestnut bands and lines; spire conoid, apex obtuse, whorls $6\frac{1}{2}$, convex, last roundly convex, deflected in front, aperture oblique, peristome thickened, reflected, white, interior purplish, margins approximating, the right descending, columellar margin thickened and broadly expanded over the umbilicus. (*Brazier.*)

Alt. 12, greater diam. $19\frac{1}{2}$, lesser 16 lines.

Wide Bay, Queensland.

H. (Hadra) Bayensis BRAZ. Proc. Linn. Soc. N. S. Wales, i, p. 2, 1875.—*H. incei* var., Cox, Mon. Austr. L. Sh., t. 18, f. 1.

This species differs from *Helix Incei*, Pfr. by being a much finer and larger shell, with the umbilicus covered with broad callus, base much broader and darker in colour, and by being only found in the thick Queensland Scrubs, whereas *Helix Incei* is found in every part of Queensland in the open forest country, Dr. Cox figured my new species in his Monograph of Australian Land Shells, plate 18, figure 1, as variety of *Helix Incei*, Pfr. (*Brazier.*)

H. HANNI Brazier.

Shell umbilicated, depressly globose, finely obliquely striated, fulvous, ornamented with two broad chestnut zones, one at the suture and one a little above the periphery; spire depressed, obtuse, whorls 5, convex, the last roundly convex, base convex, and ornamented with numerous chestnut lines, one broad with darker between, and a broad one encircling the umbilicus, aperture oblique, lunately rounded, peristome blackish, reflected, margin approximating, right descending, columellar margin reflected and expanded over the umbilicus. (*Brazier.*)

Alt. $9\frac{1}{2}$, greater diam. $15\frac{1}{2}$, lesser 12 lines.

Bowen, Port Denison, Queensland.

H. Hanni BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 97.

Brazier says: "I have seen only one specimen of this species, and it differs from *H. incei* and *H. yulei* by being more depressed and broader, and in its lesser markings."

H. INCEI Pfeiffer. Pl. 39, figs. 77, 78, 79, 80, 81.

Shell partly covered umbilicate, depressed-globose, light buff with spiral stripes of chestnut, one wider band just under the suture, another slightly narrower a short distance above the periphery, with a variable number of lines upon the base and upper surface. Peristome white, with a brown spot at the root of the columella.

Compact, solid, the umbilicus narrow and overhung by the triangularly expanded basal lip; spire low; whorls $6\frac{1}{2}$, slightly convex, the last descending in front, rather swollen around the umbilicus, which is obliquely excavated behind the baso-columellar lip. Aperture nearly white inside, and showing the bands; lip white, expanded, dilated over the umbilicus, and having a purplish-brown spot at its root and spreading a little upon the base, coloring it around the axis.

Alt. 25, greater diam. 32 mill. (large, thinner form).

Alt. $22\frac{1}{2}$, greater diam. 30 mill. (average specimen).

Alt. 17, greater diam. $23\frac{1}{2}$ mill. (small form).

Queensland in forest country, generally distributed.

H. incei PFR. P. Z. S. 1845, p. 126; Conchyl, Cab. p. 327, t. 58, f. 1-3; Monographia Hel. Viv. i, p. 329.—COX, Monog. Austr. L. Sh. p. 54, t. 5, f. 5.—PHILIPPI, Abbild., ii, p. 83, t. 7, f. 3.—REEVE, Conch. Icon. f. 356.—HEDLEY, Proc. Roy. Soc. Queensl. 1888, p. 59.—*Callicochlias incei* FFLD Verh. zool.-bot. Ges. Wien, 1869, p. 875.

An abundant species, usually smaller than *H. appendiculata* or *lessoni*, light buff with brown bands and lines and a white lip overhanging the umbilicus. Although the columella has a dark spot at its root, there is no distinct brown circum-umbilical patch as in the closely allied *H. yulei*, a species further differing in its constantly brown lip. The variation in size is shown in my illustrations. The base around the umbilicus is clear yellowish, not suffused with brown or closely banded, as it is in *H. appendiculata* and *H. lessoni*.

H. PRÆTERMISSA COX. Pl. 43, fig. 40.

Shell deeply, openly, and rather narrowly umbilicated, globose, solid, closely and finely striated, glossy, uniformly of a pale brownish yellow color, obscurely banded with fine pale chestnut lines; spire obtusely conical; whorls 7, rather convex, the last inflated and de-

flected in front; base rounded; aperture roundly-lunate, pure white within; peristome white, thickened, and slightly reflected, margins approximating, joined by a thin callus, columellar margin shortly dilated at the base, $\frac{1}{2}$ covering the umbilicus. (Cox.)

Alt. 1.08, greater diam. 1.20, lesser 1.13 inch.

Cape Direction, North-east coast of Australia.

H. (Camæna) prætermisii Cox, Mon. Austr. L. Sh., p. 111, t. 20, f. 13.

Closely allied to *H. incei*.

H. MULGRAVENSIS Brazier. *Unfigured.*

Shell umbilicated, turbinate-globose, thin, smooth, very faintly obliquely striated with fine granulations (only seen under the lens), reddish yellow, with numerous spiral chestnut lines and bands; spire conoid, obtuse; whorls 6, convex, last deflected in front, base sculptured the same as the upper surface; umbilicus deep; aperture diagonal, lunate, interior purplish; peristome reflected, tinged with brown, margins approximating and joined by a thin callus, columellar margin dilated and reflected, nearly covering the umbilicus. (Brazier.)

Alt. 1 in., 1 line, greater diam. 2 in. 4 lines, lesser 1 in. 2 lines.

Large S. Palm Island, Northeast Australia.

H. mulgravensis BRAZIER, P. Z. S. 1872, p. 21; Proc. Linn. Soc. N. S. Wales v, p. 458, 1880.—*H. mulgravei* Braz., HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 101.

This species is distinguished by the numerous fine reddish lines encircling the whole of the shell, more numerous on the base, and by the pink and brown peristome. (Braz.)

Brazier changes the name to *mulgravei*, because the locality given in his first description proved incorrect. See Hedley, *l. c.*

H. CURTISIANA Pfeiffer. Pl. 47, figs. 90, 91.

Shell narrowly umbilicated, conoid-semiglobose, solid, striate, chestnut colored. Spire conoid-convex, whitish above, apex somewhat obtuse; suture with a white thread. Whorls 6, slowly increasing, the last large, convex, subangulated above the middle, the base somewhat flattened, descending in front. Aperture nearly diagonal, rounded-lunar; peristome scarcely thickened, narrowly expanded, the columellar margin triangularly dilated above. (Pfr.)

Alt. 17, greater diam. 25, lesser 17 mill.

"Port Curtis, Australia." (Pfr.)

H. curtisiana PFR. P. Z. S. 1863, p. 528; Monogr. Hel. Viv. v, p. 343.—COX, Monogr. Austr. L. Sh. p. 58, t. 20, f. 9, 9a.—*H. bala* BRAZIER Proc. Linn. Soc. N. S. Wales, iii, p. 78, t. 8, f. 4, 1878.—HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 101.

According to Hedley (*l. c.*) the *H. bala* of Brazier is synonymous. The locality given by Pfeiffer is said to be erroneous. The description of *H. bala* is as follows:

H. BALA Brazier. Pl. 47, fig. 94.

Shell umbilicated, conoidly semi-globose, moderately solid, nearly smooth, bright chestnut; spire conoidly-convex, above light-brown; apex obtuse, suture slightly crenulated; whorls 5, slowly increasing, the last large, roundly convex, descending in front; flattish at the base, aperture nearly diagonal, roundly-lunate; peristome moderately thickened and reflected, interior flesh-tinged; margins approximating; columellar margin broadly expanded covering one-half of the umbilicus and joined by a thin callus to the upper margin. (*Brazier.*) Alt. 11, greater diam. 17, lesser $13\frac{1}{2}$ lines.

Castle Hill, near Townsville, Cleveland Bay, Queensland; also Magnetic Island.

H. AUREEDENSIS Brazier. *Unfigured.*

Shell umbilicated, depressedly globose, rather solid, very finely obliquely striated, and, under the lens finely granulated, dark chestnut; suture ornamented with a fine white thread, and also a broad dirty white undefined zone round the umbilicus; spire broadly conoid, obtuse; whorls 6 to $6\frac{1}{2}$, convex, the five upper whorls of a reddish chestnut, the last increasing in size, rounded and deflected in front; base convex; aperture diagonally ovately lunate, brownish white within; peristome straight, ivory-white, slightly thickened and reflected; margins approximating, right margin expanded, columellar margin arcuate and reflexed, concealing nearly half of the umbilicus, which is deep. (*Brazier.*)

Alt. 1, greater diam. $1\frac{1}{2}$, lesser $1\frac{1}{4}$ inch.

Near Port Denison, Australia.

H. aureedensis BRAZIER, P. Z. S. Lond. 1871, p. 640.—HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 102.

Differs from *H. incei* in having a white sutural thread, but is probably to be considered a variety of that species.

Hedley writes, on the authority of Brazier, that the true locality of this species is in the vicinity of Port Denison, not "Aureed Island, Torres Straits" as first reported.

H. JOHNSTONEI Brazier. Pl. 34, fig. 5.

Shell deeply perforated, globosely turbinated, rather thick, finely striated, banded with spiral chestnut bands, one very broad at the suture; whorls $6\frac{1}{2}$, moderately convex, last whorl large and descending in front; aperture ovately lunate, diagonal; peristome white, moderately reflected, margins approximating, columellar thickened and expanded over the perforation. (*Brazier.*)

Alt. 14, greater diam. 20, lesser 16 lines.

Bowen, Port Denison, Queensland, Australia.

H. (Hadra) johnstonei BRAZIER P. Z. S. 1875, p. 32, t. 4, f. 2.

This species somewhat resembles *H. incei* in its markings, but is more conical, and has a thick, white and reflected peristome. (*Brazier.*)

H. CREEDI Cox. Pl. 47, figs. 85, 86.

Shell deeply, openly, but rather narrowly perforated, globosely depressed, finely striated by lines of growth, dull fawn colored, darker towards the apex of the spire, ornamented by two brown bands, one forming a fine dark margin to the suture, the second rather above the periphery; whorls $5\frac{1}{2}$, convex, the last rapidly increasing in size, rather inflated, descending in front, spire slightly raised, margin broad, impressed; aperture oblique, thinly enamelled, shining and whitish within; peristome a little thickened and broadly reflected, margins somewhat approached, joined by a thin shining callus; columellar margin dilated, slightly covering the umbilicus. (*Cox.*) Alt. .70, greater diam. 1.05, lesser .82 inch.

Cadell's Straits, North Coast of Australia.

H. creedi Cox, Monogr. Austr. L. Sh., p. 110, t. 19, f. 2, 2a. 1868.—PFR. Monogr. Hel. Viv. vii, p. 396.

H. WESSELENSIS Cox. Pl. 58, figs. 20, 21, 22.

Shell deeply, openly and rather broadly umbilicated, globosely depressed, white, thin, transparent, shining, very faintly striated by lines of growth, ornamented by two orange-brown bands, one very narrow forming a margin to the suture below, the second narrow above the periphery; whorls 5, flat above, rounded, and rather dilated below, gradually increasing in size till the last $\frac{1}{2}$ turn when

it becomes flattened on the side and narrowed, and towards the peristome sharply reflected and constricted below forming a broad deep channel running into the umbilicus; suture deep, broad; aperture ovately rounded; peristome thin, margins much approached, unconnected by a callus deposit, right margin slightly everted, left and columellar margin broadly reflected, arching over the channel running into the umbilicus, formed by the constriction of the last whorl. (*Cox.*)

Alt. .40, greatest diam. .83, lesser .65 inch.

Wessel Islands, near the north coast of Australia.

H. wesselensis COX, Monog. Austr. L. Sh. p. 110, t. 19, f. 4.—PFR. Monog. vii.

H. SARDILABIATA COX. Pl. 34, figs. 8, 9.

Shell deeply, openly, rather largely umbilicated, orbicularly conoid, thin, smooth, very finely striated throughout, pale fawn-gray; whorls 6, gradually increasing in size, the last sharply deflected in front; aperture oval, margins closely approximating, slightly thickened and reflexed, and of a polished pink carnelian appearance within; columellar margin triangularly dilated, overhanging the umbilicus. (*Cox.*) Alt. .80, greater diam. 1.10, lesser .83 inch.

Mt. Dryander, Port Denison, Queensland.

H. sardilabiata COX, P. Z. S. 1871, p. 54, t. 3, f. 3.—PFR. Monogr. vii.—*H. Stephensoniana* BRAZIER, P. Z. S. 1871, p. 639.—HEDLEY, Proc. Roy. Soc. Queensland, 1889, p. 101.

“This species is of a fine straw-yellow color on the last whorl, the other whorls being nearly white; the lip is of a light pink color.” (*Brazier.*)

H. WHARTONI COX. Pl. 19, figs. 31, 32; pl. 33, figs. 68, 69.

Shell umbilicated, depressed-subglobose, rather thin, yellowish with numerous chestnut spiral lines and bands, a broad one on the border of the umbilicus; bands visible inside the mouth, continuing to the edge of the lip, which is only narrowly expanded on the outer margin, slightly more on the base, and dilated partly over the umbilicus.

More depressed than *H. appendiculata*, the spire low-conoidal; whorls 6, the last broad, depressed, descending in front. Surface showing under a strong lens an excessively fine close wrinkling, in the direction of lines of growth,—visible only on perfectly fresh

or unrubbed specimens. Aperture light inside, showing the bands, which continue to the edge of the lip.

Alt. 24, greater diam. $33\frac{1}{2}$, lesser 28 mill.

Alt. 22 greater diam. 28, lesser 24 mill.

Port Denison, Queensland.

H. whartoni COX, P. Z. S. 1871, p. 55, t. 3, f. 5, 5a.—PFR. Monographia Hel. Viv. vii, p. 393; Conchyl. Cab. p. 544, t. 165, f. 1, 2, 3.

Thinner, more depressed than *H. appendiculata*, the dark bands not coalescent behind the lip, peristome less expanded, and mottled by the terminations of the bands, not white as it is in the species named. It is a thinner, less compact shell than *H. incei*, and the triangular expansion of the columella at the umbilicus is light colored, not marked by a dark spot. *H. yulei* differs in having a dark lip and larger umbilical dark patch.

H. MOURILYANA Brazier. Pl. 34, fig. 11.

Shell narrowly perforated, depressedly globose, thin, finely striated, spirally banded with chestnut bands varying in width; spire raised, whorls 6 to $6\frac{1}{2}$, moderately convex, last descending a little in front; aperture lunate margins rather distant; peristome reflected, purplish-brown; columellar margin thickened and expanded over the perforation. (*Brazier.*)

Alt. 12, greater diam. 18, lesser 14 lines.

Bowen, Port Denison, Queensland.

H. mourilyana BRAZIER, P. Z. S. 1875, p. 31, t. 4, f. 1.—PFR. Mon. vii.

Compare *H. yulei*.

H. YULEI Forbes. Pl. 39, figs. 82, 83.

Shell narrowly, almost covered umbilicate, globose-depressed, light yellowish, spirally striped and lineated with chestnut, the more constant and prominent bands being one just below the suture, another a little above the periphery, and a well-defined and very constant circular patch at the umbilicus. Lip dark brown.

Spire convex-conoidal; sutures superficial, edged by a inconspicuous whitish line. Whorls 6, the last descending in front. Aperture oblique, whitish and showing the dark bands inside; peristome expanded, dark purplish-brown, dilated into a triangular plate

nearly closing the umbilicus; parietal wall with a very thin layer of brownish callus.

Alt. 25, greater diam. 30 mill.

Alt. 23, greater diam. 25½ mill.

Alt. 21, greater diam. 27 mill.

Port Molle and islands off Port Denison, Queensland.

H. yulei FORBES, in Appendix to narrative of the Voyage of H. M. S. Rattlesnake, p. 377, t. 2, f. 6, 1852.—PFR. Monographia Hel. Viv. iii, p. 224; Conchyl. Cab. p. 547, t. 165, f. 8, 9.—REEVE, Conch. Icon. f. 1447.—COX, Monog. Austr. L. Sh. p. 57, t. 5, f. 3.—HEDLEY, Proc. Roy. Soc. Queensl. 1888, p. 62.

Very much like *H. incei* in stature and coloration, but separated from *incei*, *whartoni*, *appendiculata*, *lessoni*, etc., by the dark-edged lip. The umbilicus is more contracted by the overhanging lip than in the species named. The circular umbilical dark tract is also characteristic and constant. The dimensions given show how the form and size vary. The striping is very variable; a form striped differently from the type is figured on pl. 23, figs. 65, 66.

H. CHALLISI COX. Pl. 36, fig. 23.

Shell solid, heavy, umbilicated, depressedly orbicular, closely, finely, striated, of a waxy yellow color, ornamented by six or more rather narrow dark chestnut bands of irregular sizes and distances apart, dark around the umbilicus; spire moderately raised, bluntly convex, whorls 7, convex, very gradually increasing in size, last shortly deflected in front; aperture ovately lunate, margins slightly approximating, joined by a thin callus, interior of aperture showing dark lines of ornamentation; peristome straight, pure white, slightly thickened and reflexed, columellar margin triangularly expanded, half covering the rather narrow umbilicus. (Cox.)

Height 0.90, greatest diam. 1.22, least 0.89 of an inch.

L. Island, near Broadsound, lat. 20° 52', E. Longit. 149° 37'.

H. (Camaena) Challisi COX, P. Z. S. 1873, p. 565, t. 48, f. 3.—PFR. Mon. Hel. Viv. vii.

Compare *H. appendiculata*, *yulei*, *incei*, *whartoni*, etc.

H. NICOMEDE Brazier. Pl. 47, fig. 87.

Shell umbilicated, depressly globose, very thin, shining, distinctly obliquely striated and granulated throughout, light-brown, encircled with one pale yellowish band just showing above the suture; whorls

6, slowly increasing, moderately convex, scarcely descending in front; periphery with faint keel, base convex, smoother than the upper surface, aperture diagonal, roundly lunate; peristome white, simple, straight, margins scarcely approaching, expanded and reflected anteriorly, columellar margin rather broadly reflected on the body-whorl. (*Brazier.*)

Alt. 12, greater diam. $18\frac{1}{2}$, lesser 15 lines.

Cardwell, Rockingham Bay, Queensland, Gould Island, in Rockingham Bay.

H. nicomede BRAZIER, Proc. Linn. Soc. N. S. Wales, iii, p. 79, t. 8, f. 6, 1878.

The following two varieties come from Gould Island, and are much smaller than those from the mainland:

Var. *a.* Thinner, darker in color on the upper surface, granulation finer; light yellowish band following the suture spirally to the apex. Alt. 8, greater diam. 13, lesser $10\frac{1}{2}$ lines.

Var. *b.* Thicker, light straw yellow, upper surface granulated, obliquely rugosely striated, keel more distinctly seen on the periphery; peristome scarcely reflected at the columellar margin. Alt. 7, greater diam. $11\frac{3}{4}$, lesser $9\frac{3}{4}$ lines. (*Brazier.*)

H. beddomæ Brazier. Pl. 47, fig. 82.

Shell umbilicated, globose, inflated, very thin, distinctly obliquely striated, granulated from left to right, taking somewhat of a zig-zag form, smoky yellow, with a chestnut band under the suture having a faint broad one above, giving it a darker color; body-whorl from the periphery dark chestnut; spire somewhat globular, suture smooth; whorls $5\frac{1}{2}$, slightly convex, slowly increasing, the last roundly convex, descending a little in front; aperture nearly diagonal, roundly lunate; peristome below slightly raised somewhat in the form of a small obtuse callus-like tooth, bluish white, very little expanded or reflected; margins rather distant, joined by a thin, bluish-white callus; columellar margin broadly expanded and reflected on the umbilicus. (*Brazier.*)

Alt. 17, greater diam. 23, lesser 18 lines.

20 miles northwest of Cardwell, Rockingham Bay, Queensland, in the ranges at an altitude of 3500 ft.

H. beddomæ BRAZ. Proc. Linn. Soc. N. S. Wales, iii, p. 80, t. 8, f. 7, 1878.

This beautiful shell is very thin; the granulations on its surface are distinctly seen with the naked eye; some run straight, some oblique or zigzag. The sculpture can only be compared to a fine double cross-cut file. The species is allied in color to *H. bipartita* Fér. (*Brazier.*)

H. BEBIAS Brazier. Pl. 47, fig. 88.

Shell umbilicated, depressedly-globose, thin, obliquely finely granulated, fulvous, ornamented with one rather broad chestnut band, on the center contiguous to the suture, above the center two thread like lines; suture dark lined, crenulated; spire sub-conoid, rather obtuse at the apex; whorls $5\frac{1}{2}$, rather convex, the last slightly descending in front, rounded at the periphery, convex at the base; umbilicus small, dark broad chestnut band encircling it; aperture nearly diagonal, lunately circular; peristome bluish brown; margins approximating, columellar margin broadly reflected concealing half of the umbilicus. (*Brazier.*)

Alt. $10\frac{1}{2}$, greater diam. $17\frac{1}{2}$, lesser 13 lines.

Garden Island, Rockingham Bay, Queensland, Australia.

H. bebias BRAZIER, Proc. Linn. Soc. N. S. Wales iii, p. 78, 1878.

H. COOKENSIS Brazier.

Shell umbilicated, turbinately globose, thin, finely obliquely striated (under a lens), rugosely granulated; spirally banded and lined with deep chestnut lines and bands, spire conoid, whorls $5\frac{1}{2}$, moderately convex, the last large and roundly convex, base convex, umbilicus deep and narrow, aperture oblique, ovately lunate, purplish within, peristome slightly reflected; margins approximating, the right partly descending, columellar margin straight and broadly expanded partly over the umbilicus; with thin coating of callus across the body whorl to the upper part of the peristome. (*Brazier.*)

Alt. 19, greater diam. 16, lesser 13 lines.

Cook Town, Endeavor River, northeast coast of Australia.

H. TOMSONI Brazier.

Shell umbilicated, depressedly globose, solid, surface covered with lengthened granulations; distinctly banded with spiral chestnut lines and bands; a broad one at the suture; whorls 5, rather convex, the last roundly convex, base convex, marked same as upper surface; having a dark broad band round the umbilicus; aperture roundly lunate, bluish white within, peristome thickened and re-

flected, margins approximating, the right descending, columellar margin largely reflected over the umbilicus. (*Brazier.*)

Alt. 11, greater diam. 14, lesser 12 lines.

Mount Elliott, Queensland.

H. (Hydra) Tomsoni BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 97, 1875.

* * *

Species allied to Sphærospira from New Guinea.

The following shells differ from *Sphærospira* in much the same way the latter differs from *Badistes*; they are heavier, more solid, with well-reflexed peristome.

H. BROADBENTI Brazier. Pl. 25, fig. 100; pl. 39, figs. 75, 76.

Shell large, umbilicated, subglobose with conoidal spire, heavy and solid, deep chestnut or purplish brown with a yellowish band on the upper and another on the lower surface of the body-whorl; surface smooth, not granulate; lip pure white, reflexed all around, dilated and partly covering the umbilicus.

The shell is strong, with conoidal spire composed of nearly 6 whorls, separated by sutures only slightly impressed. Surface lightly obliquely striatulate; color yellowish, with a broad dark band below the suture, another forming an umbilical patch, and a very broad dark girdle around the middle of the body-whorl. The spire is lighter; the dark bands coalesce on the latter part of the body-whorl. Last whorl somewhat but not much deflexed in front. Aperture oblique, wide, somewhat lunate, dark grayish-purple inside; peristome well reflexed, pure white, dilated at the columella. The back of the reflexed lip is white, the thin yellow epidermis usually being deciduous there. The interior of the umbilicus is white.

Alt. 35, greater diam. 43, lesser 36 mill.

Alt. 32, greater diam. 38, lesser 32 mill.

Port Moresby, Hall Sound, Laloki and Goldie Rivers, New Guinea; Is. Entrecasteaux.

H. broadbenti BRAZIER, Proc. Linn. Soc. N. S. Wales, ii, p. 25.—TAPPARONE-CANEFRI Ann. Mus. Civ. Genova, xix, p. 188, t. 5, f. 21; also *l. c.*, vol. xxiv (Ser. 2, vol. iv) p. 144, 1887.

A large solid species, having two yellowish-brown bands on a dark chestnut ground, lighter spire, the aperture dark inside. These characters, together with the white lip and total absence of

granulation will separate the form from the somewhat similar species of *Sulcobasis* (*H. rehsei* etc.). It should be noted that in the formation of the aperture and lip, *H. broadbenti* is very similar to *H. rehsei*.

H. HIXONI Brazier. Pl. 25, fig. 91.

Shell with a covered umbilicus, globosely depressed, rather solid, obliquely striated, more rugose on the lower whorl, white under a thin yellowish epidermis, mottled with irregular light brown opaque spots and spiral lines and bands; whorls 4, convex, the last descending a little in front, roundly convex, having a narrow line contiguous to the suture, another just above, a broader one above it near the suture and breaking off on the second whorl into irregular spots; spire obtuse, apex tipped with brown; base convex, covered with a thin shining yellowish epidermis, encircled near the center with a narrow brown line running spirally into the interior; aperture oblique, ovately rounded, interior blue black; peristome white, thick, reflected, margins approximating, joined by a thin white callus showing a chestnut brown hue beneath, the right slightly flexuous; columellar margin broadly expanded and reflected, covering the umbilicus. (*Brazier.*)

Alt. 25, greater diam. 40, lesser $31\frac{1}{2}$ mill.

Hall Sound, New Guinea.

H. Hixoni BRAZIER Proc. Linn. Soc. N. S. Wales, ii, p. 120.—TAPPARONE-CANEFRI, Ann. Mus. Civ. Genova, xix, p. 187, t. 5, f. 22.

Differs from the preceding in coloration and the covered umbilicus. The locality is not certain, as the original specimen was obtained from a trader.

H. PURPUROSTOMA Le Guillou. Unfigured.

Shell orbicular, umbilicate, plane above, white, pellucid; whorls $4\frac{1}{2}$, somewhat convex, separated by a deep suture, the last ornamented with a spirally descending rather wide purple-black band, convex beneath, white; umbilicus deep, moderate, effuse and angled at its opening; aperture most oblique, rotund; peristome narrowly reflexed, within and outside rosy, strangulated. Alt. 9, diam. 20 mill. (*Guill.*)

Triton Bay, New Guinea.

H. purpurostoma GUILL., Rev. Zool. 1842, p. 141.—Pfr. Monogr. i, p. 377.—TAPPARONE-CANEFRI, Ann. Mus. Civ. Genova, xix, p. 159.

Not known except by the original description. Pfeiffer and Taparone-Canefri place it in *Camæna*, but it is more likely, if found, to prove a *Hadra*.

Subsection XANTHOMELON Von Martens, 1861.

Xanthomelon MART. in ALBERS, Die Heliceen, 2te Ausgabe p. 174 (as sect. of *Cochlostyla*), type, *H. pomum* Pfr.—VON MARTENS, Malakozoologische Blätter, xvi, p. 77, 1869.—*Galaxias* (in part) COX, Monogr. Austr. L. Sh.

A group of globular shells, especially characteristic of north and northeast Australia. They are connected with the typical manifestations of *Hadra* by such species as *H. biteniata*, etc. The anatomy is similar to that of *Hadra* and *Sphærospira*.

The species are characteristic mainly of central and north Australia, comparatively arid regions in which the *Sphærospira* and *Bardites* sections of *Hadra* are but sparingly or not at all represented.

H. POMUM Pfeiffer. Pl. 38, figs. 73, 74.

Shell nearly covered umbilicate, globose, yellow, often reddish on the spire; not spirally striated; whorls $4\frac{1}{2}$ to 5; lip pure white, narrowly expanded all around, broad and flattened at the columella.

The shell is globular, a little depressed, pure white under the epidermis, which is yellow, a little tinged with olive. Surface shining, having oblique growth-wrinkles, and little indentations or dents in places; on the spire granulated more or less distinctly. Spire low; apex obtuse; suture rather deeply impressed. Whorls convex, the last subglobular, descending in front, a little constricted just behind the lip. Aperture oblique, round-lunate, white within; lip narrowly expanded, a little thickened within, the columella dilated into a broad flat plate which partly or almost wholly conceals the umbilicus; columellar edge bearing a blade-like callus.

Alt. 36, greater diam. 38, lesser 34 mill.

Arnhem Land, North Australia.

H. pomum PFR., Symbolæ ii, p. 37; Conchylien Cab. p. 318, t. 55, f. 11-13; Monogr. i, p. 320.—PHILIPPI, Abbild. i, t. 2, f. 8.—REEVE, Conch. Icon. f. 362.—COX, Mon. Austr. L. Sh. p. 40, t. 4, f. 7.—TATE, Trans. R. S. S. Austr. v, p. 49.—*H. urvillei* Hombr. & Jacq., Voy. Pole Sud, Moll., t. 3, f. 1-3.—*H. pseudomeadei* BRAZIER in Hareus' S. Austr. Hand-book (name only).—And in all probability, *H. sphaeroidea* LE GUILLOU, Revue Zoologique, p. 188, May, 1845.

This species is peculiar to Arnhem Land, though closely allied to *H. pachystyla* which ranges along the whole of the coast of North-east Australia. It was first obtained by MacGillivray at Port Essington, and has since been collected in the Port Darwin district. Prof. Ralph Tate found it widely but sparsely distributed over the country from Palmerston southwards to Pine Creek. It was only in the jungles near the coast that it seemed to be at all plentiful.

H. pomum is umbilicated and has the outer lip expanded, whilst its ally from Queensland, *H. pachystyla*, is imperforate and its outer lip is blunt, slightly thickened within but not expanded. The Queensland shell has also obvious spiral striæ, not shown in the *H. pomum*. The name *pseudomeadii* was proposed for specimens having the columella and parietal wall distinctly granulated. One of the specimens before me is so sculptured.

H. BANNERI Macgillivray. Pl. 38, figs. 57, 58.

Shell umbilicated, turbinately-globose, rather thin, obliquely irregularly striated and very thickly pustulated, reddish-yellow, with a yellowish band near the suture; spire shortly turbinated, apex rather acute; whorls $4\frac{1}{2}$, convex, the last ventricose, deeply descending in front; columellar slightly arched, sinuous; aperture almost diagonal, lunately rounded, somewhat pearly within; peristome thin, shortly expanded, scarcely reflected, margins converging, joined by a thin callus; columellar margin extremely dilated, reflexed in a vaulted manner, adherent, adnate. (*Pfr.*)

Alt. 31, greater diam. 41, lesser 33 mill.

Cape Direction, Queensland.

H. banneri MACGILLIVRAY in Pfr., P. Z. S. 1862, p. 270; Monographia Hel. Viv. v, p. 280; Novit. Conch. p. 213, t. 56, f. 10, 11.—Cox, Mon. Austr. L. Sh. p. 6.

A species not found as yet by Australian writers. Should be compared with *pomum* and *pachystyla*.

H. NIGRILABRIS Martens. Pl. 38, figs. 70, 71.

Shell globular, umbilicated, yellow, with a broad chestnut-brown band above, extending from suture nearly to periphery; surface covered with a dense fine wrinkling, in a direction at right angles to the growth-striæ; aperture white within, the lip expanded; lip, columella and parietal wall finely granulate, and of a deep chestnut color.

The shell is globose; spire conoidal, apex obtuse; suture deep; whorls 5, convex, the last descending, constricted behind the lip; aperture round-lunar, white inside; peristome expanded all around, very dark, granulate in adults; columella dilated, half concealing the umbilicus; its front edge very strongly arcuate, not straightened as in *H. pomum*. Columella and the dark callus on the parietal wall closely granulated.

Alt. 34, greater diam. 34, lesser 30 mill.

Liverpool River, Arnhem Land, N. Australia.

H. Edwardsi COX, Monog. Austr. L. Sh., p. 109, t. 19, f. 3, 1868.—MARTENS, Novit. Conch. iv, p. 45, t. 118, f. 4, 5 (not *H. edwardsi* Bland).—*H. (Xanthomelon) nigrilabris* MARTENS, Mal. Bl. xvi, p. 79, 1869.—CROSSE, Journ. de Conchyl. 1881, p. 20.—*H. Meadei* BRAZIER, Proc. Zool. Soc. Lond., p. 662, 1870.—TATE, Trans. Proc. Rep. Roy. Soc. S. Austr. v, p. 49, 1882.

Separated from *H. pomum* by the fine oblique wrinkling of the surface, the blackish peristome, and the concave columella.

H. ANGASIANA Pfeiffer. Pl. 38, figs. 60, 61, 62.

Shell depressed-globose, deeply umbilicated, solid, with distinct, oblique striæ of growth, and showing under a lens numerous peculiar scratches on the surface of the body-whorl, descending in a direction at right angles to the growth-striæ. Aperture round, much as in *Cyclophorus*; lip reflexed all around.

The shell is globose-depressed with conoidal spire. The specimens before me are bleached, lacking epidermis and color; but according to Angas, living shells have two chestnut bands, one subsutural, the other above the periphery. Apex flattened; sutures well impressed; whorls 5, convex, the last somewhat descending in front, rounded at the periphery. Aperture not much oblique, circular, the lip well expanded all around, terminations approaching, connected by a parietal callus. Umbilicus deep, rather cylindrical, its sides nearly perpendicular.

Alt. 19, greater diam. 22, lesser 19 mill.

Near Lake Torrens, S. Australia; Darling River, N. S. Wales.

H. angasiana PFR. Journ. de Conchyl. x, p. 228, t. 10, f. 2, 1862.—COX, Monogr. Austr. L. Sh. p. 49, t. 6, f. 4.—ANGAS, P. Z. S. 1876, p. 267, t. 20, f. 13, 14.

A shell of anomalous characters. In referring it to *Xanthomelon* I have been guided by a certain resemblance to *H. nigrilabris* in aperture and sculpture.

H. NULLARBORICA Tate. Pl. 40, figs. 96, 97.

Shell narrowly umbilicated, globosely conic, very thick, surface of a dirty white color, coarsely and closely wrinkled transversely, interrupted by equidistant incised lines, whorls $4\frac{1}{2}$, rotund, and just perceptibly flattened at the suture, which is impressed. Last whorl somewhat inflated, descending but little in front, base convex. Aperture oblique, subcircular, peristome sub-acute, slightly reflected, margins joined by a callus; columella margin thickly dilated above and nearly covering the umbilicus.

Animal.—Foot brownish-grey, muzzle black with white spots, tentacles black, collar grey and creamy white.

H. Nullarborica has considerable resemblance to *H. Angasiana*, differing from it, irrespective of coloration, in its more globose form, minute umbilicus, in its wrinkled surface, and longitudinally impressed lines and in the callus covering on the pillar.

The ridges of growth of the shell of *H. Angasiana* are regularly curved, and are interrupted by close set striæ, giving rise to a granulated appearance under the lens; but in *H. Nullarborica* they are wavy and varied in the degree of coarseness, whilst the incised longitudinal lines are distant from 20 to 25 on the body-whorl, and help to give that pitted appearance to the shell which is observable by the unaided eye. The shell is moreover remarkable for its excessively thick test, for its semi-fossilized aspect, and is devoid of an epidermis. It is very constant in form and color, though in size it presents great differences; the dimensions given are those belonging to a specimen of the common size. I may add, to avoid misapprehension on the subject, that I gathered many living examples. (*Tate*.)

Alt. 18, greater diam. 18, lesser 16 mill.

Bunda Plateau, extending to the scrubby sandhills on its east, and to the Roe Plains at the foot of the Hampton Range, in Western Australia.

H. nullarborica TATE, Trans. and Proc. and Rep. Philos. Soc. Adelaide, S. Austr., 1878-9, p. 133, t. 5, f. 1a, 1b.

The specific name is adopted from that of the treeless portion of the Bunda Plateau known as the Nullarbor Plain. (*Tate*.)

H. FORRESTIANA Angas. Pl. 38, figs. 64, 65.

Shell narrowly perforate, globosely trochiform, rather thin, obliquely striated, very finely transversely granulated; from the apex to the middle of the last whorl fulvous chestnut with an indication of a band of a lighter color between the periphery and the suture of the last whorl, below the periphery pale yellowish brown; spire obtusely conical; whorls 5, slightly convex, the last rather inflated, descending in front, a little contracted behind the aperture; aperture very oblique, ovate, purplish brown within; peristome not thickened, widely expanded, the margins approximating, joined by a thin callus; the right margin slightly flexuous, brown; the columellar margin white, dilated and reflexed, nearly concealing the perforation. (*Angas.*)

Alt. 7, greater diam. 10, lesser 7 lines.

Northwest Australia.

H. forrestiana ANGAS, P. Z. S. 1875, p. 389, t. 45, f. 3, 3a.

A species of uncertain position. Differs from most Australian Helices in having the lip thin and broadly expanded.

H. JANNELLEI LeGuillou. Pl. 38, fig. 69.

Shell narrowly and deeply umbilicated, globular, somewhat solid, horny-yellow, rather glossy; the light wrinkled lines of growth dussated with irregular wrinkles, very closely set-together; spire short, obtuse; suture irregularly crenulated; whorls 5, convex, rapidly increasing, last very large, inflated below; aperture nearly diagonal, irregularly roundly lunate; margins slightly approaching, and connected by a thin callus, white lipped, livid within; peristome flesh colored, uniformly curved, expanded outwardly, more so in front, and on the columellar margin, which is dilated above, somewhat callous within and outwardly partially concealing the umbilicus. (*Cox.*)

Alt. 25, greater diam. 26, lesser 21½ mill.

Cape York, etc., northern Australia.

H. Jannellei LEGUILL. Rev. Zool. 1842, p. 137.—PFR., Monog. Hel. Viv. i, p. 322; Novit. Conch. iv, p. 46, t. 118, f. 9, 10.—MARTENS Mal. Bl. xvi, p. 79, 1869.—HEDLEY, Proc. Roy. Soc. Queensl. 1888, p. 59.—*H. pachystyloides* COX, P. Z. S. 1867, p. 725; Monogr. Austr. L. Sh. p. 41, t. 5, f. 4.

Like *H. nigrilabris* in sculpture and umbilicus, but smaller, differently colored, etc.

Brazier is in error in referring *H. semicastanea* to *jannellei* (Proc. Linn. Soc. N. S. W. i, p. 126); this mistake was first made by Cox.

H. PERINFLATA Pfeiffer.

Shell umbilicated, globose, solid, decussated by rough growth striæ and impressed lines descending forward; yellowish-white; spire convex-conoid, apex obtuse; whorls $4\frac{1}{2}$, the last large, ventricose, much inflated beneath, sculptured with obsolete spiral striæ, deflexed in front; aperture oblique, lunar-rounded; peristome narrowly expanded, the columellar margin dilated in a plate over the narrow umbilicus. (*Pfr.*)

Alt. 20, greater diam. $23\frac{1}{2}$, lesser 20 mill.

MacDonnell Ranges, Central Australia.

H. perinflata PFR. P. Z. S. 1863, p. 528; Mon. Hel. Viv. v, p. 320.—ANGAS, P. Z. S. 1863, p. 520.—COX, Mon. Austr. L. Sh. p. 45.—ANGAS, Quart. Journ. of Conch. i, p. 135.—HEDLEY, Proc. Roy. Soc. Queensl. vi, p. 250, 251, plate xiv, (anatomy.)

H. LYNDI Angas. Pl. 38, fig. 72.

Shell imperforate, globosely conical, solid, obliquely plicately striated, the upper whorls minutely granulated, the lower whorls distantly and obscurely concentrically striate, light-chestnut color above, the last whorl brownish olive, with a faint indication of paler bands below the periphery; spire convexly conical, apex obtuse; suture distinct, crenulated; whorls 5, convex, last whorl descending in front, and contracted behind the aperture; aperture oblique, elongately oval, purplish brown within; peristome with the margins approximating, and united by a thin callus, finely and sparingly granulated, the right margin expanded and reflexed, light brown; the columellar margin angulated at the fore-part, broadly and flatly expanded, and slightly excavated at the upper part, white tinged with light brown and furnished with a few irregular granules. (*Angas.*)

Alt. 21, greater diam. 20, lesser 17 lines.

Port Essington, North Australia.

H. Lyndi ANGAS, P. Z. S. 1872, p. 610, t. 42, f. 1.—PFR., Monogr. vii.—TATE, Trans. Proc. Rep. Roy. Soc. S. Austr. v, p. 49, 1882.

This shell differs from *H. pachystyla* in the spire being more raised, the aperture being more produced anteriorly, with the margins approaching, and the outer lip expanded and reflexed. It also differs in the character of the sculpture, and in being of a darker

color, and having the aperture livid brown instead of white. This species has hitherto been obtained only from Port Essington, whilst *H. pachystyla* is widely distributed throughout Queensland. (*Angas.*)

H. PACHYSTYLA Pfeiffer. Pl. 38, fig. 63.

Shell globular, imperforate, yellow with numerous oblique brown streaks crossing the whorls; obsolete spirally striated; whorls $5\frac{1}{2}$; lip pure white, blunt, not at all expanded except on base and at the columella, which is reflexed in a broad flat plate, adnate over the umbilicus.

The shell is globose with conoidal spire; surface obliquely striate, decussated above by subobsolete spiral incised lines. The last whorl is deflexed in front; aperture oblique, its inside and the lip pure white; columella oblique, broad, its inner edge straight or a little convex; it continues in a gracefully curved white callus across the body-wall, joining the posterior termination of the outer lip.

Alt. 40, greater diam. 38, lesser 33 mill.

Alt. 31, greater diam. 29 mill.

Queensland, all along the coast.

H. pachystyla PFR. P. Z. S. 1845, p. 71; Monogr. Hel. Viv. i, p. 19; Küster's Conchyl. Cab., p. 429, t. 150, f. 7.—COX, Mon. Austr. L. Sh., p. 40, t. 6, f. 8.—VON MARTENS Mal. Bl. xvi, 1869, p. 77, with *var. Dämeli*.—SEMPER, Reisen in Archip. Phil., Landmoll. iii, p. 160, t. 17, f. 22 (Anatomy).—HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 121, t. 8 (Anatomy.)

Differs from *H. pomum* as indicated under that species. It is the most abundant and widely distributed *Xanthomelon*. There is much variation in size and in the development of spiral sculpture.

Von Martens describes a small form as *Var. dämeli* as follows: Smaller (diam. maj. 33, alt. 32 mill.); aperture more elongated, columellar margin proportionally long, blade-like, projecting into the aperture, so that the dimensions of the mouth some distance within the lip are as long as broad, while in the normal form it is broader than long. Color darker, more brownish, the darker streaks less conspicuous.

Cape York.

Section III. RHAGADA Albers, 1860.

Rhagada ALB. Die Heliceen, 2d edit., p. 108. Type, *H. reinga* Gray.

This section comprises small, compact, globose-depressed Helices, of solid, chalky texture, characteristic of western and northwestern Australia. The color is white or whitish, unicolorous or having several spiral bands and lines, of which one just above the periphery is the most prominent and constant. The outer lip is more or less expanded and generally thickened; the columella is reflexed more or less, often closing the umbilicus.

Von Martens (in *Die Heliceen*) places *Rhagada* between *Dorcasia* and *Xerophila*; Pfeiffer (*Nomenclator Heliceorum Viventium*) between *Eremina* and *Tachea*. It seems to me more naturally grouped under *Hadra* as a section, the characters of which have a direct relation to the conditions of existence in the arid desert region of West Australia. The anatomy is unknown.

It is somewhat remarkable that two species of the typical form are found in the Malay Archipelago.

The species falls into two groups: (1) Typical *Rhagada*, with rounded periphery, species of Western and Northwestern Australia, and (2) Group of *H. silveri* with the body-whorl keeled, surface strongly obliquely wrinkled, species of South Australia.

Group of H. reinga Gray (typical forms).

H. REINGA Gray. Vol. IV, pl. 36. fig. 39.

Shell covered-perforate, globose-depressed, rather solid, obliquely striatulate; whitish ornamented with one chestnut band and several orange-brown lines; spire subelevated; whorls $5\frac{1}{2}$, a little convex, sensibly widening, the last convex beneath, descending in front; aperture very oblique, narrow, subtriangular-lunar; peristome narrowly expanded, labiate with white within, the columellar margin straightened, obtusely and obsoletely unidentate. (*Pfr.*)

Alt. 10, greater diam. 15, lesser 13 mill.

Australia.

H. Reinga GRAY mss., PFR., Symbolæ iii, p. 73; Conchyl. Cab., t. 73, f. 8, 9; Monographia i, p. 289.—REEVE Conch. Icon., f. 772.—*Rhagada reinga* HUTTON Trans. N. Z. Institute xvi, p. 194.

Formerly supposed to inhabit New Zealand, but now known to be an Australian form.

H. RICHARDSONII Smith. Vol. IV, pl. 36, figs. 35, 36.

Shell perforated (perforation concealed), globosely depressed, rather thin, finely striated by the lines of growth, whitish, the last whorl encircled with ten or twelve palish-brown lines (sometimes in worn

specimens these are diaphanous and colorless) one of them a little above the periphery, being broader, and of a deeper color than the rest; spire moderately raised; whorls $4\frac{1}{2}$ –5, slowly increasing, the last conspicuously descending near the lip; aperture very oblique, rhomboidal-lunate; peristome white, thin, shortly expanded at the umbilical region, spread over the whorl in the form of a thin callosity, concealing the perforation and united to the lip above. (*Smith.*)

Alt. 12, greater diam. 19, lesser 16 mill.

Depuch's Is., West Coast of Australia.

H. Richardsonii E. A. SMITH, Voy. H. M. S. Erebus and Terror, Zool., Moll., p. 2, t. 4, f. 14.

This species is allied to *H. Reinga*; it differs in being of larger and thinner growth, in the number of the whorls, which are not so convex, being nearly one less, and in having the under side of the last whorl, which is proportionately larger, more flattened, especially at the umbilical region which is overspread by a broadish thin callosity, united above to the outer lip. The greater deflection of the last whorl near the mouth is another notable difference, and the peritreme is thinner and more expanded. (*Smith.*)

H. LEPTOGRAMMA Pfeiffer. Vol. IV, pl. 36, fig. 33.

Shell umbilicated, globose, thin, striate, sculptured with close, concentric, impressed lines, fleshy-whitish, ornamented above with three or four narrow reddish bands. Whorls $4\frac{1}{2}$, a little convex, the last one inflated, shortly descending in front. Aperture scarcely oblique, rotund-lunar, concolored within; peristome white, simple, slightly expanded, margins joined by a diffuse very thin callus, the columellar margin much dilated, white, shining, reflexed, half covering the narrow umbilicus. (*Pfr.*)

Alt. 13, greater diam. 17, lesser 14 mill.

Cygnets Bay, North Australia.

H. leptogramma PFR. P. Z. S. 1845, p. 127; Monogr. i, p. 322.—REEVE, Conch. Icon., f. 437.—COX, Monogr. Austr. L. Sh., p. 41, t. 11, f. 4.—E. A. SMITH, Zool. Erebus & Terror, Moll., p. 2, t. 4, f. 18.

H. DRINGI Pfeiffer. Vol. IV, pl. 36, fig. 40.

Shell covered-umbilicate, depressed, thin, fragile, closely plicatulate above, whitish, opaque, encircled by pellucid lines; spire nearly flat; whorls $4\frac{1}{2}$, scarcely at all convex, the last one somewhat compressed laterally, base smooth, inflated. Aperture lunar, con-

colored; peristome expanded, a little thickened within, the columellar margin shortly arcuate, dilated, reflexed, appressed. (*Pfr.*)

Alt. $7\frac{1}{2}$, greater diam. 13, lesser 11 mill.

Torres Straits, northeast Australia.

H. dringi PFR. Symb. iii, p. 73; Monogr. Hel. Viv. i, p. 289.—REEVE, Conch. Icon. f. 769.—COX, Monogr. Austr. L. Sh. p. 64.

Not seen by Cox, nor by the writer. The locality requires confirmation.

H. TESCORUM Benson. Vol. IV, pl. 36, fig. 34.

Shell imperforate, conoid-globose, solid, whitish, irregularly striated; spire conoid, rather obtuse; suture deeply channeled; whorls $5\frac{1}{2}$, a little convex, the last rotund, deflexed in front. Aperture diagonal, round-lunar; peristome thickened, the right margin slightly expanded, basal margin reflexed, columellar margin dilated, appressed. (*Pfr.*)

Alt. 13, greater diam. $19\frac{1}{2}$, lesser 17 mill.

Shark's Bay, western Australia.

H. tescorum BENS. Ann. Mag. N. H. 2d Ser. xi, p. 30.—PFR. Monogr. iv. p. 233.—REEVE, Conch. Icon. f. 1154.

H. ELACHYSTOMA Von Martens. Pl. 11, figs. 41, 42, 43.

Shell imperforate, subdepressed, rather thin, most minutely decussated with light oblique and spiral striæ, somewhat shining, white, with a number of yellowish bands; spire shortly conoid; whorls $5\frac{1}{2}$, slowly increasing, a trifle convex; suture moderate; last whorl rotund, base flattened; a little descending in front. Aperture small, very oblique, lunate-rounded, peristome thin, a little expanded, sublunate with white inside; lower margin straight, columella short, spreading in a subcircular rather thick central callus. (*Mart.*)

Alt. 12, greater diam. 19, lesser 16 mill.; apert. width 8, alt. 8 mill.

Mermaid Strait, Northwest Australia.

H. elachystoma MART. Monatsb. der K. Preuss. Akad. Wissenschaften, Berlin, 1877, p. 273, t. 1, f. 8, 9; Novit. Conch. v, p. 35, t. 144, f. 1-4.

Far more depressed than *H. convicta*, and smaller.

H. CONVICTA Cox. Pl. 14, fig. 65 (typical); pl. 35, figs. 8, 9, 10; pl. 30, figs. 7, 11.

Shell of a compact, depressed-globose form, imperforate, solid, white, with a translucent band at the periphery; surface very delicately striate, nearly smooth.

The spire is low-conoidal, composed of a little over 5 whorls, separated by distinctly impressed sutures; the last whorl is rounded at the periphery or somewhat obtusely angled at its origin and slowly descending in front. The aperture is half-round, white within, rather oblique, peristome thick, blunt, the outer lip a little expanded, columellar lip dilated in a thick pad of callus covering the umbilicus and adherent around it. There is no depression at the place of the umbilicus.

Alt. 15, greater diam. 21, lesser 18 mill.

Alt. 16, greater diam. 23, lesser 18 mill.

Nichol's Bay to Mermaid Strait, northwest Australia.

H. convicta COX P. Z. S. 1870, p. 171, t. 16, f. 6.—VON MARTENS, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1877, p. 272, t. 1, f. 6, 7.—PFR. Mon. Héi. Viv. vii, p. 323.

Larger than the other species, solid, compact, imperforate. Fig. 65 of pl. 14 is from the original one of Cox; this (typical) form is pale yellowish-white with two narrow brown bands, one near the center of the whorls, the other immediately below the suture. Figs. 7, 11 of pl. 30 represent the slightly differing form described by Von Martens, with sharply defined peripheral band of reddish-brown, and a paler yellowish one at the suture; the lip not thick; ground-color a shining white. The specimen described by me and figured on Pl. 35, figs. 8, 9, 10, is thick, heavy, white, with a scarcely noticeable translucent, narrow peripheral band. The lip is very thick, ivory-white.

H. PLECTILIS Benson. Pl. 35, figs. 16, 17, 18.

Shell depressed-globose, nearly covered umbilicate, white, rudely wrinkled above (except the rather prominent obtuse apical whorl which is smooth), radiately striate below; last whorl very deeply deflexed in front; aperture nearly circular, the ends of the lip approaching.

It is a compact little shell, chalky-white, solid, opaque. The surface has coarse, irregular, oblique wrinkles above, in places interrupted, forming low tubercles; this coarser sculpture is covered by a minute granulation, visible only under a lens. The base of the shell has rather coarse, low wrinkles of growth. Whorls $4\frac{1}{2}$, convex, separated by impressed sutures. The earlier $1\frac{1}{2}$ or 2 whorls are smooth. The last whorl is very obtusely subangular at its origin,

and descends abruptly and deeply in front. Aperture very oblique nearly circular, but a little wider than high, white within; peristome expanded all around and arched in every part, dilated on the columellar margin, and reflexed nearly over the umbilicus. Parietal wall with a light callus.

Alt. $10\frac{1}{2}$, greater diam. 14, lesser $11\frac{1}{3}$ mill.; alt. of aperture 8, breadth $9\frac{1}{2}$ mill. (meas. outside perist.)

Shark Bay and Swan River, W. Australia.

H. plectilis BENS., Ann. & Mag. N. H. 2nd ser., xi, p. 29.—PFR. Mon. Hel. Viv. iv, p. 250.—REEVE, Conch. Icon. f. 1162.—*H. paleata* REEVE, Conch. Icon. f. 1399.—*H. (Dorcasia) plectilis* Bens., TRYON, Manual of Conchol., 2nd ser. iii, p. 215, t. 49, f. 18, 17.

The rude wrinkling of this compact little *Helix* is very characteristic. In sculpture this species forms a passage to the South Australian group of *H. silveri*.

The strongly sculptured typical form is figured in Vol. III of the MANUAL, pl. 49, fig. 18; *H. paleata* of Reeve is figured on the same plate, fig. 17.

H. CARCHARIAS Pfeiffer. Unfigured.

Shell covered perforate, conoid-globose, rather solid, seen under a lens to be most minutely granulated, flesh colored; spire conoidal, the apex smooth, rather obtuse; whorls 5, a little convex, the upper ones irregularly tuberculate-plicate, the last one ventricose, above more lightly plicate, beneath radiately striate, whitish, very deeply descending in front. Aperture diagonal, subcircular; peristome simple, thin, narrowly expanded, the margins approximating, columellar margin broadly reflexed in a vaulted manner above the umbilicus. (*Pfr.*) Alt. $10\frac{1}{2}$ –14, greater diam. 17– $19\frac{1}{2}$, lesser $13\frac{1}{2}$ –16 mill.

Shark's Bay, Western Australia.

H. carcharias PFR. P. Z. S. 1863, p. 528; Monographia Hel. Viv. v, p. 322.—COX, Monogr. Austr. L. Sh., p. 45.

Closely allied to *H. plectilis* Bens., but the sculpture is less rude, and the last whorl inflated.

H. TORULUS Férussac.

This species, if really Australian, is probably a *Rhagada*. See this MANUAL vol. iii, p. 215, also COX, Monograph of Australian Land Shells, p. 42.—FERUSSAC, Histoire, pl. 27, figs. 3, 4, and PFEIFFER, Monographia i, p. 238.

* * *

Species from the Malay Archipelago.

H. COLONA Martens. Vol. IV, pl. 36, figs. 37, 38.

Shell narrowly umbilicated, globose-depressed, sculptured above with oblique parallel close folds; whitish, with obsolete translucent bands; whorls $4\frac{1}{2}$, convex, separated by deep sutures, the first $1\frac{1}{2}$ smooth, last whorl rotund, rather smooth beneath, descending in front. Aperture very oblique, truncate-ovate; peristome thick, white, upper margin not expanded, arched, lower a little expanded, columellar margin reflexed, half covering the umbilicus; parietal wall of the aperture with a distinct callus. (*Martens.*)

Alt. 7, greater diam. 11, lesser 9 mill.; aperture alt. $5\frac{1}{2}$, breadth 6 mill.

On Cypresses, Island of Dana, south-west of Timor.

H. colona Martens, Monatsberichte der K. Preuss. Akad. Wissenschaften zu Berlin, 1877, p. 272, t. 1, f. 4, 5; Novit. Conch. v, p. 36, t. 143, f. 20–23.

Differs from *H. plectilis* and *carcharias* its nearest allies, in sculpture. It is a smaller species than *H. solorensis*.

H. SOLORENSIS Martens. Vol. IV, pl. 36, figs. 31, 32.

Shell nearly covered perforate, depressed globose, compact, opaque white with numerous spiral brown bands, of which one at the periphery is broader. Whorls $5-5\frac{1}{2}$, the last descending in front; peristome thick, white, expanded, nearly closing the umbilicus by its dilated columella.

The shell is solid, strong, opaque, compact, ivory-white with brown bands, sometimes light brown on the whole upper surface. The bands cease before reaching the edge of the lip, leaving the back of the expanded peristome white, like its thick, convex face. Aperture oblique, half-oval, rather dark and showing the bands within; baso-columellar lip straight, sloping, widened, spreading in a shining callus pad at the nearly closed umbilicus.

Alt. $11\frac{1}{2}$, greater diam. $16\frac{1}{2}$, lesser 14 mill.

Alt. $14\frac{1}{2}$, greater diam. 21, lesser 17 mill.

Id. of Flores (east coast); and Solor, East Indies.

H. solorensis MARTENS, Mal. Bl. x, 1863, p. 179; Ostas. Conchyl., p. 277, t. 17, f. 3.—WALLACE, P. Z. S. 1865, p. 408.—PFR. Monogr. v, p. 353.

There is also a variety of this shell with numerous grayish bands ; or perhaps the brown bands change to gray when the shell is dead.

Group of H. silveri. (Glyptorhagada).

Shell more or less strongly keeled at the circumference ; surface corrugated by strong oblique folds ; outer lip simple, not reflexed.

H. SILVERI Angas. Vol. IV, pl. 36, fig. 44.

Shell perforated, globose-conic, thin, corrugated by strong, oblique, flexuous folds, cretaceous ; spire conoid, apex obtuse, suture distinct ; whorls 6, a little convex, the last descending in front ; periphery slightly carinated, base convex. Aperture oblique, suboval, margins converging, joined by a thin callus, the outer margin thin, acute, a little expanded, columellar margin expanded above, reflexed, half covering the perforation. (*Angas.*)

Alt. 16, greater diam. 22, lesser 18 mill.

The Eastern Plains, S. Australia.

H. silveri ANGAS, P. Z. S. 1868, p. 257, wood-cuts.

H. KOORINGENSIS Angas. Vol. IV, pl. 36, figs. 45, 46.

Shell umbilicated, somewhat globosely lenticular, rather thin, strongly obliquely flexuously corrugated, the corrugations more or less elevated and irregular, the interstices crossed with short, impressed, interrupted, transverse lines, especially on the basal portion of the last whorl, cretaceous, white ; spire flatly conoidal, apex obtuse, sutures impressed ; whorls 5, slightly convex, the last very strongly flatly carinated, not descending in front, the base tumid around the umbilicus ; aperture oblique, subquadrate ; outer lip simple ; columella arcuate, slightly thickened and partly expanded over the umbilicus. (*Angas.*)

Diam. maj. 1 inch, min. 10, alt. 6 lines.

30 miles northeast of the Burra Mines, South Australia.

This remarkable species is very similar in the character of its sculpture to *H. silveri*, Ang. ; but the corrugations are less regular, the umbilicus is larger, the shell is flattened, and the last whorl very prominently keeled. (*Angas.*)

A. Kooringensis ANGAS, P. Z. S. 1877, p. 33, woodcuts.—Cox, Proc. Linn. Soc. N. S. Wales for 1877, 2d. ser. iv, p. 1062, t. 20, f. 3, 4, 5, (Animal) March, 1888.

H. BORDAENSIS Angas. Vol. IV, pl. 36, figs. 41, 42, 43.

Shell widely and deeply umbilicated, lenticular, moderately thin, very strongly and irregularly obliquely flexuously corrugated, the corrugations becoming larger and more elevated toward the middle of the whorls; cretaceous, white; spire depressed, apex obtuse; sutures very strongly impressed and carinated. Whorls 5, nearly flat, the last depressed and strongly keeled above the periphery, not descending in front, slightly keeled around the umbilicus. Aperture oblique, semilunar; outer lip simple; columella very slightly expanded; margin united by a thin callus. (*Angas.*)

Alt. $6\frac{1}{2}$, greater diam. 16, lesser 14 mill.

Cape Borda, Kangaroo Island, S. Australia.

H. bordaensis ANGAS, P. Z. S. 1880, p. 419, t. 40, f. 3.

This remarkable shell exhibits a somewhat similar sculpture to *H. silveri* Ang., and *H. koorिंगensis* Ang., but it differs from both these species in having the raised corrugations more numerous and elevated, displaying at the sutures and on the keel an elegant frilled appearance. It is also smaller, flatter, has a wider perspective umbilicus, and the corrugated ridges show here and there a tendency to bifurcate. (*Angas.*)

Subgenus CAMÆNA Albers, 1850.

Helices of rather large size, capacious, subglobose or depressed, usually carinated, the surface generally malleated or obliquely wrinkled; lip expanded or reflexed; umbilicus narrow or closed. Embryonic shell (and consequently the egg) comparatively large, but smaller than in *Acavus*.

The characters of this group seem to place it between MACROON (*Helicophanta* + *Stylodonta* + *Panda* + *Acavus*) and HADRA.

Broader knowledge of the Oriental Helices causes me to modify the arrangement set forth on page 89 of this work. I now relegate *Thersites* to *Hadra* as a section having but slight individuality; *Camæna* had better for the present be considered a subgenus, ranking with the other groups so denominated in this work. The determination of its final rank and position awaits a knowledge of the anatomy, still lacking.

It must constantly be borne in mind that the *Camæna* of which I write is a completely different group from the heterogeneous assemblages of species under that name in the works of Pfeiffer and authors generally. The Australian group of Helices, *Hadra*, and the Japanese, *Euhadra*, seem to me to have nothing to do with *Camæna*.

Synopsis of Sections.

Section II. PHANIA Albers.

Shell depressed, imperforate, carinated, convex above and below; generally malleated; unicolored; junction of nucleus with the after-growth not distinct; lip expanded, bright colored; columella widened, adnate over the umbilicus, its edge with a convex blade-like callus.

Section I. CAMAENA Albers.

Shell subglobose, umbilicated or imperforate; coarsely sculptured, generally malleated or finely corrugated; generally banded; nucleus about one-fifth the diameter of the shell, its junction with the after-growth distinct, columella concave, rounded.

Section II. PHANIA Albers, 1860.

Phania ALBERS, Die Heliceen, 2d edition, p. 157. Type *H. lampas*.—VON MARTENS, Landschnecken der Ostasiatischen Expedition, p. 325.—PFEIFFER, Nomenclator Heliceorum Viventium p. 178.

Shell large, solid, imperforate, depressed; keeled at the periphery, convex above and below; generally malleated; unicolored; peristome thickened, expanded, highly colored, dilated over the umbilicus, the columella broadened somewhat by a plate or blade-like lobe of callus extending into the aperture; whorls about $4\frac{1}{2}$.

These characters define a group of shells characteristic of the Island of Halmaheira in the Moluccas, and the smaller islets around it. The several forms are very closely allied, and their variability causes me to surmise that they should be reduced to only three species.

The affinities of the group, so far as they can be known from the shells alone (for the soft parts are still unknown), seem to indicate a position between the Ceylonese group *Acavus* and the section *Camaena* as reconstructed in this book. From both of these, *Phania* differs in not showing the junction of the embryonic nuclear whorls with the post-embryonic growth: a character always to be seen on the shells of *Acavus* and *Camaena*. Notwithstanding the fact that this character is masked, I am wholly inclined to the belief that the embryo of *Phania* undergoes a more prolonged ante-natal development than usual in the Helices, as is the case with *Acavus* and *Cam-*

æna; that the eggs are few and as a consequence comparatively large, the young, when hatched, having a shell of several whorls.

Shell spirally malleated, especially on the base.

H. LAMPAS Müller. Pl. 59, fig. 42.

Shell imperforate, somewhat lens-shaped, rather thin, tawny, delicately striate, malleated, acutely keeled; spire little elevated; whorls 5, nearly flat, the last shortly descending in front, the base more convex, encircled by obsolete raised lines. Aperture transverse, subtriangular, livid or yellowish within; peristome simple, slightly thickened, orange colored, the right margin expanded, basal margin reflexed, appressed, columellar margin dilated. (*Pfr.*)

Alt. 29, greater diam. 74, lesser 64 mill.

Island of Halmaheira, Moluccas.

H. lampas MULLER Hist. Verm. ii, p. 12.—GMELIN, Syst. Nat. xiii, p. 3619.—PFR. Mon. Hel. Viv. i, p. 292.—REEVE, Conch. Icon. f. 205.—*H. (Phania) lampas* Müll., ALBERS, Die Hel. 2d. Edit., p. 157.—MARTENS, Ostas. Conchyl., p. 326.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genova, xx, p. 157, 1884.—*Helix carocolla* CHEMNITZ, (not of Linn).—*Helix carina* WOOD, Index Test. Suppl. p. 23, t. 7, f. 57.—*Corocolla magna* SCHUMACHER, Essai Nouv. Syst., p. 192.—*Corocolla lampas* GRAY and others.—*Discodoma gigas* SWAINS., Malacol., p. 329.

The largest species of *Phania*. It is larger, and more depressed than *H. pyrostoma*. I have not been able to procure examples. Full notes on three specimens taken at Halmaheira, are given by Tapparone Canefri, who was the first to announce the home of the species, which was formerly unknown, although the shell was described in the last century.

H. PYROSTOMA Férussac. Pl. 20, fig. 42.

Shell large, imperforate, depressed, carinated, about equally convex above and below; more or less malleated above and below the carina; whorls $4\frac{1}{2}$ to $4\frac{3}{4}$; color buff or flesh-colored under a thin brown epidermis; lip broadly expanded, reflexed, red, varying toward either orange or vermillion.

The shell is solid, strong, the circumference more or less acutely keeled. The color varies from chestnut to light buff, under a thin epidermis, lost on the spire and the base in front of the aperture.

Whorls a little convex, slowly increasing, the last deeply descending in front, and losing the keel just behind the lip. Aperture very oblique, transversely oblong, white within, or tinged with the color of the lip. Peristome broadly expanded, reflexed, red; the baso-columellar lip adnate to the base of the shell for nearly half the distance from center to circumference. It is broadly dilated and adherent over the umbilical tract; inner edge of the columella projecting into the aperture in a rather broad, convex lobe or blade; parietal wall with a light callus the same color as the lip or lighter. Surface lightly obliquely striated, more or less obviously malleated above and below the peripheral keel.

Alt. 33, greater diam. 56, lesser 46 mill.

Alt. 32, greater diam. 54, lesser 42 mill.

Island of Halmaheira, ('Jilolo' or 'Gilolo') Moluccas.

H. pyrostoma FER., Histoire, t. 15, f. 3, 4.—PFR., Symbolæ iii, p. 73; Monographia Hel. Viv. i, p. 295; Küster's Conchyl. Cab. p. 25, t. 67, f. 4, 5.—REEVE, Conch. Icon. f. 176.—VON MARTENS Preuss. Exped. nach Ostasien, Landschnecken, p. 325.—DOHRN in Conchyl. Cab., p. 598, t. 175, f. 4.—TAPPARONE CANEFRI Annali del Mus. Civ. di Storia Nat. di Genova, xx, p. 160, 1884.—*Carocolia pyrostoma* GRAY.—*Lucerna pyrostoma* H. & A. AD.—*H. (Phania) pyrostoma* ALBERS.—*Phania pyrostoma* MORCH, Journ. de Conchyl. xiii, p. 381.—WALLACE, P. Z. S. 1865, p. 408.

A magnificent species, very variable in size, degree of carination and especially color. The indentations of the surface, like repoussé work, are more constant and prominent on the base. They are not seen on the spire whorls. The keel is marked by a light line. One of the specimens before me is much more obtusely keeled than the figure on plate 20.

Var. *BUCCULENTA* Tapparone Canefri.

Shell large, aperture wider, transversely ovate, peristome of a rich orange color. Alt. 35, greater diam. 66, lesser 51 mill.; width of aperture 46, alt. 31 mill., measured outside of lip and columellar callus.

Var. *EXTINCTA* Tapparone Canefri.

Shell very large for the species, the spire more elevated, peristome porcelain-white.

This variety should be compared with the *H. patricia* of Pfeiffer; it may be the same.

H. PATRICIA Pfeiffer. Pl. 60, fig. 6.

Shell imperforate, subdepressed, solid, carinated, above obliquely striated and irregularly malleated; white (when denuded of epidermis, the color of which is unknown). Spire convex, apex obtuse; suture linear; whorls $4\frac{1}{2}$, regularly increasing, a little convex, the last more convex above, deflexed in front; less convex below the prominent, acute keel, sculptured with spiral liræ and radiating folds. Aperture diagonal, rounded-rhomboidal; peristome white, shining, expanded and shortly reflexed, the margins joined by a white callus, columellar margin entering, sloping, widened and flattened. (*Pfr.*) Alt. 35, greater diam. 63, lesser 55 mill.

Habitat unknown.

H. patricia PFR. P. Z. S. 1859, p. 23, t. 44, f. 4; Novit. Conch. p. 155, t. 41, f. 4; Monographia v, p. 310.

H. SULCOCINCTA Martens. Pl. 59, figs. 39, 40, 41.

Shell imperforate, subdepressed, rather solid, striatulate, having reticulating wrinkles and malleations, encircled with a rather acute keel at the circumference and several quite obtuse, not conspicuous, encircling carinæ on the base; purple-brown; spire shortly conoid, obtuse; whorls $4\frac{1}{2}$ scarcely convex, the last a little more convex below than above, shortly descending in front; aperture very oblique, oblong-rounded, shining bluish inside; peristome narrowly expanded, thin, orange-yellow; margins disjoined; columellar margin very oblique, dilated, thickened, forming a distinct angle where it joins the basal margin, and spreading in a callus over the umbilical tract. (*Mart.*)

Alt. 32, greater diam. 59, lesser 46 mill.; alt. of aperture 22, width 22 mill.

Island of Batjan, near Halmaheira, Moluccas.

Cochlostyla sulcocincta MART. Monatsber. Berl. Akad. April 1864, p. 270.—*Helix (Phania) sulcocincta* MARTENS, Preuss. Exped. nach Ostas., Zool., Landschnecken, p. 327, t. 18, f. 1.

Allied to *H. pyrostoma*; but the lip is narrower and differently colored, and the last whorl descends less at the suture. Described from a single specimen. I am inclined to believe it a variety of the *H. pyrostoma*.

Shell not malleated.

H. XANTHOSTOMA Herklots. Pl. 26, figs. 4, 5, 6.

Shell imperforate, subdepressed, obtusely angulated, rather solid, closely, lightly plicatulate-striatulate, a little shining, olive-brown, with scattered spots of buff; spire short, obtusely conoidal; whorls not over $4\frac{1}{2}$, slightly convex, the last deflexed in front, the angle there vanishing; aperture very oblique, quadrangular-lunate; peristome thickened, narrowly reflexed, pale orange colored; columellar margin callously thickened, reflexed in a dilated plate over the umbilicus. (*Mart.*)

Alt. 24, greater diam. 50, lesser 36 mill.; Aperture, alt. 24, breadth 26 mill.

Island of Batjan ('Bachan' or 'Batchian') near Halmaheira, Moluccas.

Phania pyrostoma var. with yellowish lips, WALLACE, P. Z. S. 1865, p. 408.—*Helix (Phania) xanthostoma* (Herklots in Mus. Ludg. Bat.) MARTENS, Landschnecken der Ostasiatischen Expedition, 1877, p. 327; and in Novit. Conch. v, p. 179, t. 151, f. 4-6.—PFR. Mon. Hel. Viv. v, p. 499.

Apparently a well-marked species, differing from *H. pyrostoma* and *H. sulcocincta* in lacking the strong malleation so conspicuous in those forms.

Section I. CAMÆNA (Albers) Pilsbry.

Camæna ABL. Die Heliceen, p. 85, 1850; 2d edit. p. 165, 1860, type *H. cicatricosa*.—*Eucochlias* THEOBALD in NEVILL, Handlist Moll. Ind. Mus. pt. 1, p. 81, 1878 (in part.)

Shell rather large, depressed globose or conoidal, dextral or sinistral, solid, yellow or brown usually encircled by numerous chestnut bands, of which one on the lower edge of the periphery is most constant. *Surface closely malleated or wrinkled all over*; whorls about $5-5\frac{1}{2}$, the upper ones flattened, the last subglobose or carinated, scarcely descending in front; peristome expanded or reflexed, its ends not converging, columellar margin dilated over or partly over the rather narrow umbilicus. *The nucleus is rather large*, (about $\frac{1}{2}$ the diameter of the shell), consisting of 2 to $2\frac{1}{2}$ whorls, its junction with the after-growth marked by a (generally) distinct line. The young shells are acutely carinated. The columella is rounded.

As constituted here, *Camæna* consists of species selected from the groups *Hadra*, *Phania*, *Cochlostyla* etc. of previous authors; on the

other hand it differs from the *Camæna* of authors in the elimination of the species of *Euhadra* etc. My group is therefore essentially a new one, not *equal* in any sense to the *Camæna* of previous authors.

These shells range from China to the Philippines and northeastern Borneo. They fall into two groups of species: (1) *group of H. cicatricosa*, embracing species of China and Farther India, and (2) *group of H. monochroa*, including the species of the Philippine Islands and northeast Borneo.

Group of H. cicatricosa Müll.

H. CICATRICOSA Müller. Pl. 21, figs. 45, 46, 47.

Shell sinistral, umbilicated, subcarinated, depressed-globose, yellow with numerous chestnut bands and lines.

The shell is globosely depressed, with a rather high dome-shaped spire; the periphery is a little carinated in front of the mouth, but becomes rounded. It is solid and strong, of a straw-yellow color, with very numerous encircling chestnut lines and bands, the widest immediately below the periphery. The surface is covered with a dense, close wrinkling or malleation, the wrinkles irregular, obliquely descending on the upper surface, concentric on the base. The spire has low, inconspicuous radiating folds below the sutures. Whorls $5\frac{3}{4}$, those of the spire nearly flat, the last convex; not descending in front. Aperture lunate, pinkish-white inside; peristome white, reflexed, dilated half over the umbilicus.

Alt. 32; greater diam. 48, lesser 41 mill.

Alt. 26, greater diam. 40, lesser 33 mill.

Central China.

H. cicatricosa MULLER, Hist. Verm., p. 42, 1774 (a specimen without peristome).—PFR. Monogr. i, p. 330.—VON MARTENS, Ostasiatische Landschnecken, p. 47.—MLDFF. Jahrb. d. Mal. Ges. 1884, p. 373, and of authors generally.—*H. cornu venatorium* β , GMEL. Syst. Nat. xiii, p. 3641.—*H. contraria* HUMPHREY, Mus. Calonnianum, p. 60.—*H. senegallensis contraria arborea* CHEMN. Conch. Cab. ix, p. 85, f. 917, 918.—*H. senegalensis* Chemn., FERUS. Hist., t. 78, f. 1. 2; and of Lam. edit. 2.—*H. chinensis* VOIGT, Cuvier's Thierreich, transl. iii, p. 61.—*Ariophanta cicatricosa* Müll., Beck, Index, p. 5.—*H. cicatricosa* var. *ducalis* ANCEY, Bull. Soc. Mal. France, 1885, p. 129.—*H. cicatricosa* var. *inflata* MLDFF., Jahrb. d. Mal. Ges. 1885, p. 393, t. 11, f. 20.

An abundant and well-known shell. Its geographical range comprises a considerable portion of central China. Möllendorff says: This species seems to range over the entire province of Guang-dung. I have found it besides in Canton, and the hilly district around it especially in gardens. Missionary Fuchs has traced it from around Liendschou to Canton, but not on the other side of the water-shed in Hunan. On the coast it is lacking at Swatow, has not been observed at Amoy or Fudschou, and according to Heude is not found in the Yangtze Valley. It seems to be absent at Hongkong and the other coast islands, as well as upon the adjacent mainland; those found in the gardens and parks of Hongkong having doubtless been imported from Canton with plants. The same is true at Macau, where I have seen it in Camoens' garden. At both places only small (dwarfed?) specimens occur.

Var. *INFLATA* Möllendorff. Pl. 25, fig. 101.

Differs from the type in the much more globose shell, the peripheral angle obsolete; last whorl much inflated, gibbous, umbilicus nearly closed. Alt. 32, greater diam. 46, lesser 37 mill. (*Mldff.*)

Tshien-ti-shan, province of Gui-dshou, China.

Var. *DUCALIS* Ancey.

Larger than the type; collumellar lip much more dilated, broadly triangular, more reflexed, everted over the umbilicus, nearly closing it. Shell more strongly malleated above. Diam. maj. 74, min. 67 mill. (*Ancey.*)

Kouy-yang-fou, province of Kouy-tcheou.

H. SERAPHINICA Heude. Pl. 69, figs. 6, 7.

Shell large, sinistral, solid, narrowly umbilicated, excavated around the umbilicus; epidermis brown, encircled by a broad black band above and below the carina, and another narrower one at the suture; suture excavated; spire subturbinata, whorls 7, keeled at the suture, the last rapidly increasing, with a thread-like keel at the periphery. Aperture elliptical deflexed, nearly horizontal; peristome subsimple, a little reflexed, umbilicus penetrating.

Alt. 30, greater diam. 55, lesser 48 mill. (*Heude.*)

Si-lin (Kouang-si), China.

H. seraphinica H., Journ. de Conchyl. 1889; Notes sur les Moll. Terr. de la Vallée du Fleuve Bleu, p. 141, t. 38, f. 11 (1890.)

H. HAHNI Mabile. Pl. 24, figs. 76, 77 ; pl. 65, fig. 88.

Shell sinistral, narrowly umbilicate, depressed, solid, opaque, rich chestnut brown ; surface scarcely shining, covered with a dense granulation, very minute and nearly obsolete on the whorls of spire, coarser on the last whorl, quite coarse beneath ; spire whorls with low, irregular radiating folds, broken into low tubercles at the periphery of penultimate whorl ; growth-lines coarse and irregular on the last whorl ; whorls 5, the upper ones subplanulate, sutures not impressed, the last whorl convex above, the suture becoming impressed ; periphery carinated, base convex, whorl not deflexed at aperture ; aperture oblique, lunar, livid inside ; peristome thick, expanded all around, purplish flesh-colored, terminations not converging, columellar margin considerably dilated, half concealing the umbilicus ; parietal wall with a very thin, flesh-colored callous.

Alt. 20, diam. maj. 45, min. 40 mill.

Alt. 28, diam. maj. 45, min. 39 mill. Width of umbilicus $3\frac{1}{2}$ mill. (specimen.)

Tonquin.

H. hahni MABILLE, Moll. Tonk. diagn., p. 3 (May, 1887) ; Bull. Soc. Mal. France, 1887, p. 82, t. 4, f. 9, 10.—*Camæna Hahni* ANCEY, Le Naturaliste (Paris) 1888, p. 71.—*Ariophanta Broti* D'HAM. & DAUTZ., Journ. de Conchyl. 1887, p. 214, t. 8, f. 1.

Differs from *H. cicatricosa* in being more depressed, more carinated, with deeper color and different sculpture. I am indebted to L'ABBE A. VATHELET for the specimen described above. The first given measurements are from Mabile's description.

A figure of the synonymous *A. Broti* is given on pl. 65, fig. 88.

H. SUBGIBBERA Möllendorff. Pl. 25, figs. 89, 90.

Shell dextral, umbilicated, subdepressed-globose, solid, sculptured with transverse close, rough striæ and wrinkles, which are obliquely descending on the upper surface, concentric on the base. Color pale brown, painted with numerous brown bands, a wider blackish-chestnut one at periphery. Whorls $5\frac{1}{2}$, the upper subplane, the following convex, the last subacutely angled at the periphery, base much inflated, almost gibbous, compressed and somewhat angled around the umbilicus. Aperture diagonal, lunate-rounded, peristome narrowly expanded, a little reflexed, margins joined by a thin callus ;

columellar margin thickened, dilated, partly covering the umbilicus. (*Mlldff.*) Alt. 36, greater diam. 48, lesser 40 mill.

Province of Guang-dung, China.

Helix (Hadra) subgibbera v. MOLLDF, Jahrb. D. M. Ges. 1885, p. 394, t. 11, f. 21.

The open umbilicus, coloration and marking show this to be closely allied to *H. cicatricosa*; and it might be considered a dextral variety of that shell were it not for the more convex whorls, stronger peripheral keel, finer sculpture, and the inflation of the last volution. The above description is from Möllendorff. Two specimens were collected by Dr. Gerlach, a few days travel inland from Hongkong.

H. LEONHARDTI Möllendorff. Unfigured.

Shell broadly umbilicated, globose-depressed, a little solid, transversely striatulate and minutely granulose, a little shining, pale brown, ornamented with numerous brown bands, one at the periphery wider; whorls $5\frac{1}{2}$, the upper subplane, following a little convex, the last rather acutely angulated at the periphery, base more convex, obtusely angulated around the profound, funnel-shaped umbilicus; not descending in front. Aperture oblique, lunate-rounded, peristome expanded, a little reflexed, labiate with white, margins joined by a very thin callus, columellar margin dilated, partially concealing the umbilicus. Alt. 26, greater diam. 44, lesser 38 mill. (*Mlldff.*)

Nien-hang-li, eastern part of the province Guang-dung, China.

Hadra Leonhardti MLLDF. N. D. M. Ges. 1888, p. 42.

A species similar to *H. subgibbera* Mlldff., but easily distinguished by being more depressed, the umbilicus wider, lacking wrinkles of the surface; by the luster, granulation, less inflated, scarcely gibbous, more angulated last whorl.

H. ILLUSTRIS Pfeiffer. Pl. 13, figs. 57, 58.

Shell with the umbilicus covered or having a minute chink behind the lip; solid and strong, opaque, yellow or reddish-brown, often with a dark line or narrow band at the periphery, which is more or less keeled. Surface slightly shining, covered with a close malleated sculpture of irregular wrinkles, which above are coarse and obliquely descending, but are finer beneath and concentric. The spire is dome-shaped, obtuse; suture superficial on the upper whorls becoming impressed around the last one. Whorls $5\frac{1}{2}$, the inner $2\frac{1}{2}$

forming the nucleus, the junction of which with the after-growth is distinctly marked by a line; the next whorl is nearly flat; the last whorl is convex above, bluntly carinated at the periphery, convex below, and generally descends a trifle (1 to 2 mill.) in front. Aperture oblique, lunate, livid-bluish inside; entire peristome expanded, reflexed, the basal margin straightened, (appearing curved forward in the middle, seen from beneath), the columellar margin a very short curve at right angles to the basal lip, very broadly expanded over the narrowly perforated axis, entirely or nearly closing the umbilicus.

Alt. 36, greater diam. 56, lesser 46 mill.

Cambodia.

H. illustris PFR. P. Z. S. 1862, p. 269, t. 36, f. 8; Monogr. Hel. Viv. v, p. 275; Novit. Conch. ii, p. 208, t. 55, f. 1-3.—MARTENS Ostas. Landschn. p. 328.—DOHRN Küster's Conchyl. Cab. p. 581, t. 171, f. 4, 5.

A large, solid species, either reddish-brown or yellow in color and often encircled at the periphery by a brown zone. On one specimen before me this is replaced by a cream-colored line. The species is about mid-way between *H. cicatricosa* and *H. ochthoplax* in character of contour and sculpture, and is about equally allied to each of them. Dohrn is undoubtedly right in referring it to *Camæna* instead of *Phania*. I had arrived at the same conclusion before seeing his note in the Conchylien Cabinet.

H. OCHTHOPLAX Benson. Pl. 61, figs. 23, 24.

Shell deeply, half-covered umbilicate, depressed, convex above, more convex beneath, thick lens-shaped, rather obtusely carinated at the periphery, rather thin, opaque, with a thin yellow epidermis. Surface obscurely malleated all over, the sculpture consisting of low, rather indistinct and irregular revolving wrinkles. Spire low, convex, apex plane, suture superficial. Whorls barely 5, nearly flat, regularly increasing, the earlier $2\frac{1}{2}$ forming the nucleus, which is rather large, (about 12 mill. diam.) and which is separated from the after-growth by a distinct arcuate line. The last whorl is depressed, carinated at the circumference, and does not descend in front. The aperture is oblique, lunate, livid flesh-color inside; peristome thin, expanded, the basal margin seen to be arched a little forward when viewed from beneath; columellar margin short,

broadly dilated, half covering the umbilicus. Umbilicus deep, rather narrow.

Alt. 29, greater diam. 55, lesser 46 mill. (*Specimen.*)

Alt. 26, greater diam. 54, lesser 46 mill. (*Bens.*)

Khasi Hills; Pegu.

H. ochthoplax BENS. Ann. Mag. N. H. 1860, vi, p. 190.—PFR. Monogr. v, p. 400.—*H. ochthoplax* Bens., THEOBALD & HANLEY, Conchol. Ind. t. 26, f. 5.—*Helix (Eucochlias) ochthoplax* Bens., NEVILL, Handlist Moll. Ind. Mus. pt. 1, p. 81, 1878.—*Nanina (Oxytes) ochthoplax* Bens., PFR. Nomencl. Hel. Viv. p. 54, 1881.—TRYON, Manual of Conchol. 2d series, ii, p. 129.

This form is like *illustris* in general characters, but is more depressed and umbilicated. The sculpture is less distinct than in the other species, and the lip is expanded but not reflexed. The figures on plate 61 are drawn from a specimen received from Nevill. The figure in Conchologia Indica has been copied by Tryon in volume II of this work, under the section *Oxytes* of *Nanina*, where of course, it does not belong.

H. ochthoplax is the type of the subgenus *Eucochlias* of Theobald, placed by Nevill between *Stylodon* and *Hadra*, and containing besides the type, *H. bougainvillei*, *illustris*, *sulcocincta* and *pyrostoma*. The second of these is correctly associated with *ochthoplax*; but *bougainvillei* belongs to *Hadra*, near such species as *H. semicas-tanea*; *sulcocincta* and *pyrostoma* belong to the section *Phania*. As *H. ochthoplax* is a genuine *Camæna* of the *ciatricosa* type, *Eucochlias* must be regarded as an absolute synonym of *Camæna*.

Blanford says of the animal: A true *Helix*, nearly black, with pale tawny markings, surface granulate; jaw grooved.

H. SATURNIA Gould. Pl. 60, fig. 5.

Shell umbilicated, thick-lens-shaped, rather thin, obliquely striated and very minutely granulated, tawny; spire conoid-convex, obtuse; suture submargined; whorls $4\frac{1}{2}$, nearly plane, regularly increasing, the last somewhat swollen toward the suture, not descending in front; periphery rather acutely keeled, base inflated, obsolete spirally sulcated. Umbilicus moderate sized, open. Aperture little oblique, rhombic-lunar; peristome expanded and reflexed, the terminations joined by a thin callus; columellar margin nearly vertical, reflexed in a vaulted manner. (*Pfr.*)

Alt. 24, greater diam. 53, lesser 45 mill.

Tavoy, Burmah.

H. saturnia GLD. Proc. Bost. Soc. N. H. ii, p. 98, 1845.—PFR. Monogr. Hel. Viv. iii, p. 250; iv, p. 299.—HANLEY & THEOBALD, Conch. Indica, t. 25, f. 3.—*H. (Phania) saturnia* Gld., PFEIFFER, Nomencl. Hel. Viv., p. 178.

This species is more nearly allied to *H. ochthoplax* Bens. than to any other described form. It differs in the longer, nearly vertical columella and other characters.

H. saturnia has been placed by Albers and Pfeiffer in *Phania*; I am confident, however, that it is a true *Camæna* (as that subgenus is herein rehabilitated), and that when specimens are examined they will show the large, distinctly marked nucleus (about one-fifth the diameter of the shell, and composed of about $2\frac{1}{2}$ whorls) characteristic of that subgenus. I have not seen specimens.

H. HAINANENSIS Adams. Pl. 21, figs. 53, 54.

Shell dextral, elevated, globose, rimate, or almost closed perforate, generally as high as wide or nearly so. Color greenish-yellow, with numerous spiral bands and lines.

The shell is globose, elevated and dome-shaped above, rather flattened on the base. It is strong and solid, greenish-yellow with numerous narrow bands and lines of dark-chestnut, and a narrow blackish-brown girdle at the periphery; the bands more numerous above than below the periphery. The surface is shining, and all over is closely finely corrugated by obliquely descending wrinkles, becoming concentric on the base. Whorls $5\frac{1}{2}$; apex obtuse; earlier whorls flattened, with superficial linear suture; last whorl convex just below the suture, rounded at periphery, not descending in front. Aperture oblique, small, livid within; peristome expanded, the basal margin narrowly reflexed, the columellar margin suddenly expanding into a reflexed triangular callus covering the umbilicus except a narrow chink behind the lip. Margins of lip remote, connected by a thin translucent sinuous callus.

Alt. 40, greater diam. 41, lesser 36 mill.

Alt. 34, greater diam. 39, lesser 34 mill.

Alt. 41, greater diam. 46, lesser 38 mill.

Island of Hainan, Southern China.

H. hainanensis H. AD. P. Z. S. 1870, p. 8, t. 1, f. 15.—MARTENS in Novit. Conch. iv. p. 9, t. 111, f. 5-7.—PFR. Monographia, viii, p. 366.—MLLDDF. in Jahrb. D. Mal. Gesell. 1884, p. 374, t. 7, f. 3.

A handsome shell, allied to *H. xanthoderma* but more elevated, and with the umbilical perforation not completely covered by the reflexed columellar lip. The measurement last given above is from Möllendorff. The others are from shells before me. This shell has a certain resemblance to the Australian helices included in the section *Sphærospira*. It may be separated at once from them by its surface-sculpture and large nucleus.

H. GABRIELLÆ Dautzenberg & d'Hamonville. Pl. 42, figs. 26, 27.

Shell narrowly but profoundly umbilicated. Spire slightly elevated. Whorls 6, a little convex, sculptured by arcuate striæ and very irregular wrinkles. Last whorl scarcely descending in front, the base convex, subangulated at the periphery. Aperture lunate-subquadrate. Columella oblique, reflexed at the perforation; lip reflexed, margins joined by a very thin shining callus. Color grayish-buff, with a rufous line at the periphery. Peristome white. (*Dautz. & Hamon.*) Alt. 24, greater diam. 32, lesser 28 mill.

Road of Bac-Ninh, at Lang-Son, Tonquin.

H. gabriellæ DAUTZ. & HAMONV. Journ. de Conchyl. 1887, p. 216, t. 8, f. 2.—*Hadra Gabriellæ* ANCEY, Le Naturaliste, 1888, p. 71, fig. 1.—*H. bathmophora* MABILLE, Bull. Soc. Mal. Fr. 1887.—*H. bathmophora* (typog. err.) in this volume, *antea* p. 120.

According to Ancey (*l. c.*) the *H. bathmophora* of Mabilie is a synonym. I cannot tell whether that species belongs where I have placed it or here in *Camæna*, without knowing whether its nucleus is large or minute. If *bathmophora* really prove a synonym of *gabriellæ* (which I have no reason to doubt), it is likely that *H. jaculata* of Mabilie will also be found to belong to *Camæna*.

It is more depressed than *H. hainanensis*, smaller, with slenderer spire and different coloration. The following variety seems to me to stand intermediate between *hainanensis* and *gabriellæ*. The species *xanthoderma*, *hainanensis*, *gabriellæ* and their varieties will probably be found to constitute a continuous series of modifications, when full collections are made.

Var. *SUBHAINANENSIS* Pilsbry. Pl. 42, fig. 28.

Shell smaller, less elevated than *hainanensis*, with more conoidal, more acute but less elevated spire; whorls $5\frac{1}{2}$, rapidly widening, sculptured as in *hainanensis*; color a light straw tint, encircling by a chestnut zone at periphery, visible above the suture on the penultimate whorl, the specimen before me having three brown lines above

the zone. Umbilicus like that of *hainanensis* not wholly covered by the reflexed columellar lip. Alt. 29, diam. 35 mill.

Habitat unknown.

H. XANTHODERMA Möllendorff. Pl. 26, figs. 1, 2.

Shell dextral, *imperforate*, depressed-globose, broad, yellow or greenish-yellow, with a narrow, blackish-brown band at the periphery, and another encircling the axis, partly concealed by the callus of the columella.

The shell is depressed with conoidal spire; strong and solid, slightly shining, closely, finely corrugated all over by oblique wrinkles. The apex is blunt, nuclear whorl light corneous in color, with arcuate radiating striæ seen only under a lens. Whorls $5\frac{1}{2}$, a trifle convex, slowly widening, the suture at first linear and superficial, becoming impressed; last whorl convex, descending only a trifle (about one millim.) anteriorly. Aperture oblique, bluish-white inside and showing the band, which is continued to the edge of the lip; peristome expanded, suddenly dilated near the columellar insertion, reflexed and completely adnate over the umbilical tract, which is covered by a shining callus; parietal wall covered by a translucent wash of callus.

Alt. 40, greater diam. 49 mill.

Alt. 43, greater diam. 50, lesser 43 mill.

Alt. 40, greater diam. 44, lesser 37 mill.

Ma-an-shan Mts., province of Guang-dung; smaller form on the island of Hongkong, China.

Helix? (an *Cochlostyla?*) *xanthoderma* O. VON MOLLENDORFF, Jahrb. D. M. Gesell. ix, p. 185, 1882; loc. cit. 1884, p. 375, t. 7, f. 1, 2; and *var. polyzona* MLLDFF. loc. cit., p. 378, t. 8, f. 1, 2.

A handsome shell, less elevated than *H. hainanensis*, larger and wholly imperforate.

The following variations are noted by Möllendorff. I translate his words:

1. Specimens from Lofoushan; form as in typical *xanthoderma*, but with many bands.

2. Specimens from Da-peng-tsheng; also banded, but higher, not attaining the altitude of *H. hainanensis*.

3. Var. POLYZONA Möllendorff. Pl. 26, fig. 3.

Always multifasciate with brown; shell elevated-globose, like *H. hainanensis* in contour, and proportionally more elevated; umbilicus wholly covered.

Alt. 43, diam. 46 mill.; alt. 45, diam. 48 mill.

Hongkong, China.

All three agree with *xanthoderma* in the fine, regular wrinkling, the strongly raised last whorl, and the *total lack of umbilical fissure*. I believe, therefore, that a combination of all these forms with *hainanensis* is not necessary, but that the banded form from the mainland and from Hongkong may be referred to *H. xanthoderma*, and *H. hainanensis* be left as a distinct species. (*Mlldff.*)

Group of H. monochroa Sowb.

The following Philippine Island species have been variously classed by authors. The large nucleus and malleated sculpture show them to belong to *Camæna* (as I have restricted that section) rather than to *Hadra*. It may be noted that while many Philippine Island helices belong to groups distributed to the south and southwest of the Archipelago, the *Camæna* are evidently of northern derivation, being more allied to the species of China.

H. TRAILLI Pfeiffer. Pl. 23, figs. 63, 64.

Shell large, globose-conoid (or turbate), elevated, narrowly nearly closed umbilicated; solid, strong, opaque, russet-brown above, becoming reddish-chestnut on the body-whorl, encircled by an ill-defined dark band midway between periphery and suture, the periphery marked by a narrow darker band, bordered below by a wider porcelain-white zone; this is followed by a wide dark brown zone, below which there is a large white umbilical tract. *Surface closely and very strongly ribbed-striate above*, less distinctly so beneath; and slight traces of malleation are visible. The spire is elevated, conical; apex whitish, a little blunt; nucleus large, consisting of $2\frac{1}{2}$ whorls, the last part darker than the beginning of the following whorl; suture impressed. Whorls 5, convex, the last large, descending gradually in front, rounded at the periphery. Aperture oblong-truncate, oblique, white but showing the bands inside; peristome rather broadly expanded all around, dark brown, variegated

by the terminating white bands; baso-columellar margin reflexed, expanded over and almost covering the umbilicus.

Alt. 43, diam. 46 mill.

Alt. 46, diam. 50 mill.

Alt. 38, diam. 55 mill.

Island of Palawan, Philippines; N. E. Borneo, on Palawan Passage.

H. trailli PFR. P. Z. S. 1855, p. 107, t. 32, f. 4; Mon. Hel. Viv. iv, p. 256.—DOHRN, Conchyl. Cab. p. 576, t. 170, f. 1, 3.—ISSEL, Moll. Borneensi, in Ann. Mus. Civ. Genova, vi, p. 409, 1874.

A fine large species, easily known by its sculpture, form and peculiar color-pattern. It has been referred by various authors to *Helicostyla*, *Acavus* and *Phenicobius*, but it doubtless belongs in this place.

H. MONOCHROA Sowerby. Pl. 22, figs. 58, 59, 60, 61, 62.

Shell half-covered umbilicate, globose-depressed, solid, opaque, yellowish-russet, with a narrow chestnut margin below the suture, a narrow band of the same shade at the periphery, and a wider one below. Surface obsoletely obliquely striate and slightly malleated or rugose, nearly lusterless. Spire low; sutures impressed. Whorls $4\frac{1}{2}$, somewhat convex, the last rounded at the periphery, slightly descending in front. Aperture quite oblique, white inside; peristome expanded and reflexed all around, and either edged with dark, or entirely of a deep chocolate shade. Umbilicus rather large inside, but more than half covered by the expanded columellar lip.

Alt. 34, diam. 45 mill.

Alt. 30, diam. 50 mill.

Palawan, Philippines, and North-east Borneo.

H. monochroa Sow. Proc. Zool. Soc. Lond. 1841, p. 1.—PFR. Symb. ii, p. 34; Monogr. Hel. Viv. i, p. 330; Conchyl. Cab., p. 326, t. 57, f. 1-3.—REEVE, Conch. Icon., f. 11.—DOHRN, Nachrbl. D. M. Ges. 1889, p. 61.—*H. palawanica* PFR. P. Z. S. 1855, p. 107, t. 32, f. 7; Monogr. iv, p. 261.—DOHRN, Conchyl. Cab., p. 577, t. 170, f. 2, 4, and t. 171, f. 1-3.—ISSEL, Annali Mus. Civ. Genova, vi, p. 409.—HIDALGO, Journ. de Conchyl. 1887, p. 108, t. 5, f. 1.—*H. saulæ* PFR. P. Z. S. 1845, p. 72; Monogr. Hel. Viv. i, p. 331.—REEVE, Conch. Icon., f. 393.—*H. lagunæ* HIDALGO, Journ. de Conchyl. 1877, p. 108, t. 4, f. 5.—*H. dorie* DOHRN, Nachrichtsbl. D. M. Ges., May 1881, p. 67.

A species excessively variable in size and coloration. The following forms are doubtless nothing more than stages in a continuous series of modifications. See on this matter, Dohrn, *Nachrichtsbl. D. M. Ges.*, 1889, p. 61.

The typical *monochroa* differs from the form called *palawanica* in nothing but the color of the lip, which is whitish, shading into deep brown on the outer edge. It is said to be from the island of Tablas, Philippines, and one of the specimens before me being labelled "Tablas" I have no especial reason for doubting it.

The *palawanica* of Pfeiffer (pl. 22, figs. 58-62) is large, variable in degree of depression, and the color varies from (1) light yellowish all over, with narrow brown bands at suture and periphery, the inside of the umbilicus brown, to (2) deep purplish brown (the spire light brown) encircled at periphery by a blackish line. See also pl. 42, fig. 19 for color-varieties. The lip is entirely purplish-brown. It is before me from Palawan and north-eastern Borneo.

The *H. saulæ* Pfr. (pl. 42, fig. 23) is small, solid, light brown, encircled by a single subperipheral dark zone. Alt. 20, greater diam. 32, lesser 27 mill. A specimen before me differs from the typical *saulæ* in having a light peristome, edged with brown. It is figured on pl. 42, fig. 22.

H. lagunæ of Hidalgo (pl. 26, fig. 9) is an elevated form approaching somewhat to *trailli* in outline and system of coloration. The four brown bands, says Hidalgo, are disposed in the following manner: two very narrow ones, one at the suture, the other at the periphery; the two others are situated at equal distances from the peripheral zone, above and below it. The upper of these is wide, and continues up the spire on the middle part of the whorls, gradually fading out; the lower band is wider still and of a darker hue; it enters the aperture, its upper margin touching the superior termination of the right lip. It is from Luzon, but the precise locality is not known.

H. doriæ Dohrn seems to be the dark reddish or chestnut-brown form, of which many examples are before me. It may be noted that the dark-colored specimens from northern Borneo are larger, solidier, and have thicker peristome than those from Palawan.

H. PALUMBA Souverbie. Pl. 27, figs. 18, 19; pl. 41, figs. 12, 13, 14, 15.

Shell half covered umbilicate, depressed-globose, thin and light, of a light brownish color, encircled by a pure white zone at the

periphery bordered above and below by narrower chestnut-brown bands, the upper one of which is visible above the suture on the spire-whorls; and with a broad white zone surrounding the brown umbilicus. Surface delicately striate obliquely. Spire low, apex obtuse, suture slightly impressed. Whorls $4\frac{1}{2}$, slightly convex, rapidly widening, the last deflexed in front. Aperture very oblique, elliptical-truncate, brownish and showing the band within; peristome thin, narrowly reflexed all around, dark brown except at the terminations of the white bands, which continue to the edge of the reflexed lip; columellar termination reflexed over the narrow but profound umbilicus.

Alt. 19, greater diam. $27\frac{1}{2}$, lesser 24 mill.

Busuanga, island of Busuanga, Philippines.

H. palumba SOUV., Journal de Conchyl. 1858, p. 369; 1862, t. 10, f. 5.—HIDALGO, Journ. de Conchyl. 1889, p. 297, t. 14, f. 1, (1890).

I agree with Hidalgo in separating this shell from *H. saulix* Pfr. It is a very thin, light species, smoother than any of the forms of *palawanica*, and it always has white spots on the lip at the terminations of the white bands. The locality given above is that of the following color-variety, described by Hidalgo.

VAR. β . Shell larger, more solid, transverse striæ almost lacking; chestnut, with peripheral and basal white zones (pl. 41, fig. 15).

H. EGREGIA Deshayes. Pl. 37, figs. 43, 44.

Shell globose, a little depressed, white, transversely 2-banded with brown; spire conic-depressed, apex obtuse; whorls 4, a little convex, slowly increasing, the last depressed, convex, base imperforate, at the periphery very obtusely angulated; aperture lunate-circular; peristome reflexed, thickened, margined outside with brown; columella dilated, depressed, calloused; left margin thickened, short.

(*Dh.*) Alt. 28, diam. 38 mill.

Habitat unknown.

H. egregia DH. in Fér. Hist., i, p. 302, t. 102, f. 17, 18.

A species not noticed by recent authors, evidently grouping with *H. monochroa*.

H. AVUS Pfeiffer. Pl. 27, figs. 15, 16, 17.

Shell umbilicated, depressed, solid, obliquely striatulate, somewhat shining, pale fulvous; spire short, convex; whorls 4, scarcely convex, sensibly increasing, the last carinated, convex above and

below, ornamented with a brown band at the suture and a white one at the periphery, the base pale, subcompressed around the moderate, conical umbilicus; aperture scarcely oblique, subtriangular-lunar; peristome thick, white, expanded and reflexed, margins remote, joined by a thick callus. Alt. 18, greater diam. 37, lesser 31 mill. (*Pfr.*)

Philippine Is.

H. avus PFR. P. Z. S. 1852, p. 83; Mon. Hel. Viv. iii, p. 251; Conchyl. Cab. p. 473, t. 157, f. 12–14.—REEVE, Conch. Icon. f. 658.

The aperture is less oblique than is usual in *Camæna*, and it may prove to belong elsewhere when the characters of the nucleus are determined.

Subgenus OBBA Beck, 1837.

Obba BECK, Index Molluscorum, p. 30, (species, *H. planulata*, *papilla*, *mamilla*).—ALBERS, (edit. von Martens,) Die Heliceen, p. 158, (type *H. mamilla* Fér.), 1860.

Shell umbilicate (rarely covered) globose, globose-depressed or lens-shaped, often carinated; apex very obtuse, the earlier $1\frac{1}{2}$ or 2 whorls forming a polished nucleus. Aperture generally very oblique or horizontal; peristome expanded, basal margin reflexed.

Beck did not indicate which of the three species enumerated by him should be regarded as the type of *Obba*. We are therefore at liberty to accept *H. mamilla* as the type following Albers' classic work.

This subgenus was accurately defined and limited by Von Martens in the second edition of Albers' Die Heliceen. *Obba* may be divided into three well-marked sections:

Section OBBA, *s. s.*

Shell rudely sculptured, the sculpture oblique to lines of growth; solid; peristome thickened, the ends converging, joined by a cord of callus; brown, or with 1 or 2 light bands.

Section OBBINA, Semper.

Shell striate or wrinkled in the direction of growth-lines; last whorl very deeply deflexed in front; aperture subhorizontal, ends of peristome converging, continuous across the parietal wall; white or light colored, banded or speckled with brown.

Section NEOCEPOLIS, Pilsbry.

Shell striate or granulate; aperture oblique, the ends of peristome but slightly converging; umbilicus narrow or closed; last whorl but little deflexed in front; columella thickened, usually toothed; having sometimes a palatal tooth also.

Section OBBA, *sensu stricto*.

Large forms, rudely sculptured with coarse radiating folds or malleations above, obliquely descending or revolving wrinkles or ridges below, the sculpture-ridges not parallel to the lines of growth; color brown or brownish, banded with lighter.

A. Last whorl very deeply descending in front; periphery rounded, mamilla.

B. Last whorl only slightly descending in front.

a. Periphery rounded; inner whorls of spire radiately plicate, quoyi.

b. Periphery acutely keeled. linnæana.

H. MAMILLA Féruſſac. Pl. 53, figs. 100, 1, 2; pl. 40, fig. 95.

Shell globose-depressed, not carinated, umbilicated, solid, strong, opaque; yellow, with a broad brown band below the suture, a narrower one at the circumference, and a broad one on the base, fading out toward the umbilicus; spire convex; last whorl rounded at periphery, very deeply descending in front; lip broadly reflexed, white.

A compact, solid shell, with low dome-shaped spire; surface of the spire-whorls sculptured with strong, coarse, radiating folds; body-whorl corrugated by close, coarse folds, descending in a direction much more oblique than the growth-striae, the base irregularly pitted and indented. Whorls $5\frac{1}{2}$, the inner two smoother, the first whorl smooth, white; last whorl rounded at periphery, but often encircled by an inconspicuous raised line indicating the position of the carina in the keeled forms of *Obba*. The whorl is very deeply deflexed in front; aperture very oblique, irregularly oval, upper and outer margins well arched, baso-columellar margin straightened; lip broadly reflexed, its face white, thickened, convex; margins approaching, joined by a cord of white callus. Umbilicus more or less concealed by the reflexed columellar lip.

Alt. 30, greater diam. 36, lesser 31 mill.

Alt. 25, greater diam. 30 mill.

Northern Celebes.

H. mamilla FER. Hist., t. 25, f. 1, 2.—QUOY & GAIMARD, Voy. de l'Astrol., Zool., ii, p. 93, t. 7, f. 1-3 (animal).—PFR. Monogr. i, p. 318; Conchyl. Cab. t. 138, f. 3-5.—REEVE, Conch. Icon. f. 471.—MARTENS, Ostas. Zool., Landschnecken, p. 291.—*Semicornu mamilla* WALLACE P. Z. S. 1865, p. 410.

The figure on pl. 53 represent a small form corresponding to Férussac's types. I have figured a larger, finer specimen on pl. 40, fig. 95. Von Martens gives measurements of still larger specimens: greater diam. $45\frac{1}{2}$, lesser $35\frac{1}{2}$, alt. 35 mill.

It is an odd thing, quite unlike any other Helix.

H. QUOYI Deshayes. Pl. 53, figs. 96, 97, 98.

Shell convex-depressed, not carinated, umbilicated, solid, opaque, rich chestnut colored with a yellow or white line at the periphery; above having coarse, radiating folds; below the periphery covered with close, fine wrinkles, descending obliquely in a direction at right angles to the striæ of growth. Last whorl but slightly descending in front; lip broadly reflexed.

Compact, solid; the spire low, convex, having rude, irregular, and uneven radiating folds; below the periphery the surface is far smoother, covered with close, fine wrinkles; the umbilicus having only growth-striæ within. Whorls 5, but slightly convex; suture superficial; the last whorl a little descending in front. Aperture oblique, semi-oval; entire peristome broadly reflexed, its face thickened, convex, white; margins approaching, joined across the parietal wall by a cord of white callus. Umbilicus deep, somewhat cylindrical, permitting one to see to the apex within it.

Alt. 30, greater diam. 57, lesser 38 mill.

Northern Celebes.

H. undulata QUOY & GAIM., Voy. Astrol. Zool. ii, p. 91, t. 7, f. 1, 2 (preoc.).—*H. quoyi* DESH. Anim. s. Vert. viii, p. 105; Fér. Hist. t. 73b, f. 4.—PFR. Monogr. iv, p. 286; Conchyl. Cab. p. 358, t. 137, f. 1-3.—MARTENS Ostas. Zool. p. 289.—LOEBBECKE & KOBELT, Jahrb. d. m. Ges. vii, 1880, p. 332, t. 8, f. 2. 3.—*Semicornu quoyi* WALLACE, P. Z. S. 1865, p. 410.—*Vallonia undulata* GRAY, Fig. Moll., t. 72, f. 3.

Allied to *H. mamilla*, but the obliquely spiral wrinkles of the body-whorl descend in the opposite direction; the form is more depressed, umbilicus wider, and the whorl does not descend deeply at the aperture.

The peripheral narrow band is white in specimens which have lost the very thin, yellow epidermis. Just below the sutures the growth-striæ are very sharp and crowded. The umbilicus is encircled by a scarcely noticeable yellowish band.

Kobelt (*l. c.*) and Möllendorff (Ber. Senckenb. Naturf. Ges. 1890), have expressed the opinion that this form belongs to *Hadra*. It is, however, a member of the typical group of *Obba*, as von Martens has already said.

H. LINNÆANA Pfeiffer. Pl. 54, figs. 18, 19.

Shell depressed, acutely carinated, umbilicate; yellowish-brown, spire paler, carina white; deeply malleated above, indistinctly spirally sulcate beneath.

Shell umbilicated, depressed, convex above and below the acute, compressed carina; strong but not very thick; rather roughly and irregularly striated, sculptured with fine, oblique wrinkle-like impressions, which become stronger below the keel, and run into indistinct spiral furrows, of which one furrow just below the keel and one at the mouth of the umbilicus are more prominent. There is also a row of regular, oblique depressions above the carina, becoming stronger toward the mouth, continuing upward around the penultimate whorl. The color of the shell is whitish-yellow, but it is covered by a persistent shining, beautiful brownish-yellow epidermis; toward the apex the color is lighter; the keel is white. The last whorl descends a little in front, is rounded below, a little constricted at the aperture, having a deep groove behind the lip within the umbilicus. The umbilicus is wide, cylindrical, showing all the whorls. Aperture narrowly semilunar; peristome thickened, guttered at the place of the keel, flesh-red or rosy, the throat also rosy; margins joined by a narrow but distinct callus; upper margin expanded, basal margin broadly reflexed, arched, the short columella dilated above, inserted quite within the umbilicus, of which it covers at least a third part. (*L. & K.*)

Alt. 33, greater diam. 65, lesser 59 mill.

Sangir (*Sanguir, Sanghir or Sangi*) *Is.*, midway between northeast Celebes and Mindanao.

H. linnæana PFR. P. Z. S. Lond., 1845, p. 43; Monogr. Hel. Viv, i, p. 390.—REEVE, Conch. Icon., f. 226.—LOEBBECKE & KOBELT. Jahrb. d. m. Ges., vii, 1880, p. 329, t. 7. f. 1, 2, t. 8, f. 1.—*H. (Obba) Linnæana* Pfr., ANCEY, Le Naturaliste, viii, p. 366, 1886.—*Nanina*

(*Oxytes*) *Linnaeana* PFR., Nomencl. Hel., Viv. p. 54.—TRYON, Manual, 2nd ser., vol. ii, p. 131, t. 43, f. 46.

A magnificent species, looking like *H. quoyi*, if we imagine that shell depressed and acutely keeled. It is very rare. The locality above given is on the authority of Ancey. Sangir, or Great Sangi (variously spelled) is a small island, lying south of Mindanao, of about 30 by 10 miles extent, having a volcano in the center. Several smaller islets are near it, connecting with Celebes. No other land shells have been reported from them.

Section OBBINA Semper, 1873.

Gallina HARTMANN, Erd und Süßwasser Gasteropoden, p. 197, 1840 (*Helix rota* Sowb.)—*Obba* (part) BECK.—*Philina* ALBERS, Die Heliceen, p. 119 (preoc.)—*Obbina* SEMPER, Reisen im Archip. Phil., Landmoll. ii, p. 123 (type *H. planulata*), 1873.

Shell variable in degree of depression (trochoidal to discoidal), having a tendency to be carinated; umbilicated; nucleus composed of about two polished whorls; last whorl suddenly deflexed in front. Aperture very oblique or horizontal; peristome expanded, basal lip reflexed, its terminations joined by a cord of callus.

Nearly all of the species inhabit the Philippine Is. and northern Celebes.

Of the names given above, *Gallina* was not defined. *Pusiodon* is a combination of *Planispira* and *Obbina*, a species of the former leading. *Philina* is preoccupied. We are therefore justified in using Semper's thoroughly-defined name *Obbina*.

The species have been grouped by some authors according to the degree of carination; others have considered the tooth of the basal lip of more importance. Both these characters are too inconstant to be of much use. Color-pattern and sculpture are far more reliable characters.

The species fall into four pretty well-defined groups as follows:

(1.) *Group of H. listeri*. Roughly sculptured forms, generally with one dark band above and one below, the aperture dark inside. Basal lip toothed, the tooth often obsolete.

(2.) *Group of H. moricandi*. Having a strong tooth on the basal lip marked by a pit behind the peristome. Aperture light inside; base microscopically spirally striated.

(3.) *Group of H. marginata*. Basal lip without any trace of a tooth. Shell banded but not obliquely streaked or speckled, rather thin.

(4.) *Group of H. horizontalis.* A strong, oblique gibbous ridge behind the upper lip; peristome thickened. Banded; surface delicately striated.

1. *Group of H. listeri.*

Interior of the aperture dark; a single dark band above and below; often speckled and spotted. Surface rudely wrinkled or malleated.

Key to species.

<i>Edge of the parietal callus not thickened,</i>	goldei.
<i>Edge of the parietal callus thickened,</i>	
<i>Acutely carinated, lens-shaped,</i>	
<i>An elevated cord on the upper surface; obliquely ribbed,</i>	
<i>nearly unicolored,</i>	calcar.
<i>No cord above; speckled; more or less malleated,</i>	
	listeri, gallinula.
<i>Obtusely or not at all carinated,</i>	
<i>Elevated, trochoidal, nearly imperforate,</i>	papilla, heroica.
<i>Depressed, decidedly umbilicate,</i>	planulata.

H. PAPILLA Müller. Pl. 53, figs. 3, 4.

Shell narrowly umbilicated or imperforate, elevated trochoidal, the height equal to or exceeding the shorter diameter; not carinated; sculptured with rude, strong, irregular wrinkles in the direction of growth-lines, the wrinkles white, interstices chocolate or bluish; base whiter.

The form is remarkably elevated, the base rather flattened, swollen, and then constricted behind the basal lip. It is solid, lusterless, lacking epidermis, having an ill-defined interrupted dark spiral band on the middle of the upper surface of each whorl, and another on the base; the wrinkles become obsolete around the umbilicus, and the surface is white there; under a strong lens the upper surface shows in places a minute granulation, like the texture produced by pressing a very fine textile fabric upon plastic clay; and upon the base traces of fine spiral incised lines may often be observed. Whorls $5\frac{1}{2}$, the inner two smooth, horn-colored. Last whorl not carinated except immediately behind the outer lip, deeply descending in front. Aperture subhorizontal, oval, dark within; peristome white, broadly expanded; baso-columellar margin reflexed, partly

or wholly closing the umbilicus, its inner edge obscurely one or two-dentate. Terminations of peristome approaching, joined by a narrow cord of white callus.

Alt. 23, greater diam. 25½, lesser 21 mill.

Alt. 23, greater diam. 26, lesser 21½ mill.

Northern Celebes.

H. papilla MULLER Hist. Verm. ii, p. 100.—FER. Hist. t. 25 B, f. 5.—PFR. in Küster's Conchyl. Cab., p. 157, t. 21, f. 8, 9; Monogr. Hel. Viv. i, p. 318.—REEVE, Conch. Icon. f. 488.—MARTENS, Ostas. Landschn., p. 292.—DOHRN in Küster's Conchyl. Cab., p. 601, t. 175, f. 11, 12.—*Obba papilla* BECK, Index, p. 30.—WALLACE, P. Z. S. 1865, p. 408.

Easily known by its elevated pupa-like form. It is certainly not a true *Obba*, but an *Obbina*, closely allied to *H. planulata*, etc., of the Philippine Islands, and especially to the following species. Some specimens are distinctly conoidal, others more pupiform.

H. HEROICA Pfeiffer. Pl. 55, figs. 42, 43, 44.

Shell umbilicated, depressed-conoid, solid, sculptured with coarse, irregular, oblique wrinkles, whitish, spotted and interruptedly banded with brown; spire convex, apex obtuse, livid; whorls 4½-5, a little convex, slowly increasing, the last shortly deflexed in front, with angulated periphery, the base scarcely convex, swollen behind the basal lip, and then constricted. Aperture very oblique, elliptical; peristome subcontinuous, white; upper margin broadly expanded, basal flexuous, dilated, reflexed, half-covering the umbilicus; having a transverse tubercle, sometimes bifid, on its inner edge. (*Dohrn.*) Alt. 12-14, greater diam. 23, lesser 14 mill.

Around Manado, northern Celebes.

H. heroica PFR. P. Z. S. 1855, p. 114; Monogr. Hel. Viv. iv, p. 291.—DOHRN in Küster's Conchyl. Cab., p. 600, t. 175, f. 8-10.—*H. (Obba) papilla* var.? MARTENS, Ostas. Landschn., p. 292.

Smaller than *H. papilla*, the umbilicus less concealed, the form far more depressed.

H. GOLDIEI Brazier. Pl. 58, figs. 37, 38.

Shell large, nearly-covered-umbilicate, depressed, about equally convex above and below, carinated. Yellowish, speckled with lighter buff, irregularly mottled with blackish. Surface roughened by irregular, spirally-descending wrinkle-like malleations. Mouth

black inside, the expanded lip white. Edge of the parietal callus not elevated.

This is a large shell, strong and solid, but rather thin; low-conical above, convex beneath; whorls nearly flat, the periphery acutely keeled. Whorls $4\frac{1}{2}$, the inner two dark purplish-brown, convex, unicolorous; the rest of the whorls speckled and mottled; last whorl deeply and abruptly descending in front, having an interrupted black band just above the keel; interior of the umbilicus and a streak back of the lip black. Aperture ax-shaped, nearly horizontal, shining and black within; peristome white, expanded, not thickened, basal margin reflexed; parietal wall coated with a shining black varnish. Umbilicus narrow, nearly concealed.

Alt. 22–24, greater diam. 40–43, lesser 34–35 mill.

Inland from Port Moresby, New Guinea, under the Astrolabe Mts.

H. Goldiei BRAZ., Proc. Linn. Soc. N. S. Wales, v, p. 637, 1880; l. c. ix, p. 804, 1884.—*Helix (Obba) oxystoma* E. A. SMITH, Ann. & Mag. N. H., 5th ser., 1883, p. 191.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genova, xix, p. 160.

This beautiful species, now for the first time figured, can be compared only with *H. listeri*. From that species it differs notably in coloration, and the lack of a parietal cord of callus. It is most curious to find a species of the typically Philippine Island group *Obbina* in so distant a locality, and associated with such a totally different snail-fauna.

H. LISTERI Gray. Pl. 56, figs. 59, 60, 61, 62, 63, 64, 65, 66.

Shell umbilicated, much depressed, lens-shaped, acutely carinated; very irregularly marbled and spotted with brown and white, having one interrupted spiral brown band above and one below; the base white inside the lower band; peristome continuous, basal lip more or less obviously toothed in the middle.

The shell is depressed, generally about equally convex above and below, but sometimes low-conical above, or rarely flat there. The periphery is acutely keeled, but often the last half of the body-whorl is narrowed, the keel blunted, giving the shell an oblong rather than circular form. It is thin but solid, rudely malleated, obliquely criss-crossly wrinkled with coarse, irregular white wrinkles. Whorls $4\frac{1}{2}$, the first $1\frac{1}{2}$ corneous, smooth, convex; the following flat; last whorl abruptly descending in front, deeply constricted behind the basal lip. Aperture horizontal, elliptical, dark within;

peristome broadly expanded, white, basal margin reflexed, toothed more or less obviously in the middle. Umbilicus deep, cylindrical, about one-ninth the diameter of the shell.

Alt. 12, greater diam. 41, lesser diam. 31 mill.

“ 14, “ “ 34, “ “ 28½ “

“ 11, “ “ 26, “ “ 21 “

“ 8, “ “ 24, “ “ 19½ “

Southern Luzon (Province of Albay), and the adjacent islands Visayas, Lugbon, Calaquas, Marinduque; Gorontalo, northern Celebes (a small form.)

Carocolla listeri GRAY, Ann. of Philos. xxv, (new ser. vol. ix) 1825, p. 412 (no description).—REEVE, Conch. Syst. ii, t. 168, f. 11, 12.—*H. listeri* PFR. Monogr. Hel. Viv. i, p. 402; Küster's Conchyl. Cab., p. 208, t. 105, f. 9–15.—HIDALGO, Journ. de Conchyl. 1887, p. 103.—MARTENS, Mal. Bl. 1872, p. 170.—*Helix listeriana* WOOD.—*Obbina listeri* Gray, SEMPER, Reisen im Archip. Phil., Landmoll., ii, p. 125, with *var. costata*.—*H. planulata* (part) REEVE, Conch. Icon., f. 122 *c, d*.—*H. auriculata* SWAINSON, Zool. Illustr. i, t. 9, 1820 (not *Polygyra auriculata* Say.)

The northernmost point recorded for this species is Palanan, far up the east coast of Luzon.

It is a very variable shell, but may be recognized by the peculiarly mottled or spotted coloration and acutely keeled periphery.

Var. AURICULATA Swains. A form collected on the island of Marinduque by M. Quadras is similar to the figures of “*H. auriculata*” given by Swainson, forming a passage to the *H. planulata*. The periphery is rounded. (See Hidalgo, *l. c.*)

Var. COSTATA Semper. Number of whorls, form of the mouth and the two brown bands as in the typical *listeri*; but differing in the flatter upper surface, distinct ribs above and below, the keel flaring upward, so that the upper surface of the last whorl is concave toward the keel. Ground-color brown above, the ribs whitish; yellowish beneath. Surface not malleated, but coarsely granulated between the ribs.

Camiquin de Luzon; Cabayat, Northern Luzon.

H. GALLINULA Pfeiffer. Pl. 57, figs. 88, 89, 90.

Shell umbilicated, lens-shaped, rather strong, rather smooth, sometimes with irregular malleations; yellowish-gray, with a few narrow brownish-red bands, over which it is clothed with an epidermis hav-

ing clear-yellow, hydrophanous, triangular spots; spire flatly convex, with broad, blunt apex. Whorls $4\frac{1}{2}$, almost flat, all of them acutely keeled, causing the suture to appear narrowly margined; the last whorl suddenly falling in front, flatly convex beneath, a little impressed in front. Aperture horizontal, narrow, angular-elliptical; peristome simple, white, the margins approaching, connected by a thin callus, upper margin expanded, basal shortly reflexed, suddenly arcuately ascending at the moderately wide, deep umbilicus. Alt. 9, greater diam. 25, lesser 20 mill. (*Pfr.*)

Islands of Luzon and Zebu; Boac and Sta. Cruz, Marinduque, Philippines.

H. gallinula PFR. P. Z. S. 1845, p. 40; Monogr. i, p. 396; Conchylien Cab. p. 438, t. 152, f. 4-6.—REEVE, f. 130.—PHILIPPI, Abbild. etc., i, Helix, p. 153, t. 5, f. 5.—HIDALGO, Journ. de Conchyl. p. 103, 1887.—*Obbina gallinula* SEMPER, Archip. Phil., Landmoll., p. 128.

I have not seen this species. Pfeiffer mentions two varieties: (1) β , smaller, base obliquely rugulose, aperture laterally less dilated, and (2) g , marked all over with impressed oblique lines, becoming subconcentric around the umbilicus; bands obsolete. It may be compared with *H. listeri*, but the basal lip is not toothed. The sculpture separates it from *H. marginata*.

H. PLANULATA Lamarck. Pl. 55, figs. 51, 52, 53, 54.

Shell umbilicated, depressed, lens-shaped, obtusely keeled, sometimes scarcely perceptibly so; whitish with a brown band above and one below, interrupted by oblique, opaque, white streaks; peristome continuous, basal lip more or less obviously toothed in the middle.

A species closely allied to *H. listeri*, but less acutely carinated, the surface nearly smooth, not malleated. Spire varying much in degree of elevation. Whorls 5, slightly convex, the last abruptly deflexed in front, constricted behind the basal lip. Aperture horizontal, dark inside; peristome white, broadly expanded, basal margin reflexed, having a slight swelling or a distinct square tooth in the middle. Umbilicus cylindrical, one-tenth to one-ninth the diam. of the shell.

Alt. 13, greater diam. 30, lesser 24 mill.

Alt. 12, greater diam. 32, lesser 25 mill.

Alt. 15, greater diam. 26, lesser 21 mill.

Island of Luzon; Islet of Corregidor, near Manilla; Marinduque; Mindoro, Philippines.

H. planulata LAM. An. s. Vert., p. 73.—FER. Hist., t. 73A, f. 3.—PFR. Monogr. Hel. Viv. i, p. 379; Conchylien Cab. p. 105, t. 14, f. 9, 10.—HIDALGO, Journ. de Conchyl. 1887, p. 98, t. 2, f. 5, 6, varieties.—*Obba planulata* BECK.—*Obbina planulata* SEMPER, Reisen, etc., p. 126.—*H. papilionacea* VAL., in Humboldt & Bonpl., Rec. Obs. Zool. et Anat. Comp. etc., ii, p. 241, t. 56, f. 6 (teste Pfr.).—*H. collapsa* FER. Prodr., 187? (teste Pfr.).

The principal character distinguishing this from *H. listeri* is the less acute carina, and smooth, not malleated, surface. The basal tooth is usually present, but in some specimens it fails. Some shells are beautifully spotted or mottled above; some are pale, even entirely white. A solid, elevated white variety is figured on pl. 68, fig. 85.

H. CALCAR Martens. Pl. 65, figs. 92, 93, 94.

Shell openly umbilicated, depressed, lenticular, bicarinate, sculptured with coarse, oblique decurrent wrinkles; blackish-brown, nearly concolorous; spire nearly plane; whorls $4\frac{1}{2}$, a little convex, depressed, the last about equally convex above and beneath, deeply, abruptly descending in front; aperture subhorizontal, ovate, outer angle acute, brown inside; peristome reflexed all around, whitish, continuous, scarcely toothed. (*Mts.*)

Alt. 9, greater diam. 23, lesser 17 mill.

Alt. $7\frac{1}{2}$, greater diam. $19\frac{1}{2}$ lesser 16 mill.

Dodinga, Island of Halmaheira, Moluccas.

H. calcar MTS. Monatsber. Berl. Akad. 1864, p. 525; Oostas. Zool., Landsehn., p. 293, t. 17, f. 5.—PFR. Monogr. v, p. 404.

This beautiful snail, says Von Martens, is most nearly allied to *H. rota* Brod. It differs in having an elevated cord in the place of the upper color-band, so that it may be called bicarinate, as this thread is almost as prominent upon the last whorl as the peripheral keel. All of the rib-like striæ continue unbroken over the two keels, whilst in *rota* only every alternate riblet (usually) is continued upon the peripheral keel.

The dark interior of the aperture shows this species to belong to the group of *H. papilla*, *listeri*, etc., rather than to *H. rota*.

2. Group of *H. moricandi*.

Basal lip with a strong tooth, marked behind the peristome by a pit. Surface obliquely striate or ribbed, microscopically spirally

striated, 2-5 banded. Aperture light inside. No gibbous ridge behind the upper lip.

This perfectly natural group of species is hard to define, as the forms included are so variable. The basal tooth is rarely obsolete in some forms.

Key to species.

<i>Periphery obtuse,</i>	<i>moricandi.</i>
<i>Periphery acutely carinated,</i>	
<i>Coarsely striate or ribbed,</i>	
<i>Ribbed, carina undulating,</i>	<i>rota.</i>
<i>Coarsely striate, carina even,</i>	<i>scrobiculata.</i>
<i>Very finely striated, lens-shaped,</i>	<i>livesayi, basidentata.</i>
<i>Obliquely wrinkled, plane above, swollen below,</i>	<i>bulacanensis.</i>

H. moricandi Sowerby. Pl. 54, figs. 24, 25, 26, 27.

Shell umbilicated, convexly conical above, flattened beneath; delicately obliquely striated, and having most minute nearly obsolete spiral incised lines; yellowish-white, a little flesh-tinged above, with a single chestnut band above and below, sometimes a nearly obsolete narrow band a short distance below the suture; periphery rounded or showing the trace of a keel; whorls $5\frac{1}{2}$.

The shell is solid, rather smooth. Spire elevated, very obtuse; whorls $5\frac{1}{2}$, slightly convex, the last abruptly descending in front, swollen on the latter half of the base, deeply grooved behind the basal lip, the groove widening and running into the umbilicus. Aperture subhorizontal, ovate-elliptical, white and banded inside; peristome not thickened, outer margin very broadly expanded, basal margin reflexed, having a strong tooth in the middle (marked behind the lip by a pit), and usually a second minute denticle on the columellar edge. Umbilicus narrow, deep, partly concealed.

Alt. 16, greater diam. 32, lesser 26 mill.; alt. 16, diam. $26\frac{1}{2}$ mill.

Islets off northern Mindanao, and Northern and Eastern Mindanao; Bohol; La Laguna, Isl. of Luzon.

H. moricandi (Sowb. in Cuming's shell list) PFR. in P. Z. S. 1842, p. 86; Monogr. i, p. 380; Küster's Conchyl. Cab., p. 62, t. 77, f. 7-9.—REEVE, Conch. Icon., f. 58.—HIDALGO, Journ. de Conchyl. 1887, p. 99.—*Obbina Moricandi* SEMPER Reisen im Archip. Phil. Landmoll., p. 123.

Semper is in error in referring *H. bizonalis* Desh. to *moricandi* as a synonym. The true *bizonalis* is a West Indian species of the section *Caracolus*.

The elevated spire, number of whorls ($5\frac{1}{2}$,—one more than in most species of *Obbina*), and strong basal tooth (very rarely obsolete), are the prominent characters. The color-pattern is very constant. The periphery is scarcely keeled.

H. BASIDENTATA Pfeiffer.

Shell umbilicated, conoid-semiglobose, solid, obliquely striated, white, ornamented with a brown band above and below, and a narrower orange band at the suture; spire convex-conoid, obtuse; whorls 5, convex, the last carinated, much deflexed in front, the base rather flat. Umbilicus narrow. Aperture horizontal, elliptical; peristome continuous, reflexed all around, the basal margin armed in the middle with a strong, obtuse tooth. Alt. 11, greater diam. 26, lesser 20 mill. (*Pfr.*)

East coast of Mindanao; Islands in the straits of Surigao; Ubay, Island of Bohol, Philippines.

H. basidentata PFR. P. Z. S. 1856, p. 329; Monogr. iv, p. 310.—HIDALGO, Journ. de Conchyl. 1888, p. 30, t. 5, f. 9.—*Obbina basidentata* SEMPER, Phil. Archip., Landmoll., p. 124 (anatomy).

I have not seen this form. It seems to be closely allied to *H. livesayi*.

H. LIVESAYI Pfeiffer. Pl. 56, figs. 72, 73; pl. 59, figs. 46, 47.

Shell narrowly umbilicated, lens-shaped, acutely carinated; yellowish-corneous with two chestnut bands above, one below; surface delicately obliquely striated, showing under a lens incised spiral lines which are nearly obsolete. Basal lip strongly unidentate in the middle.

This is a species of about the form of *H. serobiculata* but darker colored and far more delicately striated. The surface has something of a silky luster. Above there is a chestnut band bordering the white suture, and another one of a darker shade midway between suture and carina. The carina is white; the base is more or less obviously radiately streaked with light brown, and there is a dark band near the circumference. Spire low-conic; whorls 5, nearly flat, the last suddenly deflexed in front, constricted behind the basal lip. Aperture subhorizontal, ovate; outer lip broadly expanded, basal lip reflexed, strongly toothed (position of tooth marked by a pit behind the lip), partly concealing the umbilicus.

Alt. 12, greater diam. $28\frac{1}{2}$, lesser 24 mill.

Zebu and Magtan; Bohol and Camotes, north of Bohol, Philippines.

H. livesayi PFR., P. Z. S. 1860, p. 134; Mal. Bl. 1860, p. 239; Monographia v, p. 413; Novit. Conch. iii, p. 397, t. 92, f. 12, 13.—*Obbina livesayi* SEMPER, Phil. Archip. Landmoll., p. 127.—MOLLENDORFF, Mal. Bl. n. f. x, p. 155; Bericht Senckenb. naturforsch. Ges. 1890, p. 221.

Mollendorff has noticed a form *luteofasciata* and mutations *pallens* and *albina*, with monstr. *subscalaris*, from Olango and Pandano, between Zebu and Bohol.

Allied to *H. scrobiculata*; distinguished by the darker coloration and much smoother surface.

H. SCROBICULATA Pfeiffer. Pl. 56, figs. 67, 68, 69, 70, 71.

Shell umbilicated, depressed, lens-shaped, acutely carinated, of a delicate brownish tint, varied by obliquely radiating white streaks and brown spiral bands, of which one on the middle of the upper surface and another on the base are conspicuous and constant. Surface having strong oblique growth-striæ and on the base close fine spiral impressed lines. Basal lip with a strong tooth, marked behind the peristome by a corresponding pit.

The shell is solid, rather thin, strongly obliquely striated. Spire low-conoidal, apex obtuse. Whorls $4\frac{3}{4}$, the inner two polished, whitish; last whorl abruptly deflexed in front, constricted behind the basal lip, and having a pit to mark the place of the lip-tooth. Besides the single prominent bands above and below, there are often narrow, faint ones above and below the carina, and a little distance below the suture. The aperture is horizontal, ovate, white within and showing the band; peristome white, continuous, broadly expanded, basal lip reflexed, strongly toothed in the middle.

Alt. 11, greater diam. 27, lesser 22 mill.

Alt. 9, greater diam. 22, lesser 18 mill.

Island of Zebu, Philippines.

H. scrobiculata PFR. P. Z. S. 1842, p. 88; Monogr. Hel. Viv. i, p. 403; Conchylien Cab., p. 67, t. 78, f. 13–15.—PHILIPPI, Abbild. u. Beschreib. ii, p. 185, Helix t. 9, f. 6.—REEVE, Conch. Icon. f. 130.—HIDALGO, Journ. de Conchyl. 1887, p. 104.

Pfeiffer gives *Bohol* as the locality, on the authority of Cuming.

The species differs from *H. listeri* in the sculpture, coloration and white interior of the mouth; from *H. rota* it differs in having the keel smooth, not fluted, and the sculpture much less strongly developed; moreover, the parietal callus is adnate to the body-whorl

in *H. scrobiculata*, its edge but little elevated, whilst in the *rota* this margin is usually decidedly elevated.

H. ROTA Broderip. Pl. 56, figs. 77, 78, 79.

Shell umbilicated, depressed, lens-shaped, acutely carinated, light brownish, occasionally with oblique white streaks, having three narrow brown bands above, two beneath. Surface sculptured by prominent elevated, thread-like oblique riblets, arched in the direction of growth-lines; the base having also microscopic close spiral lines. Basal lip toothed in the middle. Carina fluted.

Shell about as convex above as below, or else nearly flat above. Whorls $4\frac{1}{2}$, the inner two whitish, smooth; last whorl abruptly descending, constricted behind the basal lip, with a slight pit there, marking the position of the lip tooth. Aperture horizontal, elliptical, white and showing the bands within. Peristome white, continuous, expanded, basal lip reflexed, strongly toothed in the middle. The outer bands of the body-whorl are on the carina.

Alt. 10, greater diam. 29, lesser $24\frac{1}{2}$ mill.

Alt. 8, greater diam. 23, lesser 19 mill.

Visayas Is., Philippine group (Hidalgo); *Siquijor* (Cuming); *north coast of Bohol; Lampinigan, near Basilan; Balatanai an islet near Lampinigan; Islas Camotes, north of Bohol* (Semper).

Helix rota BROD. P. Z. S. 1841, p. 45.—PFR. Monographia, i, p. 403; Conchyl. Cab. p. 68, t. 78, f. 16–18.—REEVE, Conch. Icon. f. 128.—HIDALGO, Journ. de Conchyl. 1887, p. 104.—*Carocolla rota* REEVE, Conch. Syst. ii, t. 167, f. 1, 4.—*Gallina rota* HARTM. Gast. Schw., p. 197, t. 76.—*Lucerna rota* ADS.—*Obbina rota* SEMPER, Reis. Arch. Phil. Landmoll., p. 122.—MOLLENDORFF, Bericht Senckenb. Naturf. Ges. 1890, p. 220.

This species has strongly elevated, thread-like oblique riblets, and and a wavy or fluted keel. The riblets are nearly obsolete on the base in some specimens; the localities given for these are S. Juan de Surigao, on the eastern coast of Mindanao, Limansaua, west of Surigao, Islas Camotes, Tubigon, east coast of Bohol, and Mac-Crohon, south coast of Leyte. Another variety with rugose but not ribbed base, feebly crenate or smooth carina, is found at Malitboc, south coast of Leyte, Limansaua, Mac-Crohon, Leyte and Islas Camotes, northward of Bohol. This last variation is much like *H. scrobiculata*, but differs in the arrangement of the bands. A third variety was found by Semper at Maribojoc, west coast of Bohol. It is very

feebly sculptured, the carina distinctly wavy; tooth of the basal lip very weak or obsolete; shell bandless (or bands very faint), or with only a narrow basal band.

Hidalgo found on the Visayas isles a small mutation having the spire flattened, last whorl very convex beneath. Specimens are before me, but they seem to grade into the typical form.

H. BULACANENSIS Hidalgo. Pl. 65, figs. 78, 79.

Shell umbilicated, orbicular, rather solid, not shining, *flat above*, the base swollen, periphery acutely carinated, sculptured with close, suboblique irregular wrinkles (here and there transversely striated under a lens); pale fulvous, brown at the carina, ornamented with a broad whitish zone around the umbilicus; suture simple. Whorls 4-4½, flat, the first smooth, the last deeply deflexed in front, subconstricted beneath. Umbilicus broad, perspective, whitish. Aperture transversely lanceolate; peristome whitish, expanded above, basal margin regularly arcuate, reflexed, margins converging, joined by a narrow, slightly elevated callus. (*Hid.*)

. Alt. 10, greater diam. 32, lesser 27 mill.

Province of Bulacan, Luzon, Philippines.

H. bulacanensis HID., Journ. de Conchyl. 1888, p. 310; *l. c.* 1889, p. 299, t. 13, f. 2.

Very distinct in form and sculpture. It may group elsewhere than with *rota*, for the basal lip is toothless.

3. Group of *H. marginata*.

These shells have no trace of a tooth on the basal lip; the aperture is white, with bands inside. Surface very finely obliquely striated, and with either microscopic spiral lines or an excessively minute, dense granulation. Spiral bands 2 to 5. There is no gibbous ridge behind the upper lip. *H. marginata* and *H. bigonia* have a dark streak on the antepenultimate whorl.

H. BIGONIA Férussac. Pl. 55, figs. 45, 46, 47.

Shell umbilicated, low-conoidal above, flattened below; white, with one or two brown bands above, one beneath; surface nearly smooth, having delicate growth-striae and microscopic spiral incised lines. Upper whorls with a purple streak; basal lip without trace of a tooth.

The shell is rather elevated, and is angulated at the periphery, the angle sometimes obsolete. There is (typically) a single dark

chestnut band above and one below; but often a fainter subsutural band is developed. The band on the upper surface ascends to within about $1\frac{1}{2}$ whorls of the apex, and between it and the suture, on the antepenultimate whorl the surface is lilac or purple. Apex plane. Whorls $4\frac{1}{2}$, the last deeply descending in front, convex beneath. Aperture subhorizontal, oval, white and banded within; peristome expanded, white; basal lip reflexed, partly concealing the umbilicus. Alt. $13\frac{1}{2}$ –14, greater diam. 22–25, lesser 18–20 mill.

Samar; Catbalogan; Eastern Mindanao; Basilan; and Leyte, Philippine Is.

H. bigonia FER. Hist., t. 70, f. 2.—PHILIPPI, Abbild., i, p. 78, t. 4, f. 7.—PFR. in Conchyl. Cab., p. 330, t. 58, f. 13, 14; Monographia, i, p. 334.—REEVE, Conch. Icon. f. 105.—HIDALGO, Journ. de Conchyl. 1887, p. 98.—*H. samarensis* PFR. P. Z. S. 1842, p. 87.—*Lucerna bizonia* ADS.—*Obbina bigonia* SEMPER, Phil. Archip. Landmoll., p. 127.

More elevated than the allied toothless species; white, with two or three brown bands and a purple streak on the antepenultimate whorl.

H. MARGINATA Müller. Pl. 57, figs. 4, 5, 6.

Shell umbilicated, depressed, lens-shaped, acutely carinated, having three chestnut bands above, two below, on a whitish or light-brownish ground. Surface lightly obliquely striated, showing when highly magnified a texture like that produced by pressing fine cloth upon plastic clay. Outer $2\frac{1}{2}$ whorls banded, the next inner one with a brown streak. No trace of a tooth on the basal lip.

The shell is rather thin, solid, low-conoidal above, feebly convex below; carina acute, white, three bands above, two below; apex plane. Whorls $4\frac{1}{2}$, the last abruptly deflexed in front, a trifle constricted behind the basal lip. Aperture subhorizontal, white with bands within; peristome expanded, white, continued in a cord of callus, across the parietal wall; basal lip regularly curved, reflexed, with no trace of a tooth.

Alt. 12, greater diam. $26\frac{1}{2}$, lesser $21\frac{1}{2}$ mill.

Alt. 10, greater diam. 21 mill.

Isl. Camiguin; Pta. Malimono near Surigao, and around Zamboanga, Isl. of Mindanao, Philippines.

H. marginata MÜLLER, Hist. Verm. ii, p. 41.—PFR. in Conchyl. Cab. p. 69, t. 78, f. 7–9; Monogr. i, p. 395; v, p. 405.—REEVE,

Conch. Icon. f. 129.—HIDALGO, Journ. de Conchyl. 1887, p. 102.—MARTENS, Mal. Bl. 1872, p. 171 (varieties).—*Helix grayana* PFR., Symbolæ ii, p. 29.—*H. grayi* HOMBR. & JACQ., Voy. Pol Sud Moll., t. 7, f. 18–21.—*H. scabrosa* FER., Hist., t. 63, f. 1, 2.—*Obbina marginata* SEMPÉR, Phil. Archip., Landmoll., ii, p. 127.—*H. sororcula* MARTENS, Ostas. Zool., Landschn., p. 294, t. 17, f. 4 (not of Benoit).—*H. devincta* TAPPARONE CANEFRI, Ann. Mus. Civ. Genova, xx, p. 156, 1884.

May be known from other species having no tooth on the basal lip by its color-pattern, and the microscopic sculpture of the upper surface of the last whorl.

Von Martens has discussed the variations and geographic range of this species in Malak. Blät. 1872, p. 171.

Var. *SORORCULA* Martens. Pl. 57, figs. 94, 95, 96.

Narrowly umbilicated, lenticular, acutely carinated, delicately striated, rather shining, whitish, painted with 3–5 narrow pale reddish bands; spire short, conic, obtuse. Whorls scarcely 4, plane, the last slightly and equally convex above and beneath, in front abruptly and deeply descending; aperture subhorizontal, subovate, its outer angle rather acute; peristome thin, narrowly expanded, whitish, margins approximating, joined by a *thin callus*. (*Mts.*)

Alt. 8–9, greater diam. 17–19 mill.

Manado, northern Celebes.

Smaller than *H. marginata*, with narrower umbilicus and less developed parietal callus, but scarcely, it seems to me, to be separated specifically. Tapparone Canefri, however, considers it a distinct species.

Var. *GRISEOLA* v. Möll. Shell a little smaller than the type, umbilicus wider, color gray-yellowish, bands narrower, last whorl at aperture suddenly, vertically deflexed; aperture horizontal, peristome continuous, free above.

Alt. 10, diam. 26 mill.; alt. 8, diam. 21 mill.

Mts. of Zebu and Siquijor, Philippines.

This is *Obbina gallinula* Möll., J. D. M. Ges. xiv, p. 271, not of Pfr. See Bericht Senckenb. naturforsch. Ges. 1890, p. 218.

H. KOBELTIANA Pfeiffer. Pl. 56, figs. 80, 81.

Shell umbilicated, orbicular-depressed, rather lens-shaped, rather thin, obliquely striate and very minutely granulated (seen under a

lens), irregularly malleate-impressed, subunicolored brown, with one obscure obsolete band beneath. Spire very shortly conoid, apex obtuse; sutures simple, linear; whorls 4, flat, the last very shortly descending in front. Periphery acutely compressedly carinated, the base a little convex around the narrow umbilicus (which is about one-ninth the diameter of the shell in width.) Aperture very oblique, ax-shaped, outer margin acutely angled, peristome whitish, margins scarcely converging, joined by a rather thin callus; upper margin narrowly expanded, the outer angle a little turned upward; basal margin thickened, reflexed, horizontal in the middle, ascending at both ends, dilated at the umbilicus.

Alt. 8-8½, greater diam. 23-25, lesser 20½-22 mill. (Pfr.)

Island of Ceram.

H. Kobeltiana, PFR. Mal. Bl. 1871, p. 124; Monogr. v, p. 456; Novit. Conch. iv, p. 73, t. 121, f. 12, 13.—MARTENS, Mal. Bl. 1872, p. 172.

A form very like *H. marginata*, but darker, more obviously sculptured; whorls flatter, the last one much less descending in front, terminations of the peristome more distant, parietal callus slighter; the aperture is more angled at the carina. The locality given is far removed from that of the *marginata*.

H. PARMULA Broderip. Pl. 57, figs. 85, 86, 87; pl. 65, figs. 73, 74, 75.

Shell umbilicated, very much depressed, with an acute, peripheral keel; pale brown, with a narrow chestnut band above and one below; the two sides of the knife-like keel brown, its edge white. Surface delicately obliquely striated, and showing in places, under a very strong lens, an excessively minute granulation. Surface coarsely wrinkled for a short distance behind the lip.

The shell is rather thin and light, like others of the *marginata* group. It is discoidal, pale colored; the outer part of the whorl, behind the lip, is obliquely wrinkled. Whorls 4½-5, flat, the last abruptly deflexed in front, a little contracted behind the basal lip. Aperture nearly horizontal; peristome continuous, white, outer lip expanded, angled, basal lip reflexed, not toothed within.

Alt. 13, greater diam. 43, lesser 37 mill. (typical.)

Alt. 10, greater diam. 35, lesser 29 mill. (Smaller form.)

Is. Negros and Zebu (Cuming); *Zamboango, Mindanao, and Visayas Is.* (Hidalgo); *Isl. of Siquijor, Philippines.*

Carocolla parmula BROD. P. Z. S. 1841, p. 38.—REEVE, Conch. Syst. ii, t. 167, f. 7.—*Helix parmula* PFR. Monographia i, p. 394; Conchyl. Cab., p. 210, t. 106, f. 4-6.—REEVE, Conch. Icon. f. 120.—DESH. in Fér., Hist., p. 356, t. 101, f. 19-21.—HIDALGO, Journ. de Conchyl. 1887, p. 100.—v. MOLL., Bericht Senckenb. naturforsch. Ges. 1890, p. 217.—? *H. discus* DESH. (not Thom.) in Fér., Hist., p. 360, t. 62 A, f. 4.

More flattened than any other species; very acutely keeled, with a somewhat lanceolate horizontal mouth. The bands are nearly obsolete.

A small form is figured on pl. 65, figs. 76, 77. It measures, alt. 10, diam. $27\frac{1}{2}$, mill. It is from Zebu, and was obtained direct from the collector.

Var. DISCUS Desh. (Pl. 57, figs. 91, 92, 93.) Thin, white (bleached?), striate; whorls $5\frac{1}{2}$; umbilicus wider than in *H. parmula*.

This form, described by Deshayes from a single specimen of unknown origin, and not found by recent collectors, is probably to be referred to *H. parmula* as a variety or individual variation.

Form OBSCURA Möllendorff. Shell smaller, plicate-striate, corneous-brown, bands obscure brown. Alt. $9\frac{1}{2}$, diam. 28 mill.

Matutinao, Zebu.

Form ELEVATA Möll. Shell smaller, more solid, strongly rugose-striate; spire more elevated. Alt. 14, diam, $32\frac{1}{2}$ mill.; alt. 13, diam. 27 mill.

A still more elevated form, *trochoidea* Möll., measures, alt 13, diam. $22\frac{3}{4}$ – $26\frac{1}{2}$ mill. It is from *Sambuan* and *Malabuyoc, Zebu*.

The elevated forms tend to assume a scalariform aspect. See von Möllendorff, *l. c.*

H. BUSTOI Hidalgo. Pl. 60, figs. —, 13, 14.

Shell moderately umbilicated, very much depressed, discoidal, carinated, thin, subpelluced, sculptured above with obsolete oblique costulae, striatulate beneath. Whitish, two-zoned with yellowish-brown. Spire little raised; apex flat, smooth. Whorls $4\frac{1}{2}$, a little convex, the last but little wider than the next inner one, angularly deflexed in front; base convex; carina very acute, white, marked by an impressed line. Umbilicus one-seventh the diameter. Aperture horizontal, sublanceolate; peristome simple, margins joined by

a narrow, little-elevated callus. Upper margin expanded, basal reflexed. Alt. 8, greater diam. 28, lesser 24 mill. (*Hidalgo.*)

Badajos, Isl. of Tablas, Philippines.

H. bustoi HID., Journ. of Conch. 1887, p. 100, t. 2, f. 3.

Under a very strong lens most minute granulations are visible, as in *H. parmula*, etc.

H. SARANGANICA Hidalgo. Pl. 60, figs. 10, 11.

Shell narrowly umbilicated, convex-depressed, discoidal, carinated, rather solid, obliquely striatulate, pale tawny, with five yellowish-brown zones; spire convex, apex obtuse; whorls $4\frac{1}{2}$, planulate, the last little wider than the next inner one, in front angularly deflexed, scarcely convex above, sloping, at the labrum subcompressed, beneath convex in the middle, constricted at the aperture, carina acute, white. Umbilicus profound, one-tenth the diameter of the shell. Aperture horizontal, oblong; peristome simple, margins joined by a narrow callus, upper margin expanded, basal reflexed, obsolete one-toothed in the middle. Alt. 12, greater diam. 35, lesser 30 mill. (*Hidalgo.*)

Islet of Sarangani, south of Mindanao, Philippines.

H. Saranganica HID., Journ. de Conchyl. 1887, p. 101, t. 2, f. 4.

Described from a dead specimen, but apparently a distinct species. It may, perhaps, belong to the group of *H. horizontalis*.

H. KOCHIANA Möllendorff. Pl. 59, figs. 43, 44, 45.

Shell rather openly umbilicated, depressed, acutely carinated, elegantly sculptured with rather distant riblets becoming evanescent beneath, and decussating, most minute spiral lines; pale corneous-brown, encircled with 5 narrow bands; three above, one at suture, one at carina, and a darker one midway; two beneath, the carinal one indistinct. Whorls 5, planulate, the last more convex below, suddenly deflexed in front. Aperture nearly horizontal, angular-elliptical, the peristome continuous, expanded, a little reflexed, labiate with white, brown margined outside. Alt. $13\frac{1}{2}$, diam. 32 mill.; alt. 13, diam. 34 mill.; alt. 18, diam. 40 mill. (*Müllff.*)

Medellin and Bantayan, Northern Zebu.

Obbina kochiana v. MOLL., Nachrichtsbl. D. M. Ges. 1888, p. 88; Bericht Senckenb. naturforsch. Ges. zu Frankfurt a. M., 1890, p. 216, t. 7, f. 10.

The toothless basal lip combined with strong oblique riblets will sufficiently distinguish this form.

4. *Group of H. horizontalis.*

Species with a strong oblique gibbous ridge or swelling a short distance behind the upper lip; peristome reflexed all around and thickened, preceded by a constriction. The surface is smooth, delicately obliquely striated, 1 to 5 banded. Basal lip toothed or not. Aperture light within.

H. HORIZONTALIS Pfeiffer. Pl. 57, figs. 97, 98, 99 (typical); 100, 1, (var.)

Shell umbilicated, depressed, acutely carinated at the periphery, soiled whitish with 3 chestnut bands above (the 3d on the carina), and two below, the outer one at the carina; inner half of the base of a brown color, lighter than the bands but darker than the ground-color. Aperture horizontal, more than $1\frac{1}{2}$ times as wide as long. Basal lip obtusely toothed just within the termination of the basal band.

Solid, delicately obliquely striated; spirally banded, the bands continuous, not interrupted by light streaks or blotches; the third band upon the carina. Apex obtuse. Whorls $4\frac{3}{4}$, flat, the last one suddenly descending at the aperture; just behind the peristome constricted and then having a prominent, oblique gibbous ridge or crest on the upper surface. Aperture oblong, almost horizontal; peristome thickened, convex, reflexed, flesh-colored, continuous; the upper and basal margins parallel, the basal lip obtusely toothed near its junction with the outer lip. Umbilicus deep, about one-tenth the diam. of the shell. Alt. 13–14, greater diam. 31 mill.

Island of Batayon and Id. of Tablas, Philippines.

H. horizontalis PFR. P. Z. S. 1845, p. 40; Monographia, i, p. 395; Conchylien Cabinet, p. 410, t. 146, f. 14–16.—REEVE, Conch. Icon. f. 116.—HIDALGO, Journ. de Conchyl. 1887, p. 102.

The mouth is narrower than in *H. reeveana*, there is a brown band on the periphery, and the central area of the base is brown. The peripheral keel too is stronger, and the basal lip has an obtuse tooth near its distal extremity. A smaller variety is mentioned by Hidalgo, having three or only two bands, much resembling *H. reeveana*. It is from Looc, Tablas.

Var. MAJOR (pl. 57, figs. 100, 1). Decidedly larger than the type, somewhat more depressed, but otherwise identical in coloration and proportions. Alt. 13, greater diam. 41, lesser 34 mill.

H. REEVEANA Pfeiffer. Pl. 55, figs. 31, 32, 33, 34, 35, 36.

Shell umbilicated, depressed, lens-shaped, obtusely keeled at the circumference; yellowish with three (3 to 5, according to Pfr.) chestnut bands; delicately obliquely striate, the base concentrically striated. Aperture subhorizontal, its width not $1\frac{1}{2}$ times its length.

A form closely allied to *H. horizontalis*, but having a less narrowed mouth and concentric striæ on the base. Whorls $4\frac{1}{2}$, flattened, the last abruptly deflexed in front, convex beneath. Behind the reflexed peristome it is deeply constricted, having above a gibbous ridge behind the constriction. Aperture nearly horizontal, elliptical; peristome continuous, reflexed, its face thickened, upper margin flesh-colored, basal lip white, having a very slight indication of a tooth in the middle. Umbilicus one-tenth the diameter of the shell.

Alt. 10, greater diam. 24, lesser 21 mill.; alt. 12, greater diam. 30, lesser 24 mill.

Island of Zebu, Philippines.

H. Reeveana PFR. P. Z. S. 1846, p. 42; Monographia i, p. 377; Küster's Conchyl. Cab., t. 75, f. 6-8.—*Obbina reeveana* MOLLENDORFF, Bericht Senckenb. naturforsch. Ges. 1890, p. 220.

A form closely allied to *H. horizontalis*, but without a brown area in the middle of the base, having a less contracted mouth, and the basal lip has no trace of a tooth at the position where it is developed in *H. horizontalis*. Mollendorff has found a more carinated form.

H. LASALLII Eydoux. Pl. 54, figs. 20, 21, 22.

Shell umbilicated, depressed, rather thick, smooth, tawny, three-zoned with brown and marbled with whitish. Spire slightly convex; whorls $4\frac{1}{2}$ -5, nearly flat, the last cylindrical, suddenly deflexed at the aperture. Umbilicus moderate. Aperture horizontal, ear-shaped; peristome much thickened, reflexed, continuous, the upper margin sinuous, impressed, basal margin obsoletely toothed.

Alt. 12, greater diam. 28, lesser 22 mill. (*Pfr.*)

Luzon, Philippines.

H. lasallii EYDOUX, in Guér. Mag. de Zool., t. 115, f. 1.—PFR. in Conchylien Cab., p. 62, t. 77, f. 4-6; Monographia i, p. 380.—REEVE, f. 121.—*H. meretrix* SOWB. P. Z. S. 1841, p. 20.—PFR. Symbolæ, ii, p. 33.—REEVE, Conch. Syst. ii, t. 163, f. 6.—*Obbina Lasallii* (Eyd.) MOLLENDORFF, in N. D. M. Ges. 1888, p. 87, with *forma subcarinata*, *f. subcostata*, and varieties *obscura* and *grandis*.

H. COLUMBARIA Sowerby. Pl. 54, figs. 14, 15, 16, 17.

Shell umbilicated, depressed, low-conic above, the periphery not carinated; of an olive-yellow tint, having one, two or three chestnut bands, variegated with opaque buff flecks or zigzag lines; a row of light blotches always below the suture; basal lip prominently toothed in the middle.

The shell is solid, delicately obliquely striated; there is almost always a brown peripheral band present, usually a broader basal band, and a fainter one at the suture, interrupted by regularly placed opaque buff blotches. Apex obtuse, corneous, first two whorls polished. Last whorl not angled or keeled at periphery, abruptly deflexed in front. There is a constriction just behind the reflexed upper lip, and then a prominent crest or gibbous ridge. Aperture white within, very oblique, ovate-wedge-shaped; peristome white or delicate flesh-tinted, thickened, reflexed; basal lip toothed in the middle. Umbilicus narrow, deep.

Alt. 18, greater diam. 30, lesser $25\frac{1}{2}$ mill.

Province of Albay, Id. of Luzon, Philippines.

H. columbaria SOWB., P. Z. S. 1841, p. 19.—PFR., Monogr. i, p. 381; Conchyl. Cab. p. 61, t. 77, f. 1-3.—REEVE, f. 54.—HIDALGO, Journ. de Conchyl. 1887, p. 100.—*Obbina columbaria* SEMPER, Phil. Archip., ii, p. 126.

May be known from other species having a crest or gibbous ridge behind the upper lip, by its elevated spire, rounded periphery, and row of buff blotches around the sutures.

Section NEOCEPOLIS Pilsbry, 1890.

Shell globose or globose-depressed, with no tendency toward carination. Umbilicus narrow or closed. Columella widened, generally more or less toothed; surface striate, granulated or decussated, not malleated or rudely wrinkled; lip reflexed all around, its terminations remote from one another, scarcely converging. Last whorl only moderately or not at all descending in front; typically having a callus tooth within as in the section *Cepolis*. Anatomy unknown. Type *Helix merarcha* Mabille.

Distribution, *Southeastern Asia (Tonquin, etc.), Andaman Islands, Nicobar Is., Philippines.*

The section here constituted is much more comprehensive than Albers' *Janira*. The latter name is several times preoccupied in Zoölogy.

Group of H. merarcha (typical *Neocepolis*).

Shell globose, with elevated spire, and narrow, slowly-widening whorls, the last deflexed in front. Aperture small, truncate-rounded, the lip reflexed all around, its ends joined by a stout callus. Columella dilated, thickened, and obtusely toothed within. A strong fold within the outer wall, marked outside by a deep pit. Type *Helix merarcha* Mabile.

This shell has very much the aspect of the Neotropical section *Cepolis*, but belongs, I do not doubt, in the vicinity of *Obba*.

The value of the internal fold on the outer wall of the aperture as a group character is not very great.

Examples of a similar structure are found in *H. subtussulcata*, of the section *Jeanneretia*; *H. pellisserpentis*, of the group *Solaropsis*; *H. porcellana* and *H. endoptycha*, of the section *Planispira*; *H. duclosiana* of the section *Plagiptycha*; and teeth with corresponding pits outside are characteristic of the sections *Cepolis* and *Stegodera*. The first four groups named include also species without an internal tooth.

Besides possessing a palatal fold, *Neocepolis merarcha* differs from *H. campanula*, etc., in the narrow, closely coiled whorls, stronger parietal callus, and different columella.

H. MERARCHA Mabile. Pl. 32, figs. 42, 43, 44, 45.

Narrowly, almost closed umbilicate, globose-conoidal, solid, opaque, (probably brown, the only specimen known being destitute of cuticle and whitish); surface closely, regularly plicate-striate, smoother beneath; apical two whorls smooth, shining; spire convex in outline, elevated, dome-shaped; apex obtuse; sutures scarcely impressed; whorls 6, very slowly widening, the upper ones not convex, the last two somewhat convex above. The periphery is slightly angled on the last whorl; the base is scarcely convex on the first half, but its latter part is inflated, gibbous. It is somewhat constricted behind the basal lip, very deeply deflexed anteriorly. There is a deep groove or scrobiculation immediately below the periphery a short distance behind the lip, which corresponds to a callous lamella inside the outer lip. The aperture is very oblique, small, truncate-rounded, livid inside; peristome thick, expanded, subreflexed, flesh-colored, columellar margin dilated, thickened and

obtusely toothed within, parietal wall covered by a thick deposit of callous. Alt. 20, diam. maj. $24\frac{1}{2}$, min. $21\frac{1}{2}$ mill.

Halong, Tonquin.

H. merarcha MABILLE, Bull. de la Soc. Philomathique, Paris, 1888.

A very distinct form. The dome-shaped spire, strong striation, and callous fold within the outer lip are the more obvious characters. My description and figures are drawn from the unique type in the collection of L'abbé A. Vathelet, Ammonier de la Division navale de l'Atlantique.

Group of H. codonodes.

This group is equivalent to *Janira* of Albers.

H. CODONODES Pfeiffer. Pl. 53, figs. 8, 9, (type); 10 (var.)

Shell umbilicated, globose-conoid, solid, obliquely striatulate, very subtly sculptured with close spiral lines; white or straw-colored, shining, with one or two chestnut bands; spire bell-shaped, apex obtuse; whorls $5\frac{1}{2}$, scarcely convex the last descending in front, base gibbous, then subconstricted behind the aperture; aperture oblique, subquadrangularly rounded; peristome thickened, reflexed, the margins subapproximating, joined by a shining callus; columella having a tooth-like protuberance inside, dilated outwardly, sinuous. Alt. 17, greater diam. 20, lesser 17 mill. (*Pfr.*)

Great Nicobar Island.

H. codonodes PFR. P. Z. S. 1846, p. 112; Mon. i, p. 321; Conchyl. Cab. p. 232, t. 111, f. 15, 16, and var. *minor*, t. 128, f. 3, 4.—REEVE, f. 91.—*Helicostyla (Janira) codonodes* MÖRCH, Journ. de Conchyl. xx, 1872, p. 312 (with vars.).

Var. *minore* Mörch. (pl. 53, fig. 10). No bands.

Var. *subcylindrica* Mörch. Larger, with sutural and median black bands. Alt. 27, length of aperture 15 mill.

Var. *edentula* Mörch. Shell thin, having two very obsolete bands; alt. 28, length of aperture 11 mill.

H. CAMPANULA Pfeiffer. Pl. 53, figs. 11, 12, 13.

Shell umbilicate, globose, solid, subtly and regularly obliquely striated; chestnut colored; spire semiglobose, apex obtuse, pale; whorls $4\frac{1}{2}$, a little convex, the last scarcely wider than the preceding, scarcely descending in front, having a pale girdle in the middle.

Aperture very oblique, lunate-oval, livid inside; peristome brown, subthickened, shortly reflexed, margins joined by a callus, the basal margin with a white, obsolete tooth within, dilated outwardly; umbilicus narrow, deep, half concealed.

Alt. 21, greater diam. 27, lesser 23 mill. (*Pfr.*)

Habitat unknown.

H. campanula PFR. P. Z. S. 1845, p. 65; Mon. Hel. Viv. i, p. 321; Conchyl. Cab., p. 231, t. 111, f. 13, 14.—REEVE, Conch. Icon. f. 66.

Compared by Pfeiffer to *Cochlostyla brachyodon*.

Var. β . Pale brown, apex chestnut colored, peristome white. (Pl. 53, figs. 11, 12.)

H. BINTUANENSIS Hidalgo. Pl. 61, fig. 28.

Shell obliquely rimate, globose, solid, somewhat shining, sculptured with scarcely visible growth lines (in places most minutely granulose under a lens); tawny, 3-banded with rufous; spire half-globular, apex obtuse; suture simple, marked by a hair-line of white. Whorls 5, convex; the three last wide, subequal, the last not descending in front, periphery scarcely angled; somewhat turgid beneath. Aperture oblique, truncate-oval, whitish inside, with pellucid bands; peristome flesh-colored, thickened-reflexed, margins joined by a thin callus, the right margin noduliferous at the insertion; columellar margin inwardly thickened-subtruncate, outwardly much dilated, nearly closing the rimation. Alt. 30. greater diam. 28, lesser 26 mill. (*Hid.*)

Penon de Bintuan, Island of Busuanga, Philippines.

Helix Bintuanensis HIDALGO, Journ. de Conch. xxix, 1889, p. 296, t. 13, f. 1.

A form allied to *H. campanulata* Pfr. The three bands are situated, one at the suture, one above and one below the quite obvious angulation encircling the periphery of the last whorl.

H. CAMELUS Pfeiffer. *Unfigured.*

Shell compressly umbilicated, conoid bell-shaped, solid, striate, under a lens most minutely decussated, white, trifasciate with chestnut. Spire ventricose, conoidly attenuated above; whorls 6, moderately convex, the last scarcely descending in front; base subgibbously compressed. Aperture diagonal, truncate-oval; columella

arcuate; calloused, subtruncate; peristome white, expanded, columellar margin dilated.

Alt. 26, greater diam. 29; lesser 25 mill. (*Pfr.*)

Habitat unknown.

H. camelus PFR. P. Z. S. 1855, p. 111; Monographia iv, p. 247.

H. ANACARDIUM Dohrn. Pl. 53, figs. 5, 6, 7.

Shell narrowly umbilicated, globose-turbinata, rather solid, chestnut colored; finely arcuately striated; under a lens finely wrinkled, little shining. Spire convex-turbinata; whorls 6, moderately increasing, the last very obtusely angulated, a little descending in front, the base subdepressed. Aperture diagonal, bluish inside, lunate-rounded; peristome lilac-colored, all around shortly expanded. margins approximating, joined by a callus of the same color; columellar margin reflexed, half-covering the perforation, having one tubercle on its inner edge.

Alt. 21, greater diam. 28, lesser 24 mill.; width of aperture 15 mill. (*Dohrn.*)

Habitat unknown.

Helix anacardium DOHRN, Nachr. Bl. D. M. Ges. 1878, p. 68; Continuation of Küster's Conchylien Cab., p. 599, t. 175, f. 5, 6, 7.

Described from a single specimen of unknown origin. It is allied to *H. campanula*, *codonodes*, etc., but seems to be perfectly distinct.

H. HEMIOPTA Benson. Pl. 31, figs. 21, 25; pl. 64, figs. 67, 68, 69, 70, 71, 72.

Shell narrowly umbilicated, depressed-conoidal, a trifle striatulate, nearly smooth, very minutely granulated, opaque, whitish; last whorl chestnut colored above, darker toward the periphery; spire convex-conoidal, apex obtuse, suture scarcely impressed. Whorls $4\frac{1}{2}$, a little convex, sensibly widening, the last a little concave above the obtusely angled periphery, somewhat convex below; aperture oblique, subquadrate-lunate, concolored within; peristome a little expanded, arched forward above, narrowly reflexed beneath, margins remote, the columellar strongly dilated above, nearly covering the umbilicus. (*Bens.*) Alt. 10, greater diam. 16, lesser $13\frac{1}{2}$ mill.

Port Blair, Andaman Is.

H. hemiopta BENS. Ann. Mag. N. H. 3d Ser. xi, p. 318, May 1863.—PFR. Monogr. v, p. 347.—HANL. & THEOB. Conch. Indica, t. 30, f. 4; t. 53, f. 8.—VON MARTENS, Novit. Conch. v, p. 37, t. 143, f. 1-8.—DOHRN, Küster's Conchyl. Cab., p. 578, t. 170, f. 5-7.

Numerous color-varieties have been figured, the more notable of which are given on my plates.

H. CERES Pfeiffer. Pl. 53, fig. 99.

Shell umbilicated, semiglobose-subcampanuliform; solid, lightly striatulate, little shining, dull buff, ornamented with several reddish bands; spire convex, apex subtle, obtuse; suture scarcely impressed. Whorls $6\frac{1}{2}$, scarcely convex, slowly increasing, the last not descending; periphery carinated; base more convex. Aperture diagonal, obliquely lunar, whitish-flesh-colored inside; peristome brownish-flesh-colored; margins remote, right margin expanded, basal shortly reflexed, columellar margin dilated, having an oblique fold within, vaulted outwardly, half-covering the narrow umbilicus. Alt. 14, greater diam 23, lesser 20 mill. (*Pfr.*)

Philippine Is.

H. ceres PFR. P. Z. S. 1853, p. 49; Monographia, iii, p. 647.—REEVE, Conch. Icon. f. 1021.

Group of H. platyodon.

Subglobose species, imperforate or narrowly umbilicated, with no tendency to carination. Banded or unicolored. Lip reflexed; columella toothed more or less distinctly.

H. PLATYODON Pfeiffer. Pl. 32, figs. 35, 36, 37, 38, 39.

Shell globose-depressed, imperforate, solid; white, with 5 rich chestnut bands, the upper three much interrupted by white spots and streaks, often fused into oblique, zigzag streaks, giving the upper surface a brown-and-white maculated pattern. Surface nearly smooth, delicately obliquely striate and densely microscopically granulated all over.

Spire moderately depressed, of $5\frac{1}{2}$ slightly convex whorls, the first 2 glossy, corneous; the last whorl deflexed in front. One of the bands is below the suture, one at periphery, another midway between them; these three bands are usually broken into rhombic blotches, which often coalesce with the blotches above and below, forming oblique streaks. The fourth band is on the base, and is less interrupted. Another band encircles the place of the umbilicus. Aperture quite oblique; lip reflexed, white; columellar margin bearing within a squarish or simply convex tooth-like process; at the insertion dilated over the umbilicus.

Alt. 18, greater diam. 27, lesser 23 mill.

Island of Hainan, S. China.

H. platyodon PFR. P. Z. S. 1845; Mon. Hel. Viv. i, p. 311; Conchyl. Cab., t. 63, f. 11, 12.—PHILIPPI, Abbild., ii, Helix t. 7, f. 1.—MARTENS Ostas. Landsehn., p. 50.—GREDLER, Mal. Bl. n. f. v, p. 175.—MOLLENDORFF, Jahrb. D. M. Ges. 1884, p. 372, t. 8, f. 3—8.—*H. tournoueri* CROSSE, Journ. de Conchyl. xvi, 1868, p. 107, 173, t. 6, f. 4.

In both form and coloration this species varies much. The general pattern of banding, the granulated surface and general form are, nevertheless, sufficiently different from any other species to permit ready identification. Fig. 36 of plate 32, represents the typical form. The columellar tooth is often more prominent and square than the figures show.

The jaw, Möllendorff says, is of the odontognathous type. Animal finely wrinkled, pale reddish gray-brown; sole yellowish gray-brown, indistinctly tripartite.

H. MORLETI Dautzenberg & d'Hamonville. Pl. 65, figs. 80, 81.

Shell umbilicated, conic-globose, thin, subpellucid, very shining. Spire conoid. Whorls 7, convex, densely radiately arcuately plicated; the base delicately striated, perforated by a very deep, funnel-shaped umbilicus. Aperture subrotund, margins thickened, broadly reflexed, joined by a thin, shining callus. Columella subdentate at base. Color pale grayish buff. Alt. 23, greater diam. 30, lesser 25 mill. (*D.* & *d'H.*)

Road from Bac-Ninh to Lang-Son, Tonquin.

Helix Morleti D. & H., Journ. de Conchyl. 1887, p. 217, t. 8, f. 3.—*Rhagada Morleti* ANCEY, Le Naturaliste, (Paris), p. 70, March, 1888.—*Helix mercatorina* MABILLE, Bull. Soc. Mal. France, 1887, p. 88, t. 2, f. 10, 11.

This species seems more closely allied to *H. platyodon* than to other forms known to me. A translation of the original description of *H. mercatorina* was given in this volume, p. 121, and the original figures are on pl. 15, figs. 67, 68. I have no doubt that the species really belongs to *Obba* rather than in *Euhadra* where I formerly placed it.

H. morleti is apparently allied to *H. merarcha* in having numerous narrow whorls of the spire.

*Unfigured and doubtful species of Obba.*H. CHEIRI Lesson. *Unfigured.*

Shell depressed, umbilicate, rather solid, obliquely sub-rugose, buff, striate with rufous; last whorl broad, carinated; suture profound; umbilicus large, funnel-shaped; aperture obovate, white within; peristome thick, reflexed, margin glabrous. Alt. 8, diam. 16 lines. (*Lesson, Voy. de la Coquille, p. 308.*)

Port Dorey, New Guinea.

An unrecognized species, probably belonging either to *Obbina* or more likely, *Geotrochus*.

H. RECLUZIANA Le Guillou. *Unfigured.*

Shell orbicular, convex-depressed above, reddish-brown, whitish below. Whorls 5, lightly and closely striated, convex-depressed, the last rotund, encircled by a white band margined above with a rufous line. Aperture subrotund, reflexed, tinted with brown; columella dilated, truncated and obtusely one-toothed within. Umbilicus consolidated, rufescent. Alt. 17-20, diam. 26-27 mill. (*Guill. in Rev. Zool. 1842, p. 137.*)

Habitat unknown.

Evidently not a member of this group. It is impossible to identify this species except by an examination of the original type.

 Subgenus CHLORITIS Beck, 1837.

Shell depressed-globose, discoidal or planorboid, the apical whorl (and usually the whole spire) flattened or sunken; nucleus small, not differently sculptured from the succeeding whorls. Lip reflexed. Southern China to northern Australia, East Indies.

Shells of the great group *Chloritis* are distinguished from *Obba* and its subdivisions and from *Camæna* and *Acavus* by the smaller nucleus, not marked off in any way from the following whorls; from *Hadra* by the flattened or concave nucleus, etc.

The subgenus comprises a great variety of forms, but the extremes are connected by so many intervening species that subdivisions are only vaguely bounded and correspondingly difficult to define.

Section I. CHLORITIS Beck.

The *apical whorl* (and often the whole shell) having granules or hair-scars arranged in oblique rows. Shell generally reddish or brown, unicolored, or more rarely banded.

Section II. PLANISPIRA Beck.

Apical whorl smooth, not granulate or sculptured. Shell white or pale, banded with brown.

For the ill-defined subdivisions of these sections, see under the sectional heads below.

Section I. CHLORITIS Beck, 1837.

Chloritis BECK, Index Moll. p. 29, (Subgenus 24th).—ALBERS, Die Heliceen 1850, p. 91; Die Hel. (Edit. v MARTENS) p. 161, 1860, type *H. unguлина* Linn.—TAPPARONE CANEFRI, Annali Mus. Civ. Genova, xix, p. 161, 1883, and of authors generally,—*Erigone* ALBERS, Die Hel., 1850, p. 92 (for *H. discordialis* Fér.).—*Semicornu* ("Klein") H. & A. Adams, Genera Rec. Moll. ii, p. 202, 1855.

As I have already said above, the species of *Chloritis* have the apical whorl granulate; this character is sometimes obscured by the apex becoming rubbed or worn. Under *Chloritis* four feebly-characterized subsections we may recognize with profit, splitting, as they do, the multitude of species into manageable portions.

1. Subsection *Chloritis* (restricted). Spire plane or sunken, rarely elevated. Shell generally unicolored reddish, sometimes banded, under a thin, freely deciduous epidermis which is usually velvety or hairy. Last whorl embracing the preceding one. Umbilicus open. Moluccas, New Guinea, Louisiade, Solomon and Admiralty groups of islands. Type *H. unguлина* Linn.

2. Subsection *Sulcobasis* Tapp. Can. Shell large, heavy, globose-depressed, the spire convex; dark, unicolored; base encircled by more or less well-marked sulci or furrows. Type *H. sulcosa* Pfr.

3. Subsection *Austrochloritis* Pilsbry. Small, thin, unicolored, narrowly umbilicated; spire convex; aperture lunate; epidermis hairy or velvety, not deciduous. Peristome thin, narrowly reflexed. Northern Australia, Western New Guinea. Type, *H. porteri* Cox.

4. Subsection *Trichochloritis* Pilsbry. Shell depressed, thin, light, the spire low-convex or plane; epidermis not deciduous, more or less hairy or velvety; unicolored brown or having a suprapraperipheral band. South-eastern Asia; Philippine Is. Type, *H. breviseta* Pfr.

1. Subsection *Chloritis*, restricted.*Group of H. unguлина.*

Spire decidedly sunken; shell unicolored reddish or brown, the epidermis generally deciduous.

H. UNGULINA Linné. Pl. 51, figs. 54, 55, 56.

Unicolored; striatulate, not decussated; spire deeply sunken, narrow; whorls $5\frac{1}{2}$ –6. Aperture a narrow crescent.

Shell umbilicated, planorboid, obliquely striatulate, chestnut colored (usually denuded of the thin pellucid epidermis), lighter beneath. Spire deeply sunken, composed of $5\frac{1}{2}$ –6 slightly convex, narrow whorls, the last very large, descending in front, tumid above, then sloping toward the periphery, bluntly subangular on the base, broadly concave around the umbilicus, which is deep, and about one-eighth the diameter of the shell. Aperture crescentic, embracing a large segment of the whorl, little oblique, pale lilac-colored inside; peristome thin, expanded all around and subreflexed, fleshy-white or pale lilac. Alt. 22, greater diam. 40, lesser 33 mill.

Ceram, Moluccas.

H. unguлина LINN., Syst. Nat. x, p. 772.—PFR. Mon. i, p. 383; Conchyl. Cab., t. 14, f. 7, 8.—REEVE, Conch. Icon., f. 473.—CHENU, Illustr. Conchyl., t. 8, f. 1.—MARTENS, Preuss. Exped. Ostas., Land-schn., p. 279.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xx, p. 149.—*Chloritis unguлина* BECK, Index, p. 29.

The largest species of the unicolored group of *Chloritis*. The width of the concave spire, measured along the line of the lesser diameter is less than one-third of that diameter,—narrower than in other species. The figures on my plate are not very good. The suture along the latter fourth of the body-whorl should form a tangent to the preceding whorls.

The young are shortly, closely pilose.

Var. MINOR Fér. Pl. 51, figs. 57, 58, 59.

More shining, brownish-orange, spire less immersed, peristome proportionately wider, aperture larger, basal angle obsolete. Alt. 16, greater diam. 30, lesser 24 mill.; aperture, length 18, width 16 mill. It is from Ceram.

H. unguлина var. β minor. Fér. Hist. t. 77, f. 2.—? *Chloritis aurantium* BECK, Index, p. 29.—v. MARTENS, Preuss. Exped. Landschn., p. 280.

H. UNGUICULINA Martens. Pl. 50, figs. 29, 30, 31.

Shell inflated, with immersed spire, narrowly umbilicated, lightly striatulate, little shining, obsoletely pilose, olivaceous-brown, concolored; *spire profoundly sunken*, suture profound; whorls 5, subangular at the suture, the last one tumid, *obtusely angulated beneath*, excavated inside of the angle, deeply descending in front; aperture little oblique, subtrigonal-lunate, margins strongly arcuate near their insertions; peristome not thickened, all around rather widely expanded, white. Alt. 10, greater diam. 17, lesser 13 mill; apert. length $8\frac{1}{2}$, width 9 mill.

Alt. 8, greater diam. 13, lesser 10, apert. length 6, width $6\frac{1}{2}$ mill.

Kajeli and Oki, Island of Buru, Moluccas.

H. unguiculina MART., Mal. Bl. x, 1863, p. 113, 135; Preuss. Exped. Landschn. p. 278, t. 14, f. 5.—PFR. Mon. v, p. 390.

A miniature *H. unguicula*; the two angles are often more prominent than in that species; the peristome is proportionally wider. Differs from *H. unguiculastra* in the deeply sunken spire, etc. Traces of short numerous hairs are seen on the best-preserved specimens.

H. BIOMPHALA Pfeiffer. *Unfigured.*

Shell moderately umbilicated, depressed, rather solid, striatulate and covered with short down; brown; spire profoundly sunken; whorls nearly 5, swollen, the last one rapidly increasing, inflated, high, perceptibly descending in front, not angulated around the umbilicus. Aperture slightly diagonal, lunar-rounded, pearly inside; peristome thin, flesh-colored, margins converging, the right margin ascending from the insertion, subregularly arcuate, narrowly expanded; columellar margin subarcuate-sloping, narrowly reflexed. Alt. 10–11, greater diam. 20, lesser 17 mill. (*Pfr.*)

H. biomphala PFR., P. Z. S. 1862, p. 272; Mon. v, p. 391.—MARTENS, Preuss. Exped., Landschn., p. 279.

Similar, says v. Martens, to *H. unguiculina*, especially in the deeply concave upper surface, but larger, umbilicus and spire-cavity narrower, the umbilicus not encircled by an angulation.

H. MARTENSI Pfeiffer. *Unfigured.*

Shell inflated-discoidal, rather widely umbilicated, lightly striatulate, chestnut colored; spire little sunken, sutural angle distinct; no angulation around the umbilicus; whorls $4\frac{1}{2}$, the last deeply de-

flexed in front; aperture diagonal, subtriangular, peristome expanded all around, rosy, upper margin angled above near the suture.

Alt. 9, greater diam. 19, lesser 14 mill.; apert., length $9\frac{1}{2}$, alt. 9 mill. (*Mart.*)

Ceram, Moluccas.

H. martensi PFR. P. Z. S. 1861, p. 193; Monogr. v, p. 389.—MARTENS, Ostas. Landschn., p. 279.

Stands between *unguiculastra* and *unguiculina*, nearer the last, but distinguished by the less sunken spire, wider umbilicus and less high shell.

H. CHERATOMORPHA Tapparone Canefri. Pl. 51, figs. 48, 49, 50, 51.

Shell umbilicated, discoidal, somewhat solid, lightly striated, all over closely impressed-punctate, rufous, the umbilicus and peristome whitish; spire compressed, in the middle immersed. Whorls $5\frac{1}{2}$, separated by an impressed suture, the upper ones flattened, the last cylindrical, large, deflexed in front; umbilicus moderate, deep. Aperture oblique, lunar, pale inside; peristome a little thickened, narrowly expanded above, reflexed beneath, margins approaching, the right margin ascending a little from the insertion, then incurved, basal margin nearly straight, columellar little-oblique, slightly dilated. Alt. 16, greater diam. 38, lesser 31 mill. (*Can.*)

Island of Sorong, New Guinea.

H. cheratomorpha CANEFRI, Ann. Mus. Civ. Genova, xix, p. 167, t. 4, f. 15-18, 1883.—*H. unguicula* CANEFRI, Ann. Mus. Civ. Genova, ix, p. 289, 1876-77 (not of Ferussac.).

.

H. BIFOVEATA Benson. Pl. 50, fig. between 36 and 42.

Shell umbilicated, subglobose, concave above and below, obliquely striated and most minutely granulated, buffish-brown, translucent; spire profoundly excavated, perspectively umbilicus-shaped; whorls $4\frac{1}{2}$, narrow, convex, receding, the last one prominent, inflated, compressed above, compressedly-angulate around the moderate, perspective umbilicus beneath. Aperture vertical, very long, projecting beyond the body-whorl above and below, very narrowly crescentic, subangular above and below; peristome simple, acute, a little expanded, the margins remote, converging, columellar margin short, subvertical, lightly expanded. Alt. 6, greater diam. 10, lesser 9 mill. Aperture, alt. 7, width scarcely 2 mill. (*Pfr.*)

Village of Therabuin, Tenasserim Valley, Burmah.

H. bifoveata BENS., Ann. Mag. N. H. 2nd ser. xviii, p. 251.—PFR., Mon. iv, p. 296.—HANLEY & THEOB., Conch. Indica, t. 14, f. 8.

A very peculiar species, having the spire deeply sunken. The sculpture consists of lines of granules crossing each other obliquely. I have not seen the species, but place it here on account of the concave spire. It might be considered as a tangent from the circle of *Helix breviseta*. The very poor figure is larger than the natural size.

Group of H. circumdata.

Spire sunken; last whorl encircled by numerous dark and light bands and lines. Distribution, New Guinea.

H. CIRCUMDATA Férussac. Pl. 52, figs. 74, 75, 76.

Shell umbilicated, discoidal-inflated; surface delicately but closely and regularly striatulate, and showing under a lens minute points (hair-scars) regularly arranged. Very numerous light yellowish and chestnut bands and lines encircle the body-whorl; Spire concave, shallow. Whorls 5, the last descending to the middle of the preceding whorl in front, broadly concave around the umbilicus. Aperture slightly oblique, whitish inside; peristome white, expanded all around, baso-columellar margin narrowly reflexed. Alt. 13, greater diam. 27, lesser 22 mill.; alt. of apert. 12, width 15 mill.

Aru Is.; Mysol; Waigiou; Mac Cluer Gulf, western New Guinea.

H. circumdata FER. Hist., t. 77, f. 1.—PHILIPPI, Abbild. i, p. 152, *Helix* t. 5, f. 9.—QUOY & GAIMARD, Voy. de l'Uranie, Zool. p. 470, t. 67, f. 12, 13.—PFR., Mon. i, p. 387; Conchyl. Cab. p. 335.—REEVE, Conch. Icon. f. 470.—MARTENS, Monatsber. K. P. Acad. Wissensch. Berl. p. 274, 1887.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xxiv, 1887, p. 142.—*H. molliseta* PFR. P. Z. S. 1862, p. 271; Novit. Conch. p. 205, t. 54, f. 4-6.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. 1887, p. 142.—*Semicornu circumdatum* and *S. mollisetum* WALLACE, P. Z. S. 1865, p. 410.

A smaller species than *H. lansbergiana*, with less expanded peristome. It differs from *H. maforensis* in having short hairs or hair-scars all over.

H. molliseta is doubtless a synonym. The original figures are given on pl. 51, figs. 63, 64, 65.

H. LANSBERGIANA Dohrn. Pl. 50, figs. 26, 27, 28.

Shell umbilicated, depressed, planorboid, rather solid, light fulvous, with many rufous zones, striate, densely beset all over with granules (hair-scars arranged in quincunx). Spire plane, sunken in the middle. Whorls 6, a little convex, the last very large, depressed-rounded, deflexed in front. Aperture oblique, lunar, bluish-white inside; peristome milk-white, thickened, right margin broadly expanded and a little reflexed. Columella more shortly reflexed, flexuous, half concealing the narrow umbilicus. Alt. 18, greater diam. 46, lesser 37 mill. (*Dohrn.*)

New Guinea?

H. lansbergiana DOHRN, Nachr. d. Mal. Ges. 1879, p. 69; Continuation of Conchyl. Cab., p. 598, t. 175, f. 1-3.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. 1887, p. 142.

Closely allied to *H. circumdata*, but larger, with broader peristome.

H. MAFORENSIS Tapparone Canefri. Pl. 61, figs. 15, 16, 17.

Shell *broadly and profoundly umbilicated*, depressed, planorboid, *solid*, waxy-white, encircled by many *brown bands and lines*. Spire plane, sunken in the middle, whorls $5\frac{1}{2}$, subconvex, longitudinally striated, the last large, rotund, in front moderately descending, subflattened beneath, excavated around the umbilicus. Aperture oblique, narrowly lunate, subquadrate, inside whitish; peristome simple, all around narrowly reflexed, whitish, margins converging, the right margin regularly curved, basal substraightened, columellar ascending, narrowly reflexed.

Alt. 13, greater diam. 32, lesser 27 mill. (*Canefri*).

Island of Mafor, Bay of Geelvink, New Guinea.

H. maforensis CANEFRI, Ann. Mus. Civ. Genov. 1877, p. 140, t. 1, f. 1-3.

Differs from *H. circumdata* and *molliseta* in lacking hair-scars on the body-whorl, in the coloration, solidity and wider umbilicus.

Var. *MICROMPHALUS* Pilsbry. Pl. 52, figs. 77, 78, 79.

Much smaller than typical *maforensis*; whorls 5; umbilicus very narrow, one-twelfth the diameter of the shell.

Alt. 11, greater diam. 21, lesser $17\frac{1}{2}$ mill.; Apert., alt. 10, width $11\frac{1}{2}$ mill.

Aru Is.

Group of H. unguicula.

Spire plane, neither sunken or convex, unicolored or with one or two light bands. Distribution, Moluccas.

H. UNGUICULASTRA Martens. Pl. 50, figs. 39, 40, 41.

Shell discoidal, narrowly umbilicated, lightly, widely striate, little shining, chestnut colored, unicolored; *spire plane*, suture rather deep; whorls 5, the last tumid, rounded, convex beneath. Aperture little oblique; broadly lunar; peristome scarcely thickened, all around shortly and equally expanded, violaceous. (*Mts.*)

Amboyna group of the Moluccas, Is. of Buru and Amboyna.

H. unguiculastra MART. Preuss. Exped. Ostas. Landschn., p. 281, t. 14, f. 1.

Von Martens recognizes two forms:

a. var. Buruensis (or typical; see figs.)

Larger, last whorl obtusely angled at suture, but little and gradually descending in front; umbilicus narrower. Alt. 14, greater diam. 26, lesser 22; length of apert. 15, width 14 mill. Alt. 11, greater diam. 22½, lesser 18; length of apert. 12, width 12 mill.

b. var. amboinensis Mts. Smaller, last whorl scarcely angular, deeply descending in front; umbilicus a little wider. Alt. 11, greater diam. 22, lesser 18 mill.; apert. length 11½, width 10 mill. Alt. 9, greater diam. 18, lesser 14½ mill.; apert., length 9, width 9 mill.

Animal dark reddish-gray, finely granulate; tentacles slender, black; tail smooth, without mucous gland; sole 26 mill. long, 6 broad; tentacles 13 mill. long; jaw with projecting riblets [*leisten*]. Very shy. Young, fresh examples are finely hairy. (*Martens.*)

This species resembles in color and the narrow umbilicus *H. unguilina*; In the flattened form and the entirely flat spire it is more like *unguicula*; but it is smaller than either. The far flatter form, quite comparable to *H. quimperiana*, renders the smaller forms quite different from *H. quieta* Rve. The *H. flexuosa* of Pfeiffer may be the same. Martens believes the locality "*Borneo*", given by Pfeiffer for that species, to be an error for *Buru*.

Var. PILOSA Martens. Shell inflated-discoidal, moderately umbilicated, lightly striatulate, beset with short black hairs; pale brown; spire plane, suture moderately deep; no angle at the suture, whorls 5, the last inflated, rotund, deeply deflexed in front; aperture sub-diagonal, lunate-circular, peristome not thickened, all around expanded, reflexed, white. Alt. 11, greater diam. 21, lesser 17½ mill.; apert. alt. 10½, diam. 11½ mill. (*Mart.*)

The last whorl is more deflexed in front than in *unguiculastra*.
H. breviseta Pfr. has a wider umbilicus.

H. FLEXUOSA Pfeiffer. *Unfigured*.

Shell umbilicate, depressed, rather solid, lightly striate, a little shining, chestnut colored; spire subplane, a trifle immersed in the middle. Whorls 5, rapidly increasing, a little convex, above irregularly spirally striate; last whorl wide, subdepressed, a trifle descending in front, base not compressed around the narrow umbilicus. Aperture oblique, rotund-lunar, wider than high; peristome lilac, expanded, basal margin sloping, flexuous, reflexed.

Alt. 11, greater diam. 30, lesser 25 mill. (*Pfr.*)

“*Borneo.*”

H. flexuosa PFR. P. Z. S. 1855, p. 112; Monogr. iv, p. 292.—MARTENS, Preuss. Exped. nach Ostas., Landschn., p. 282.

H. CERAMENSIS Pfeiffer. *Unfigured*.

Shell discoidal, narrowly umbilicated, lightly, rather widely striated, shining, chestnut-rufous; spire plane, a little immersed in the middle; suture moderately profound; whorls 5, the last rounded, deflexed in front; aperture little oblique, transverse, semi-elliptical; peristome slightly thickened, pale violaceous. Alt. 15, greater diam. 35, lesser 26 mill.; apert. long 20, alt. 16½ mill. (*Mart.*)

Island of Ceram, Moluccas.

H. ceramensis PFR. P. Z. S. 1861, p. 192; Monogr. v, p. 386.—MARTENS, Ostas. Landschn. p. 283.

Intermediate between *unguiculastra* and *unguicula*; flatter and more shining than the former, having a narrower umbilicus than the latter. (*Mart.*)

H. UNGUICULA Féruissac. Pl. 50, figs. 32, 33, 34.

Shell inflated-discoidal, openly umbilicate, lightly striate, a little shining, *orange colored*, with a little-distinct *whitish band above, and a wide umbilical whitish tract*; spire little immersed, nearly plane. Whorls 5½, suture rather deep; last whorl swollen, rounded, *its base concave*; slightly descending in front. Aperture diagonal, broadly lunar, peristome rather widely expanded all around, of the color of the shell, columellar margin dilated at the insertion.

Alt. 18½, greater diam. 38½, lesser 30 mill.; apert. long, 20½, lat. 19 mill.

Alt. 13, greater diam. 22½, lesser 20 mill.

Ceram and Amboyna, Moluccas.

H. unguicula FER. Hist., t. 76, f. 3, 4.—PFR. Mon. i, p. 384.—REEVE, Conch Icon. f. 468.—MARTENS, Preuss. Exped., Landschn. p. 283.—*H. yoldii* MORCH, ms.

Varies much in size. The whitish band above and white umbilical patch will distinguish it from other forms.

H. GRUNERI Pfeiffer. Pl. 68, figs. 86, 87, 88.

Shell umbilicated, depressed, nearly plane above, very minutely punctate-striate, rufous; whorls $5\frac{1}{2}$, perceptibly increasing, nearly plane, the last one rounded, a trifle deflexed in front; umbilicus narrow; aperture subvertical, depressed, broadly lunar; peristome thickened, reflexed, margins joined by a thin callus which bears above a strong arcuate tooth. Alt. 18, greater diam. 38, lesser 32 mill. (*Pfr.*)

Island of Buru, Moluccas.

H. gruneri PFR. P. Z. S. 1845, p. 63; Monogr. i, p. 384; Conchyl. Cab. p. 473, t. 157, f. 9–11.—MARTENS, Ostas. Landschn. p. 284.—*Semicornu gruneri* Pfr., WALLACE, P. Z. S. 1865, p. 410.

Spire not sunken; shell finely punctate, unicolored; umbilicus narrow.

H. EXACTA Pfeiffer. Pl. 50, figs. 35, 36.

Shell umbilicate, depressed, solid, somewhat roughly striate, tawny; spire plane, subimmersed in the middle. Whorls $5\frac{1}{2}$ a trifle convex, *slowly increasing*, the last not descending, rounded on the periphery, the base subinflated around the narrow umbilicus; aperture little oblique, narrowly lunar; peristome narrowly expanded and thickened, margins remote, the right margin ascending a little from the insertion, columellar margin a little dilated. Alt. 14, greater diam. 30, lesser $26\frac{1}{2}$ mill. (*Pfr.*)

Northern New Guinea.

H. exacta PFR., P. Z. S. 1862, p. 271; Novit. Conch. p. 212, t. 56, f. 5, 6; Monogr. v. p. 386.

Group of H. eustoma.

Shell thin, the spire nearly plane; epidermis thin usually persistent, hairy. Species inhabiting the islands lying eastward from New Guinea, from the Lousiade and Solomon groups north to New Ireland and the Admiralty Is.

H. ERINACEUS Pfeiffer. Pl. 52, figs. 88, 89.

Shell umbilicated, depressed, thin, beset with hairs on tubercles arranged in quincunx; rufescent; spire subplane, suture simple. Whorls $4\frac{1}{2}$, a little convex, the last inflated, somewhat descending in front, compressed around the umbilicus. Aperture oblique, rotund-lunar; peristome fleshy-brown, thin, expanded in every part, margins converging joined by a thin callus, columellar margin dilated.

Alt. 14, greater diam. 22, lesser 18 mill. (*Dohrn.*)

New Ireland; New Georgia.

H. erinaceus PFR. P. Z. S. 1861, p. 192; Monogr. v, p. 387; Novit Conch. ii, p. 174, t. 47, f. 3, 4.—DOHRN Conchyl. Cab., p. 602, t. 175 f. 15, 16.

A species generally confused with *H. eustoma*; the difference from that species is marked. The spire is less flat; the suture is not channelled, the umbilicus penetrates deeply but is not broadly funnel-shaped as in *eustoma*; the lip is expanded but not reflexed. It is more nearly allied to *H. discordialis*, perhaps not specifically separable. See Dohrn, *l. c.*

H. LEEI Cox. Pl. 49, figs. 18, 19.

Shell with a large, open, funnel-shaped umbilicus, thin, translucent, globosely depressed, of a dark cinnamon-brown color, transversely rather coarsely striated throughout, and covered above and below with oblique rows of prominent rather coarse setæ; spire slightly raised, bluntly convex; suture deeply impressed; whorls 5, convex, gradually increasing in size, last somewhat inflated, rounded below, excavated round the umbilicus, and gradually depressed in front for half the circumference of the whorl; aperture transversely oval, lip broadly expanded and slightly thickened, triangularly dilated at the columella, the outer margin of which overhangs the umbilicus; margins of aperture joined by a thin callus.

Alt. 0.76, greater diam. 1.21, lesser 0.95 inch.

Island of St. Aignan, Louisiade Archipelago.

H. leei Cox, P. Z. S. 1873, p. 565, t. 48, f. 5, 5a.—E. A. SMITH, Ann. & Mag. N. H. 1889 (Vol. iv, 6th Ser.), p. 201.

Resembles a large *H. erinaceus*.

H. SUBCORPULENTUS Smith. Pl. 68, fig. 84.

Shell broadly and profoundly umbilicated, rather thin, globose-depressed, shining, pale brownish, paler toward the apex; whorls 5,

a little convex, rather rapidly increasing, sculptured with oblique, delicate lines of growth; separated by a well-impressed suture; the last whorl inflated, shortly and obliquely descending in front. Aperture broadly lunar, little oblique, pearl-like inside; peristome livid-rufescent, broadly expanded and reflexed, margins joined by a very thin callus, the columellar margin much dilated. Alt. 25, greater diam. 40, lesser 32 mill. (*Smith.*)

Rossel Island, Louisiade Archipelago.

H. (Chloritis) subcorpulentus E. A. SMITH, Annals and Magazine of Natural History, 6th series, vol. iv, p. 201, t. 13, f. 14, Sept., 1889.

In form this species is very like *H. leei*; it is, however, much larger and differently sculptured; it exhibits no trace of the oblique rows of granules occurring in that species, the epidermis being apparently non-pilose, (*Smith.*)

H. DISCORDIALIS Férussac. Pl. 45, figs. 36, 37.

Shell umbilicated, globose-depressed, thin, minutely granulated all over, silky, diaphanous, tawny; spire depressed, plane above; whorls $4\frac{1}{2}$, rapidly increasing, turgid at the sutures, the last descending in front, compressed around the broadly funnel-shaped umbilicus. Aperture diagonal, lunate-oval; peristome thin, broadly expanded, margins approaching, columellar margin dilated. Alt. $13\frac{1}{2}$, greater diam. 26, lesser 20 mill. (*Pfr.*)

Port Carteret, New Ireland.

H. discordialis FER., Hist. t. 74, f. 1.—PFR. Monogr. iii, p. 244.—MARTENS, Monatsb. k. p. Akad. Wissensch. zu Berlin, 1877, p. 274, 1878.—*H. squalus* HINDS, Zool. of the Voy. of H. M. S. Sulphur, p. 55, t. 19, f. 12.—REEVE, Conch. Icon. f. 414.

H. EUSTOMA Pfeiffer. Pl. 50, figs. 44, 45, 46; pl. 52, figs. 86, 87.

Shell umbilicated, inflated-discoidal, thin, brown, covered with a dull, lusterless, very thin epidermis, usually deciduous in places, the surface underneath this epidermis is shining; closely beset all over with short hairs (or hair-scars the hairs being usually rubbed off.) arranged in oblique lines. Spire plane; whorls $4\frac{1}{2}$, very convex, separated by profound sutures, the last whorl inflated, descending in front; base prominently angular around the broadly funnel-shaped umbilicus. Aperture slightly oblique, rounded-lunate; lip

thin, narrowly expanded, baso-columellar margin more broadly expanded, subreflexed. Alt. 13, greater diam. 21, lesser 17 mill.

Islands of Ugi, Faro, New Georgia, Ysabel, Solomon group.

H. eustoma PFR., P. Z. S. 1856, p. 383; Mal. Bl. 1856, p. 243; Novit. Conch. i, t. 38, f. 3-5.—DOHRN, Continuation Conchyl. Cab. p. 572, t. 169, f. 1-3.—SMITH, P. Z. S. 1885, p. 594.

A light thin species with flat or nearly flat spire, very deep sutures, the base prominently angulated. Mr. E. A. Smith considers *H. erinaceus* a synonym; but Dohrn has, I believe correctly, retained them separate.

H. DENTRECASTEAUXI Smith. Pl. 68, figs. 89, 90, 91.

Shell depressed, narrowly umbilicated, light brown, marked with fine lines of growth, and everywhere finely punctate, and probably pilose in a fresh condition, spire slightly sunken below the body-whorl. Volutions 5, convex above, separated by a deepish suture, slowly enlarging; the last somewhat inflated, a little descending anteriorly, having two indentations one, elongate, about the middle of the whorl, at a short distance from the lip, the other nearer the labrum, just under the base, both forming denticular prominences within. Aperture oblique, narrowly lunate. Peristome whitish, thickened, reflexed everywhere, the extremities being united by a thin callosity spreading over the whorl. (*Smith.*)

This remarkable species is readily distinguished from its allies by the peculiar indentations on the body-whorl forming within the aperture pseudo-denticles. As compared with Pfeiffer's figure of *H. eustoma*, also from the Admiralty Islands, it will be seen that this species has a more depressed spire, a narrower umbilicus, and a narrower aperture. (*Smith.*)

Wild Island, Admiralty group.

H. (Chloritis) dentrecasteauxi E. A. SMITH, P. Z. S. 1884, p. 265, t. 22, f. 6, 6b.

H. URSINA Pfeiffer. Pl. 32, figs. 56, 57.

Shell umbilicated depressed, rather thin, striatulate, and under a lens seen to be punctulate, scarcely shining, deep brown. Spire very shortly conoidal, vertex minute. Whorls $5\frac{1}{2}$, moderately convex, the last large, inflated, not descending, subcompressed around the narrow perforate umbilicus. Aperture oblique, lunate-oval, lilac, with a pearly luster inside. Peristome thin, margins distant,

the right one arcuate, narrowly expanded, columellar margin sloping, somewhat reflexed, dilated at the umbilicus. (*Pfr.*)

Alt. $10\frac{1}{2}$, greater diam. 20, lesser 17 mill.

Admiralty Islands.

H. ursina PFR. P. Z. S. 1856, p. 384; Mal. Bl. 1856, p. 243; Monographia, iv, p. 290; Novit. Conch. i, p. 112, t. 31, f. 14, 15.

H. DINODEOMORPHA Tapparone Canefri. Pl. 52, figs. 66, 67, 68.

Shell umbilicated, rather thin, discoidal lightly striate, under a lens seen to be somewhat cancellated by very delicate, obsolete striæ, and all over covered with minute, close, elevated points; rufous or livid-rufous, covered by a setigerous, freely deciduous brown epidermis, the hairs close, short, stiff. Spire plane, immersed in the middle. Whorls $4\frac{1}{2}$, rather convex, separated by profound sutures, the last whorl large, descending in front, subcompressed at the moderate, profoundly perforating umbilicus, generally with some very obsolete spiral grooves. Aperture rotund-lunate, oblique, large; peristome reddish, whitish at base, shortly expanded, reflexed beneath, margins regularly curved, approaching and joined by a thin callus; right and basal margins regularly curved, columellar dilated and reflexed above the umbilicus.

Alt. $16\frac{1}{2}$, greater diam. 31, lesser 25 mill. (*Canefri.*)

Central New Guinea.

H. dinodeomorpha CANEFRI, Ann. Mus. Civ. Genova, xix, p. 168, t. 4, f. 4-7 (shell); t. 7, f. 5, and t. 9, f. 2, 15, (anatomy.)

Allied to *H. erinaceus*, but the umbilicus is narrower, more covered.

H. SILENUS Angas. Pl. 50, figs. 37, 38.

Shell deeply and perspectively umbilicated, rather thin, globosely depressed, pale brown, minutely and very finely punctately striate; spire immersed; whorls 5, rounded, rapidly increasing, the last inflated, a little flattened at the upper part, descending considerably in front, and somewhat angulated round the umbilicus; aperture oblique, rhomboidly lunate; peristome thin, whitish; margins approximating, the right flexuous, narrowly expanded; the columellar margin rounded, expanded, and slightly reflexed. (*Angas.*)

Alt. 10, greater diam. 14, lesser 12 mill.

New Ireland.

H. (Semicornu) Silenus ANGAS, P. Z. S. 1873, p. 182, t. 20, f. 2.

Compare *H. gaimardi* Dh.

H. GAIMARDI Deshayes. Pl. 52, figs. 69, 70, 71, 72, 73.

Shell umbilicated, globose-depressed, rather solid, minutely granulated, tawny; spire plane, subsunken in the middle. Whorls $4\frac{1}{2}$, convex, slowly widening, the last large, deflexed in front, a little swollen at the suture, obsoletely subangulated in the middle, the base distinctly angulated around the moderate-sized funnel-shaped umbilicus. Aperture little-oblique, irregularly, broadly lunar; peristome white, narrowly reflexed, upper margin arched upward, then flexuous, columellar margin sloping.

Alt. $7\frac{1}{2}$, greater diam. 15, lesser $12\frac{1}{2}$ mill. (*Pfr.*)

Port Carteret, New Ireland.

H. gaimardi DH. in Guér. Mag. de Zool., 1831, t. 29; in Fér., Histoire, t. 72, f. 6–9.—PFR. Monogr. i, p. 387; iv, p. 294.—*H. gaymardi* DH. olim.—*H. adustus* HINDS, Voyage of the Sulphur, Zool., p. 55, t. 19, f. 11.—REEVE, Conch. Icon. f. 451.

H. MENDANÆ COX. *Unfigured.*

Shell with a deep open, perspective umbilicus, discoid, white, semi-opaque, smooth and shining, finely transversely striated throughout with lines of growth, ornamented with two narrow dark brown bands, one immediately above, the other immediately below the periphery of the last whorl, and continuous to the apex of the spire; the last whorl is subcarinated only for a short distance near the insertion of the outer margin of the aperture; spire convexly flattened; whorls 6, gradually increasing in diameter, the last not depressed; base convex; aperture oblique, irregularly subcircular, margins approaching, joined by a thin brown callus; lip slightly thickened and everted. (*Cox.*)

Alt. 0.35, greater diam. 0.72, lesser 0.63 inch.

Solomon Is.

H. mendanæ COX, P. Z. S. 1873, p. 148.

A semiopaque, white, flattened species, with a conspicuously open umbilicus, and ornamented with two narrow dark brown bands, one above, the other below the periphery of the last whorl. (*Cox.*)

Systematic position doubtful.

H. MAJUSCULA Pfeiffer. Pl. 48, figs. 4, 5, 6.

Shell large, discoidal, flat or nearly so above, with a broad funnel-shaped umbilicus beneath; dark brown.

It is solid, opaque, of a reddish-brown color, scarcely shining; surface smooth except for slight irregular growth-wrinkles and rude,

shallow spiral furrows and malleations on the base. Spire flat or a little convex, the suture deeply impressed; whorls 5, *convex*, the last wide, obtusely angled at the periphery, which is above the middle of the whorl; a trifle descending in front. Below the periphery the surface slopes to the prominence around the broad umbilicus, within which the whorls are visible to the apex. The aperture is oblique, narrowly lunar, livid inside, the lip white or pink, expanded, outer, basal and columellar margins reflexed, the columellar edge impinging upon the umbilicus. Parietal wall with a transparent wash of callus.

Alt. 16, greater diam. 46, lesser 40 mill.

Alt. 15, greater diam. 41 mill.

New Hanover, New Ireland, Admiralty Is.

H. majuscula PFR., Proc. Zool. Soc. Lond. 1856, p. 381; Novit. Conch. i, p. 107, t. 30 f. 3-5; Monog. Hel. Viv. iv, p. 300.—DOHRN in Küster's Conchyl. Cab. p. 592, t. 173, f. 14-16.

A large, chestnut-brown species, flat above, with deeply impressed sutures. The umbilicus is broader than in the following species.

The surface in all the specimens I have seen, is denuded of the very thin epidermis. The remains of the latter to be seen in the sutures show it to agree with *Chloritis* in being granulate. Young specimens will doubtless be found to be hirsute.

H. isis Pfeiffer. Pl. 32, figs. 46, 47, 48; pl. 49, figs. 16, 17.

Shell umbilicated, depressed, rather solid, striatulate, unicolored chestnut; spire scarcely elevated; whorls 5, hardly convex, sensibly increasing, the last subdeflexed in front; periphery very obsoletely angled; base more convex; aperture oblique, broadly lunar, having a pearly luster inside; peristome white, the margins scarcely converging, upper margin subhorizontal, expanded, basal broadly reflexed, shortly ascending at the insertion, partly closing the moderate umbilicus by its dilation. (*Pfr.*)

Alt. 19, greater diam. 45, lesser 38 mill.

Admiralty Is.

H. isis PFR. Proc. Zool. Soc. Lond. 1860, p. 133, t. 50, f. 8; Malak. Bl. 1860, p. 237; Monographia Hel. Viv. v, p. 375; Novit. Conch. iv, p. 113, t. 126, f. 1-5.

Besides the unicolored chestnut form, specimens occur which are brown with several broad darker bands or yellowish with broad chestnut-brown bands (fig. 48).

The shallower sutures and narrower umbilicus separate this species from *H. majuscula*.

Group of H. quercina.

Depressed-globose with conoidal spire and narrow umbilicus; *the apex prominently exerted*. Surface covered with short rigid hairs; unicolored brown.

The exerted apex of this species is unique in *Chloritis*, where as a rule the apex is planorboid or sunken. The earlier whorls seem to be smooth, as in *Planispira*. Compare also *H. majuscula* and *isis*.

H. QUERCINA Pfeiffer. Pl. 37, figs. 48, 49.

Shell narrowly, half-covered umbilicate, depressed-globose with conical, acute spire; chestnut-brown, unicolored; surface covered with short, stiff hairs, about $\frac{1}{2}$ millim. apart.

Opaque, strong but rather thin, the surface in fresh specimens nearly lusterless and covered with stiff wirey hairs about a half millimeter in length, worn off on the spire and around the umbilicus. In rubbed shells the hair-scars may still be seen on the surface. Spire elevated, acute, its sides slightly concave; apex pointed, projecting; suture impressed, whorls $5\frac{1}{2}$ to 6, convex, the last sub-globose, but often very obtusely angled at the periphery. In front it descends a trifle. Aperture somewhat oblique, the peristome seen in profile to be arched backward in the middle. The aperture is flesh-colored inside, of a rounded-lunar form; peristome white, narrowly reflexed all around, dilated triangularly at the columellar insertion, half covering the narrow umbilicus.

Alt. 23, greater diam. 29, lesser 26 mill.

Shortland, Faro and Ysabel Islands, Solomon Is.; (Admiralty Is.?)

H. quercina PFR. Proc. Zool. Soc. Lond. 1856, p. 382; Novit. Conch. i, p. 108, t. 31, f. 1, 2; Monog. Hel. Viv. iv, p. 247.—*H. Hombroni* PFR. P. Z. S. 1856, p. 382; Novit. Conch. i, p. 111; t. 31, f. 9–11; Monog. Hel. Viv. iv, p. 262.—DOHRN in Conchyl. Cab. p. 583, t. 172, f. 1–4.—*H. janellii* HOMBR. & JACQ. Voy. Pole Sud, Zool. v. p. 8, t. 4, f. 15–18, (not *H. Janellii* Le Guillou, a species of *Xanthomelon*).—*H. (Camæna) hombroni* Pfr. E. A. SMITH P. Z. S. 1885, p. 594.

The typical *quercina* is rather globose, the aperture of a rounded-lunar shape. The form called *H. Hombroni* by Pfeiffer is connected by insensible gradations with it, and must be considered as at most a mere variety.

Var. HOMBRONI Pfr. Pl. 37, figs. 45, 46, 47.

Shell more depressed, the aperture of a narrowly crescentic form ; color chestnut-brown like the type, of a chocolate shade, dark specimens having the inner whorls lighter, and the reflexed lip white, both on its face and back.

Alt. 19, greater diam. 31, lesser $26\frac{1}{2}$ mill.

Alt. 20, greater diam. 36, lesser 31 mill.

Alt. 18, greater diam. 27, lesser 24 mill.

Specimens both larger and smaller than the one figured are before me. Fig. 47 is incorrect in showing no umbilicus.

Group of H. tuba.

Spire flat or convex ; having a few wide dark bands on a lighter or white ground. Distribution, Celebes.

H. BULBULUS Mousson. Pl. 44, figs. 1, 2, 3,—, 16, 17.

Shell *rather broadly umbilicated*, inflated-discoidal, lightly striatulate, roughened by minute close hairs, and minutely *quasi* reticulated. White, three-banded with brown, the umbilicus brown ; spire subimmersed ; suture rather deep ; whorls $4\frac{1}{2}$, the last inflated, convex beneath, deeply descending in front. Aperture diagonal, lunate-semi-elliptical ; peristome broadly expanded all around, thin, of the same color as the shell, margins conniving.

Alt. $19\frac{1}{2}$ – $16\frac{1}{2}$, greater diam. 42– $33\frac{1}{2}$, lesser 31–25 mill. (Mart.)

Southern Celebes, at the waterfall at Maros.

H. bulbus MOUSS., Moll. Jav., p. 114, t. 21, f. 5 (young).—MARTENS, Mal. Bl. x, 1863, p. 76.—*H. bulbulus* (MOUSS., *ms.*) PFR. Monogr. iii, p. 271.—MARTENS, Ostas., Landschn., p. 285, t. 17, f. 2 ; t. 19, f. 4 (animal).—DOHRN, Conchyl. Cab., p. 574, t. 169, f. 7–9.

Distinguished from *H. tuba* by the wider umbilicus, wider and more arcuate basal lip, and completely flat spire.

H. TUBA Albers. Pl. 46, figs. 54, 55, 56 ; pl. 55, fig. 55.

Shell *very narrowly umbilicate*, depressed, thin, subgranulate and beset with short, rigid hairs arranged in quincunx ; opaque, tawny, banded with brown, the umbilical region brown, encircled with white ; spire little projecting ; whorls 4, slightly convex, the last inflated, a trifle descending in front ; aperture nearly vertical, transversely oblong ; peristome reflexed all around, pale corneous, the

margins rather distant, lower one straightened, convexly bent forward. Alt. 22, greater diam. 39, lesser 28 mill. (*Mart.*)

Southern Celebes.

H. tuba ALB. Mal. Bl. 1854, p. 214.—PFR. Novit. Conch. i, p. 25, t. 7, f. 1–3; Monogr. iv, p. 288.—MARTENS, Ostas. Landschn. p. 285.—DOHRN, Conchyl. Cab. p. 574. t. 169, f. 10–12.

The banding is variable; it may be expressed in these formulæ: 00340, 10340 or (123)(45).

H. ZODIACUS Férussac. Pl. 48, figs. 9, 10, 11.

Shell rather narrowly umbilicate, depressed-inflated, lightly striated, sculptured with *very numerous minute impressed points* (probably hair-scars); orange, tawny, paler beneath, with a *broad white, brown-edged band*. Spire a little projecting. Whorls $4\frac{1}{2}$, a trifle convex, the last rounded, a little more swollen below than above, a little descending in front; aperture subvertical, transversely elliptical; peristome widely reflexed, thick, white, outside rosy, margins converging, joined by a white callus, the lower margin straightened, bending forward. Alt. $29\frac{1}{2}$, greater diam. 55, lesser $38\frac{1}{2}$ mill. Apert. long. 35, lat. $26\frac{1}{2}$ mill. (*Mart.*)

Celebes.

H. zodiacus FER., Hist. t. 75, f. 2.—PFR., Monogr. i, p. 373.—REEVE, Conch. Icon. f. 472.—MARTENS, Preuss. Exped. Ostas., Landschn. p. 284.

Most nearly allied to *H. tuba* Alb.

2. Subsection *Sulcobasis*, Tapparone Canefri, 1883.

Sulcobasis TAPP. CAN., Fauna Malacologica del Nuova Guinea, in Annali del Museo Civico di Storia naturale di Genova, xix, 1883, p. 161.—*Chloritis* and *Sphaerospira*, in part, of authors.

Shell large, globose-depressed, unicolored dark chestnut or brown (reddish when the thin epidermis is removed). *Spire convex*, inner whorls (and apex when not worn) showing minutes granules or hair-scars arranged in oblique rows; *body-whorl more or less spirally sulcated*, especially on the base. Umbilicus narrow; aperture wider than high, lip reflexed. Type, *H. sulcosa* Pfr.

A group of large, solid shells, characteristic of New Guinea. They differ from *Chloritis* chiefly in having the spire raised, not concave, and the aperture wider than high.

H. SULCOSA Pfeiffer. Pl. 49, figs. 12, 13, 14.

Shell umbilicated, convex-depressed, rather solid, minutely striatulate and punctate, unicolored, chestnut; spire little convex, obtuse; whorls $5\frac{1}{2}$, rather flattened, the last inflated, sculptured with malleations and irregular subspiral furrows, the side opposite the aperture somewhat swollen; last whorl not descending in front, subcompressed and excavated around the moderate umbilicus. Aperture little oblique, lunar, livid inside; peristome broadly expanded all around, margins slightly converging, the right one much arched, basal lightly arched, columellar margin dilated above, vaultedly reflexed. Alt. 22, greater diam. 43, lesser 34 mill. (*Pfr.*)

Aru Islands.

H. sulcosa PFR., Mal. Bl. i, 1854, p. 65; Novit. Conch. i, p. 1, t. 1, f. 1-3; Monogr. iv, p. 287.—REEVE, Conch. Icon. f. 1350.—*Semicornu sulcosa* Pfr. WALLACE, P. Z. S. 1865, p. 410.—*Helix (Sulcobasis) sulcosa* Pfr. TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 163, 1883.

H. sulcosa being the first species given by Canefri may be considered the type of *Sulcobasis*.

H. RUBRA Albers. Pl. 48, figs. 1, 2, 3.

Shell umbilicated, solid, lightly striate and irregularly, distantly obliquely sulcate; unicolored brick-red; spire but little elevated; whorls $5\frac{1}{2}$, little convex the last dilated and descending in front, the base a little paler; aperture ample, subdiagonal, oblique, lunate-oval, with a pearly luster inside; peristome simple, white, margins joined by a sinuous callus, right margin expanded, basal reflexed, columellar margin dilated.

Alt. 23, greater diam. 65, lesser 50 mill. (*Pfr.*)

Mysol; Aru Is.

H. rubra ALB. Mal. Bl. iv, 1857, p. 93, t. 2, f. 1-3.—PFR. Mon. Hel. Viv. iv, p. 287.—DOHRN, Conchyl. Cab., continuation, p. 569, t. 168, f. 7-9.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 166.

H. BEATRICIS Tapparone Canefri. Pl. 36, fig. 19.

Shell globose-depressed, longitudinally striated, unicolored brownish-chestnut under a thin buffish-green epidermis; spire depressed, a little convex, apex obtuse. Whorl $5\frac{1}{2}$, regularly increasing, the upper obsoletely impresso-punctate, the last large, inflated, in the middle and beneath submalleated and encircled by little-impressed,

irregular sulci; last whorl not descending in front, subcompressed around the perforating, deep umbilicus; aperture a little oblique, rounded-lunar, throat livid; peristome livid-brown, simple, all around expanded and subreflexed, the margins a little converging and joined by a very thin callus; upper and right margins regularly incurved, columellar subthickened, broadly reflexed.

Alt. 35, greater diam. 52, lesser 42 mill. (*T. C.*)

Helix (Sulcobasis) Beatricis T. C., Ann. Mus. Civ. Genov. xix, p. 163, t. 4, f. 14, and anatomy, t. 8, f. 16.

Distinguished from *H. sulcosa* by its far greater dimensions, more globose form and elevated spire, more convex whorls, more rotund form and larger aperture, smaller umbilicus and brownish-chestnut color.

H. REHSEI Martens. Pl. 36, fig. 20.

Shell large, globose-depressed, narrowly umbilicated, solid, dark chestnut, unicolorous; whorls $4\frac{1}{2}$, the earlier having microscopic hair-scars in oblique series, the last encircled at and below the middle by numerous, scarcely noticeable, shallow furrows; lip bluish, thick, broadly reflexed, basal margin sinuous.

The spire is low-conical, obtuse; last whorl slightly descending in front; umbilicus deeply penetrating but rapidly becoming narrow. Aperture livid-bluish inside; peristome thick, broadly reflexed all around, its face convex, bluish, brown-edged; its terminations remote; columellar margin dilated, impinging upon the umbilicus.

Alt. 35, greater diam. 46, lesser 36 mill.

Alt. 30, greater diam. 43, lesser 34 mill.

Inland from Port Moresby, at the foot of the Astrolabe Mts.

Helix (Xanthomelon) Rehsei v. MARTENS, Jahrb. D. Mal. Ges. 1883, p. 82.—SMITH, Ann. Mag. N. H. 5th Ser., xix, p. 418, t. 15, fig. 19.—*H. (Camaena) rehsei*, Mart. TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. 1877, p. 144.—*H. (Sphaerospira) Gerrardi* E. A. SMITH, Ann. Mag. N. H. 5th Ser., xi, p. 192, 1883 (preoc. by Mackay).—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 165.—BRAZIER, Proc. Linn. Soc. N. S. Wales, ix, p. 185, 1884 (by typog. error "*Genardi*").—*H. (Sulcobasis) Gerrardi var. obtecta*, REINHARDT, Sitzungsberichte der Ges. Naturforsch. Freunde zu Berlin, no. 4, 1886, pp. 58, 59.

This heavy, solid shell is remarkable for the thick, broadly reflexed lip, sinuous on its base.

Var. *OBTECTA* Reinhardt.

Agrees with the typical *Rehsei* in form, coloration and sculpture; differs in having the umbilicus entirely closed by the broadly reflexed columellar lip. Alt. 37, greater diam. 48, lesser 35 mill.

H. CONCISA Férussac. Pl. 49, fig. 15.

Shell umbilicated, depressed, solid, unicolored reddish, regularly striate, cut by irregular, oblique furrows; spire somewhat plane, suture impressed; whorls 6, a trifle convex, the last one rounded, scarcely deflexed in front; umbilicus funnel-shaped; aperture oblique, lunate-oval, shining inside; peristome subthickened, white, expanded, margins joined by an arcuate white callus.

Alt. 25, greater diam. 58, lesser 46 mill. (*Pfr.*)

Waigheu, New Guinea; Aru Is.; Id. of Ravack.

H. concisa FER., Hist. t. 78, f. 3, 4; Voy. de l'Uranie, p. 470.—WOOD, Index Test. Suppl. t. 7, f. 53.—PFR. Monogr. i, p. 373.—*Semicornu concisa* Fér., WALLACE, P. Z. S. 1865, p. 410.—*Helix (Sulcobasis) concisa* Fér., TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 165, 1883.

3. Subsection *Austrochloritis* Pilsbry, 1891.

Shell small, thin, unicolored brown or corneous-brown; umbilicate, depressed, hairy or having hair-scars or points, *even to the apex*; spire slightly convex; upper whorl planorboid; periphery rounded; aperture round-lunar, outer lip narrowly expanded, thin, columellar lip reflexed partly concealing the umbilicus, which is excavated somewhat behind it; ends of peristome converging; suture deeply impressed. Type, *Helix porteri* Cox.

Distribution, Northern Australia and New Guinea.

Separated from *Chloritis* by the convex spire; from *Sulcobasis* by the small thin shell, lacking spiral sulci; from *Planispira* and *Cristigibba* the closely granulate apex will separate it.

This group is very like the Indo-Chinese section *Tricho-chloritis*. The Australian species referred by authors to *Trachia* (such as *H. tuckeri*, *cyclostomata*, *dentoni* etc.) seem to hold about the same relation to *Austrochloritis* that the typical *Trachia* of India (*H. asperella*, *Nilagherica*,) bear toward *Tricho-chloritis*. These groups are still in great confusion. In arranging them I am handicapped by the fact

that *Trachia* has already been monographed in the MANUAL (vol. IV) by Mr. Tryon, and I do not wish to duplicate species once treated.

H. SPINEI Cox. Pl. 52, figs. 90, 91, 92.

Shell openly umbilicated, discoid, flattened on the top, yellowish-brown, covered with coarse, long bristles in regular rows; whorls 5, gradually increasing, rounded, last descending in front, suture deep and narrow; aperture diagonal, rounded; peristome simple, lip everted, columellar margin not dilated. (Cox.)

Alt. 0·23, greater diam. 0·55, lesser 0·44 inch.

Port Curtis, Queensland, Australia.

H. hystrix Cox, Monogr. Austr. L. Sh. p. 48, t. 17, f. 5, 5a, 5b, (preoc.).—*H. spinei* Cox, l. c., p. 111.

Differs from its allies in being more discoidal and bristled.

H. PORTERI Cox. Pl. 58, figs. 23, 24.

Shell depressed-globose, half-covered umbilicate, thin, dark reddish-chestnut; surface densely beset with very short, delicate hairs, the scars of which are seen as minute granules in regular oblique rows on the earlier whorls of the spire. Whorls $4\frac{1}{2}$.

The form is depressed, spire low-conoidal, apex obtuse, planorboid; whorls, especially the earlier, very convex, separated by deep sutures; last whorl somewhat compressed above and below, but not carinated, its latter half decidedly swollen, abruptly descending in front, and narrowly constricted just behind the lip. Aperture very oblique, transversely oval, dark within; peristome thin, narrowly expanded, white or nearly so, the columella dilated in a triangular plate, partly or nearly concealing the umbilicus.

Alt. 12, greater diam. 16, lesser $14\frac{1}{2}$ mill.

Upper Clarence River at Guy Faux; Upper Richmond River at Cowlong; Upper Nerang Creek, Queensland.

H. porteri Cox, P. Z. S. 1866, p. 373; Monogr. Austr. L. Sh., p. 48.—HEDLEY, Proc. Roy. Soc. Queensl. 1889, p. 249, plate xv (anatomy.)

Allied to *H. brevipila* but much larger, the earlier whorls more distinctly granulated. It has about the size and color of *H. mansueta*, but differs in being hairy and less widely umbilicated.

H. MANSUETA Pfeiffer. Pl. 33, figs. 64, 65.

Shell depressed, umbilicated, spire low, obtuse, periphery rounded; chestnut or cinnamon brown, scarcely shining, all over granulated, the granules very minute, separated, equidistant, less obvious beneath; suture evenly and deeply impressed from apex to the deflexed termination of the last whorl; outer lip slightly expanded, flesh-colored, columella white, reflexed partly over the umbilicus, which is obliquely excavated behind the lip.

The form is a little more depressed than *H. porteri*. Rather thin but moderately strong; spire low, apical whorl planorboid; whorls $4\frac{1}{2}$, quite convex, the last deeply descending in front; surface covered with minute points, but not hairy. As in the allied species, even the apex is sculptured. Aperture flesh-colored inside; whorl slightly constricted behind the lip; growth-striæ fine and weak, not stronger at the suture. Terminations of the peristome decidedly converging, the aperture assuming a transversely oval form.

Alt. 11, greater diam. $16\frac{1}{2}$, lesser 14 mill.

Moreton Bay, Queensland; Richmond River, N. S. Wales.

H. mansueta PFR., P. Z. S. 1854, p. 57; Monogr. iv, p. 290; Conchyl. Cab. p. 534, t. 163, f. 7-9.—REEVE, Conch. Icon. f. 1304.—COX, Monogr. Austr. L. Sh. p. 59, t. 2, f. 4.

More broadly umbilicated than *H. porteri*, and although studded with minute points, there are no true hairs.

H. BLACKALLI Brazier. *Unfigured.*

Shell deeply, rather largely and openly umbilicated, globosely depressed, very thin, translucent, light brown, irregularly striated with raised waved striæ, irregularly studded with numerous close-set, obtuse, short bristles; whorls 5, roundly convex, the last large, in front largely inflated, base roundly convex, smoother than upper surface, aperture broadly oval, peristome thin, slightly reflexed, right margin descending, columellar margin expanded and partly covering the large umbilicus. (*Brazier.*)

Alt. $5\frac{1}{2}$, greater diam. $8\frac{1}{2}$, lesser 7 lines.

Mount Dryander, Port Denison, Queensland.

H (Dorcasia) Blackalli BRAZ. Proc. Linn. Soc. N. S. Wales, i, p. 1, 1875.

This species resembles *H. brevipila* Pfr. and *H. coxeni* Cox in being covered with fine hair epidermis. (*B.*)

H. BUXTONI Brazier. *Unfigured.*

Shell umbilicated, depressed, thin, slightly shining, brownish horn under a velvety periostraca; faintly obliquely striated; suture distinctly impressed covered with short, minute, sharp-pointed stiff hairs; spire small, apex slightly raised, granulated; whorls $4\frac{1}{2}$, convex, last large and rounded; deflected in front, base convex with a few minute scattered hairs; umbilicus rather wide outwardly, aperture diagonal, lunately rounded, peristome flesh tinged, expanded, margins approximating, right thin, columellar margin regular, finely granulated, broadly reflected, but not covering the umbilicus.

There are two distinct-varieties of this species; one is dark brownish horn, the other reddish-brown; the least rubbing will remove the beautiful velvety periostraca with the short minute pointed hairs that gives the surface the appearance of being granulated with minute lengthened grains. I wet the outer surface of one specimen and removed the outer coating with the point of a penknife; this entirely alters the appearance, showing the striæ at the suture and umbilicus to be very much coarser, other parts being quite smooth. They resemble dark varieties of *Helix Delessertiana* with the sculpture removed. (*Brazier.*)

Alt. 6, greater diam. 12, lesser $9\frac{1}{2}$ mill.; width of umbilicus 2 mill.

Thursday Island, Torres Straits.

H. (Planispira) Buxtoni BRAZIER, Proc. Linn. Soc. N. S. Wales, iv, p. 394, 1879.

This may possibly belong to the group of *H. tuckeri* Pfr.

H. BREVIPILA Pfeiffer. .Pl. 58, figs. 28, 29, 30.

Shell small, depressed, narrowly umbilicated, thin and fragile, the periphery rounded; light brown, under a lens seen to be densely clothed with short, stiff hairs.

The form is globose-depressed, spire convex, but low, and blunt; the sutures impressed; whorls 4, convex, the last not at all angular at the periphery, suddenly a little descending in front; aperture wider than high, transversely oval, oblique; peristome thin, narrowly expanded, dilated at the columella, impinging a little upon umbilicus. Alt. 5, greater diam. $9\frac{1}{3}$, lesser 8 mill.

Victoria, S. Australia; N. S. Wales; Queensland and the islands in Torres Straits.

H. brevipila PFR., P. Z. S. 1849, p. 130; Mon. Hel. Viv. p.—REEVE, Conch. Icon. f. 777.—COX, Mon. Austr. L. Sh. p. 47, t. 5, f. 2a, 2b.

A very small, fragile species, seen under a lens to be densely covered with fine short hairs. The shell varies much, the spire being at times much flattened, at others more elevated and acute. In large specimens the hairs are absent. The facts of its distribution are taken from Dr. Cox's account.

H. ARIDORUM COX. Pl. 58, figs. 31, 32, 33.

Shell small, umbilicated, of a depressed form, the spire low, sutures deep, periphery rounded; pale yellowish horny, thin, transparent, microscopically granulated; lip thin, a trifle expanded, the columellar lip dilated half over the umbilicus.

A small, thin shell with rather small deep umbilicus; spire low; the entire surface, even to the tip of the spire is microscopically granulated, but the base is smoother, more shining; the granulation is prominent within the umbilicus. Whorls $4\frac{1}{2}$, very convex, separated by exceptionally deeply impressed sutures, the last whorl gradually descending a little in front, rounded at periphery. Aperture rounded-lunar; peristome thin, very narrowly expanded, not thickened, the columellar margin dilated triangularly, half-covering the umbilicus. Alt. 10, greater diam. $13\frac{1}{2}$, lesser $11\frac{1}{2}$ mill.

Clarence River; Fitzroy Island and Brisbane, Australia.

H. aridorum COX P. Z. S. 1867, p. 724; Monogr. Austr. L. Sh., p. 44, t. 11, f. 16.—PFR. Monogr. v, p. 351.—BRAZIER, Proc. Linn. Soc. N. S. W. i, p. 123.—HEDLEY, Proc. Roy. Soc. Queensl. 1888, p. 54.—TRYON, Manual iii, p. 217, t. 50, f. 34, 35.

A larger species than the closely allied *H. brevipila*, and not velvety but granulate. The sutures are quite deeply impressed.

H. OCCULTA Pfeiffer. Pl. 58, figs. 25, 26, 27.

Shell narrowly umbilicated, globose-depressed, thin, under a lens seen to be everywhere very minutely granulated, brownish; spire slightly elevated; whorls 4, a little convex, the last wide, deflexed and a little constricted in front, more ventricose on the base; aperture large, oblique, lunate-oval; peristome white-calloused, margins approximating, the outer margin expanded, basal reflexed, dilated above the umbilicus.

Alt. 7, greater diam. 12, lesser 10 mill. (*Pfr.*)

Last whorl distantly longitudinally corrugated, and subcarinated at the periphery; color corneous or reddish brown; surface pubescent, covered with very short, very close hairs.

Alt. 8, greater diam. 14, lesser 12 mill. (*Tapp. Can.*)

Aru Is., near New Guinea.

H. occulta PFR. P. Z. S. 1860, p. 22; Mal. Bl. 1860, p. 238; Monogr. Hel. Viv. v, p. 380.—*Dorcasia occulta* WALLACE, P. Z. S. 1865, p. 408.—*H. (Dorcasia) occulta* PFR. Nomencl. Hel. Viv. p. 188.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genova, xix, p. 112, t. 2, f. 18–20, 1883.

Distinguished from *Dorcasia similaris* by the hairy epidermis, etc. It seems to belong with *H. brevipila* etc., of Australia.

H. CHLORITOIDES Pilsbry. Pl. 58, figs. 34, 35, 36.

Shell small, thin, umbilicated, depressed; the spire only a trifle convex; light horn-color, tinged with brown. Hair-scars close and fine on the apical whorl, sparse on the body-whorl, arranged in oblique rows.

The shell is depressed, inner whorls of the spire not raised; whorls $4\frac{1}{2}$, very convex, the sutures deeply impressed. Last whorl somewhat descending in front. Aperture oblique, rounded, a little lunate, lip expanded, flesh-colored, baso-columellar margin reflexed, whiter; terminations approaching. Umbilicus one-sixth the diameter of shell. Alt. $6\frac{1}{2}$, greater diam. 12, lesser 10 mill.; width of umbilicus 2 mill.; width of aperture (including peristome) 7 mill., alt. $5\frac{3}{4}$ –6 mill.

New Guinea.

Much more depressed than *H. aridorum*, etc.; more widely umbilicated than *H. occulta*. The exact locality in New Guinea is not known. The specimens were collected by Mr. Wm. Denton when travelling in New Guinea.

4. Subsection *Trichochloritis* Pilsbry, 1891.

Shell depressed, rather thin, the spire low-convex or plane, last whorl not carinated, but usually obtusely angled around the umbilicus; but little deflexed in front; epidermis not deciduous; apex, as well as the whole shell, hirsute or marked by hair-scars arranged in regular lines. Lip narrowly expanded or reflexed. Type *H. breviseta* Pfr.

Geographical distribution, southern China and Burmah south to the Malay Peninsula; Mindanao and Mindoro, Philippine Is.

I am not sure that all of the species I have placed here belong together; but being under the necessity of grouping the forms in some manner, and having no clue to the chaos of Oriental Helices save the obscure hints furnished by the shell alone, I have built up this apparently natural group. Its members agree in having the apex and generally the whole shell hairy or studded with hair-scars in close, regular, oblique rows; in the narrowly, evenly reflexed lip, the light, thin shell, unicolorous or with a supra-peripheral band.

As a whole, they differ from *Trachia* (a section which seems to be most closely allied), in having the whorl less deflexed in front, whorls more robust, terminations of the lip less approaching. From *Dorcasia* and *Planispira* their granulated apices distinguish species of the present group; and the same characters separate them from *Trichia* and other hirsute members of the *Fruticicola* series of Helices.

Besides the species given below, the following forms (among others) probably belong here:

H. hungerfordiana Nevill, Manual iii, p. 182, pl. 40, figs. 27, 28. Formosa; Hongkong.—? *H. tomentosa* Pfr. (and some allied forms), Manual iii, p. 212, pl. 49, fig. 96.—*H. tranquereyi* C. & F. (Journ. Conch. 1863, p. 353) Manual iv, p. 64.—*Lysinoe seriatiseta* Rochebrune, Bull. Soc. Philomathique de Paris, 1881-2, p. 69, 1882.

H. BREVISETA Pfeiffer. Pl. 52, figs. 80, 81.

Shell umbilicated, depressed, rather thin, covered with very short, close hairs; subdiaphanous, pale fulvous; spire scarcely raised; whorls 5, a little convex, the last little descending, subangulated below the middle, and also around the large, funnel-shaped umbilicus. Aperture little oblique, rotund-lunar; peristome white; shining, margins converging, upper and basal margins arcuate, reflexed, columellar margin short, dilated above. Alt. $10\frac{1}{2}$, greater diam. 22, lesser $18\frac{1}{2}$ mill. (*Pfr.*)

Siam, Perak.

H. breviseta PFR., Journ. de Conchyl. 1862, p. 41, t. 5, f. 4, 5; Monogr. v, p. 387.—*Planispira breviseta* J. DE MORGAN, Bull. Soc. Zool. France, for 1885, p. 386.

If Pfeiffer really meant "Anfr. ult. *infra medium* obsolete sub-angulatus," this character sufficiently distinguishes the species from *H. tenella*.

H. TENELLA Pfeiffer. Pl. 51, figs. 52, 53.

Shell umbilicated, depressed, thin, lightly striate, pellucid, pale corneous; spire plane; whorls scarcely over 4, a little convex, the last not descending, obsoletely angulated above the middle, inflated beneath, subangulated around the wide, funnel-shaped umbilicus; aperture oblique, lunate-rounded; the peristome thin, margin converging, right and basal margins expanded, columellar margin sub-dilated. Alt. 8, greater diam. 16, lesser $13\frac{1}{2}$ mill.

Siam.

H. tenella PFR. Journ. de Conchyl. 1862, p. 42, t. 5, f. 6, 7; Monogr. v, p. 390.—*Chloritis tenella* ROCHEBRUNE, Bull. Soc. Philomathique de Paris, 1881-2, p. 69, 1882.

The nearly plane spire, body-whorl bluntly subangular above the middle and around the widely expanded umbilicus, will distinguish this from other similarly sculptured forms. A specimen before me is straw-colored and decidedly larger but has the same number of whorls. Pfeiffer mentions no hairs or hair-scars, but the latter are present on my specimen, and doubtless on the original ones as well.

H. QUINARIA Pfeiffer. *Unfigured.*

Shell sub-widely umbilicated, a little depressed, a little thin, striate and all over granulated, diaphanous, rufous-corneous; spire little raised, apex obtuse; whorls 5, a little turgid at the suture, the last obsoletely angulated in the middle, constricted and deflexed in front. Aperture very oblique, nearly circular; peristome simple, margins approximating, the upper one expanded, basal reflexed.

Alt. 7, greater diam. 14, lesser 12 mill. (*Pfr.*)

Cambodia.

H. quinaria (typog. err.) PFR. P. Z. S. 1861, p. 195.—*H. quinaria* PFR. Monogr. v, p. 380.

The shape of the aperture seems different from the other species grouped here.

H. CONDORIANA Crosse & Fischer. Pl. 31, figs. 23, 24.

Shell umbilicated, subdepressed, rather thin, roughened with very short, close hairs (setæ); subdiaphanous, fulvous; spire little elevated. Whorls 5, a little convex, the last descending in front, subangulated around the moderate, funnel-shaped umbilicus. Aperture little oblique, elongate-lunar; peristome white, shining, margins

strongly converging, reflexed; columellar margin short, dilated above, partly closing the umbilicus.

Alt. $12\frac{1}{2}$, greater diam. 20, lesser 18 mill. (*Crosse.*)

Island of Pulo Condor, Cochín-China.

H. condoriana C. & F., Journ. de Conchyl. 1863, p. 351, t. 14, f. 1.—PFR. Mon. v, p. 377.

Compared by Crosse & Fischer to *H. breviseta* Pfr.

H. NORODOMIANA L. Morlet. Pl. 36, figs. 35, 36, 37.

Shell umbilicated, depressed, thin, buffish, unicolored, minutely and regularly striated, subdiaphanous, apex but little projecting; whorls $5\frac{1}{2}$ –6, a little convex, the last angulated, descending; suture profoundly impressed, subcanaliculate; umbilicus broad, carinated; aperture oblique, base rounded, columellar margin short, dilated above; margins joined by a thin callus; peristome white, shining, reflexed. Alt. 9, greater diam. 10, lesser 7 mill. (*Mor.*)

Kamchay, Cambodia.

H. norodomiana MOR. Journ. de Conchyl. 1883, p. 106, t. 4, f. 3.

There is evidently an error in Morlet's measurements. The species should be compared with *H. tranquereyi* C. & F. (Manual iv, p. 64).

H. MIARA Mabille. Pl. 68, fig. 83, 83.

Shell umbilicated, depressed, the spire slightly convex; corneous, somewhat translucent, thin, light, striatulate, under a lens seen to be densely and very finely granulated in every part. Peristome narrowly expanso-reflexed all around.

Whorls $4\frac{1}{2}$ –5, convex, the last one wide, a trifle descending in front, not at all constricted behind the expanded peristome, which is white and a little thickened within. There are traces of low folds parallel with growth-striæ on parts of the body-whorl. The base is indistinctly, obtusely angled around the narrowly funnel-shaped umbilicus. Aperture not much oblique, terminations of peristome converging. Alt. 10, greater diam. 20, lesser $16\frac{1}{2}$ mill.

Tonquin.

H. miara MAB. Moll. Tonk. diagn., p. 6, May 14, 1887; Bull. Soc. Mal. Fr. iv, p. 85, t. 1, f. 6, 7.

This species is very similar to *H. hungerfordiana* Nev.; it constantly differs in the more reflexed, more thickened peristome, and decidedly wider umbilicus. The specimens before me were collected by l'Abbé A. Vathelet.

H. HERZIANA Möllendorff. *Unfigured.*

Shell rather openly and deeply umbilicated, globose-depressed, thin, horny-brown, transversely lightly striatulate; sculptured with most minute impressed points arranged in regular, very close lines. Whorls 5, convex, separated by much impressed sutures, the last-whorl large, much inflated, not descending in front, obtusely but distinctly angled around the umbilicus. Aperture little oblique, rounded-lunar, the peristome lightly expanded, a little reflexed, sublabiata, basal margin sinuous, bent backward at the columella.

Alt. $10\frac{1}{2}$, greater diam. 17, lesser $14\frac{1}{2}$ mill. (*Mlldff.*)

Hoihow, Island of Hainan, S. China.

H. herziana MLLDFF. N. D. M. Ges. 1888, p. 41.

Allied to *H. hungerfordiana* Nev. and also *H. franciscorum* Gredl., *puberula* Heude, etc.

H. RHINOCEROTICA Heude. Pl. 69, figs. 8, 9, 10.

Shell orbicular-discoidal; spire plane; whorls 4-5, rather cylindrical, separated by an impressed suture, regularly increasing, epidermis white, shining, obsoletely, very minutely striate, somewhat punctate; ornamented with a wide supraperipheral rufous zone; last whorl subcylindrical, obscurely angled; aperture subquadrate; peristome acute, expanded, scarcely reflexed, the columellar margin angular; umbilicus moderate, open, profound, obscurely margined around its opening.

Alt. 13-9, greater diam. 21-15, lesser 19-13 mill. (*H.*)

Tay-ninh, Cochin China.

H. rhinocerotica H., Notes sur les Moll. Terr. Fl. Bl., p. 144, t. 38, f. 14.

H. QUIETA Reeve. Pl. 50, figs. 42, 43.

Shell umbilicated, depressed, striatulate, and everywhere most minutely granulated; silky, pellucid, reddish-horn-colored; spire plane; suture impressed; whorls 5, a little convex, the last large, rotund, scarcely descending in front, obsoletely angulated around the narrow, funnel-shaped umbilicus. Aperture little oblique, rounded-lunar, higher than wide; peristome shortly expanded, the right margin regularly arcuate, columellar margin oblique, sloping, dilated. Alt. $10\frac{1}{2}$, greater diam. 20, lesser 16 mill. (*Pfr.*)

Misamis, Isl. of Mindanao, Philippines.

H. quieta RVE. Conch. Icon. f. 142 ; PFR. Mon. iii, p. 245 ; Conchylien Cab. p. 426, t. 149, f. 18, 19.

Allied evidently to *H. brevidens*, but has a wider umbilicus and lacks the basal tooth.

H. EVERTTI H. Adams. MANUAL Vol. III, p. 211, pl. 49, fig. 95.

This species described in P. Z. S. 1873, p. 207, from Borneo, seems to belong here rather than in *Fruticicola* or *Dorcasia*.

H. BREVIDENS Sowerby. Pl. 55, figs. 37, 38, 39, 40, 41.

Shell depressed-subglobose, narrowly, partly covered umbilicate, the upper surface only slightly convex, lower surface very convex ; light brownish horn-color, with a narrow chestnut supra-peripheral band, which ascends the spire just above the suture, becoming diffused on the inner whorls. Lip narrowly but evenly and flatly reflexed, the basal margin with a small tooth.

The shell is thin, light, delicately substriate, covered with very closely, regularly placed, short hairs, on the upper whorls and apex the scars alone remaining. Whorls $4\frac{1}{2}$, the last a little descending in front, swollen below, bluntly subangular around the very narrow umbilicus, not constricted behind the lip except in the immediate vicinity of the umbilicus. Aperture lunar, somewhat oblique, flesh-colored inside, terminations of peristome remote. Alt. $12\frac{1}{2}$, greater diam. 21 mill.

Island of Mindoro, Philippines.

H. brevidens SOWB. P. Z. S. 1841, p. 25.—PFR. Mon. i, p. 381 ; Conchyl. Cab. p. 64, t. 78, f. 10–12.—REEVE, f. 144.

The low spire, swollen base, nearly closed umbilicus, and clothing of fine hairs or hair-scars are the more prominent characters of this shell.

H. SANZIANA Hombron & Jacquinot. Pl. 37, figs. 51, 52, 53, 54.

Shell umbilicated, globose-depressed, solid, striatulate and all over granulated, a little shining, reddish, with a chestnut peripheral band and an obsolete one above and below ; spire depressed-semiglobose, apex plane, wide ; whorls 5, a little convex, sensibly increasing, the last scarcely descending in front ; periphery subangular, base convex ; aperture nearly vertical, subangulate-lunate, bluish-white inside. Peristome expanded, brown-edged ; basal margin a little

straightened, columellar margin violet, triangularly reflexed, half covering the narrow umbilicus. (*Pfr.*)

Alt, 15, greater diam. 29, lesser 24 mill.

Zamboanga, Id. of Mindanao, Philippines.

H. Sanziana HOMBR. & JACQ. Voy. au Pol Sud, Moll., t. 4, f. 19-23.—*PFR.* in Conchyl. Cab., p. 423, t. 149, f. 6, 7; Monographia iii, p. 240.—*Chloritis Sanziana* SEMPER, Reisen im Archip. Phil., Landmoll., p. 235.—HIDALGO Journ. de Conchyl. 1887, p. 109.—*H. lituus* REEVE, Conch. Icon., t. 22, f. 93a, b (but not descript.)

Semper and Hidalgo have recently confirmed the locality, Zamboanga. Semper also found the species on the little island Malaunavi, off the north coast of Basilan.

The diagnosis of Pfeiffer mentions that the surface is *granulate*. This granulation is probably caused by the fresh shell being hairy. The hair-scars are far closer together than in a denuded specimen of *H. spinosissima*, and the surface of the shell is much more strongly striate.

H. SPINOSISSIMA Semper. Pl. 37, figs. 55, 56.

Shell umbilicated, depressed, thin, densely covered all over with little spines; cuticle diaphanous, reddish-chestnut, ornamented with a peripheral band of brown and one of white. Spire depressed, apex plane or impressed; whorls 5-5½, a little convex, sensibly increasing, the last a little descending in front; periphery subangulated, base convex. Aperture subvertical, subangularly lunar, white within, or bluish; peristome expanded, columellar margin violaceous, triangularly reflexed, half covering the umbilicus. (*Semper*).

Alt. 21, greater diam. 36, lesser 29 mill.

Mindanao, Philippine Is.

H. spinosissima SEMPER, Reisen im Archip. der Philippinen, Landmoll., p. 234, t. ix, f. 10a, b, and t. xiv, f. 9a, b (anatomy).—*H. boxalli* SOWB., P. Z. S. 1888, p. 211, t. 11, f. 13.

Found at many localities on the Island Mindanao. Semper says: This species stands very near to the *H. sanziana*, discovered by Hombron and Jacquinot at Zamboanga, and I was formerly inclined to consider it a variety of that species. It differs, however, in the greater size, the greater flattening of the whorl above, the thinner



shell, and especially by the stiff, short but not very thickly standing hairs covering the outside of the shell, etc.

The synonymous *H. boxalli* of Sowerby is figured on pl. 37, fig. 50.

Section II. PLANISPIRA Beck, 1837.

Planispira BECK, Index Molluscorum, etc., p. 29 (subgenus 25th); first species *H. exceptiuncula* Fér.—ALBERS, Die Heliceen (edit. v. Martens, 1860), p. 160, type *H. zonaria* L.—SEMPER, Reisen im Arch. Phil., Landmoll., ii.—PFR., Nomencl. Hel. Viv. p. 181, 1878.—v. MARTENS, Preuss. Exped. nach Ostas., Landschn., p. 295.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 162, 1883.—*Pusiodon* SWAINSON, in part.—*Philina* ALBERS, Die Hel. 1850, in part.

This section differs from *Chloritis* proper in the white or pale shell, banded with brown, and having a smooth apical whorl, and the more oblique aperture. It may be divided into two divisions of slight systematic value.

1. *Planispira s. s.* No crest-like ridge behind the lip; aperture decidedly wider than high; basal lip usually more or less thickened or toothed.

2. *Cristigibba.* A crest or gibbous ridge behind the lip; aperture about as high as wide; basal lip narrow, not thickened or toothed.

1. Subsection *Planispira* (restricted).

Shell depressed, with flattened spire, the apical whorl smooth, depressed; umbilicus narrow, rarely covered; last whorl deflexed in front, usually constricted behind the reflexed peristome, aperture very oblique, wider than high; ends of the peristome approaching but not connected by a raised callus; brown-banded on a white or pale ground.

A group of snails very characteristic of the Moluccas, ranging from Celebes to western New Guinea, and replacing to a great extent in this region the other forms of *Chloritis*.

Key to the groups of species of Planispira.

Surface showing under a lens hairs or hair-scars.

Imperforate or very narrowly perforate,

Group of *H. exceptiuncula.*

Umbilicated; spire not raised; bands continued on lip,

Group of *H. kurri*.

Surface without hairs or hair-scars; shell umbilicated.

Last whorl with an oblique impression or pit outside,

Group of *H. endoptycha*.

No prominent pit outside.

Spire convex, lip rather narrow, suture white-bordered,

Group of *H. zonalis*.

Spire plane or concave,

Group of *H. zonaria*.

Group of *H. zonaria*.

Shell umbilicated; the spire plane or sunken; surface without hairs or granulations, usually light and banded. Aperture wider than high, very oblique.

H. ZEBRA Pfeiffer. Pl. 46, figs. 77, 78, 79, 80, 81.

Shell umbilicated, discoidal, the inner two whorls of the spire sunken; yellowish or grayish white, having radiating zigzag brown stripes above, and on the base often numerous colorless spiral bands. Last whorl descending in front, rounded; base not much swollen, a little constricted behind the basal lip; aperture oblique, rounded; face and back of the lip white.

This species resembles some forms of *H. zonaria* but differs in the rounder mouth, less swollen base, absence of a tooth on the basal lip, and the absence of an oblique impression on the body-whorl behind the lip. Whorls $4\frac{3}{4}$. Alt. 10, greater diam. 23, lesser 18 mill.

Island of Ceram, and islet of Goram.

H. zebra PFR. Zeitschr. f. Mal. 1850, p. 83; Monogr. iii, p. 246; Conchyl. Cab., p. 353, t. 135, f. 16-18.—REEVE, Conch. Icon., f. 499.—MARTENS, Ostas. Zool., Landschn., p. 315.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. 1884, p. 153.—*H. zonaria* var. *a*, FER., Hist., t. 73, f. 5.—*H. guttata* LE GUILLOU, Revue Zool. 1842, p. 141 (not *guttata*, Oliv.).—*Planispira zebra* WALLACE, P. Z. S. 1865, p. 409.

The notes given above indicate the differences between this species and *H. zonaria*.

Var. *EMBRECHTIANA* Mousson, Pl. 55, figs. 56, 57, 58.

Shell umbilicated, depressed, rather thin, striatulate and sculptured with microscopic spiral striæ, shining, white, ornamented with two rather wide corneous-chestnut bands and having above a series

of triangular or crescentic spots; beneath corneous, blotched and streaked with white. Spire plane, a little sunken in the middle, the suture rather deep. Whorls 4, moderately convex, the last rounded, slowly descending in front, not constricted; the base a little more swollen behind the lip, and lightly impressed toward the moderate umbilicus. Aperture diagonal, lunate-rounded, peristome simple, white, margins converging, the upper rather widely expanded, arched forward, basal margin expanso-reflexed, a little dilated at the insertion. Alt. 9, greater diam. 21, lesser 17 mill. (*Pfr.*)

Moluccas.

H. embrechtiana (MOUSS. in coll.) PFR., Novit. Conch. iv, p. 39, t. 117, f. 7-9; Monogr. vii, p. 477.—MARTENS, Mal. Bl. xx, 1872, p. 154.

This is a form of *H. zebra* having the zigzag stripes broken for the passage of two spiral bands.

H. IADDÆ Pilsbry. Pl. 68, figs. 92, 93, 94, 95.

Shell umbilicated, subdiscoidal, the inner 3 whorls plane, not perceptibly sunken; yellowish-white with radiating interrupted zigzags and numerous spiral lines of pinkish or olive corneous, producing a mottled effect. There are usually two spiral chestnut bands. Base rather swollen, somewhat constricted behind the basal lip. Peristome expanded, basal lip reflexed.

The shell is thin, quite ventricose, striate, mottled with opaque buffish-white on a more translucent pinkish-corneous ground. Upper surface convex; whorls about $4\frac{1}{2}$, convex, the last descending in front, slightly constricted behind the basal lip; aperture very oblique, large, oval-truncate, mottled and banded inside; peristome white, expanded, thin, the upper margin with a rather acute but generally slight prominence in the middle, marked on the back of the expanded lip by one little groove; outer margin not more widely expanded than the upper; basal margin reflexed, not toothed, but showing usually a barely perceptible thickening.

Alt. 15, greater diam. 30 lesser $23\frac{1}{2}$ mill.

Moluccas.

This is a species of the *zonaria* group. It is less solid than *H. zonaria*, more ventricose; but the base is much less swollen. The basal lip has no tooth. The coloration is very peculiar, recalling *H. zebra* and its color-variety *embrechtiana* in some respects,—forms from which this differs much in the shape of the aperture and the flat, not concave spire.

H. ZONARIA Linné. Pl. 44, figs. 4, 5, 6, 7, 8, 9, 10.

Shell umbilicate, discoidal, spire a little concave; white with brown bands, above clouded, mottled or obliquely streaked with brown; bands not continued upon the lip; latter half of base much swollen, constricted behind the basal lip; a wide excavation behind the columellar lip.

Depressed, rounded at periphery, very delicately striated, nearly smooth, shining. Whorls $4\frac{1}{2}$, convex, the earlier 2 sunken. There is usually a band at the periphery, one above the periphery, a row of spots or streaks inside of the upper band, and numerous narrower grayish or brown spiral lines beneath. The last whorl descends in front. Aperture very oblique, truncate-oblong, white with bands inside. Peristome white; upper margin broadly expanded, having usually a slightly projecting point in the middle; basal lip reflexed, with a rather long, obsolete tooth. Umbilicus permitting all the whorls to be seen. Alt. 13, greater diam. 27, lesser 20 mill.

Alt. 10, greater diam. $21\frac{1}{2}$ mill.

Moluccas; Amboyne Is. (Amboyna, Ceram, Buru); Banda-Neira, Banda Is.

H. zonaria LINN. Syst. Nat. xii, p. 1245.—PFR. Monogr. i, p. 386.—VON MARTENS, Ostas. Zool., Landschn. p. 307, t. 16, f. 6–11; t. 19, f. 6.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. 1884, p. 151 (with color-varieties); l. c. xix, 1883, p. 181, t. 7, f. 8; t. 9, f. 1, 19 (full synonymy, distribution and anatomy).—*Planispira coluber* BECK, Index, p. 30.—*Helix coluber* PFR., Monogr. i, p. 286.—REEVE, Conch. Icon. f. 500.—*H. collis* (MOUSS. in coll.) PFR. Novit. Conch. iv, p. 36, t. 117, f. 1–3. See Martens Mal. Bl. xx, 1872, p. 153.—*H. dromedarius* MOUSS. in coll.

One of the most abundant snails in the Amboyne Is. and very variable in size and coloration. *H. coluber* is absolutely synonymous. The species may be known by the row of streaks or spots above, the subobsolete elongated tooth-like process on the basal lip, the swollen base, and excavation behind the columellar lip. The two Linnæan specimens of *H. zonaria* belong to the color-varieties *lineolata* and *fasciata*. Specimens of this species often have an oblique dent-like impression on the outer part of the whorl a short distance behind the outer lip.

H. zonaria stands midway between *zebra* and *fasciolata*. In *zebra* the oblique streaks or spots cover the surface to the exclusion of the

usual two bands; in *fasciolata* there is no trace of these markings, but the two bands are broad and conspicuous.

The animal is ochre-yellow externally; sole 21 mill. long, 11 broad. Jaw slightly arcuate, lightly striated.

Var. ZONARIA L. Pl. 44, figs. 4, 5, 6, 7, 8, 10.

Shell having a row of spots or oblique streaks above, generally banded below. The following color-forms have been named. A part of the specimens before me combine characters of several of them; others could be named as new varieties, if such a course were desirable.

Form *lineolata* Mart. (pl. 44, figs. 4, 5). Yellowish-brown above, with gray flecks and lines; gray below with narrow brownish-yellow, often interrupted spiral bands. Usually rather large. Peristome rather narrow, pale rose-colored, rarely in fresh examples white. Island of Amboyna. This should be considered the typical *zonaria*.

Form *fulminata* Mart. (fig. 10). Reddish-gray or whitish, with opaque whiter markings radiating from the suture, at first wavy, then zigzag; beneath banded with white; the whole shell often washed with rose-red. Always a subperipheral band; often a supra-peripheral, both broad and dark, nearly black. Peristome broad, usually rose-red. Size above the medium. Isl. of Buru; Banda-Neira.

Form *obliquata* Mart. (fig. 8). Ochre-brown or isabelline, with clearer, oblique, close rays. No band, or only a subperipheral dark chestnut one. Peristome pale violet or white. Medium size. Isl. of Ceram.

Form *maculata* Mart. Yellowish-brown, with a row of dark brown spots, mostly quadrangular, sometimes appearing as interrupted bands; beneath brown with few yellowish-brown narrow spiral bands. Peristome pale reddish, broad, medium size or over. Ceram.

Form *coluber* Beck, (figs. 6, 8). Isabella-yellow, with darker, mostly crescentic spots, banded below. Ceram. This is the *var. lunulata* of Martens.

Var. FASCIATA Martens. Pl. 44, figs. 9, 14, 14, 15.

Shell with bands (rarely lacking), but no spots or oblique streaks.

Form *fasciata* (fig. 9.) Ground-color pure white; subperipheral and supra-peripheral bands present, and very often a broad band

above, close to the suture. No spots. Peristome white, broad. Usually an impression behind the lip above. Size below the medium or small. North Coast of Ceram.

Form *collis* MOUSS. (pl. 44, figs. 14, 14, 15.) White, with two brown or rufous bands (subperipheral and supra-peripheral); last whorl higher, more robust than in *zonaria*, very deeply descending in front, the aperture nearly horizontal, rather narrow. Alt. 12, diam. 25 mill. Amboyna.

H. fasciolata LESSON. Pl. 44, fig. 11; pl. 65, figs. 89, 90.

Shell umbilicated, depressed, spire nearly plane, the inner two whorls sunken, the next outer whorl a little projecting over the succeeding one; white, with two dark purplish-brown bands, the upper one ascending the spire midway between the sutures, the lower band wider, at and above the periphery. Base strongly swollen, and then deeply constricted behind the basal lip.

The aperture is very oblique; lip rather narrowly reflexed, and of the same width all around; pure white, perceptibly thickened within; basal lip very obsoletely thickened, not really toothed. Whorls $4\frac{2}{3}$, the outer one convex, rounded, its upper surface behind the aperture sloping, but without any oblique impression. Face and back of the lip white.

Alt. $11\frac{1}{2}$, greater diam. $21\frac{1}{2}$, lesser $17\frac{1}{2}$, mill.

Amboyna (Lesson); Ceram, Moluccas (Martens.)

H. fasciolata LESSON, Voy. de la Coquille, Zool., ii, p. 311.—VON MARTENS, Ostas. Zool., Landschn., p. 314.

While belonging to the immediate group of *H. zonaria*, this shell differs in the more regularly convex last whorl, less expanded aperture, lack of an impression or dent back of the aperture on the upper surface, lack of color spots, etc. In *zonaria* the outer lip is much expanded; in this form it is not broader than the other margins. The species is here for the first time figured.

H. chariessa PILSBRY. Pl. 44, figs. 12, 13; pl. 68, figs. 96, 97, 98

Shell umbilicated, subdiscoidal, $1\frac{1}{2}$ inner whorls of the spire a very little sunken; chalky white with a narrow brown band exactly on the periphery; base a trifle swollen, gradually constricted behind the basal lip; a broad pit with several distinct little grooves behind the middle of the upper lip; peristome very broadly expanded.

The shell is opaque white; the band is brown or has that grayish or colorless translucent appearance which the bands often assume in

Planispira. The surface is but little shining, is regularly, delicately, but very distinctly obliquely striated. Whorls 5 or nearly that, the last rounded above, below and at the periphery; in front it descends more or less deeply; and on the base is somewhat swollen. Aperture very oblique, oblong-truncate; peristome very broadly expanded all around, the basal margin obsolete toothed. The upper margin has a blunt projection in the middle, caused by a pit behind its expansion, this pit having several short grooves running toward the lip-edge, like those produced by sharply folding paper and then nearly straightening it.

Alt. 12, greater diam. 28, lesser 21 mill.

Alt. 12, greater diam. $24\frac{1}{2}$, lesser $18\frac{1}{2}$ mill.

Moluccas.

This species differs from *H. zonaria* and all its varieties in being much more distinctly striated; the inner whorls less sunken; there is a wide pit behind the middle of the broadly flaring upper lip, and the base is far less swollen. In *H. zonaria* the swelling continues to within a short distance of the basal lip, and there the base is deeply, narrowly constricted; in *H. chariessa* the swelling is far less marked, and gradually decreases some distance behind the basal lip. In *zonaria* the basal lip is rather narrowly reflexed, whilst in *chariessa* it is broadly flaring, and has on its reverse, short, narrow marks, like those in the pit behind the upper lip. The umbilicus is rather wide, permitting all of the whorls to be seen. Numerous specimens from two sources are before me, but without exact locality.

The form of this shell reminds one of *Ampelita sepulchralis* of Madagascar.

H. QUADRIFASCIATA LeGuillou. Pl. 56, figs. 82, 83, 84.

Shell rather widely umbilicated, depressed, striatulate, horny-white, 4-banded with reddish; lower band at the umbilicus; spire scarcely projecting; whorls $4\frac{1}{2}$, a little convex, the last ventricose, the last whorl descending to the middle of the space between the two median bands, obliquely swollen, then deeply constricted. Aperture very oblique, lunate-half-ovate, the peristome slightly thickened, reflexed, white, the margins a little approaching, nearly equally arched, the basal margin with one tooth.

Alt. 8, greater diam. $17\frac{1}{2}$ - $18\frac{1}{2}$, lesser 13-14 mill. (*Mart.*)

Dodgingo, Isl. of Halmahera; Isl. of Ternate, Moluccas.

H. quadrifasciata GUILL. Rev. Zool. 1842, p. 141.—PFR. Monogr. i, p. 381.—MARTENS, Ostas. Zool., Landschn., p. 300, t. 16, f. 4; and

var. edentata MARTENS, l. c., t. 16, f. 5.—*H. instricta* MARTENS, Monatsberichte der Berl. Akad. 1864, p. 268.

Var. INSTRICTA Martens. Pl. 45, figs. 38, 39, 40.

Smaller than *H. quadrifasciata*, more elevated, with thicker, *toothless* peristome, but showing a slight swelling in the place of the basal tooth; whorl more deflexed in front.

Islands Mareh and Kajoa, near Ternate, Moluccas.

This is the *H. quadrifasciata var. edentata* of Martens.

H. AURITA Martens. Pl. 45, figs. 44, 45, 46.

Shell narrowly umbilicated, depressed, striatulate, whitish, three-banded with reddish; spire plane; suture superficial; whorls $4\frac{1}{2}$, the upper ones complanate, the last one more convex above than beneath, the periphery rounded; in front it widens, and is deeply deflexed; is not constricted above, but distinctly so below; aperture subhorizontal, ax-shaped, outwardly bent upward; peristome thin, white, nearly straight above, broadly expanded outwardly, narrowly reflexed below; margins moderately approaching, the upper rectilinear, basal quite arcuate.

Alt. 12, greater diam. 27, lesser $19\frac{1}{2}$ mill. (Mart.)

Island of Moti, Moluccas.

H. aurita MART. Monatsber. d. Berl. Akad. 1864, p. 369; Preuss. Exped. nach Ostas., Landschn., p. 316, t. 16, f. 12.—PFR. Mon. v, p. 389.

A single specimen found. Most nearly allied to *H. zonaria*, but distinguished by the more stretched out mouth, the produced, ear-lobe-like outer lip, and the rectilinear, simple upper lip.

H. BICONVEXA Martens. Pl. 46, figs. 57, 58, 59.

Shell narrowly umbilicated, lenticular, acutely carinated, lightly striatulate, sculptured with very close, very fine spiral lines; shining, white (three) banded with brown; spire plane; whorls 4, a little convex above, the last one a little and *equally* convex above and below, with *acutely carinated* periphery, descending in front, distinctly constricted below, not so above. Aperture subhorizontal, ax-shaped, outer part bent upward; peristome scarcely thickened, white, nearly straight above, narrowly reflexed below, margins rather approaching, the upper rectilinear, basal arcuate.

Alt. $9\frac{1}{2}$, greater diam. $26\frac{1}{2}$, lesser 19 mill. (Mart.)

Island of Tawalli, near Batjan, Moluccas.

H. biconvexa MART. Monatsber. Berl. Akad. 1864, p. 526; Preuss. Exped. Ostas., Landschn., p. 317, t. 16, f. 13.—PFR. Mon. v, p. 404.

The band-formula is either (12)340 or 10340. One specimen found.

H. SCHEEPMAKERI Pfeiffer. Pl. 55, figs. 48, 49, 40.

Shell narrowly umbilicated, subdepressed, carinated, slightly striatulate, and sculptured with subobsolete, close, very fine spiral lines; shining, diaphanous white, often banded with brown; spire plane; suture superficial; whorls 4, rapidly increasing, the last very convex above, *flat beneath*, the periphery acutely carinated, descending slightly below the carina in front, distinctly constricted below, not so above; aperture subhorizontal, ax-shaped, bent upward outwardly; peristome subthickened, white, nearly straight above, broadly expanded outwardly, narrowly reflexed below, margins much approaching, the upper incurved, basal arcuate. Alt. 11, diam. 26 mill.; alt. 8, diam. 21 mill. (*Martens.*)

Isl. Batjan, Ternate group of the Moluccas. Rather rare on wooded hills.

H. Scheepmakeri PFR. Zeitschr. f. Mal. 1850, p. 82; Conchyl. Cab. p. 351, t. 135, f. 5-7; Mon. iii. p. 254.—MARTENS, Preuss. Exped. Ostas., Landschn., p. 318.

The bands are generally one or two, rarely three on the upper surface. Formula 12300 or 02300, or 1(23)00 or 02000; sometimes there are none.

H. aurita, biconvexa and *scheepmakeri* are closely allied in general form and especially the aperture. *H. aurita* has no carina; *H. biconvexa* and *scheepmakeri* are acutely keeled, but the former is about equally convex above and below, whilst *scheepmakeri* is flat below, very convex above.

Group of *H. endoptycha*.

Spire more or less convex; last whorl with a pit or oblique depression outside; umbilicated.

H. ENDOPTYCHA Martens. Pl. 45, figs. 32, 33, 34, 35.

Shell somewhat narrowly umbilicated, depressed, striatulate, somewhat shining, brownish-tawny; spire little convex; suture quite deep. Whorls 5, the last rounded, with convex base, deeply descending in front, having an *oblique, descending impression*, marked

by a prominence inside; aperture oblique, rounded-triangular, the peristome a little thickened, rather widely reflexed, white, the margins moderately converging; upper margin deeply arched, basal margin rather straightened, having an oblique, entering fold, marked outside by a scrobiculation.

Alt. 8, greater diam. 16, lesser 13 mill.; length and breadth of the mouth 7 mill.

Islands of Batjan, Mareh and Ternate, Ternate group, Moluccas.

H. endoptycha MARTENS, Monatsb. d. Berl. Akad. 1864, p. 268; Ostas. Zool., Landshn., p. 301, t. 14, f. 2.—? *Dorcasia compta* H. AD., P. Z. S. 1865, p. 414, t. 21, f. 8.—WALLACE, l. c., p. 408.

This species is peculiar in the oblique impression on the last whorl, visible as a prominence inside the mouth, and the uniform brown color. Von Martens is disposed to consider *H. compta* H. Ad. to be a synonym, believing that the presence of the oblique impression was omitted in the description.

H. compta H. Adams (pl. 45, fig. 31). Umbilicated, depressed, thin, cinnamon-colored; spire very shortly conoidal, apex obtuse; whorls 5, convex, slowly increasing, the last scarcely descending, base compressed around the funnel-shaped umbilicus; aperture oblique, lunate-rounded, pale and shining inside; peristome whitish, a little reflexed, margins conniving, basal arcuate, subreflexed.

Alt. 6½, greater diam. 14, lesser 11 mill. Id. of Batjan. (*Ad.*)

H. PORCELLANA Grateloup. Pl. 65, figs. 82, 83.

Shell orbiculate-depressed, umbilicated, very shining, diaphanous, yellowish above, white below; spire retuse; umbilicus excavated; aperture subovate, bidentate; margin of outer lip reflexed; white. Alt. 9, diam. 15 mill. (*Grat.*)

A charming species, characterized by its orbicularly compressed form, nearly flat, but convex below, porcelain-white, very smooth and shining. Spire much depressed, very obtuse; last whorl two-thirds the total altitude, with two yellowish brown transverse bands. Suture visibly channelled. Umbilicus narrow, deep, funnel-shaped. The aperture has behind and toward the base a large tooth-like prominence, marked outside by a scar-like depression. Another smaller tooth on the columellar margin. Whorls of the spire 5, convex, finely obliquely striate.

Island of Lombok, east of Java.

H. porcellana GRAT., Actes de la Soc. Linn. de Bordeaux, xi, p. 410, t. 1, f. 5, 6, 1839.—PFR., Mon. Hel. Viv. i, p. 346; v, p. 355.—MARTENS, Ostas. Zool., p. 302 and 397.

The description above is taken from the original one. Pfeiffer says (Monographia, l. c.) that Wallace found the species upon the Island of Lombok. The very poor original figures are given. The locality given by Grateloup is "Cuba."

This is a form much resembling shells of the Haitian section *Cepolis*. Among Oriental snails it may be compared with *H. merarcha* Mabile, and *H. endoptycha* Mart.

Group of H. zonalis.

Spire convex, not concave, the apex not sunken; lip narrow, reflexed; surface not hirsute or showing scars or granules; suture bordered by a white band; umbilicus open; bands not continued upon the lip.

H. ZONALIS Férussac. Pl. 45, figs. 24, 25, 29, 30.

Shell umbilicated, depressed, the spire a little convex; brownish-corneous or isabelline, with two chestnut bands above and two beneath; a white margin to the suture; base flattened, scarcely at all swollen, scarcely constricted behind the basal lip. Aperture rounded-oval, peristome evenly expanded and subreflexed all around, the basal margin toothed.

The shell is rather thin, very delicately striated; whorls $4\frac{1}{2}$ –5, slightly convex, the last descending in front; aperture very oblique, purplish-white inside; peristome white, its ends approaching, basal lip usually one-toothed. Alt. 12, greater diam. 26, lesser 21 mill.

Moluccas, Ternate group, at Dodingo; Is. of Halmaheira; Port Dorey, New Guinea.

H. zonalis FER. Hist., t. 70, f. 5.—PFR. Monogr. i, p. 380.—MARTENS, Ostas. Zool., Landschn., p. 299.—TAPP. CAN. Ann. Mus. Civ. Genova, xix, p. 183.—*Planispira zonalis* BECK, Index p. 30.—WALLACE, P. Z. S. 1865, p. 409.—*H. zonaria* (in part) of some authors.—*H. leucostoma* ADS. & RVE., Voy. Samarang, Moll., p. 61, t. 16, f. 3.

The bands usually number four, but the upper one is frequently very narrow, sometimes lacking; those on the base are broader.* The banding would be represented by the formula 02345, or (rarely) 00345.

H. ATROFUSCA Pfeiffer. Pl. 54, figs. 28, 29, 30.

Shell umbilicated, depressed, rather thin, closely striated, blackish-brown, with a buff sutural band. Spire conoid-convex, apex corneous. Whorls $4\frac{1}{2}$, convex, rapidly increasing, the last depressed-rotund, a little descending in front, moderately excavated around the umbilicus. Aperture ample, diagonal, lunate-oval, very light and pearl-like inside; peristome white, broadly expanded and a little reflexed, margins converging, the columellar dilated above, having a rounded tubercle within. Alt. 15, greater diam. 32, lesser 25 mill. (*Pfr.*)

Island of Halmaheira.

H. atrofusca PFR. P. Z. S. 1861, p. 22, t. 3, f. 3; Novit. Conch. p. 164, t. 45, f. 1-3; Monogr. v, p. 382.—MARTENS, Ostas. Zool., Landschn. p. 299.—*Planispira atrofusca* WALLACE, P. Z. S. 1865, p. 409.

Whorls more rapidly increasing than in the allied *H. zonalis*, aperture less oblique, larger, the columella with a rounded tubercle. The color is also different.

H. LATIZONA Pfeiffer. *Unfigured.*

Shell moderately umbilicated, depressed, rather thin, striatulate, scarcely shining, brown, ornamented with a rather broad white zone at the suture; spire sub-plane. Whorls $4\frac{1}{2}$, the upper somewhat convex, the last rotund. Above subsulcate in front and deflexed; constricted beneath. Aperture very oblique, rotund-oval; peristome all around rather broadly expanded, margins converging; the columella having an oblong noduliform tubercle within.

Alt. 11, greater diam. $26\frac{1}{2}$, lesser 21 mill. (*Pfr.*)

Island of Ceram.

H. latizona PFR. P. Z. S. 1863, p. 524; Monogr. v, p. 394.—*Planispira latizona* WALLACE, P. Z. S. 1865, p. 409.

Similar to *H. atrofusca* but the spire is plane.

H. LOXOTROPIS Pfeiffer. Pl. 46, figs. 60-64, 68.

Shell narrowly or nearly-covered perforate, depressed *conoidal*, subangulate, arcuately striatulate, opaque, greenish-olive with brown bands, more distinct and wider beneath; sutural region pale; spire rather elevated, obtuse; whorls $4\frac{1}{2}$, a little convex, the last one plane beneath, subangulated at the periphery, distinctly descending in front, obliquely swollen, then constricted; aperture subhorizon-

tal, ovate; peristome subthickened, expanded above, reflexed below, the columella dilated, toothless. Alt. 11, greater diam. 24, lesser 19 mill.

Ternate group of the Moluccas; Port Dorey, New Guinea.

H. loxotropsis PFR. Zeitschr. f. Mal. 1850, p. 82; Conchyl. Cab. p. 351, t. 135, f. 3, 4; Monogr. iii, p. 226.—REEVE, f. 1392.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genova, xix, p. 183.—VON MARTENS, Preuss. Exped. nach Ostas., Landschn. p. 304, t. 16, f. 3, 2, with numerous varieties (see text).—*H. lorquini* PFR. Mal. Bl. 1865, p. 122; Novit. Conch. p. 273, t. 67, f. 14, 15; Mon. v, p. 345.

I have not seen this species, my description being compiled from Martens and Pfeiffer. Martens describes the animal: Head and foot black; tentacles short; jaw with weak ribs.

The greenish ground-color and lusterless surface separate this form from others. It is similar to *H. zonalis* in the band arrangement. The specimens from the island of Dodinga have the band-formula 02(34)5, or rarely 0(234)5; those from Batjan 00045; from Mareh 02345; and from Kajoa 02340. The following forms have received names:—

Form *Bernsteinii* Martens. Large, rather conical, isabelline-yellow, with a white sutural zone, a moderately wide peripheral, and a wide basal zone of blackish-brown. Alt. 19, diam. 31 mill.

Form *laticlavia* Martens (pl. 46, figs. 62, 64, 68.) Moderate sized; depressed-conic, olivaceous, with a wide white sutural zone, upper bands distinct; suture descending in front into the space between the lowest and next upper band. Alt. 13–14, diam. 25 mill.

Dodingo.

Form *angusticlavia* Mart. (pl. 46, fig. 63.) Small; quite conical brownish-greenish, with a narrow whitish sutural zone, upper bands obsolete or none; suture descending in front, next to the lower band.

Alt. 12–13, diam. 21½ mill. *Batjan.*

Form *pluricineta* Mart. Small, depressed conical, pale greenish-yellow, sutural white band rather wide, upper, peripheral and basal bands equal, a little wide, intense chestnut.

Alt. 12–13, diam. 20–22 mill.

Var. *LORQUINI* Pfr. Pl. 57, figs. 2, 3.

Shell thinner than in *loxotropsis*, spire lower, whorls flatter, and peristome much more broadly expanded.

H. ATACTA Pfeiffer. Pl. 44, figs. 18, 19, 20.

Shell narrowly umbilicated, depressed, subangulate, lightly striatulate, whitish, with 5 narrow rufous bands, the lowest remote from the umbilicus; spire little projecting; whorls $4\frac{1}{2}$, scarcely convex, the last but a little (and equally) convex above and below, subangulated, the suture descending in front into the interval between the lowest and next band. Whorl not swollen above, a little so beneath, and slightly constricted; aperture subhorizontal, sub-ax-shaped; peristome reflexed, of the color of the shell, thin, margins moderately approaching, the upper nearly straight, basal arcuate. Alt. 11-12, diam. 24-25 $\frac{1}{2}$ mill. (*Mart.*)

Halmaheira, Ternate, Kajoa, Moluccas.

H. atacta PFR., P. Z. S. 1861, p. 386, t. 37, f. 5; Mon. v, p. 376.—
MARTENS Preuss. Exped. n. Ostas., Landschn. p. 306, t. 16, f. 1.—
Planispira atacta WALLACE, P. Z. S. 1865, p. 409.

Differs from *H. loxotropis* in being much more depressed, the swelling and constriction behind the peristome far less developed, the lower band remote from the umbilicus.

Group of H. kurri.

More or less hirsute, or having hair-scars. Spire plane, not concave; suture white-bordered; band or bands when present continued on the lip. Umbilicus open; suture more or less distinctly white-bordered.

These species are allied to *H. zonalis* and *H. exceptiuncula*.

H. KURRI Pfeiffer. Pl. 45, figs. 21, 22, 23.

Shell umbilicated, discoidal, the spire flat or a mere trifle raised, not sunken at the apex; typically corneous-white with a supra-peripheral brown band and a fainter peripheral band, both *extending to the edge of the expanded lip*; base somewhat swollen, gently constricted behind the peristome.

The shell is thin, nearly lusterless, showing under a lens sparse, short, delicate hairs, or if rubbed, their scars; delicately striatulate. Coloration as described above, or as follows: Base corneous-white, becoming brownish toward the periphery, where there is a brown band (often indistinct, and sometimes having several very faint narrow bands below it); above this peripheral girdle there is a pure white zone, and then a dark brown supra-peripheral band, bordered on its upper as well as lower edge with white; the suture has an in-

conspicuous white border; the surface between this border and the supra-peripheral band is light brown, becoming darker on the latter part of the body-whorl. Whorls $4\frac{1}{2}$, convex; sutures impressed; last whorl descending in front. Aperture oblique, rounded-lunar, showing the bands within; peristome expanded, white except where the dark bands spot it; basal margin reflexed, with no trace of a tooth. Alt. 10, greater diam. $22\frac{1}{2}$ lesser 18 mill.

Is. Batchian, Waigou, etc., Moluccas.

H. kurri PFR. P. Z. S. 1847, p. 228; Conchyl. Cab., p. 251, t. 114, f. 1-3; Monogr. i, p. 386.—REEVE, Conch. Icon., f. 432.—TAPP. CAN., Ann. Mus. Civ. Genova, xix, p. 182.—*Planispira Kurri* WALLACE, P. Z. S. 1865, p. 408.

A variable species in coloration. A pure white specimen with a faint, narrow peripheral band and the usual narrow, opaque, white, subsutural band is before me. *H. flavidula* Martens is scarcely more than a variety.

H. FLAVIDULA Martens. Pl. 45, figs. 47, 48, 49.

Shell narrowly umbilicated, subdepressed, having short hairs (or if denuded, their scars), striatulate, pale corneous-yellowish, generally having one rufous band; spire scarcely or a little raised. Whorls $4\frac{1}{2}$, a trifle convex above, the last inflated beneath, subangulated around the umbilicus, in front distinctly descending and scarcely constricted. Aperture little oblique, lunate-semiovate; peristome shortly reflexed all around, a little thickened, flesh-colored, the margins quite remote; upper margin deeply arched, basal margin a little straightened, subcallous; parietal callus thin, shining. Alt. 10-10 $\frac{1}{2}$ greater diam. $17\frac{1}{2}$ -19, lesser 14-15 mill.; alt. 8, greater diam. 15 mill. (*Mart.*)

At the water-fall at Maros, southern Celebes.

H. flaveola MART. Monatsb. d. Berl. Akad. 1864, p. 525 (not *H. flaveola* Kryn., 1837).—*H. flavidula* MART. Ostas. Zool., Landschn. p. 302, t. 14, f. 4.—PFR. Monogr. v, p. 378.

The fleshy-yellow coloration leaves a milk-white place close to the suture, within the umbilicus, and on each side of the narrow peripheral band, so that one may regard it as the result of coalescent bands according to the formula (12)3(45); a disposition exhibited by many European *Campylæas*. The constriction behind the lip, in general only weakly indicated, is distinct where it passes into the umbilicus.

All examples show hair-scars, more separated than in *H. exceptiuncula*.

This species is certainly closely allied to *H. kurri* Pfr., and may prove a variety of that species. It is proportionally higher and has a smaller aperture.

Group of H. exceptiuncula.

Imperforate, or quite narrowly umbilicated; ends of the broadly expanded lip scarcely converging; columella with a tooth; spire not concave, plane, or nearly so, at least the three inner whorls. Surface having minute hairs, or in rubbed specimens hair-scars; suture white-bordered.

This group of species resembles the group of *H. zonalis* in having a white subsutural border; it differs in being imperforate or nearly so, and in being hairy. The last character forms a bond with the Philippine Island species grouping around *H. sanziana*, and with the typical forms of *Chlorites*. The apex, however, is not granulate in these hirsute species of *Planispira*.

H. EXCEPTIUNCULA Férussac. Pl. 65, figs. 84-87; pl. 45, figs. 50-53.

Shell imperforate, depressed-globose, spire a little raised but the earlier $2\frac{1}{2}$ whorls in a plane; isabelline with few or numerous brown and orange bands; lip white, broadly expanded, reflexed, adnate over the umbilicus; terminations of peristome not converging; surface covered with short rigid hairs, or if denuded of hairs, showing their regularly arranged scars.

The shell is elevated, for a *Planispira*, but the spire is flat-topped. Whorls $4\frac{1}{2}$, the last descending, rounded, not at all constricted behind the peristome. There are two principal dark zones, one above, one below the periphery, usually edged with orange; above the upper zone there are three narrow bands, one edging the suture; the base is usually brown. The upper whorls are brown or corneous, with a sutural white border. Basal lip having a strong tubercle on its inner edge, at the point of its union with the columella. Alt. 13, greater diam. 23, lesser 18 mill.

Moluccas, Halmaheira; Batjan; Ternate.

H. exceptiuncula FER., Hist., t. 70, f. 1.—PFR. Monographia i, p. 311.—REEVE, Conch. Icon. f. 501.—MARTENS, Ostas. Zool., p. 296, t. 18, f. 3.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genova, 1884, p. 155.—*H. phryne* PFR. P. Z. S. 1861, p. 386, t. 37, f. 7; Monogr.

v, p. 311.—*H. aspasia* H. AD. P. Z. S. 1865, p. 415.—PFR. Mon. v, p. 312.—*H. except. var. elatior* MARTENS, Ostas. Zool., p. 297.—*Planispira aspasia* WALLACE, P. Z. S. 1865, p. 409.

This aberrant species may be recognized by its closed umbilicus (open in the young) and hairy surface. It varies greatly in coloration. The typical pattern is described above, and figured on pl. 65, figs. 86, 87. Another form with few bands is figured on pl. 45, figs. 50–52.

Form *p hryne* Pfr. (pl. 65, figs. 84, 85). Spire more depressed, aperture more oblique, more ovate, the lip more broadly expanded; columellar tooth minute.

Form *aspasia* H. Ad. (pl. 45, fig. 53.) Only one band; the next to the last whorl a little projecting. This is *var. elatior* Martens.

H. THETIS Pfeiffer. Pl. 56, figs. 74, 75, 76.

Shell umbilicated, obtusely bell-shaped, rather thin, smooth, shining, white, with two brownish-black bands. Spire elevated, obtuse; whorls five, a little convex, the three upper ones forming a corneous, flat or sub-sunken apex, the penultimate whorl inflated, the last whorl high, very obliquely descending in front, most obsoletely angulated, the base rather flat; umbilicus narrow, obliquely entering; aperture very oblique, truncate-elliptical, concolored within; peristome simple, broadly expanso-reflexed, margins coniving, the columellar dilated above and adnate above the umbilicus, having a callous tooth within.

Alt. 14, greater diam. 22, lesser $17\frac{1}{2}$ mill. (*Pfr.*)

Habitat unknown.

H. thetis PFR. Zeitschr. f. Mal. 1851, p. 127; Conchylien Cabinet, p. 443, t. 153, f. 1–3; Monogr. iii, p. 217.

Evidently, as Von Martens has said, very closely allied to *H. exceptiuncula*, differing in the more elevated form and perforate umbilicus. It may prove a mere variation of the species named.

H. NOVÆGEORGIENSIS Cox. Pl. 54, fig. 23; pl. 65, fig. 91.

Shell imperforate, globosely depressed, surface corrugated and shiny, white, ornamented with 5 or 6 narrow brown bands; apex of spire bluntly rounded; whorls 4, rapidly increasing in size, each flatly sloping to the center, causing a subcarinated appearance; last whorl suddenly deflected in front, and carinated near the aperture; aperture very oblique, ear-shaped, margin ivory-white, flatly ex-

panded; the brown bands on the last whorl abruptly terminating at the base of the expanded lip; margins approaching, joined by a thin callus; columellar margin slightly dilated, and inclining to be tuberculated within.

Alt. 0.55, greater diam. 0.95, lesser 0.70 inch.

New Georgia, Solomon Is.

H. novæ-georgiensis COX, P. Z. S. 1870, p. 170, t. 16, f. 3, 3a.

I have not seen this species. It may prove to group elsewhere, perhaps in *Geotrochus*.

2. Subsection *Cristigibba* Tapparone Canefri, 1883.

Cristigibba TAPP. CAN. Annali Mus. Civ. di Genova, xix, 1883, p. 161. Type, *H. corniculum* H. & J.—*Planispira* in part, of authors.

With the general *facies* of *Planispira*, these shells differ in having a crest or swollen ridge behind the lip, or a strong swelling on the base immediately behind the constriction preceding the lip. The spire is plane, a little immersed or concave in the middle. The group is characteristic of New Guinea.

Group of H. corniculum.

Base strongly swollen behind the basal lip; crest scarcely developed above. Species of New Guinea.

H. CORNICULUM Hombron & Jacquinet. Pl. 46, figs. 65, 66, 67.

Shell umbilicate, suboblong in circumference, depressed, thin, lightly striatulate, shining, whitish, ornamented with one supra-peripheral blackish-band. Spire plane, reddish; whorls 4, a little convex, rapidly increasing, the last rounded, descending in front, the base substrangulated just behind the lip; umbilicus narrow, perforating; aperture very oblique, ample, subcircular; peristome broadly expanded, margins approximating, columellar margin shortly reflexed. Alt. 11, greater diam. 24, lesser 19 mill. (*Pfr.*)

Id. of Sorong; Port Dorey, Dorey Hum, New Guinea; (also Id. of Batjan, according to Wallace).

H. corniculum H. & J. Voy. au Pole Sud, Atlas t. 5, f. 10-12.—ROSSEAU in text of same, p. 13.—REEVE Conch. Icon. f. 502.—PFR. Monogr. iii, p. 247; Conchyl. Cab. p. 425, t. 149, f. 16, 17.—TAPPARONE CANEFRI, Ann. Mus. Civ. di Genova, xix, p. 180, 1883; xxiv, 1887, p. 143.—*H. collis?* TAPP. CAN. Bull. Soc. Zool. Fr. 1878, p. 271.

The supra-peripheral band in this species *extends to the edge* of the expanded peristome. It is rarely absent, as in Hombron and Jacquinot's figure 13 of plate 5, *Voy. au Pole Sud*. The peristome is rosy in specimens collected at Dorey Hum (Tapp. Can., *Ann. Mus. Civ.* 1887).

The *H. Kiesneri* of LeGuillon, briefly diagnosed in *Revue Zool.* 1842, p. 140, and not figured nor recognized by subsequent authors, is perhaps synonymous with *corniculum*. See also Pfr., *Monogr. i.*, p. 427, and Tapparone Canefri, *Annali del Mus. Civ. di Genova*, xix, p. 181, 1883. It is from Triton Bay, New Guinea.

H. DEANIANA Ford. Pl. 63, figs. 56, 57, 58.

Shell umbilicated, discoidal, flattened above and below; thin but solid; white, with a broad chestnut-brown zone encircling the last whorl just above the periphery, and continued on the next earlier whorl immediately above the suture.

Surface comparatively smooth, the growth striæ being very faint. Whorls $4\frac{1}{2}$, convex, the inner ones sunken a trifle below the level of the penultimate whorl, which projects very slightly above the last whorl. The latter is large, rounded above, below and at the periphery, slowly descending in front to about the middle of the preceding whorl; very narrowly and deeply constricted behind the basal lip, much inflated just behind the constriction, and with an oblique excavation behind the columellar lip running into the umbilicus. Aperture very oblique, rotund, lunar, white, showing the brown band inside. Lip broadly expanded on upper and outer margins, very narrowly reflexed on the basal and columellar. The outer and basal portions are of a beautiful pink rose-color. The parietal wall has a thin wash of callus. Umbilicus funnel-shaped and slightly impinged upon by the columellar lip.

Alt. 11, greater diam. 26, lesser 20 mill. Aperture, oblique alt. 16, breadth $14\frac{1}{2}$ mm., including peristome. Width of umbilicus $2\frac{2}{3}$ mm.

New Guinea.

H. (Planispira) Deaniana JOHN FORD, *Proc. Acad. Nat. Sci. of Philadelphia*, 1890, p. 188 (July 29, 1890.)

This beautiful species stands between *H. corniculum* and *H. diminula*. It is less elevated, less convex above than the latter species, the swelling on the base is much nearer the basal lip, causing the constriction to be narrower, and the umbilicus is far broader, far

less concealed by the columellar lip, which is in the *deaniana* very narrow. It differs from *corniculum* in having the band not continued upon the lip; the inner whorls not rosy, the baso-columellar lip much more arcuate, etc.

H. DOMINULA Tapparone Canefri. Pl. 68, figs. 79, 80, 81, 82.

Shell umbilicated, discoidal, shining, obliquely striatulate and most obsoletely costulate, rosy-reddish, rarely with a brown zone above; spire plano-convex, the apex subimmersed; whorls $4\frac{1}{2}$, a little convex, and separated by profound sutures; last whorl large, very obscurely subangular at the periphery, descending in front, subconstricted behind the aperture and obliquely swollen on the base; base a little convex, and having a little-dilated, perforating umbilicus. Aperture rotund-lunate, very oblique, ample, the throat pearly white; peristome expanded, margins converging, approximating, the right regularly lunate, broadly expanded, basal little incurved and narrow, columellar short, dilated, and above the umbilicus narrowly reflexed. Largest example, alt. 13, greater diam. 28, lesser $23\frac{1}{2}$ mill. Smallest example, alt. 12, greater diam. 21, lesser 18 mill. (*Tapp. Can.*)

On the Rivers Fly and Katau, Southern New Guinea.

H. dominula TAPP. CAN., Ann Mus. Civ. di Genova, xix, 1883, p. 178, t. 4, f. 8-11, and anatomy, t. 7, f. 4; t. 9, f. 5, 14.

This species has much affinity in form to *H. corniculum* H. & J., but is very distinct and easily recognized by its generally larger size, the convexity of the spire in the new species, which becomes only flat on the last whorl, but is slightly concave in the middle; by the great tumidity of the last whorl behind the aperture and its less deflection in front; and finally by the *smaller size of the umbilicus*, which differs from that of *H. corniculum*, in being always at least one-third covered by the columellar margin. (*Tapp. Can.*)

The following variations are noted by Tapparone Canefri:

Form *a*. Entire shell, including peristome, white. Alt. 12, greater diam. 27, lesser $22\frac{1}{2}$ mill.

Form *b*. Shell white, peristome rosy. Alt. 12, greater diam. 26, lesser $21\frac{1}{2}$ mill.

Form *d*. (pl. 68, fig. 81.) Shell larger, more depressed, the aperture wider, white with a wide brownish chestnut zone above, the peristome broadly expanded above, bright rose-colored. Alt. 14, greater diam 31, lesser 25 mill. River Fly.

Group of *H. tortilabia*.

A swollen crest developed behind the upper and outer margins of the lip. Species of New Guinea.

H. TORTILABIA LESSON. Pl. 36, figs. 30, 31, 32; pl. 60, figs. 7, 8, 9.

Shell umbilicated, suborbicular, discoidal, yellowish-white, unicolorous or bifasciate with reddish brown; spire plane; whorls 5, a little convex, the last subdepressed, a little deflexed in front and having a gibbous ridge or crest above, constricted beneath; umbilicus moderate. Aperture very oblique, rounded-lunar; peristome reflexed, margins converging.

Alt. $9\frac{1}{2}$, greater diam. 22, lesser 19 mill. (*Pfr.*)

Western New Guinea; Sorong and Aru islands.

H. tortilabia LESSON, Voy. de la Coquille, Zool. II, p. 311, t. 13, f. 1.—PHIL. Abbild. i, p. 152, *Helix* t. 5, f. 4.—PFR. Conchyl. Cab., p. 129, t. 90, f. 10-12; Mon. Hel. Viv. i, p. 388.—RVE, Conch. Icon., f. 498.—MARTENS, Ostas. Zool. ii, p. 391.—*H. (Cristigibba) tortilabia* Less. TAPP. CAN. ANN. MUS. CIV. GENOV. xix, p. 171, 1883.—*H. (Planispira) tortilabia* Less., PFR. Versuch. etc., p. 136; Nomencl. Hel. Viv., p. 182.—TAPP. CAN. ANN. MUS. CIV. GENOV. vi, p. 561, 1874; ix, p. 289, 1876-77; Bull. Soc. Zool. France, 1878, p. 270.—*H. gibbosula* HOMBRON & JACQUINOT, Voy. au Pole Sud, atlas, t. 5, f. 14-16; and ROUSSEAU in text of same, p. 14.—*H. torticollis* TAPP. CAN. ANN. MUS. CIV. GENOV. vi, 1874, p. 561, 562 (and of Le Guillou?)

Two principal forms of this species are recognized by Tapparone Canefri.

FORM A. Shell relatively larger; aperture somewhat oval, ample; superior margin of the peristome wider and less expanded outwardly. The following color-forms occur:

Typical. Shell white all over with two brown bands. This is the typical form figured by Lesson.

a. White all over, without bands, covered with a very thin, yellowish epidermis. This is *H. gibbosula* H. & J. and *tortilabia* Phil. See figs. 30-32 of pl. 36.

b. Shell bandless, white, the first whorl of the spire, the peristome and the palatal region within and outside, bright rose colored. One example from Aru Island.

FORM B. Shell relatively smaller, aperture narrower and rotund; edge of peristome narrow also above and uniformly expanded outwardly. Color-forms as follows:

c. Shell with a brown band above, the peristome rosy. Reeve's figure of *tortilabia* represents this form.

d. Shell very small for the species, white and bandless, the peristome a beautiful rose color.

e. Shell entirely white, bandless.

f. Shell blackish all over, the peristome of the same color.

The *H. torticollis* LeGuillou (Revue Zool. 1842, p. 140), described from Triton Bay, New Guinea, is probably a synonym. It can only be identified by an examination of the type. See Pfr. Monog. i, p. 388, and Tapparone Canefri, Ann. Mus. Civ. di Genova, xix, p. 173, 1883.

H. SEMIRASA Mousson. Pl. 46, figs. 71, 72, 73.

Shell umbilicated, much depressed, thin, subtly striatulate and beset with very short, not close, hairs; a little shining, corneous-whitish or white, ornamented with a wide chestnut band above, a narrow one below the middle; spire plane, apex subimmersed; suture impressed; whorls 4, little convex, the last depressed-rounded, shortly descending in front, swollen behind the aperture, on the base rather flattened, subconstricted in front; umbilicus moderate (about one-seventh the diameter of the shell), conical. Aperture very oblique, lunate-subcircular; peristome simple, rosy, margins converging, the upper narrowly expanded, basal narrowly reflexed, dilated in a triangular plate at the insertion.

Alt. 7, greater diam. 19, lesser 16 mill. (Pfr.)

Mysol and Aru Is., near New Guinea.

H. semirasa (MOUSS. in coll.) MARTENS, Preuss. Exped. Ostas., Landschn., p. 392.—PFR. Novit. Conch. iv, p. 38, t. 117, f. 4-6.—TAPP. CAN. Ann. Mus. Civ. Genova, xix, p. 173, 1883.—*H. moluccensis* PFR. Zeitschr. f. Mal. 1850, p. 84; Mon. iii, p. 245; Conchyl. Cab., p. 352, t. 135, f. 10, 11.

The name *moluccensis* Pfr. has priority, but has been changed by Martens, because the species is not from the *Moluccas*, but belongs to the Papuan fauna. It is closely allied to *H. tortilabia*.

H. PLAGIOCHEILA Tapparone Canefri. Pl. 52, figs. 82, 83, 84.

Shell umbilicated, discoidal, rather thin, pellucid, obliquely striatulate and obsoletely impressed-punctate; covered with a gray-

ish or brownish-buff epidermis, here and there regularly and shortly setigerous, the hairs readily deciduous and leaving a golden or silvery impressed point; corneous-white, unicolorous or with two brown bands, one above, one below the periphery; spire depressed, plane, subimmersed in the middle. Whorls $4\frac{1}{2}$, subconvex, separated by impressed sutures; the last whorl large, subconstricted behind the lip and with a gibbous crest; scarcely descending in front; with a moderate, penetrating umbilicus. Aperture rotund-lunate, higher than wide, very oblique, white inside; peristome rosy purple, narrowly and equally expanded and reflexed, the margins converging, columellar slightly dilated and deflexed above the umbilicus.

Alt. 8, greater diam. 18, lesser 16 mill. (*Tapp. Can.*)

Shores of the river Fly, Southern New Guinea; also, shores of the Katau.

H. plagiocheila TAPP. CAN. Ann. Mus. Civ. Genova, xix, 1883, p. 174, t. 5, f. 4-7, and anatomy, t. 7, f. 6.

Resembles *H. tortilabia* in form. It is a third smaller, is flat above, the shell is thinner, is less gibbous behind the constriction at the aperture, the latter is higher than wide; it especially differs in the epidermis, which in *tortilabia* is smooth, lucid, thin, closely adherent; that of *plagiocheila* being velvety, readily coming off and having scattered stiff short hairs.

H. LEPTOCHEILA Tapparone Canefri. Pl. 61, figs. 25, 26, 27.

Shell umbilicate, discoidal, rather thin, shining, pellucid, obliquely striatulate, white, having a broad, deep chestnut band above; spire plane, subimmersed in the middle. Whorls 4, a little convex, separated by impressed sutures; the last whorl subconstricted behind the aperture, then subinflated and obliquely swollen; moderately descending in front; base convex and subcompressed around the penetrating but little widened umbilicus. Aperture ovate-lunate, wider than high, very oblique; peristome rosy, narrowly expanded, reflexed, margins converging, approximating, columellar slightly dilated and reflexed above the umbilicus. Alt. $7\frac{1}{2}$, greater diam. 17, lesser 15 mill. (*Tapp. Can.*)

Moluccas.

H. leptocheila TAPP. CAN., Ann. Mus. Civ. Genova, 1887, p. 150, t. 1, f. 14-16.

Intermediate between *H. expansa* and *H. plagiocheila*; above it is like the former; but the swollen base, color and form of the peristome distinguish it from that species.

H. RHODOMPHALA Tapparone Canefri. Pl. 48, figs. 7, 8.

Shell umbilicated, discoidal, depressed above, obliquely striate, covered with a grayish-brown, velvety, shortly-hairy epidermis; under the epidermis white, apex rosy, a rosy sutural zone on the last two whorls, and two narrow brown bands, one edging the rosy sutural zone, the other nearly peripheral; umbilical region purplish; spire plane, apex sub-immersed. Whorls $4\frac{1}{2}$, a little convex, separated by profound sutures; the last large, subtumid beneath, behind the aperture subconstricted, and below obliquely gibbous-crested; compressed around the rather open and perforating umbilicus; scarcely descending in front. Aperture rotund-lunar, higher than wide, very oblique, inside rosy toward the peristome, then white; peristome often blackish-purple, expanded and reflexed in every part, margins converging, regularly arcuate, columellar scarcely dilated, and reflexed above the umbilicus.

Alt. 10, greater diam. 21, lesser 17 mill. (*Tapp. Can.*)

Shores of the River Fly, Southern New Guinea.

H. rhodomphala TAPP. CAN. Ann. Mus. Civ. Genov. xix, 1883, p. 176, t. 4, f. 12, 13.

One example of the seven seen by Canefri was white all over, less gibbous behind the aperture, the peristome broad, blackish-purple.

This species has much affinity to the preceding, but is easily distinguished by its greater depression above, larger size, form of the upper margin of the peristome and the peculiar color of the lip.

Group of H. margaritis.

Crest inconspicuous. These species connect *Cristigibba* and *Planispira*; they are from the Moluccas.

H. MARGARITIS Pfeiffer. Pl. 52, figs. 93, 94, 95.

Shell depressed, moderately umbilicated, striolate, white, with 2 or 3 blackish-brown bands; spire plane; whorls $3\frac{1}{2}$, scarcely 4, sub-plane, the last convex on the base, not much descending in front; swollen, inflated, and then constricted behind the peristome. Aper-

ture transversely subelliptical, peristome expanded, white, moderately thickened. Alt. 9, greater diam. 19, lesser 15 mill. (*Mart.*)

Moluccas, Ceram.

H. margaritis PFR. Zeitschr. f. Mal. 1850, p. 83; Conchyl. Cab. p. 354, t. 135, f. 19-21; Monogr. iii, p. 246.—MARTENS, Preuss. Exped. nach Ostas., Landschn. p. 307.—*H. zonulella* MOUSS. in coll. teste MARTENS.

Typical *margaritis* has two bands, the last whorl scarcely descending in front, aperture little oblique.

Var. ZONULELLA MOUSS. Bands 3, upper one interrupted; last whorl moderately descending; aperture very oblique. Alt. $7\frac{1}{2}$, greater diam. 16, lesser 12 mill.

H. EXPANSA Pfeiffer. Pl. 46, figs. 69, 70, 71, 74, 75, 76.

Shell narrowly umbilicated, inflated-discoidal, subtly striate, thin, waxy-white, painted above with rufous-brown bands, unicoloral beneath; spire plane, apex a little immersed, suture pretty deep. Whorls $4\frac{1}{2}$, a little convex, the last inflated beneath, shortly descending in front, not constricted. Aperture diagonal, ample, lunate-rotund; peristome thin, reflexed, white, margins approaching, joined by a thin callus, collumellar margin arcuate.

Alt. 13, greater diam. 20, lesser 15, aperture alt. and width 11 mill. (*Mart.*)

Island of Batjan, Moluccas, on wooded hills.

H. expansa PFR. P. Z. S. 1861, p. 22, t. 3, f. 8 (unrecognizable fig.); Novit. Conch. p. 165, t. 45, f. 4-6; Monogr. v, 391.—MARTENS, Preuss. Exped. Ostas., p. 286, t. 14, f. 3.—*H. anozona* MARTENS, Monatsber. d. Berl. Akad. der Wissensch. 1864, p. 269.

Above like *H. margaritis*; beneath like *H. corniculum*. The sutural band is sometimes wanting.

H. MERSISPIRA Martens. Pl. 45, figs. 26, 27, 28.

Shell narrowly umbilicated, depressed, striatulate, concolored, whitish?; spire a little sunken; whorls 4, a little convex, the last depressed-rounded at the periphery, below more convex and obtusely angulated around the umbilicus; in front distinctly descending; above moderately, beneath deeply constricted; aperture very oblique, lunate-circular; peristome shortly expanded all around, rather thin, white, margins rather approaching, the upper slightly, the basal much arched. Alt. $11\frac{1}{2}$, greater diam. 24, lesser 18 mill. (*Mart.*)

Island of Moti, Moluccas.

H. mersispira MART., Monatsb. d. Berl. Akad. 1864, p. 525; Ostas. Zool., Landschn. p. 303, t. 14, f. 8.—PFR. Monogr. v, p. 388.

Only dead, bleached specimens were obtained. The slightly sunken spire, narrow lip, without a basal tooth, and uniform white coloration are its more notable features.

H. QUADRIVOLVIS Martens. Pl. 45, figs. 41, 42, 43.

Shell with a funnel-shaped umbilicus, inflated discoidal, subtly striate, white, with one brown band. Spire a trifle immersed; suture profound; whorls 4, cylindrical, the last scarcely descending in front, not constricted. Aperture subvertical, sinuous, obliquely lunate; peristome thin, shortly expanded in every part, margins distant, columellar margin obliquely descending, basal subrectilinear, ascending forward, the upper inflexed. Alt. 7, greater diam. 15, lesser 12 mill. (Mart.)

Western Borneo near Mandhor; at Kepahiang and Rinduhati, Middle Sumatra.

H. quadrivolvis MART., Monatsber. Berl. Akad. Wissensch. 1865, p. 53; Ostas. p. 288, t. 14, f. 6.—PFR., Mon. v, p. 392.

Above, near the suture, and beneath around the umbilicus there are slight indications of carination, too indistinct to be mentioned in the description. There is no constriction behind the lip. The straight basal lip reminds one of *Planorbis trivolvis* Say.

APPENDIX.

STEGODERA.

STEGODERA HENSANIENSIS Gredler. Unfigured. (See page 13.)

Allied to *H. trisinuata* Mart.; widely umbilicated, scarcely carinated, subdepressed; spire a little convex, closely striated, finely granulated to the apex, but without the rows of tubercles of *H. trisinuata*; chestnut-rufous, streaked transversely below the suture with whitish; whorls $4\frac{3}{4}$ –5, separated by profound sutures, the last whorl not swollen around the umbilicus, free in front and deflexed. Aperture ob-triangular, trisinuate, pale flesh-brown inside; peristome continuous, thickened, whitish, reflexed, three-toothed; one tooth on the parietal callus, one (somewhat bifid) on the basal margin, one on the outer margin, the two latter marked by broad furrows behind the peristome. Alt. 10, diam. 20–21 mill. (Gredler.)

Hensan, Province of Hunan, China

H. (Polygyra) hensaniensis GREDLER, Zur Conchylien-Fauna von China, viii Stück, p. 4, published by the author, Bozen, 1885.

AMPELITA (page 16.)

Since the publication of the first number of the MANUAL for 1890, Crosse and Fischer's *Hist. Nat. Moll. Madagascar* has appeared (See note on page 65 of this volume); and also a review of the group of *H. sepulchralis* in their *Journal*.

AMPELITA SEPULCHRALIS Fér.

Crosse and Fischer (in *Journ. de Conchyl.*, xxx, p. 127) admit and diagnose the following varieties of *sepulchralis*; they are mostly merely color-forms.

Form *sganziniana* C. & F. (pl. 64, figs. 58, 59). Depressed; subdiscoidal; pale olive-brown; spire subplane; inside of aperture and peristome pale bluish. (see p. 21, this volume). This is the *H. sganziniana* of *Hist. Madag., Moll.*, plate 5, figs. 8-10.

Form *præclara* C. & F. Subdepressed, scarcely subdiscoidal, chestnut-brown, aperture and peristome shining, vivid grayish-blue. This is *H. sepulchralis* var. *g* of Crosse & Fischer, *Hist. Madag. Moll.*, t. 17, f. 6.

Form *olivacea* Pilsbry (pl. 64, figs. 62, 63). Subdepressed, subdiscoidal, olive-yellowish, the earlier whorls very dark, pinkish or purple; apex whitish. This is *H. sganziniana* var. *g* of C. & F., *Hist. Madag., Moll.*, t. 12, f. 3, December, 1889.

Form *lethifera* C. & F. (pl. 64, fig. 61). Subdiscoidal, depressed, unicolored black; aperture bluish-white inside, the peristome intense brownish-black. *H. sganziniana* var., C. & F. in *Hist. Madag. Moll.*, t. 7, f. 3.

Form *funebri* Martens (pl. 3, fig. 43-45). Larger than normal *sepulchralis*, the body-whorl malleated; of a blackish-brown color, with bands of papery whitish epidermis.

Having again worked over the material examined by me when preparing my monograph, together with a large number of additional specimens received during the past year, and having studied attentively the excellent work of Messrs Crosse & Fischer, I have arrived at the following arrangement of forms of the *H. sepulchralis* group. In the extent and perplexing inter-relations of the varieties, these *Helices* may be compared to the *H. californiensis* group in America, the *H. peliomphala* group in Japan, or the *H. grayi* group in Australia.

H. SEPULCHRALIS Fér. typical.

The type of Férussac is a shell with rather elevated spire, having a distinct furrow on both upper and lower surfaces; a light zone upon the gibbous, subangular ridge around the umbilicus. Alt. 25, diam. 45 mill. (From Férussac's illustration, Hist. t. 75, f. 1).

Var. *SGANZINIANA* C. & F. (pl. 64, figs. 58, 59.)

Spire nearly plane; last whorl concave above, flattened beneath, etc. To this variety are to be referred many depressed specimens of a uniform dark hue, which are not angled around the umbilicus but have the base convexly flattened. Umbilicus encircled by a light or dark band or by none. Color-varieties very numerous. *There are no white or creamy streaks or bands.*

Var. *EURYCHILA* C. & F. (pl. 64, figs. 56, 57).

A distinct furrow above and below, as in the type; shell large (diam. 57–64 mill); spire low; umbilicus bounded by a gibbous ridge and usually a light band; *surface streaked or banded with hydrophanous whitish markings.* *H. cadaverosus* Pilsbry (pl. 62, figs. 29–31) is a depressed form of this variety, connecting it with Martens' *funebri*, which is intermediate between *cadaverosus* and *sganziniana*.

Connected with the typical *sepulchralis* by numerous shells smaller than *eurychila* but having the same "papery" epidermis. I have acquired a large series of these shells since my description of *cadaverosus* was printed. The oblique light streaks are sometimes cut into spiral bands (like Martens' *funebri*) by dark spirals. A pale color-form (*pallidior*, pl. 64, fig. 56) is diagnosed by Crosse & Fischer.

Var. *FUNEBRIS* Morelet, (not Martens). Pl. 67, figs. 67, 68, 69.

No furrow or depression on the convex upper surface, or only a very slight one; base having a circular impression; purplish-black or rufous, unicolored; aperture dark within, lip whitish, the basal margin having a low, slight tooth-like prominence in the middle. Alt. 24–26, diam. 45–53 mill. (See Morelet, Journ. de Conchyl. 1877, p. 217, also Crosse & Fischer, in Hist. Madag., Moll. t. 11, f. 3). The series before me shows this to be a mere variety of *sepulchralis*. It often shows whitish streaks, like *H. eurychila*.

I have not seen *H. excoriata* Martens. It is probably a form of *eurychila*.

H. SUBSEPULCHRALIS Crosse. Add to synonymy, CROSSE & FISCHER, in Grandidier, Hist. Madag., Moll., t. 11, f. 1, 1a, Dec. 1889; and Journ. de Conchyl. 1890, p. 128.

Form *obscura* C. & F. (pl. 62, fig. 37), Moll. Madag. t. 11, f. 2, 2a, 2b; Journ. Conch. 1890, p. 128.

Form *minor* C. & F. (pl. 62, fig. 36). See *H. sepulchralis* RVE., f. 147b.—*H. subsepulchralis* ANGAS, P. Z. S. 1877, t. 80, f. 3.—CROSSE & FISCHER, Moll. Madag. t. 17, f. 7.

Form *nigropurpurea* C. & F. This is *H. subsepulchralis* C. & F., Moll. Madag. t. 17, f. 8.

H. STRAGULUM Crosse & Fischer. Pl. 64, figs. 64, 56, 66.

This is closely allied to *H. lamarei* Mke.

H. HOVA Angas. Add to synonymy, *H. hova* C. & F., Moll. Madag. t. 18, f. 2-5.

In the second paragraph on page 25, read *pl. 66, figs. 64, 65*, instead of "pl. 64."

H. LAMAREI Mke. Add to synonymy, *H. hova var. C. & F., l. c. t.* 18, f. 6, 6a, 6b, 7, 7a.

Crosse and Fischer surmise that *hova* and *lamarei* will prove to be one species. The narrower umbilical perforation of the latter seems to me to separate them.

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H. ATROPOS Fér., according to Crosse and Fischer, belongs to the group of *H. omphalodes*.

H. NOVACULA Martens. Specimens lately received agree in all respects with the one commented upon on page 33.

H. CAZENAVETTI, Fischer & Bernardi. Pl. 67, figs. 73, 74, 77, 78.

The figures given on pl. 67 are from Crosse & Fischer, Moll. Madagascar.

H. FULGURATA Sowb. Pl. 67, figs. 75, 76.

The figures are from Crosse and Fischer.

H. SUAREZENSIS Crosse & Fischer. Pl. 67, figs. 70, 71, 72.

Shell broadly umbilicated, subdepressed, moderately thick, subobliquely rugate-striate, pale olive-fulvous, unicolorous. Spire little projecting, the apex plane; suture deeply impressed; whorls 5, nearly plane, first two a little roughened, the last scarcely descending, carinated a little above the middle, the base more convex,

plane around the umbilicus. Aperture oblique, subhorizontal, lunate-elliptical, livid violaceous-brown inside; peristome simple, dull whitish, margins joined by a very thin violet-brown callus, columellar margin subdilated, slightly reflexed, a little sinuous; basal and outer margins thin, subacute.

Alt. 20, greater diam. 46, lesser 38 mill. (*C. & F.*)

Diego-Suarez, Madagascar.

H. Suarezensis *C. & F.*, Journ. de Conchyl. 1877, p. 78; and in Grandidier, Hist. Madag., Moll., t. 4, f. 2, 2a, 2b.

Belongs evidently in the vicinity of *H. lanx* Fér.

H. LANCIFORMIS Boettger.

H. lanx Crosse & Fischer (not Fér.), Moll. Madag. t. 11, f. 4, 4a, 4b, is doubtless synonymous. It is a distinct, well-marked species. *H. Campbelliana* Pilsbry is perhaps a small variety of the same.

HELICOPHANTA.

Page 64, 12th line from bottom, read *pl. 66, fig. 63*, instead of *pl. 64, fig. 63*. 7th line from bottom of page, read *pl. 66, fig. 62*, instead of *pl. 64, fig. 62*.

ACAVUS.

ACAVUS HÆMASTOMA L. var. CONCOLOR Pilsbry. (The Nautilus iv, p. 59, September, 1890). Unicolored chestnut all over, the two earlier whorls and a narrow umbilical crescent pink; lip and parietal wall red. No spiral white zones or bands. Form normal. (No 60959 of Acad. Colln.)

HADRA.

On page 88–89 I offered an arrangement of this group, which I have found to be imperfect, after the whole of my material was studied. The following arrangement is more in harmony with the facts as I understand them. I especially would insist upon the complete divorce of *Hadra* from *Camæna*, and the essential identity of *Thersites* with the former. Upon this latter point I have already expressed my opinion (p. 129, this volume); I may add, that since the passage referred to was printed, I have received a letter from Mr. C. Hedley, the talented malacologist of the Queensland Museum, in which he expresses the same view of *Thersites*.

Subgenus XIX. HADRA Albers, 1850.

(=*Thersites*+*Hadra* of my synopsis on p. 89.)

(*Sino-Japonic branch.*)

Section EUHADRA Pilsbry, 1890. See p. 95.

(*Australian branch.*)

Section HADRA, restricted.

Subsection HADRA. Type *H. bipartita* Fér., p. 126.

Subsection BADISTES Gld. Type *H. gulosa* Gld., p. 129.

Subsection THERSITES Pfr. Type *H. richmondiana* Pfr., p. 90.

Subsection SPHÆROSPIRA Mörch. Type *H. fraseri* Gray, p. 149.

Subsection XANTHOMELON Martens. Type *H. pomum* Pfr., p. 178.

Section RHAGADA Albers, 1860. See p. 184.

Subsection GLYPTORHAGADA Pilsbry. Type *H. silveri* Ang. p. 191.

Subgenus XX. ANOGLYPTA Martens, 1860. See p. 92.

This group has probably nothing to do with *Hadra* (+*Thersites*), and may stand for the present as a distinct subgenus. It is possible that an examination of the dentition will prove *Anoglypta* to belong to the *Zonitidæ*. The animal is unknown.

* * *

It will be understood that I give but little value to the Australian subsections of *Hadra*. They simply represent the more salient or extreme aspects of variation, and are connected by forms more or less intermediate.

EUHADRA.

The Japanese species of the *H. peliomphala* group are excessively variable, and the number of specific types must be considerably reduced. Kobelt has pretty thoroughly worked them up in his work *Fauna molluscorum extramarinorum Japoniæ*, 1879. I suggest the following as a rearrangement of the varieties of *H. lukuana* Sowb. This name must take precedence over *H. peliomphala* Pfr., as it is several years earlier.

EUHADRA LUHUANA Sowb. 1839. (Beechey's Voy., Zool., Moll. p. 143, t. 35, f. 4.—KOBELT, Fauna Jap. p. 27, t. 3, f. 5-7; t. 5, f. 8; t. 6, f. 1-9).

In its typical development this form differs from typical *peliomphala* in the flatter spire, less oblique, less transversely widened aperture, the altogether stronger and rougher shell. It is brown, with a single narrow blackish band; umbilicus dark or light. Alt. 20, greater diam. 41, lesser 35 mill.

The periphery is obtusely subangulated above the middle. Specimens smaller than above indicated, and of a clear yellow color, *lip white*, are numerous. They have no umbilical spots or bands.

? Var. *EOA* Crosse, 1868, (see p. 98). This seems to differ in being more depressed above than typical *luhuana*, but is probably a variety of that species.

*Banded but not conspicuously obliquely streaked; bands
sometimes spotted.*

Var. *PELIOMPHALA* Pfr. 1850.

The type of *peliomphala* as represented in *Fér. Hist.* is a shell like figs. 1, 2 of pl. 30, but without spots or streaks on the bands, which are 4 in number, inclusive of the black umbilical patch. Specimens with spots on the bands (pl. 30, figs. 1-4) are more frequent. Specimens with *continuous* bands usually lack the superoior narrow one (shown in fig. 2, pl. 30.) The spire is rather low. The sculpture is finer, smoother than in typical *luhuana*, and the aperture is wider.

Form *typica*. Bands 2, 3 or 4 (incl. umbil. spot), continuous, not streaked or spotted with yellow. Shell more depressed than var. *callizona*.

Form *maculata*. Bands 1-4, maculated with yellow; umbilical spot present or absent.

Form *conica*. Bandless, yellowish-corneous, usually with a pinkish streak on the body-whorl, marking the place of a former peristome; spire elevated, conical, sutures impressed; lip violet-pink, umbilicus rapidly narrowing. Alt. 24, diam. 33 mill.

Kioto, Japan.

Var. *CALLIZONA* Crosse, 1871 (see p. 105). Smaller, much more elevated, with narrow umbilicus; banded, the bands not interrupted by flecks or streaks of yellowish. It sometimes lacks bands, but

may be known by the elevated spire and narrow umbilicus. *H. amaliae* Kobelt, 1875, and *H. conenor* Smith, 1878, are synonyms.

Conspicuously obliquely streaked with whitish over spiral bands.

Var. *NIMBOSA* Crosse, 1868 (see p. 101). Spire not much raised; dark bands distinct, frequently interrupted by whitish or buff streaks.

Form *brandti* Kobelt, 1875. Small; umbilicus narrow, scarcely perforating.

Form *senckenbergiana* Kobelt, 1875. Very large; umbilicus wider, open.

Form *nipponensis* Kobelt, 1876. Shell having spiral ill-defined brownish tracts (at least beneath); obliquely streaked, having opaque buff *raised thread-like oblique striæ* in places. *H. congenita* Smith, 1878, is a synonym. See p. 102. The spire is usually distinctly conoidal; the aperture is broad and low; there is no umbilical dark patch.

H. scævola Martens, Sitzungsber. Naturforsch Fr. zu Berl. 1877, p. 104, may be an *Euhadra*. See Kobelt, Faun. Jap.

H. BLAKEANA Newc.

H. Blakei Newc. KOBELT, Faun. Jap., p. 23, t. 7, f. 10, 11.

This is scarcely an *Euhadra*. Kobelt places it in *Aegista* with doubt.

H. PLATYSOMA, (p. 104). This is a synonym of *H. jaspidea*, Pfr.

Group of H. swinhoei, Pfr. (p. 115.)

H. GRANULIFERA Mollendorff. Pl. 69, figs. 99, 100.

Shell openly umbilicate, depressed-globose, solid, transversely plicate-striatulate, closely and minutely granulose, chestnut-brown. Whorls 6, subplane, spire globose-conoidal with convex lateral outlines; last whorl with a strong, exerted carina at periphery; base inflated, subgibbous, very shortly descending in front. Aperture diagonal, lunate-rounded, peristome expanded, a little reflexed, violet-lipped; columellar margin dilated, partially concealing the umbilicus. Alt, 28, greater diam. 46, lesser 40 mill. (*Mlldff.*)

Wutshangfu, Province of Hubei, China.

Hadra granulifera MLLDFF. N. D. M. Gess. 1888, p. 43.—*Helix granulifera* Mlldff., HEUDE, Notes sur les Moll. Terr. de la Vallée du Fleuve Bleu, p. 141, t. 37, f. 8, 8a.

H. RENALTIANA Heude. Pl. 69, figs. 1, 2.

Shell rather large, subsolid, subconic-discoidal, chestnut-brown, minutely spirally striate, striæ undulating, interrupted; spire obtuse; whorls 5, regularly increasing, the last carinated; suture subplane; umbilicus narrow; aperture oblique, sub-elliptical, inequal; peristome undulating, white, expanded, reflexed at the umbilicus. Umbilicus small, perforating.

Alt. 25, greater diam. 45, lesser 37 mill. (*H.*)

Si-lin (Kouang-si), China.

H. renaltiana H., Journ. Conch. 1889; Notes sur les Moll. Terr. Fl. Bl., p. 141, t. 38, f. 10.

Group of H. succincta (p. 117).

Add to synonymy of *H. STENOZONA* Mlldff. HEUDE, Notes sur les Moll. Terr. Vallée Fl. Bl., p. 140, t. 38, f. 9.

Heude compares it to his *H. cremata*.

H. NUX Möllendorff. *Unfigured.*

Shell narrowly and half-covered umbilicate, globose-conic, transversely subtly striate and decussated by spiral rugulose lines, chestnut, girt with a narrow band at the periphery. Whorls $6\frac{1}{2}$, subplane, forming a conic spire with acute apex; last whorl obtusely angulated, base convex, a little applanate before the aperture, very shortly descending in front. Aperture oblique, lunate-rounded; peristome rather expanded, a little reflexed, the basal margin subhorizontal, columellar margin dilated, thickened, partly concealing the umbilicus. Alt. 25, greater diam. $28\frac{1}{2}$, lesser 24 mill. (*Mlldff.*)

Formosa.

Hadra nux MLLDFF. N. D. M. Ges. 1888, p. 43.

Differs from *H. friesiana* (antea, p. 118) in the more elevated spire, last whorl scarcely carinated, slightly angulated, base not compressed, but more convex, rather inflated, peristome more expanded.

H. SCHMACKERI Möllendorff. Pl. 69, figs. 3, 4, 5.

Shell moderately umbilicated, depressed globose, solid, obliquely plicate-striate, spirally rugulose, chestnut-brown, with three yellow bands, one at suture, one at periphery, the third around the umbilicus. Whorls $5\frac{1}{2}$, a little convex, the last inflated on the base, obtusely angulated at the periphery, shortly descending in front.

Aperture diagonal, lunate-elliptical; peristome expanded, thickened, purplish, margins joined by a thin callus, columellar margin dilated.

Alt. 24–26½, greater diam. 37½–39, lesser 31–33 mill. (*Muldff.*)

Lien-shou region, province of Guang-dung, China.

Hadra Schmackeri MLLDF. N. D. M. Ges. 1888, p. 42.—*Helix* (*Hadra*) *schmackeri* SCHMACKER & BOETTGER, N. D. M. Ges. 1890, p. 137, t. 2, f. 9a, 9b, 7b.

Differs from *H. caspari* in being smaller, higher, whorls more convex, the last one inflated, obtusely angulated (not carinated), in the narrower umbilicus and the bands.

HADRA.

Page 137, for "*H. mabellei*" read *H. mabillei*.

Group of *H. biteniata* Cox (p. 144).

H. (HADRA) BOURKENSIS E. A. Smith. *Unfigured.*

Shell narrowly umbilicated, depressed-globose, sub-thin, shining, yellowish, ornamented with two rufous-brown zones above the middle; whorls 5½, a little convex, rather slowly increasing, separated by rather profound suture, striated by delicate growth-lines, minutely granulated above, the last a trifle descending in front, rounded at the periphery, more shining below than above, scarcely granulated; spire short, obtuse at apex. Aperture wide, lunate, pale brownish, ornamented above with a zone of darker; peristome thin, pale, slightly expanded, columellar margin dilated and reflexed, half covering the umbilicus. Alt. 14½, greater diam. 20, lesser 17½ mill.; aperture, length 10, width 9½ mill. (*Smith, Annals and Mag. N. H. 6th ser., vii, p. 137, Jan. 1891.*)

Bourke, Darling River, N. S. Wales, Australia.

This species, in general appearance, is considerably like *H. Broughami* Angas and *H. Angasiana* Pfeiffer. The banding is exactly the same as that of the latter species, but its epidermis is yellower. It is also distinguished by its less globose form, smaller body-whorl, its more glossy surface, especially the under surface, the much smaller umbilicus and much thinner peristome, and a different granular sculpture on the spire. *H. Broughami* has an additional brown band below the periphery, has a finer granulation above, the umbilicus is more open and surrounded by a colored zone, and the aperture is wider. *H. Stutchburyi* Pfr. is a smaller form, more finely granular above, and in the type the spiral zones are much narrower than in the present and the two above-named species.

Index to Subgenera and Sections

Contained in Volume VI.

- Acavus Montf., 58, 76, 303.
Ampelita Beck, 16, 300.
Anoglypta Mart., 304, 89, 92.
Austrochloritis Pils., 242, 262.
Badistes Gld., 94, 129.
Camæna (Alb.) Pils., 192, 197.
Chloritis Beck, 241, 242, 243.
Columpica Hartm.=Stylodonta,
85.
Cristigibba Can., 274, 291.
Erigone Alb.=Chloritis, 242.
Eucochlias Theob.=Camæna, 197.
Euhadra Pilsbry, 94, 95, 304.
Eurystylus Anc.=Pœcilostylus,
56.
Gallina Hartm.=Obbina, 215.
Glyptorhagada Pils., 191.
Hadra Alb., 303, 304, 89, 93, 126,
308.
Helicophanta, Alb., 58, 59, 303.
Janira Alb.=Neocepelis, 234, 236.
Macroön Pilsbry, 57.
Moellendorffia Anc., 6, 10.
Neocepelis Pils., 212, 234.
Obba Beck, 211, 212.
Obbina Semp., 211, 215.
Oligospira Anc.=Acavus
Montf., 76.
Otala Schum.=Acavus Montf.,
76.
Pachya Alb.=Stylodonta, 85.
Panda Alb., 58, 74.
Pedinogyra Alb., 13.
Phania Alb., 193.
Philina Alb.=Obbina, 215.
Philina=Planispira, 274.
Planispira Beck, 242, 274.
Pœcilostylus Pils., 56.
Pusiodon Sw.=Planispira, 274.
Rhagada Alb., 95, 184.
Semicorum Kl.=Chloritis, 242.
Sphærospira Mörch, 94, 149.
Stegodera Mart., 5, 7, 299.
Stylodon Beck.=Stylodonta, 85.
Stylodonta Crist., 58, 85.
Sulcobasis Can., 242, 259.
Thersites Pfr., 303, 304, 89.
Traumatophora Anc., 6, 8.
Tricho-chloritis Pils., 242, 267.
Trihelix Anc., 6, 9.
Xanthomelon Mart., 95, 178.

(309)

29092

REFERENCE TO PLATES.

HELICIDÆ, (IV) VI.

PLATE 1.

FIGURE.	PAGE.
1, 2, 3, 4. <i>Stegodera triscalpta</i> Martens. Novit. Conch.,	8
5, 6, 7, 8. <i>Stegodera triscalpta</i> Martens. From Heude,	8
9, 10, 11. <i>Stegodera horrida</i> Pfr. Küster's Conch. Cab.,	9
12, 13, 14. <i>Stegodera trisinuate</i> Mts. Novitates Conch.,	11
15, 16, 17. <i>Stegodera angusticollis</i> Mart. Novitates Conch.,	7
18, 19, 20. <i>Stegodera loxotatum</i> Mabilie,	13
21, 22. <i>Stegodera eastlakeana</i> Möllendorff,	12
23, 24. <i>Stegodera trisinuata</i> var. <i>sculptilis</i> Möllendorff,	12
25-27. <i>Stegodera biscalpta</i> Heude,	9

PLATE 2.

28, 29. <i>Pedinogyra cunninghami</i> Gray. Original,	14
30, 31. <i>Pedinogyra cunninghami</i> Gray. Guerin's Magazine,	14
32, 33, 34. <i>Ampelita shavi</i> Smith. Proc. Zool. Soc.,	34
35, 36. <i>Pedinogyra muhlfeldtiana</i> Pfr. Küster's Conchyl. Cabinet,	15
37. <i>Ampelita calypso</i> Pfr. Proc. Zool. Soc.,	28

PLATE 3.

38, 39, 40. <i>Ampelita sepulchralis</i> Fér. Original,	18
41, 42. <i>Ampelita sepulchralis</i> Fér. Original,	18
43-45. <i>Ampelita sepulchralis</i> Fér. var. <i>funebri</i> Mart. Novit. Conch.,	19
46, 47. <i>Ampelita subsepulchralis</i> Crosse. Journ. Conch.,	22

PLATE 4.

50, 48. <i>Ampelita hova</i> Angas. Férussac, Histoire,	24
49. <i>Ampelita hova</i> Angas. Proc. Zool. Soc.,	24
51, 52. <i>Ampelita hova</i> Angas. Original,	24
53, 54, 55. <i>Ampelita vesconis</i> Morel. Morelet's Ser. Conch.,	31
56, 57. <i>Ampelita chlorozona</i> Grat. Reeve and Conchyl. Cab.,	31
58, 59, 60. <i>Ampelita omphalodes</i> Pfr. Küster's Conchyl. Cabinet,	27
61, 62, 63. <i>Ampelita calypso</i> var. <i>intensior</i> Pils. Original	28
64. <i>Ampelita guillaini</i> Petit. Journ. Conchyl.,	30

PLATE 5.

FIGURE.	PAGE.
65-67. <i>Ampelita lamarei</i> Mke. Conch. Cab., . . .	25
68-71. <i>Ampelita sakalava</i> Angas. Original, . . .	26
72, 73. <i>Ampelita watersi</i> Angas. P. Z. S., . . .	26
74-76. <i>Ampelita unicolor</i> Pfr. Conch. Cab., . . .	37
77. <i>Ampelita atropis</i> Fér. Hist., . . .	20

PLATE 6.

75, 76, 77. <i>Ampelita novacula</i> Mts. Novit. Conch., . . .	33
78, 79, 80. <i>Ampelita clotho</i> Fér. Férussac, Histoire, . . .	42
81, 82. <i>Ampelita consanguinea</i> Ibid. . . .	30
83, 84, 85. <i>Ampelita novacula</i> Mts. Ibid., . . .	33

PLATE 7.

89, 90, 91. <i>Ampelita covani</i> Smith. Proc. Zool. Soc., . . .	44
92, 93, 94. <i>Ampelita granulosa</i> Fér. Férussac, Histoire, . . .	43
95, 96, 97. <i>Ampelita schærfiæ</i> Pfr. Küster's Conchyl. Cab., . . .	43
98, 99, 100. <i>Ampelita lancula</i> Fér. Férussac, Histoire, . . .	36
1, 2. <i>Ampelita schærfiæ</i> Pfr., var. Küster's Conchyl. Cab., . . .	43
3, 4, 5. <i>Ampelita robillardi</i> Angas. Ibid. . . .	32

PLATE 8.

7-9. <i>Ampelita lanx</i> Fér. Original, . . .	38
10, 11. <i>Ampelita lanx</i> var. <i>radama</i> Lesson. Original, . . .	38
12-14. <i>Ampelita fulgurata</i> Sowb. Conch. Cab., . . .	36
15, 16. <i>Ampelita madagascariensis</i> Lam. Conch. Icon., . . .	32

PLATE 9.

16, 17. <i>Helicophanta magnifica</i> Fér. Conch. Cab., . . .	65
18, 19. <i>Helicophanta guestieriana</i> Crosse. Journ. Conch., . . .	62
20. <i>Helicophanta echinophora</i> Fér. Hist., . . .	71
21. <i>Helicophanta goudotiana</i> Fér. ("oviformis" Rve.). Conch. Icon., f. 172, . . .	70
22, 23. <i>Ampelita basizona</i> Mouss. Journ. Conch., . . .	29

PLATE 10.

26, 27. <i>Ampelita percyana</i> Smith. Proc. Zool. Soc., . . .	42
28. <i>Helicophanta audeberti</i> Mouss. Journ. Conchyl., . . .	67
30, 31. <i>Ampelita galactostoma</i> Pfr. Conchyl. Cab., . . .	44
29. <i>Ampelita lachesis</i> Fér. Histoire, . . .	41
32. <i>Helicophanta betsileoensis</i> Angas. Proc. Zool. Soc., . . .	61
33. <i>Helicophanta betsileoensis</i> Angas. Original, . . .	61

PLATE 11.

34, 35. <i>Helicophanta bicingulata</i> Smith. P. Z. S., . . .	63
36-38. <i>Ampelita xystera</i> Val. Fér. Hist., . . .	33

FIGURE.	PAGE.
39. <i>Helicophanta phenax</i> Pils ("goudotiana" Rve). Conch. Icon.,	69
40. <i>Helicophanta gloriosa</i> Pfr. Novit. Conch.,	68
41-43. <i>Rhagada elachystoma</i> Mart. Ibid.,	187

PLATE 12.

41, 42, 43. <i>Geotrochus brumepiensis</i> Forbes. Original, Vol. VII.	
44. <i>Helicophanta souverbiana</i> Fischer. Journ. de Conchyl.,	66
45, 46. <i>Helicophanta souverbiana</i> Fischer. Conchyl. Cab.,	66
47, 48. <i>Acavus superba</i> var. <i>grevillei</i> Pfr. Novit. Conch. and Conchol. Indica,	82

PLATE 13.

49, 50. <i>Helicophanta ibaroensis</i> Angas. Original,	61
51, 52. <i>Hadra novæhollandiæ</i> Gray. Conch. Cab.	91
53, 54. <i>Euhadra fortunei</i> Pfr. Ibid,	112
55. <i>Hadra lorioliana</i> Crosse. Journ. Conch.,	145
56. <i>Euhadra formosensis</i> Pfr. P. Z. S.,	112
57, 58. <i>Camæna illustris</i> Pfr. Conch. Cab.,	201

PLATE 14.

59-61. <i>Helicophanta cornugiganteum</i> L. Original.	60
62-64. <i>Ampelita duvalli</i> Petit. Mag. de Zool.,	41
65. <i>Rhagada convicta</i> Cox. P. Z. S.,	187
66. <i>Ampelita terveriana</i> Grat. Act. L. S. Bord.,	37

PLATE 15.

67, 68. <i>Neocepelis morleti</i> D. & H. (<i>H. mercatorina</i> Ma- bille). Bull. Soc. Mal. Fr.,	240
69, 70. <i>Euhadra ? fortunei</i> var. <i>meridionalis</i> . J. D. M. Ges. '84, t. 7, f. 5,	112
71. <i>Helicophanta farafanga</i> Angas. Conch. Cab.,	73
72, 73. <i>Camæna gabriellæ</i> D. & H. (<i>H. bathmophora</i> Ma- bille). Bull. Soc. Mal. Fr.,	205
74, 75. <i>Geotrochus phonicus</i> Mabille.	Vol. VII.
76. <i>Helicophanta ? follis</i> Fér. Histoire,	74

PLATE 16.

1, 2. <i>Acavus superba</i> var. <i>roseolabiata</i> Nev. Original,	82
3, 4. <i>Acavus superba</i> Pfr. Conch. Cab.,	81
5, 6. <i>Acavus fastosa</i> Alb. Novit. and Conch. Ind.,	79
7. <i>Acavus hæmastoma</i> var. <i>conus</i> Pilsbry. Original,	79
8, 9. <i>Geotrochus comriei</i> Angas. P. Z. S. 1876.	Vol. VII.

PLATE 17.

FIGURE.		PAGE.
10, 11, 12.	<i>Acavus phoenix</i> L. Original, Conch. Ind. and Conch. Icon.,	80
13.	<i>Geotrochus coraliolabris</i> Smith (=chapmani Cox). Ann. and Mag. N. H.	Vol. VII.
14, 15.	<i>Acavus prospera</i> Albers. Mal. Blätter,	80
16.	<i>Geotrochus latiaxis</i> Smith (=zeno Brazier). Ann. and Mag. N. H.	Vol. VII.

PLATE 18.

17, 18, 19.	<i>Acavus skinneri</i> Rve. Original and Conch. Icon.,	84
20, 21.	<i>Acavus waltoni</i> Rve. Original and Conch. Indica.,	83
22-25.	<i>Acavus hæmastoma</i> L. Original, Conch. Ind., and Conch. Icon.,	78

PLATE 19.

26.	<i>Panda maconelli</i> Rve. Proc. Zool. Soc.,	75
27.	<i>Helix ampulla</i> Bens. Conch. Icon.,	
28, 29.	<i>Hadra macleayi</i> Cox. Küster's Conchyl. Cab.,	156
30.	<i>Hadra macleayi</i> Cox. Zoöl. 'Magenta,'	156
31, 32.	<i>Hadra whartoni</i> Cox. Conchylien Cabinet,	171
33.	<i>Panda falconeri</i> Rve. Conch. Iconica,	75

PLATE 20.

34-36.	<i>Hadra richmondiana</i> Pfr. Original,	90
37-39.	<i>Anoglypta launcestonensis</i> Rve. Original,	91
40, 41.	<i>Euhadra swinhoei</i> Pfr. Conch. Cab.,	115
42.	<i>Phania pyrostoma</i> Fér. Ibid.,	194

PLATE 21.

43, 44.	<i>Hadra bipartita</i> Fér., type and small form. Original,	126
45-47.	<i>Camæna cicatricosa</i> Müll. Original,	198
48, 49.	<i>Hadra rockhamptonensis</i> Cox. Original,	159
50, 51.	<i>Hadra forsteriana</i> Pfr. var. major. Conch. Cab.,	127
52.	<i>Hadra croftoni</i> Cox. Ibid.,	153
53, 54.	<i>Camæna hainanensis</i> H. Ad. Ibid.,	204

PLATE 22.

55, 56.	<i>Hadra bougainvillei</i> Pfr. Conchyl. Cab.,	128
57.	<i>Hadra gratiosa</i> Cox. var. Conchyl. Cab.,	156
58-62.	<i>Camæna monochroa</i> Sowb. Conchyl. Cab.,	208

PLATE 23.

63, 64.	<i>Camæna traillii</i> Pfr. Conchyl. Cab.,	207
65, 66.	<i>Hadra yulei</i> Forbes. Ibid.,	172

FIGURE.	PAGE.
67. <i>Hadra blomfieldi</i> Cox. <i>Ibid.</i> ,	154
68. <i>Hadra andersoni</i> P. Z. S.,	157
69-71. <i>Hadra oconnellensis</i> Cox. <i>Conch. Cab.</i> ,	158
72, 73. <i>Hadra rainbirdi</i> Cox. <i>Ibid.</i> ,	157
74, 75. <i>Hadra coxi</i> Crosse. <i>Ibid.</i> ,	152

PLATE 24.

76, 77. <i>Camæna hahni</i> Mabilie. <i>Bull. Soc. Mall. Fr.</i> ,	200
78-80. <i>Euhadra moreletiana</i> Heude. <i>Mem. Chin.</i> ,	110
81, 82. <i>Euhadra hæmatozona</i> Heude. <i>Ibid.</i> ,	119
83-85. <i>Acusta billeana</i> Heude. <i>Ibid.</i> ,	111
86-88. <i>Euhadra percussa</i> Heude. <i>Ibid.</i> ,	111

PLATE 25.

89, 90. <i>Camæna subgibbera</i> Mldff. <i>J. D. M. G.</i> '85,	200
91. <i>Hadra hixonii</i> Braz. <i>Ann. Mus. Genov.</i> ,	177
92, 93. <i>Euhadra caspari</i> Gredl. <i>J. D. M. Ges.</i> '84,	115
94, 95. <i>Euhadra succincta</i> Ab. <i>Ibid.</i> ,	118
96, 97. <i>Euhadra friesiana</i> Mldff. <i>Ibid.</i> ,	118
98, 99. <i>Cathaica magnaciana</i> Heud. <i>Mem. Chin.</i> ,	176
100. <i>Hadra broadbenti</i> Brazier. <i>Ann. Mus. Genov.</i> ,	176
101. <i>Camæna cicatricosa</i> var. <i>inflata</i> Mldff. <i>J. D. M. G.</i> '85,	199

PLATE 26.

1, 2. <i>Camæna xanthoderma</i> Mldff. <i>J. D. M. Ges.</i> '84,	206
3. <i>Camæna xanthoderma</i> var. <i>polyzona</i> Mldff. <i>Ibid.</i> ,	207
4, 5, 6. <i>Phania xanthostoma</i> Herklots. <i>Novit. Conch.</i> ,	197
7. <i>Plectotropis?</i> <i>mellea</i> Pfr. <i>P. Z. S.</i> '65, t. 46, f. 4,	97
8. <i>Euhadra bacca</i> Pfr. <i>P. Z. S.</i> 1865,	112
9. <i>Camæna monochroa</i> var. <i>lagunæ</i> Hidalgo. <i>Journ. Conch.</i> '87,	209
10-12. <i>Euhadra herklotsi</i> Mart. <i>Novit. Conch.</i> ,	101

PLATE 27.

1-3. <i>Dorcasia conrauxiana</i> H. <i>Mem. Chin.</i> t. 27, f. 18,	119
6-8. <i>Cathaica?</i> <i>oncopila</i> H. <i>Ibid.</i> t. 16, f. 6,	119
4, 5. <i>Euhadra stenozone</i> Mldff. <i>J. D. M. Ges.</i> '84,	119
9, 10, 10a. <i>Euhadra caliginosa</i> Ad. & Rve. <i>Original and</i> <i>Voy. Samarang</i> ,	123
11, 12. <i>Euhadra batânica</i> . <i>Conch. Icon.</i> ,	111
13, 14. <i>Euhadra orientalis</i> Ads. & Rve. <i>Ibid.</i> ,	110
15-17. <i>Euhadra avus</i> Pfr. <i>Ibid.</i> ,	210
18, 19. <i>Camæna palumba</i> Souv. <i>Journ. Conch.</i> ,	209

PLATE 28.

FIGURE.		PAGE.
1-3.	<i>Euhadra callizona</i> Crosse. Novit. Conch., . . .	105
4.	<i>Euhadra callizona</i> Crosse. Journ. Conch., . . .	105
5-7.	<i>Euhadra amalixæ</i> Kobelt. J. D. M. Ges., . . .	105
8, 9.	<i>Euhadra nimbose</i> Crosse. Journ. Conch. '71, . . .	101
10, 11.	<i>Euhadra senckenbergiana</i> Kob. J. D. M. Ges., . . .	102
12.	<i>Euhadra senckenbergiana</i> Kob. var. <i>Ibid.</i> , . . .	102
13, 14.	<i>Satsuma papilliformis</i> Kob. <i>Ibid.</i> . . . See Vov. IV.	
15, 16.	<i>Euhadra brandti</i> Kob. <i>Ibid.</i> ,	101

PLATE 29.

1, 2.	<i>Euhadra congenor</i> Smith. P. Z. S.,	105
3, 4.	<i>Euhadra nipponensis</i> Kob. J. D. M. Ges.,	102
5.	<i>Euhadra congenita</i> Smith. P. Z. S.,	103
6.	<i>Euhadra lewisii</i> Smith. P. Z. S.,	106
7-9.	<i>Euhadra myomphala</i> Martens. Ostas. Conch.,	107
10.	<i>Euhadra formosensis</i> Pfr. P. Z. S.,	112
11-13.	<i>Euhadra quæsitæ</i> Dh. Ostas. Conch.,	108

PLATE 30.

1-6.	<i>Euhadra peliomphala</i> Pfr. Ostas., etc.,	99
7, 11.	<i>Rhagada convicta</i> Cox. Monatsb. k.-p. Akad. '77,	187
8.	<i>Euhadra swinhoei</i> Pfr. P. Z. S.,	115
9, 10.	<i>Euhadra quæsitæ</i> Dh. var. <i>montium</i> Mart. (=parryi Jay). Novit. Conch.,	109
11.	<i>Rhagada convicta</i> Cox. (See fig. 7),	187
12, 13.	<i>Euhadra eoa</i> Crosse. Journ. Conch.,	98
14-16.	<i>Euhadra luhuana</i> Sow. Ostas. Conch.,	100

PLATE 31.

17-19.	<i>Euhadra pantheia</i> Mab. Original,	116
20.	<i>Euhadra pilidion</i> Bens. Conch. Ind.,	114
22.	<i>Euhadra peguensis</i> Bens. <i>Ibid.</i> ,	113
23, 24.	<i>Chloritis condoriana</i> C. & F. Journ. Conch.,	269
25, 21.	<i>Obba hemiopta</i> Bens. Conch. Ind.,	238
26, 27.	<i>Euhadra mercatoria</i> Gray. Conch. Cab.,	121
28.	<i>Euhadra bairdi</i> Ad. P. Z. S.,	111
29.	<i>Euhadra cecillei</i> . Conch. Icon.,	109
30, 31.	<i>Euhadra</i> (?) <i>primeana</i> . Journ. Conch.,	125
32.	<i>Euhadra mandarina</i> Gray. Conch. Cab.,	124
33, 34.	<i>Euhadra herrmanseni</i> Pfr. <i>Ibid.</i>	98

PLATE 32.

35-39.	<i>Obba platyodon</i> Pfr. J. D. M. Ges.,	239
40, 41.	<i>Euhadra</i> ? <i>bocageana</i> C. & F. Journ. Conch.	112
42-45.	<i>Neocepholis merarcha</i> Mab. (from type),	235

FIGURE.	PAGE.
46-48. <i>Chloritis isis</i> Pfr. Novit. Conch	256
49. <i>Euhadra bacca</i> Pfr. P. Z. S.,	112
50. <i>Euhadra deliciosa</i> Pfr. Ibid.,	113
51, 52. <i>H. leucolena</i> C. & F. Journ. Conch.,
53. <i>H. phayrei</i> Theob. Conch. Ind.,	114
54, 55. <i>Cathaica constantiæ</i> H. Ad. P. Z. S. 1879, t. 27, f. 8,
56, 57. <i>Chloritis ursina</i> Pfr. Novit. Conch.,	253

PLATE 33.

58-60. <i>Hadra fraseri</i> Gray. Original,	150
61-63. <i>Hadra lessoni</i> Pfr. Original,	162
64, 65. <i>Chloritis mansueta</i> Pfr. Original,	264
66, 67. <i>Hadra gulosa</i> Gld. U. S. Expl. Exped.,	131
68, 69. <i>Hadra whartoni</i> Cox. Original,	171
70. <i>Hadra coxeni</i> Braz. P. Z. S.,	138
71, 72. <i>Hadra appendiculata</i> Pfr. Original,	163

PLATE 34.

1. <i>Hadra bellendenkerensis</i> Braz. P. Z. S.,	161
2, 3. <i>Hadra broughami</i> Angas. Ibid.,	146
4. <i>Hadra informis</i> Mouss. Journ. Conch.,	160
5. <i>Hadra johnsoni</i> Braz. P. Z. S.,	170
6. <i>Hadra barneyi</i> Cox. P. Z. S.,	165
7. <i>Hadra rawnesleyi</i> Cox. P. Z. S.,	165
8, 9. <i>Hadra sardilabiata</i> Cox. P. Z. S.,	171
10. <i>Hadra morosa</i> Mor. Journ. Conch.,	134
11. <i>Hadra mouriliana</i> Braz. P. Z. S.,	172
12, 13. <i>Hadra yatalaensis</i> Cox. P. Z. S.,	140
14. <i>Hadra mossmani</i> Braz. P. Z. S.	152

PLATE 35.

1-5. <i>Hadra semicastanea</i> Pfr. Original,	126
6, 7. <i>Hadra rainbirdi</i> Cox var. Original,	158
8-10. <i>Rhagada convicta</i> Cox. Original,	187
11, 12. <i>Hadra parsoni</i> Cox. Original,	162
13. <i>Hadra parsoni</i> Cox. P. Z. S.,	162
14, 15. <i>Hadra lessoni</i> Pfr. (Pfr's original illustrations),	163
16-18. <i>Rhagada plectilis</i> Bens. Original,	188

PLATE 36.

19. <i>Chloritis beatricis</i> J. C. Ann. Mus. Civ. Gen.,	260
20. <i>Chloritis rehsei</i> Mart. Ann. Mag. xix,	261
21, 22. <i>Hadra arthuriana</i> Cox. P. Z. S.,	159
23. <i>Hadra challisi</i> Cox. P. Z. S.,	173
24. <i>Hadra thatcheri</i> Cox. P. Z. S.,	164

FIGURE.	PAGE.
25, 26. <i>Hadra moresbyi</i> Ang. P. Z. S.,	160
27. <i>Hadra hilli</i> Braz. P. Z. S.,	164
28, 29. <i>Helix sturmiana</i> Pfr.,
30-32. <i>Planispira tortilabia</i> Less. Phil., Abbild.,	294
33, 34. <i>Helix grossularia</i> Pfr. Novit. Conch.,
35-37. <i>Chloritis norodomiana</i> Mor. Journ. Conch.,	270.

PLATE 37.

38-40. <i>Euhadra herrmannseni</i> Pfr. Original,	98
41, 42. <i>Euhadra connivens</i> Pfr. Original,	96
43, 44. <i>Camæna egregia</i> Dh. Fér., Hist.,	210
45-47 <i>Chloritis quercina</i> var. <i>hombroni</i> Pfr. Original,	258
48, 49. <i>Chloritis quercina</i> Pfr. Original,	257
50. <i>Chloritis boxalli</i> Sowb. (=spinosissima). P. Z. S.,	272
51-54. <i>Chloritis sanziana</i> H & J. Voy. Astrol.,	272
55, 56. <i>Chloritis spinosissima</i> Semper. Reis. Arcip., Phil.,	273

PLATE 38.

57, 58. <i>Hadra banneri</i> McGil. Novit. Conch.,	179
59. <i>Hadra daintreei</i> Braz. P. Z. S.,	134
60, 61, 62. <i>Hadra angasiana</i> Pfr. Journ. Icon. & P. Z. S.,	180
63, <i>Hadra pachystyla</i> Pfr. Conch. Cab.,	184
64, 65. <i>Hadra forrestiana</i> Ang. P. Z. S.,	182
66-68. <i>Hadra bitæniata</i> . Original,	144
69. <i>Hadra jannelli</i> Le Guill. Novit. Conch.,	182
70, 71. <i>Hadra nigrilabris</i> Mart. Novit. Conch.	179
72. <i>Hadra lyndi</i> Ang. P. Z. S.,	183
73, 74. <i>Hadra pomum</i> Pfr. Conch. Cab.,	178

PLATE 39.

75, 76. <i>Hadra broadbenti</i> Braz. Original,	176
77-81. <i>Hadra incei</i> Pfr. Original,	167
82, 83. <i>Hadra yulei</i> Forbes. Original,	172
84, 85. <i>rainbirdi</i> (var. <i>basalis</i>). Original,	158
86, 87. <i>Hadra rainbirdi</i> (typical). Original,	157

PLATE 40.

88. <i>Hadra gratiosa</i> Cox. Original,	155
89. <i>Hadra gratiosa</i> Cox. P. Z. S.,	155
90, 91. <i>Hadra jervisensis</i> Q. & G. Voy. Astrol.,	141
92. <i>Hadra coxi</i> Crosse. Original,	152
93, 94. <i>Hadra luteofasciata</i> . Cox, Mon.,	144
95. <i>Obba mamilla</i> Q. Original,	212
96, 97. <i>Hadra mullarborica</i> Tate. Proc. Phil. Soc. Adel.,	181
98, 99. <i>Hadra mulgoæ</i> Cox. Original,	136
100, 101. <i>Hadra exocarpi</i> Cox. Cox, Mon.,	139

FIGURE.	PAGE.
1, 2. <i>Hadra corneovirens</i> Pfr. Original,	136
3. <i>Hadra corneovirens</i> Pfr. Conch. Icon.,	136
4, 5. <i>Hadra plethorica</i> Crosse. Journ. Conch.,	137
6, 7. <i>Hadra blackmanni</i> Cox. Cox, Mon.,	137
8, 9. <i>Hadra evandaleana</i> Pfr. Cox, Mon.,	142
10-12. <i>Hadra leucocheilus</i> Cox. Original,	139
13. <i>Hadra lismorensis</i> Pilsbry. Original,	140

PLATE 41.

1-3. <i>Euhadra simodæ</i> Jay (from type specimen),	95
4-7. <i>Euhadra luhuana</i> var. <i>nipponensis</i> Kob. Original,	102
8, 9. <i>Euhadra parryi</i> Jay (from type specimen),	108
10, 11. <i>Euhadra latilabris</i> Mildff. N. D. M. G.,	109
12-14. <i>Camæna palumba</i> Souv. Original,	209
15. <i>Camæna palumba</i> Souv. var. Journ. Conch.,	210
16-18. <i>H. platysoma</i> (= <i>H. jaspidea</i> Pfr.!) Original,	104

PLATE 42.

19. <i>Camæna monochroa</i> var. <i>doriae</i> Dohrn. Original,	209
20, 21. <i>Euhadra jaculata</i> Mab. Bull. Soc. Mal. Fr.,	120
22. <i>Camæna monochroa</i> var. Original,	209
23. <i>Camæna monochroa</i> var. <i>saulæ</i> Rve. Conch. Icon.,	209
24, 25. <i>Hadra novæhollandiæ</i> . Original,	91
26, 27. <i>Camæna gabriellæ</i> D. & H. Journ. Conch.,	205
28. <i>Camæna subhainanensis</i> Pils. Original,	205
29. <i>Helicophanta partuliformis</i> Böttg. Moll. Madag.,	72
30. <i>Helicophanta grandidieri</i> C. & F. Moll. Madg.,	72
31, 32. <i>Helicophanta echinophora</i> Fér. Moll. Magad.,	71
33-35. <i>Euhadra submandarina</i> Pils. Original,	122

PLATE 43.

36. <i>Hadra lincolniensis</i> . Cox, Mon.,	144
37, 38. <i>Hadra coarctata</i> Fér. Hist.,	151
39. <i>Hadra monacha</i> Pfr. P. Z. S.,	133
40. <i>Hadra prætermisssi</i> Cox. Cox, Mon.	167
41. <i>Hadra gilberti</i> Pfr. Cox, Mon.	142
42-44. <i>Hadra grayi</i> Pfr. varieties. Original,	130
45, 46. <i>Hadra greenhilli</i> Cox. Cox, Mon.,	138
47. <i>Hadra scottii</i> Cox. Cox, Mon.,	133
48, 49. <i>Hadra coriaria</i> Pfr. Original,	132
50. <i>Hadra stutchburyi</i> Pfr. Cox, Mon.,	148
51. <i>Hadra coriaria</i> Pfr. var. Original,	132

PLATE 44.

1-3. <i>Chloritis bulbulus</i> Mouss. Conch. Cab.,	258
—, 16, 17. <i>Chloritis bulbulus</i> Mouss. Ostas. Landschn.,	258

FIGURE.

PAGE.

4-10. <i>Planispira zonaria</i> L. vars. Ostas. Landschn.,	. 277
11. <i>Planispira fasciolata</i> Lesson. Original,	. 279
12, 13. <i>Planispira chariessa</i> Pils. Original,	. 279
14, 15. <i>Planispira collis</i> Mouss. (=zonaria var.). Novit. Conch.,	. 279
18-20. <i>Planispira atacta</i> Pfr. Ostas. Landschn.,	. 287

PLATE 45.

21-23. <i>Planispira kurri</i> Pfr. Conch. Cab.,	. 287
24, 25. <i>Planispira leucostoma</i> (=zonalis Fér.). Voy. Sama- rang,	. 284
26-28. <i>Planispira mersispira</i> Mart. Ostas.,	. 298
29, 30. <i>Planispira zonalis</i> Fér. Conch. Cab.,	. 284
31. <i>Planispira compta</i> , Ad. P. Z. S.,	. 283
32-35. <i>Planispira endoptycha</i> Mart. Ostas.,	. 282
36, 37. <i>Chloritis discordialis</i> Fér. Hist.,	. 252
38-40. <i>Planispira instricta</i> Mart. Ostas. Landschn.,	. .
41-43. <i>Planispira quadrivolis</i> Mart. Ostas. Landschn.,	. 299
44-46. <i>Planispira aurita</i> Mart. Ostas. Landschn.,	. 281
47-49. <i>Planispira flavidula</i> Mart. Ostas. Landschn.,	. 288
50-53. <i>Planispira exceptiuncula</i> Fér. Ostas. Landschn.,	. 289

PLATE 46.

54-56. <i>Chloritis tuba</i> Alb. Conch. Cab.,	. 258
57-59. <i>Planispira biconvexa</i> Mart. Ostas.,	. 281
60-62, 63, 64, 68. <i>Planispira loxotropis</i> Pfr. varieties. Ostas.,	285
65-67. <i>Planispira corniculum</i> H. & J. Astrol.,	. 291
69-71. <i>Planispira expansa</i> Pfr. Novit. Conch.,	. 298
72-73. <i>Planispira semirasa</i> Mouss. Novit. Conch.,	. 295
74-76. <i>Planispira expansa</i> Pfr. Ostas.,	. 298
77-81. <i>Planispira zebra</i> Pfr. Conch. Cab. and original,	. 275

PLATE 47.

82. <i>Hadra beddomæ</i> Braz. P. L. S. N. S. W.,	. 174
83. <i>Hadra bayensis</i> Braz. Cox, Monogr.,	. 166
84. <i>Hadra mazee</i> Braz. P. L. S. N. S. W.,	. 165
85, 86. <i>Hadra creedi</i> Cox. Cox, Monogr.,	. 170
87. <i>Hadra nicomede</i> Braz. P. L. S. N. S. W.,	. 173
88. <i>Hadra bebias</i> Braz. P. L. S. N. S. W.,	. 175
89. <i>Hadra zebina</i> Braz. P. L. S. N. S. W.,	. 151
90, 91. <i>Hadra curtisiana</i> Cox. Cox, Monogr.,	. 168
92, 93. <i>Hadra mitchellæ</i> Cox. Cox, Monogr.,	. 154
94. <i>Hadra bala</i> Braz. (=curtisiana Pfr.) P. L. S. N. S. W.,	169

PLATE 48.

FIGURE.	PAGE.
1-3. <i>Chloritis ruba</i> Alb. Conch. Cab.,	260
4-6. <i>Chloritis majuscula</i> Pfr. Conch. Cab.,	255
7, 8. <i>Planispira rhodomphala</i> T. C. Ann. Mus. Civ. Genova,	297
9-11. <i>Chloritis zodiaca</i> Fér. Hist., and Conch. Icon.,	259

PLATE 49.

12-14. <i>Chloritis sulcosa</i> Pfr. Novit. Conch.,	260
15. <i>Chloritis concisa</i> Fér. Hist.	262
16, 17, —, <i>Chloritis isis</i> Pfr. Conch. Cab.,	256
18, 19. <i>Chloritis leei</i> Cox. P. Z. S.,	251
20-25. <i>Geotrochus fringilla</i> Pfr. See next vol. of the MANUAL.	

PLATE 50.

26-28. <i>Chloritis lansbergiana</i> Dohrn. Conch. Cab.,	247
29-31. <i>Chloritis unguiculina</i> Mart. Ostas.,	244
32, 33, 34. <i>Chloritis unguicula</i> Fér. Hist. & Reeve.,	249
35, 36. <i>Chloritis exacta</i> Pfr. Novit. Conch.,	250
37, 38. <i>Chloritis silenus</i> Aug. P. Z. S.,	254
—, (below 36) <i>Chloritis bifoveata</i> Bens. Conch. Ind.,	245
39-41. <i>Chloritis unguiculastra</i> Mart. Ostas.,	248
42, 43. <i>Chloritis quieta</i> Rve. Conch. Cab.,	271
44-46. <i>Chloritis eustoma</i> Pfr. Conch. Cab.,	252

PLATE 51.

48-51. <i>Chloritis cheratomorpha</i> T. C. Ann. Mus. Genov.,	245
52, 53. <i>Chloritis tenella</i> Pfr. Journ. Conch.,	269
54-56. <i>Chloritis unguilina</i> L. Original,	243
57-59. <i>Chloritis unguilina</i> var. <i>minor</i> . Original,	243
60-62. <i>Chloritis heteromphalus</i> Pilsbry. Original,	246
63-65. <i>Chloritis circumdata</i> var. <i>molliseta</i> Pfr. Novit. Conch.,	246

PLATE 52.

66-68. <i>Chloritis dinodermorpha</i> Can. Ann. Mus. Genov.,	254
69-72. <i>Chloritis gaimardi</i> Dh. Guér. Mag.,	255
73. <i>Chloritis adustas</i> Hinds (= <i>gaimardi</i>). Voy. Sulphur.,	255
74-76. <i>Chloritis circumdata</i> Fér. Original,	246
77-79. <i>Chloritis micromphalus</i> Pils. Original,	247
80, 81. <i>Chloritis breviseta</i> Pfr. Journ. Conch.,	268
82-85. <i>Planispira plagiocheila</i> Can. Ann. Mus. Genov.,	295
86, 87. <i>Chloritis eustoma</i> Pfr. Original,	252
88, 89. <i>Chloritis erinaceus</i> Pfr. Novit. Conch.,	251
90-92. <i>Chloritis spinei</i> Cox. Monogr.,	263
93-95. <i>Planispira margaritis</i> Pfr. Conch. Cab.,	297

PLATE 53.

FIGURE.	PAGE.
96-98. <i>Obba quoyi</i> Dh. Original,	213
99. <i>Obba ceres</i> Pfr. Conch. Icon.,	239
100, 1, 2. <i>Obba manilla</i> Fér. (typical). Original,	212
3, 4. <i>Obba papilla</i> Müll. Conch. Cab.,	216
5-7. <i>Obba anacardium</i> Dohrn. Conch. Cab.,	238
8, 9. <i>Obba codonodes</i> Pfr. Conch. Cab.,	236
10. <i>Obba codonodes</i> var. Conch. Cab.,	236
11, 12. <i>Obba campanula</i> Pfr. Conch. Cab.,	236
13. <i>Obba campanula</i> Pfr. Conch. Icon.,	236

PLATE 54.

14-17. <i>Obba columbaria</i> Sow. Original,	234
18, 19. <i>Obba linnæana</i> Pfr. J. D. M. G.,	214
20-22. <i>Obba lasallei</i> Eydoux. Conch. Cab.,	233
23. <i>Planispira novægeorgiensis</i> Cox. P. Z. S.,	290
24-27. <i>Obba moricandi</i> Sowb. Original,	222
28-30. <i>Planispira atrofusca</i> Pfr. Novit. Conch.,	285

PLATE 55.

31-33. <i>Planispira reeveana</i> Pfr. Conch. Cab.,	233
34-36. <i>Planispira reeveana</i> Pfr. Original,	233
37, 38. <i>Chloritis brevidens</i> Sowb. Original,	272
39-41. <i>Chloritis brevidens</i> Sowb. Conch. Cab.,	272
42-44. <i>Obba heroica</i> Pfr. Conch. Cab.,	217
45-47. <i>Obba bigonia</i> Fér. Conch. Cab. & Spec.,	226
48, 49, 40. <i>Planispira scheepmakeri</i> Pfr. Conch. Cab.,	282
51-54. <i>Obba planulata</i> Lam. Original,	220
55. <i>Chloritis tuba</i> Alb. Novit. Conch.,	258
56-58. <i>Planispira zebra</i> var. <i>embrechtiana</i> Mouss. Novit. Conch.,	275

PLATE 56.

59-64. <i>Obba listeri</i> Gray. Conch. Cab.,	218
65, 66. <i>Obba listeri</i> Gray varieties. Original,	218
67-69. <i>Obba serobiculata</i> Pfr. Conch. Cab.,	224
70, 71. <i>Obba serobiculata</i> Pfr. Original,	224
72, 73. <i>Obba livesayi</i> Pfr. Novit. Conch.,	223
74-76. <i>Planispira thetis</i> Pfr. Conch. Cab.,	290
77-79. <i>Obba rota</i> Sow. Conch. Cab.,	224
80, 81. <i>Obba kobeltiana</i> Pfr. Novit. Conch.,	228
82-84. <i>Planispira quadrifasciata</i> Guill. Ostas.,	280

PLATE 57.

85-87. <i>Obba parmula</i> Brod. Conch. Cab.,	229
88-90. <i>Obba gallinula</i> Pfr. Conch. Cab.,	219

FIGURE.	PAGE.
91-93. <i>Obba discus</i> Desh. Fér. Hist.,	230
94-96. <i>Obba sororecula</i> Mart. Ostay.,	228
97-99. <i>Obba horizontalis</i> Pfr. Conch. Cab.,	232
100, 1. <i>Obba horizontalis</i> Pfr., var. original,	232
2, 3. <i>Planispira lorquini</i> Pfr. Novit. Conch.,	286
4-6. <i>Obba marginata</i> Müll. Conch. Cab.,	227

PLATE 58.

7-9. <i>Hadra cassandra</i> Pfr. Original,	147
10-12. <i>Hadra sublorioliana</i> Pilsbry. Original,	147
13-15. <i>Hadra tomsetti</i> Tate. Fr. R. S. S. Austr.,	143
16. <i>Hadra patruelis</i> Cox. Cox, Mon.,	131
17-19. <i>Hadra marcescens</i> Cox. Cox, Mon.,	142
20-22. <i>Hadra wesselensis</i> Cox. Cox, Mon.,	170
23, 24. <i>Chloritis porteri</i> Cox. Original,	263
25-27. <i>Chloritis occulta</i> Pfr. Ann. Mus. Civ. Gen.,	266
28-30. <i>Chloritis brevipila</i> Pfr. Original,	265
31-33. <i>Chloritis aridorum</i> Cox. Original,	266
34-36. <i>Chloritis chloritoides</i> Pils. Original,	267
37, 38. <i>Obba godiei</i> Braz. Original,	217

PLATE 59.

39-41. <i>Phania sulcocincta</i> Mart. Ostay.,	196
42. <i>Phania lampas</i> Müll. Conch. Icon.,	194
43-45. <i>Obba kochiana</i> Müll. Ber. Senck.,	231
46, 47. <i>Obba livesayi</i> Pfr. Original,	223

PLATE 60.

1, 2. <i>Euhadra philippinensis</i> Semp. Reisen,	123
3, 4. <i>Euhadra philippinensis</i> Semp. Original,	123
5. <i>Camæna saturnia</i> Gld. Conch. Ind.,	203
6. <i>Phania patricia</i> Pfr. Novit. Conch.,	196
7-9. <i>Planispira tortilabia</i> Less. Phil., Abbild.,	294
10, 11. <i>Obba saranganica</i> Hid. Journ. Conch.,	231
—, 13, 14. <i>Obba bustoi</i> Hid. Journ. Conch.,	230

PLATE 61.

15-17. <i>Chloritis maforensis</i> Can. Ann. Mus. Genov.,	247
18-20. <i>Stylodonta studeriana</i> Fér. Original,	87
21, 22. <i>Stylodonta unidentata</i> . Original,	86
23, 24. <i>Camæna ochthoplax</i> Bens. Original,	202
25-27. <i>Planispira leptocheila</i> Can. Ann. Mus. Gen.,	296
28. <i>Obba bintuanensis</i> Hid. Journ. Conch.,	237

PLATE 62.

FIGURE.	PAGE.
29-31. <i>Ampelita cadaverosus</i> Pilsbry (type),	19, 301
32-35. <i>Ampelita duvalli</i> Pet. Original,	41
36. <i>Ampelita subsepulchralis</i> v. <i>minor</i> C. & F. P. Z. S.,	302
37. <i>Ampelita subsepulchralis</i> v. <i>obscura</i> C. & F. Conch. Icon.,	302
38. <i>Ampelita omphalodes</i> var. <i>loucoubeensis</i> . Conch. Cab.,	27
39, 40. <i>Ampelita stumpffi</i> Kob. J. D. M. G.,	35

PLATE 63.

41-43. <i>Ampelita campbelliana</i> Pils. (type),	39
44. <i>Ampelita atropos</i> Fér. Conch. Icon.,	20
45. <i>Ampelita sakalava</i> Aug. P. Z. S.,	26
46, 47. <i>Ampelita subconsanguinea</i> Pils. Conch. Cab.,	30
48, 49. <i>Ampelita cazenavettii</i> F. & B. Journ. Conch.,	35
50-52. <i>Pœcilostylus viridis</i> Dh. Original,	56
53-55. <i>Pœcilostylus cerina</i> Mor. Novit. Conch.,	57
56-58. <i>Planispira deaniana</i> Ford (type),	292

PLATE 64.

56, 57. <i>Ampelita eurychila</i> C. & F. Moll. Madag.,	301
58, 59, 60. <i>Ampelita sepulchralis</i> , v. <i>sganziniana</i> C. & F. Moll. Madag.,	21, 300, 301
61. <i>Ampelita sepulchralis</i> v. <i>lethifera</i> C. & F. Moll. Madag.	21, 300
62, 63. <i>Ampelita sepulchralis</i> v. <i>olivacea</i> Pils. Moll. Madag.	19, 300
64, 56, 66. <i>Ampelita stragulum</i> C. & F. Moll. Madag.,	23, 302
67-72. <i>Obba hemiopta</i> Bens. Conch. Cab.,	238

PLATE 65.

73-75. <i>Obba parmula</i> Brod. Original,	229, 230
76, 77. <i>Obba parmula</i> Brod. var. Original,	230
78, 79. <i>Obba bulacanensis</i> Hid. Journ. Conch.,	225
80, 81. <i>Obba morleti</i> D. & H. Journ. Conch.,	240
82, 83. <i>Planispira porcellana</i> Grat. Soc. Bord.,	283
84, 85. <i>Planispira exceptiuncula</i> v. <i>phryne</i> . Fér. Hist.,	290
86, 87. <i>Planispira exceptiuncula</i> (typical). Original,	289
88. <i>Camæna broti</i> (= <i>hahni</i> Mab.). Journ. Conch.,	200
89, 90. <i>Planispira fasciolata</i> Less. Original,	279
91. <i>Planispira novægeorgiensis</i> Cox. P. Z. S.,	290
92-94. <i>Obba calcar</i> Mart. Ostas. Zool.,	221

PLATE 66.

59. <i>Helicophanta phenax</i> var. Original,	70
60. <i>Helicophanta oviformis</i> Grat. (typical). Act. Soc. Bord.,	68

FIGURE.	PAGE.
61. <i>Helicophanta phenax</i> Pilsbry, (type specimen), . . .	69
62, 63. <i>Helicophanta bicingulata</i> Sw. varieties. Original, . . .	64
64, 65. <i>Ampelita hova</i> Ang. var. Original, . . .	24, 25
66, 66. <i>Hadra forsteriana</i> Pfr. Conch. Cab.	127

PLATE 67.

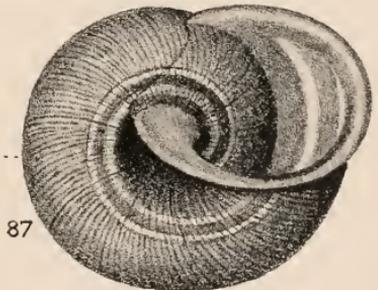
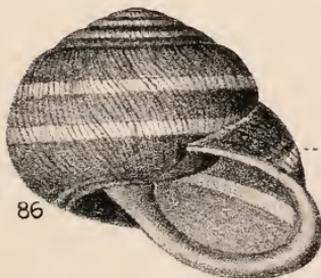
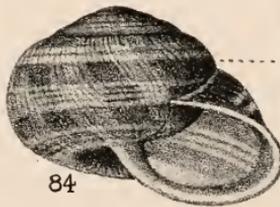
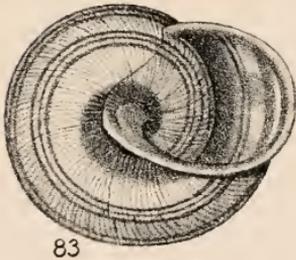
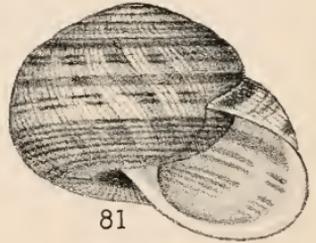
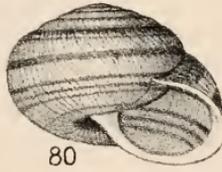
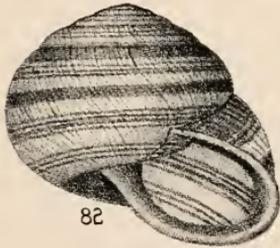
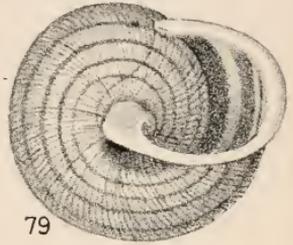
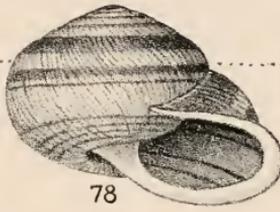
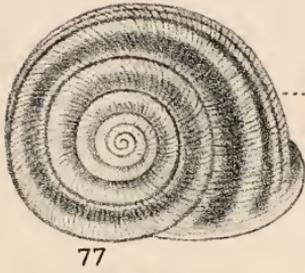
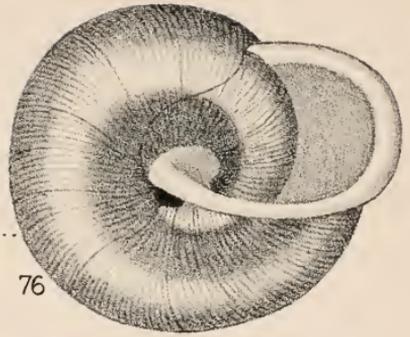
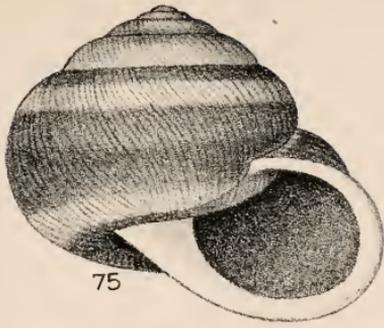
67-69. <i>Ampelita funebris</i> Mor. Moll. Madag., . . .	301
70-72. <i>Ampelita suarezensis</i> C. & F. Moll. Madag., . . .	302
73, 74, 77, 78. <i>Ampelita cazenavetti</i> F. & B. Moll. Madag., . . .	35, 302
75, 76. <i>Ampelita fulgurata</i> Sowb. Moll. Madag., . . .	36, 302

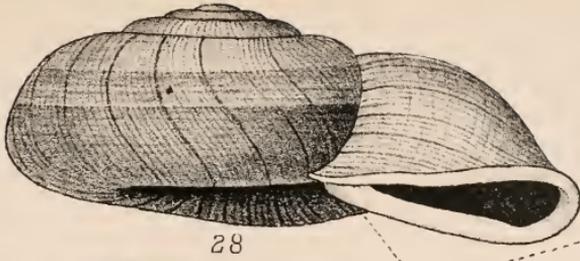
PLATE 68.

79-82. <i>Planispira dominula</i> Can. Ann. Mus. Gen., . . .	293
83, 83. <i>Chloritis miara</i> Mab. Bull. Soc. Mal. Fr., . . .	270
84. <i>Chloritis subcorpulentus</i> Smith. Ann. Mag. N. H., . . .	251
85. <i>Obba planulata</i> var. <i>solidior</i> Hid. Journ. Conch., . . .	221
86-88. <i>Chloritis gruneri</i> Pfr. Conch. Cab.,	250
89-91. <i>Chloritis dentrecasteauxi</i> Sw. P. Z. S.,	253
92-95. <i>Planispira iaddæ</i> Pilsbry. Original,	276
96-98. <i>Planispira chariessa</i> Pilsbry. Original,	279

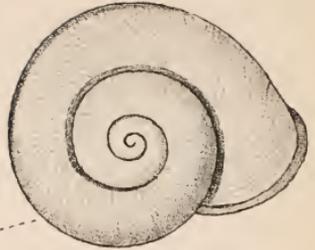
PLATE 69.

99, 100. <i>Euhadra granulifera</i> Mildff. Mem. Chin., . . .	306
1, 2. <i>Euhadra renaltiana</i> H. Mem. Chin.,	307
3-5. <i>Euhadra schmackeri</i> Mildff. N. D. M. G.,	307
6, 7. <i>Camæna seraphinica</i> H. Mem. Chin.,	199
8-10. <i>Chloritis rhinocerotica</i> H. Mem. Chin.,	271

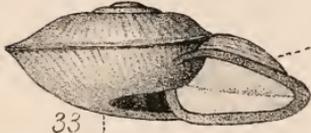




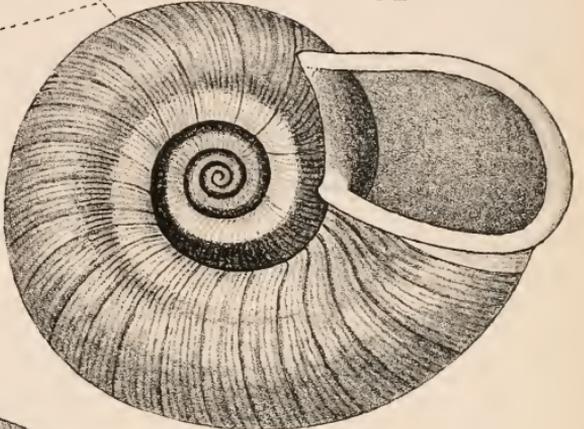
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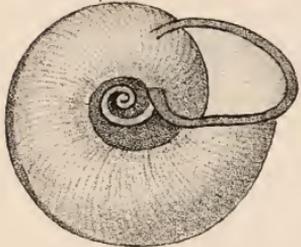
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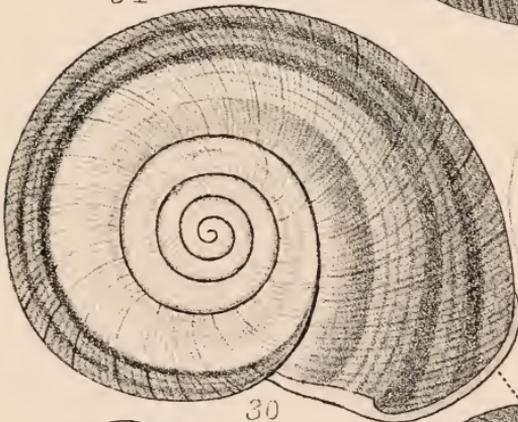
33



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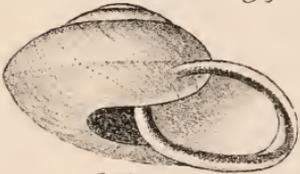
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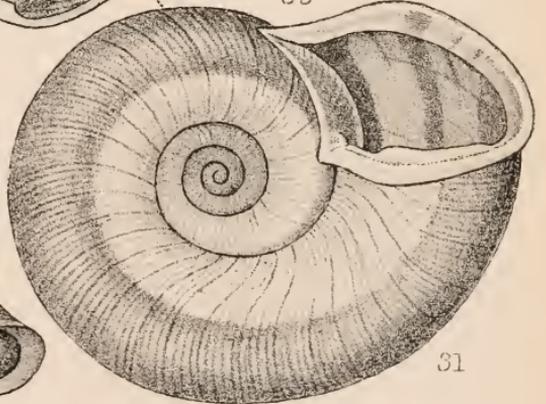
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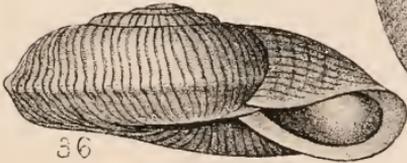
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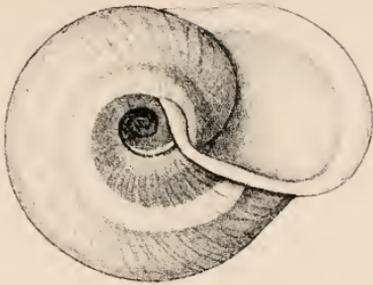
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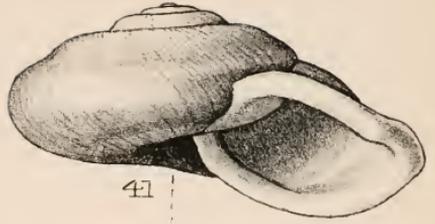
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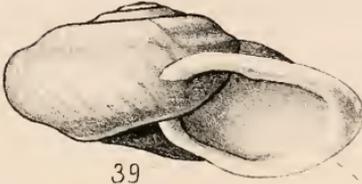
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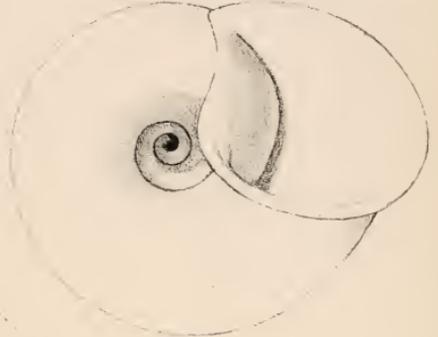
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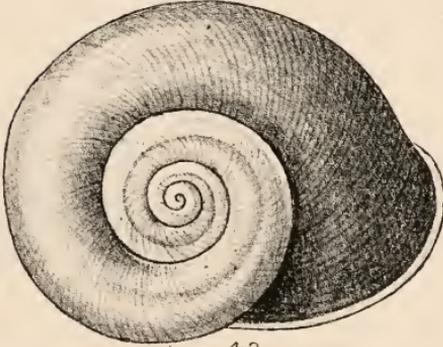
41



39



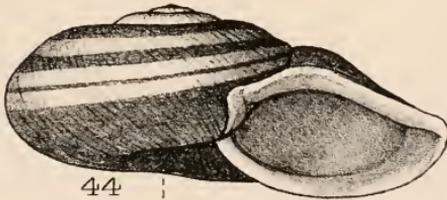
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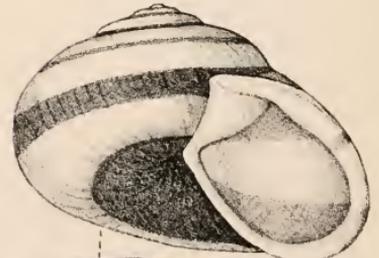
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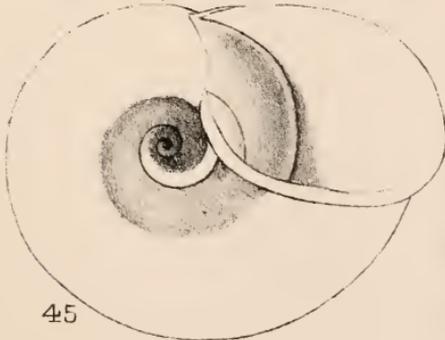
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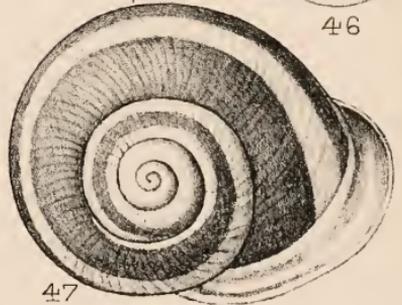
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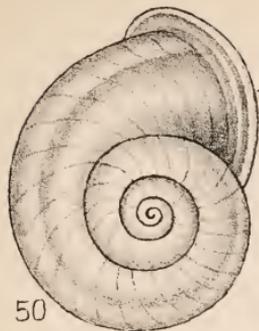
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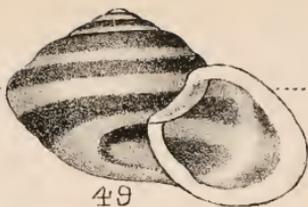
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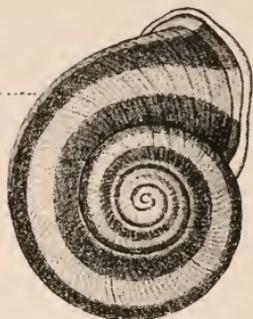
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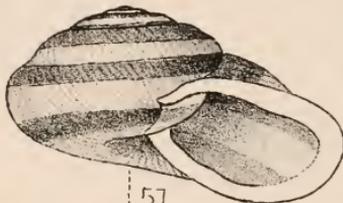
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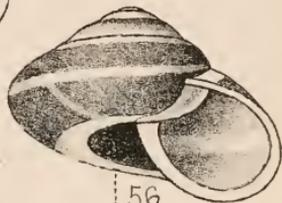
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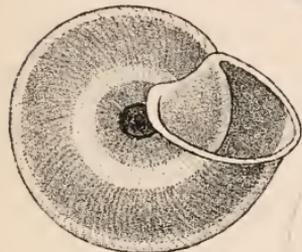
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51



56



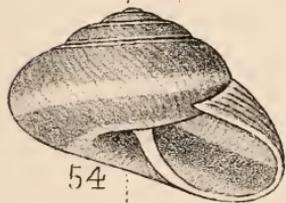
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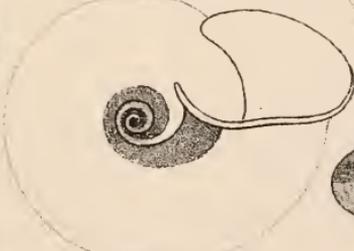
52



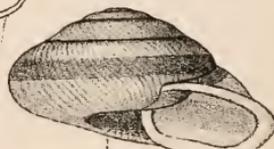
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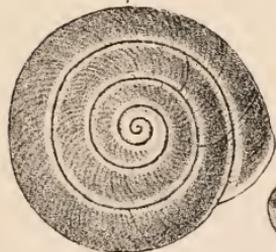
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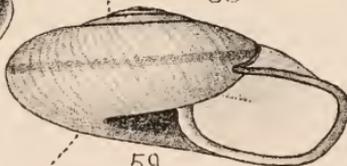
58



61



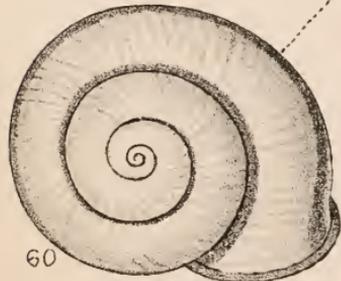
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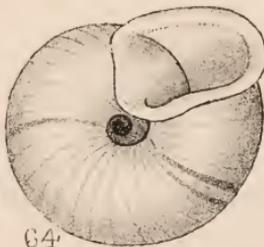
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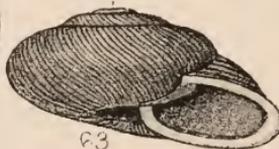
62



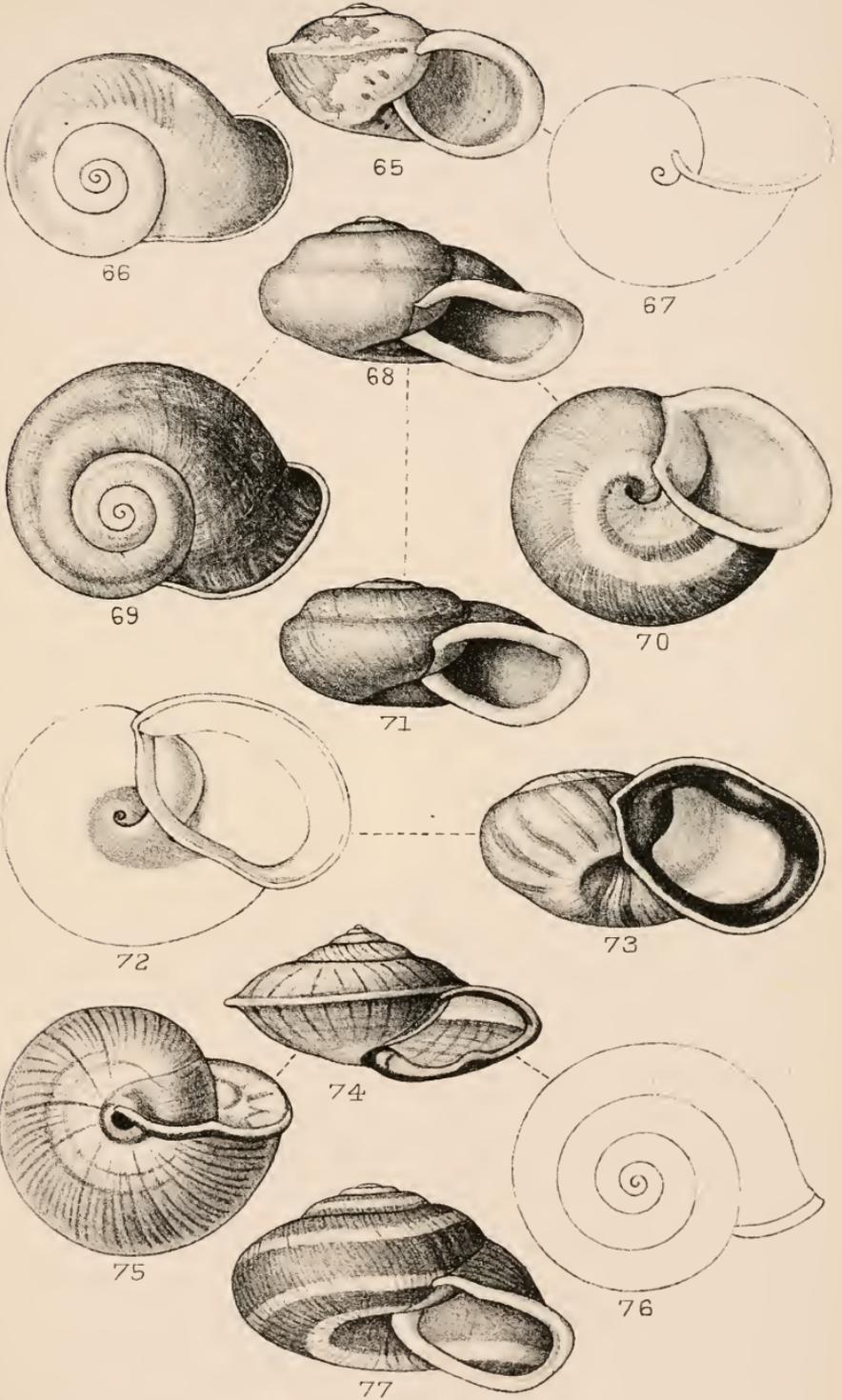
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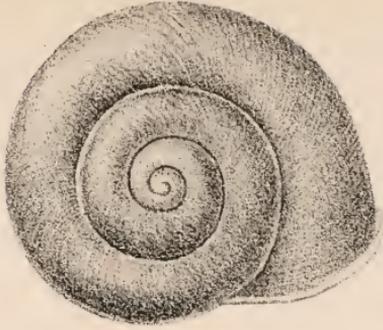


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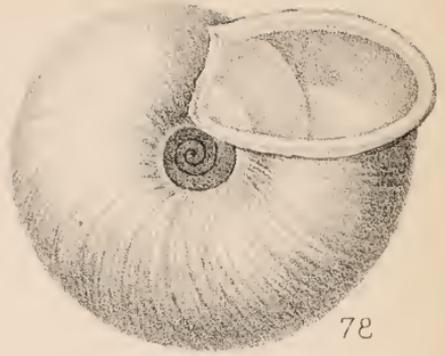


63





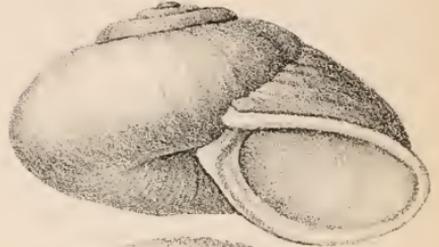
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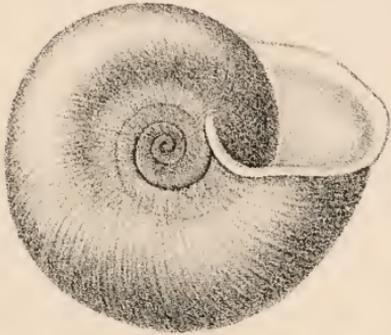
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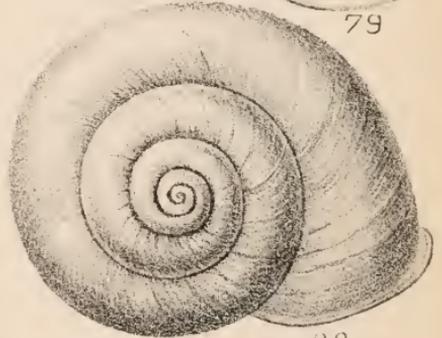
76



79



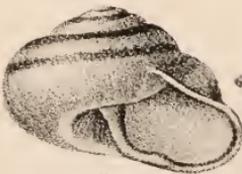
77



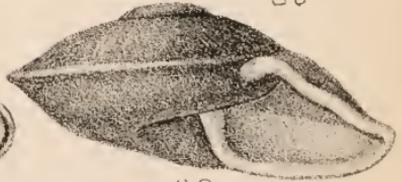
80



81



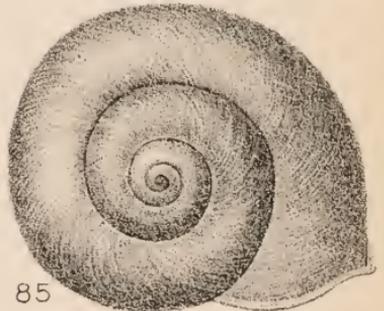
82



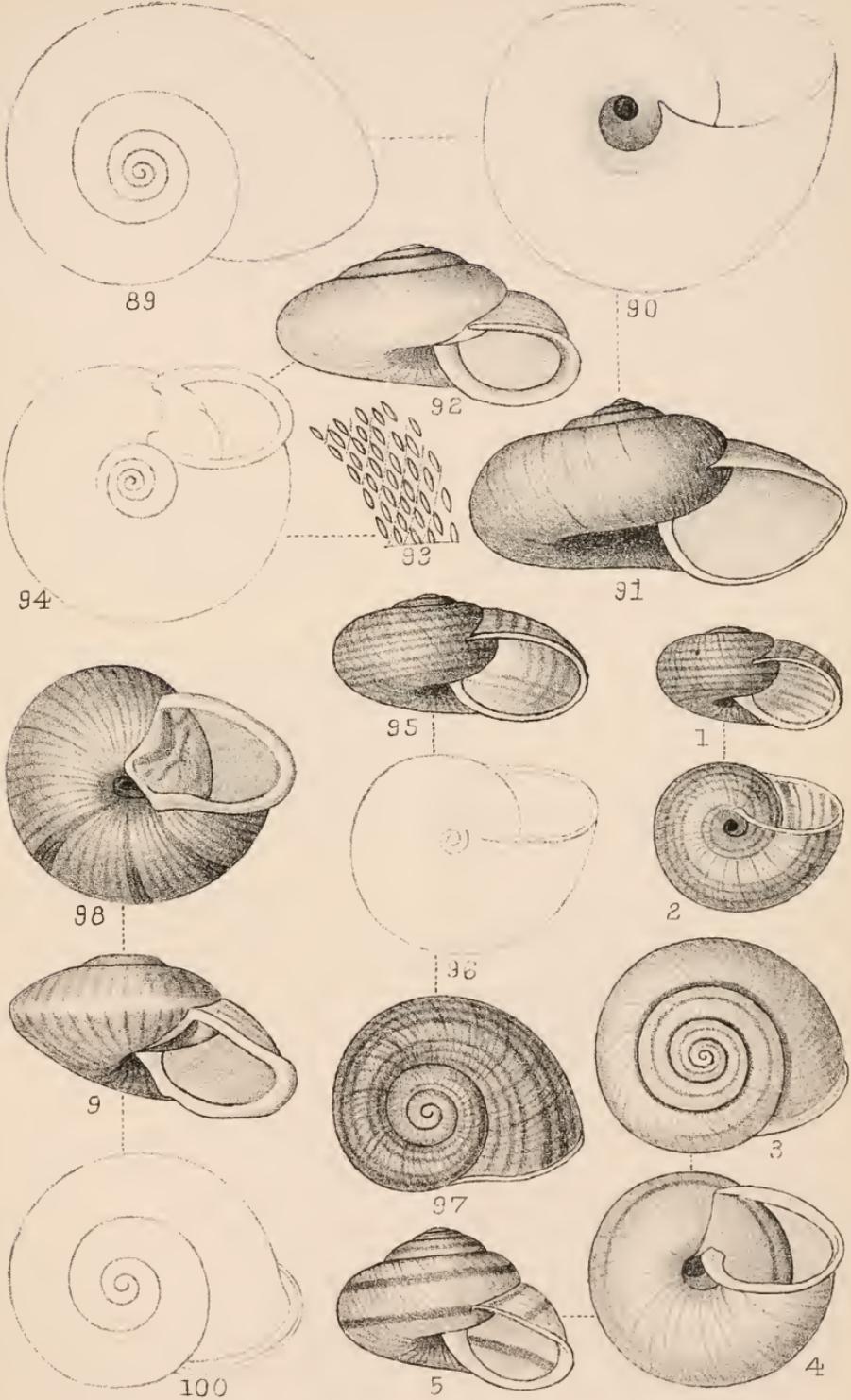
83

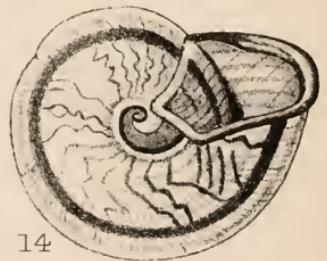
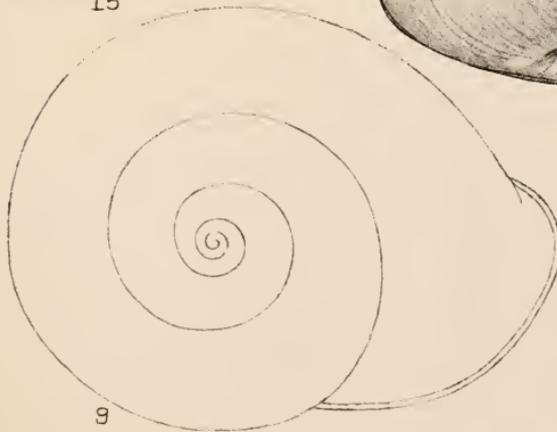
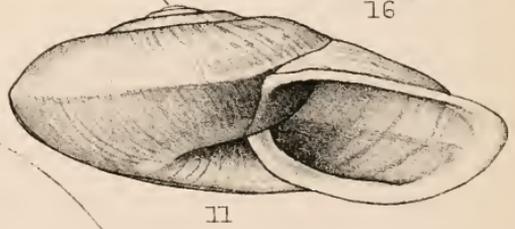
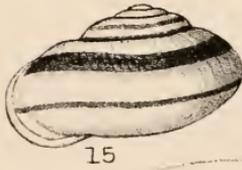
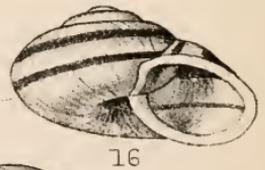
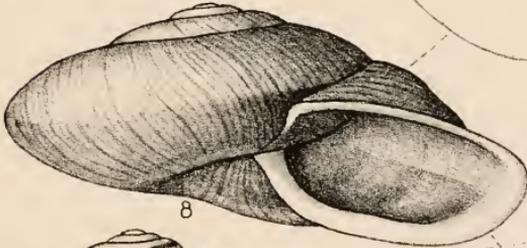
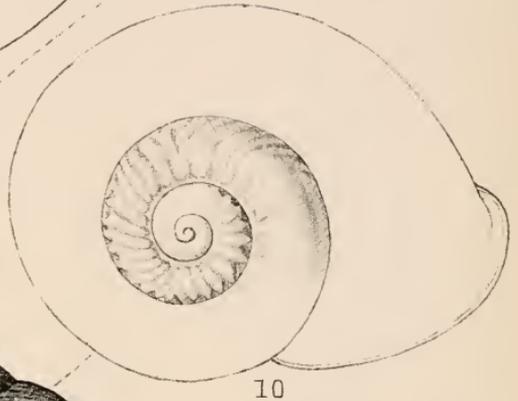
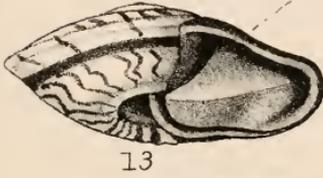
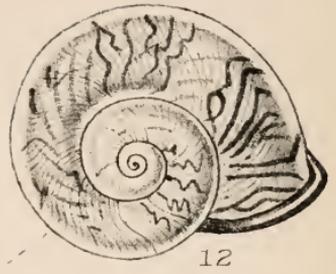
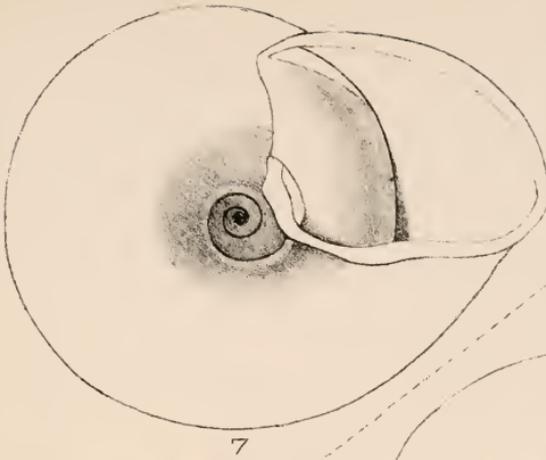


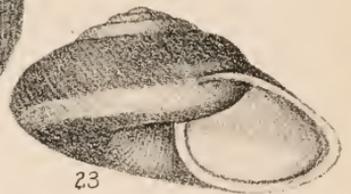
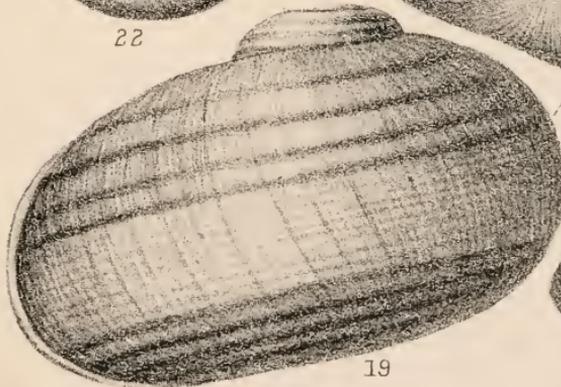
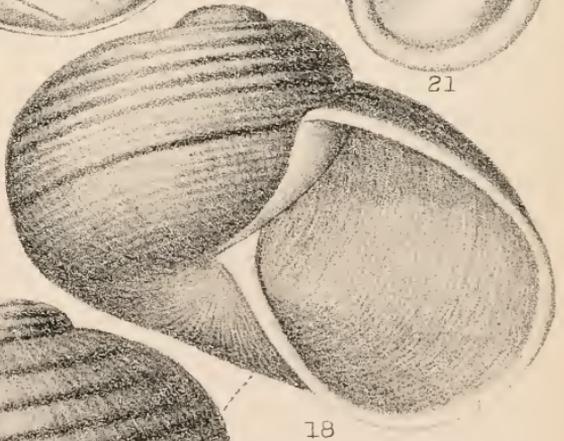
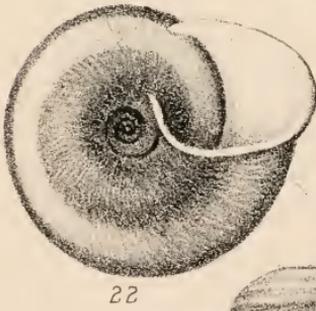
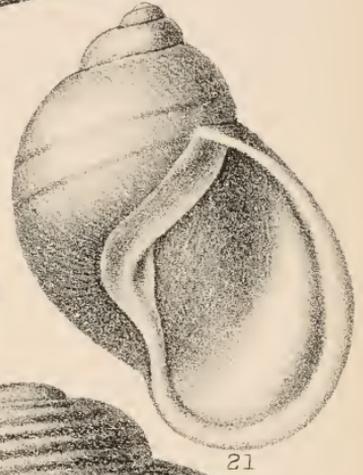
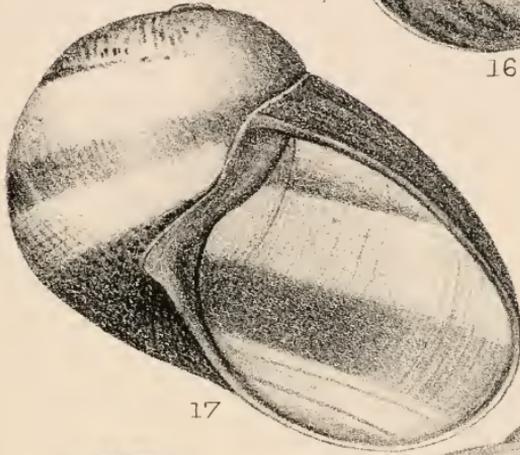
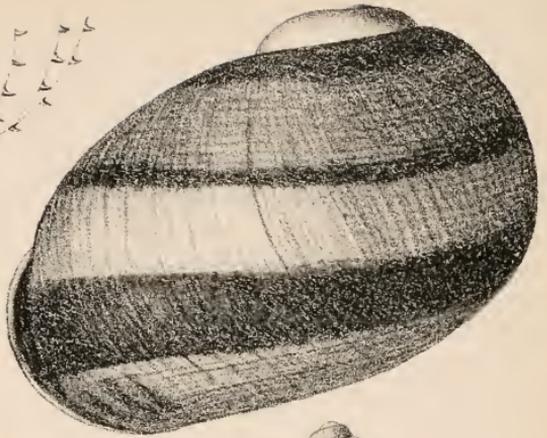
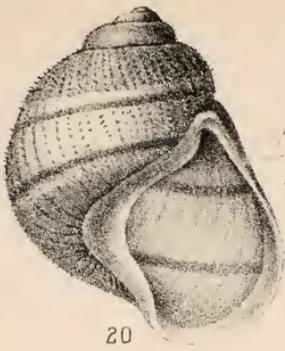
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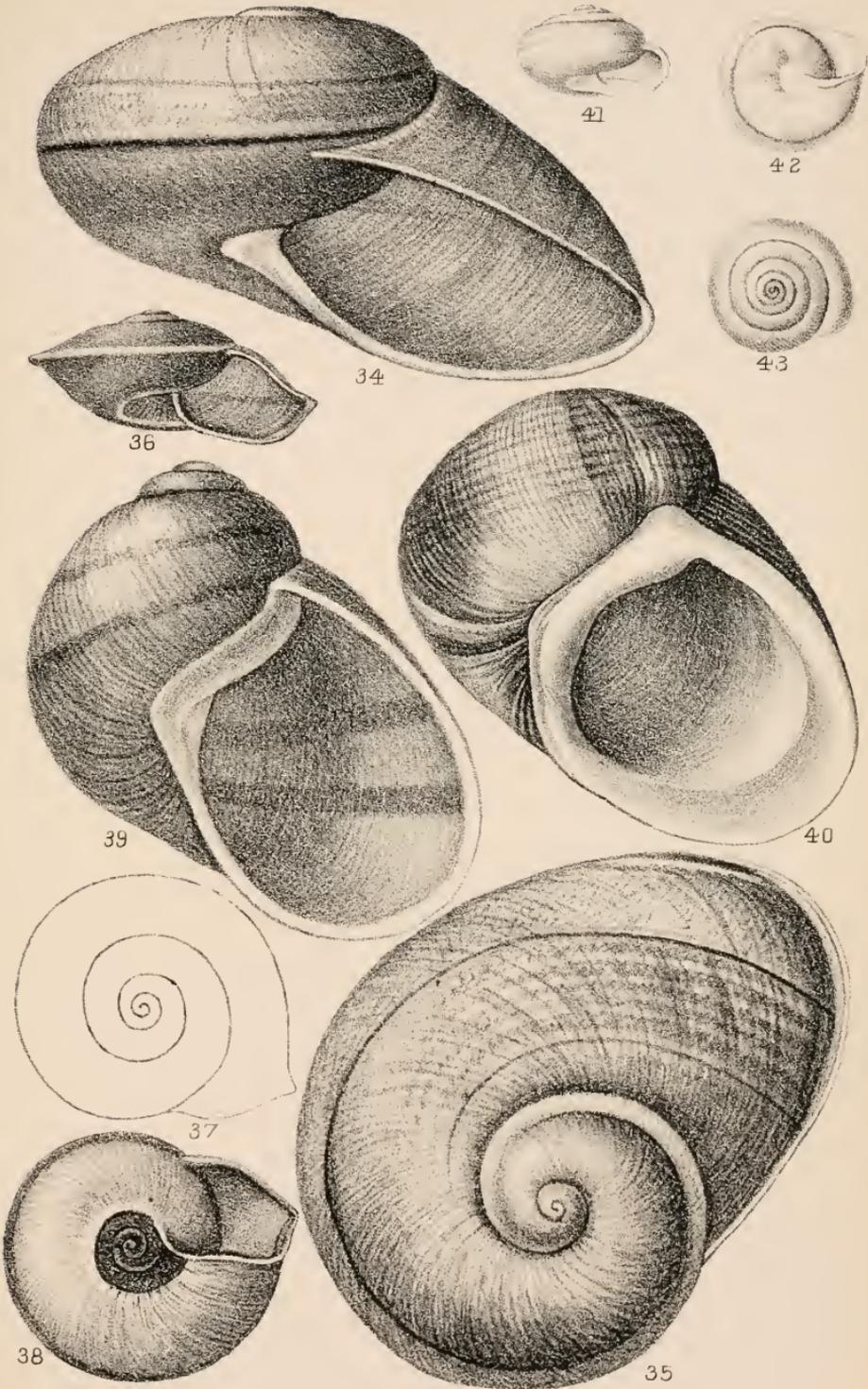
85













41



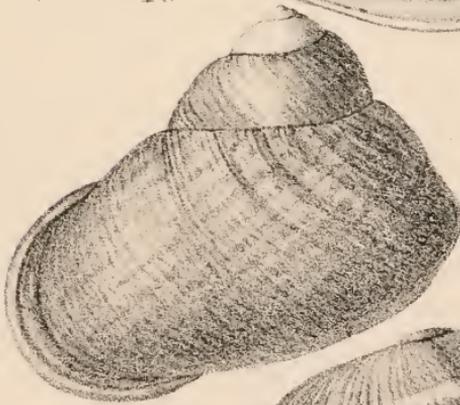
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45



42



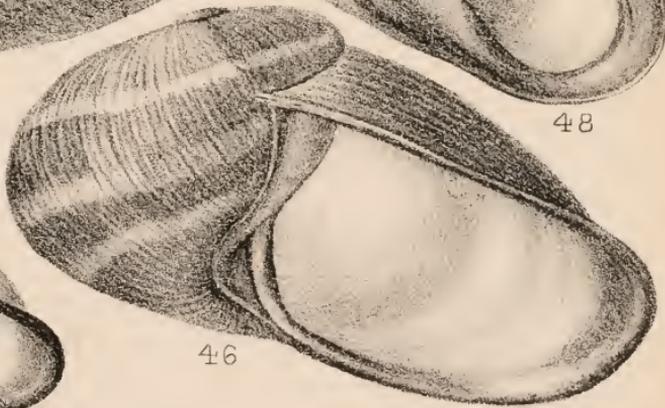
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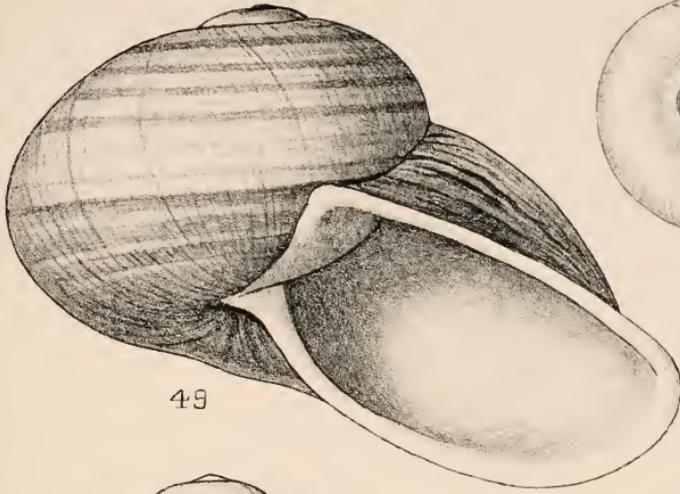
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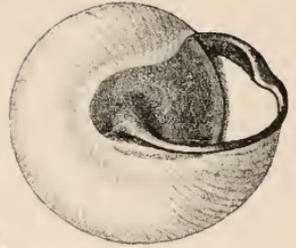
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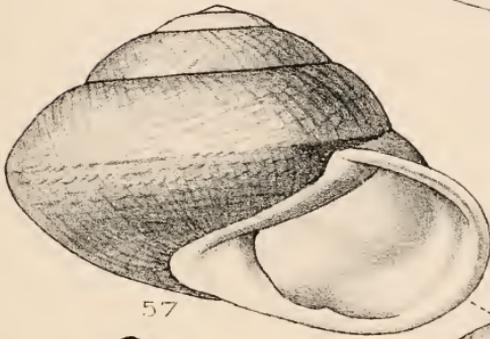
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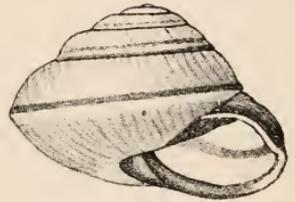
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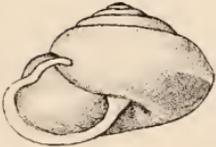
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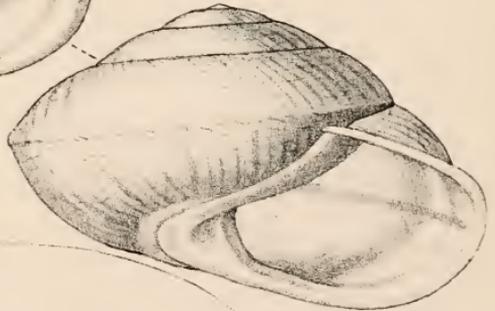
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52



56



58



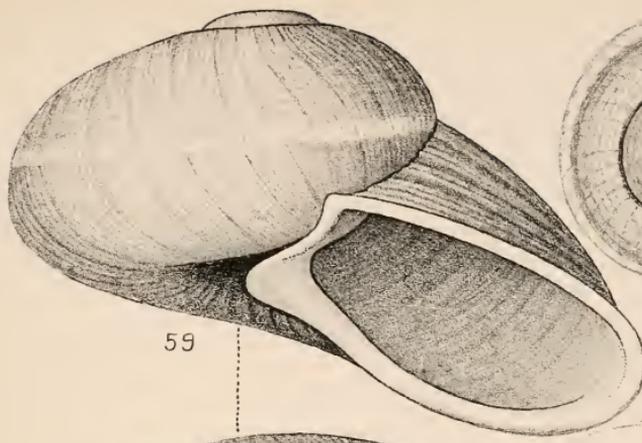
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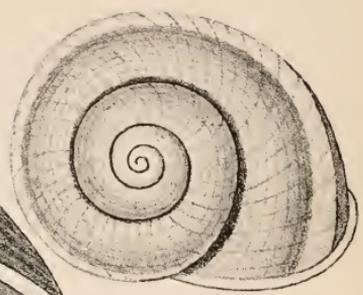
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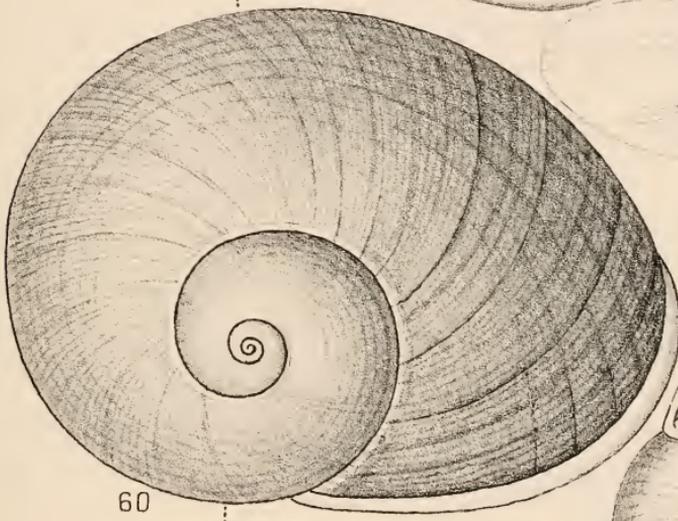
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59



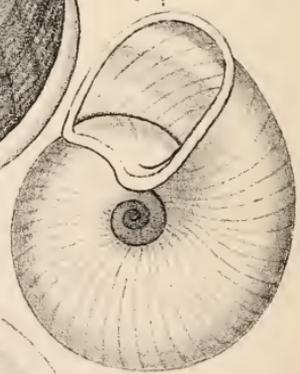
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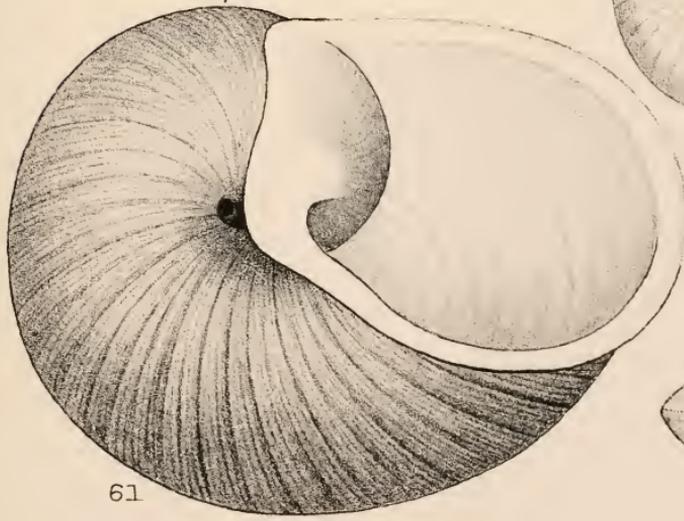
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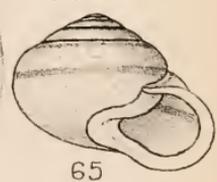
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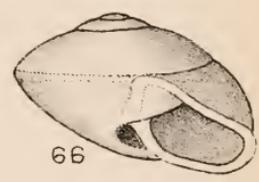
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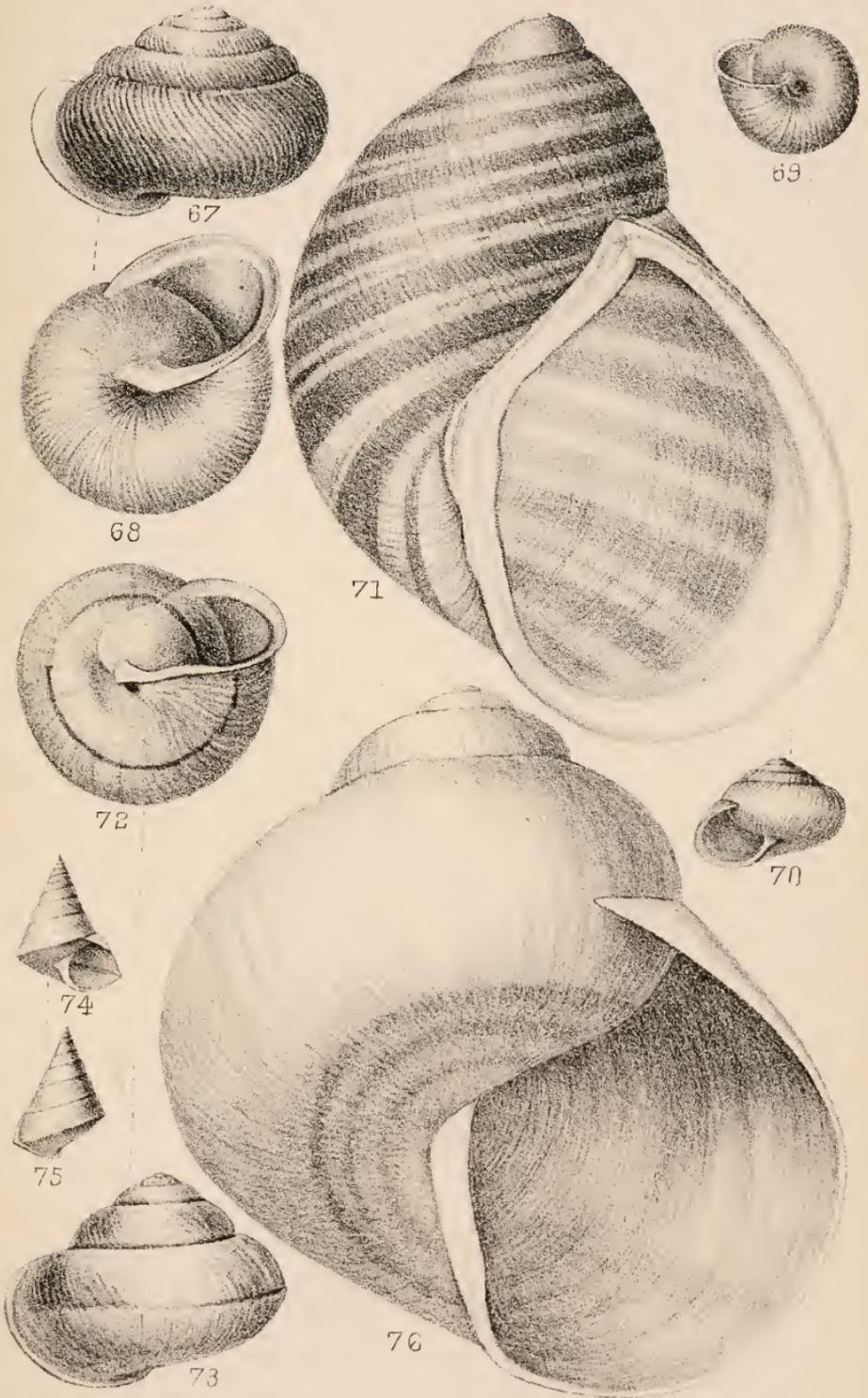
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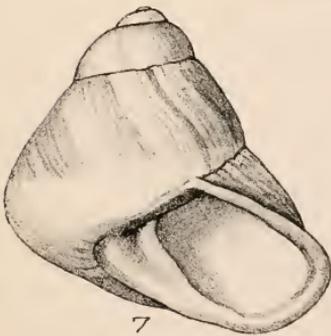
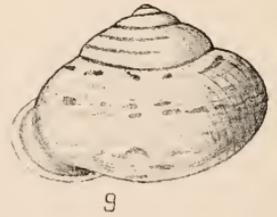
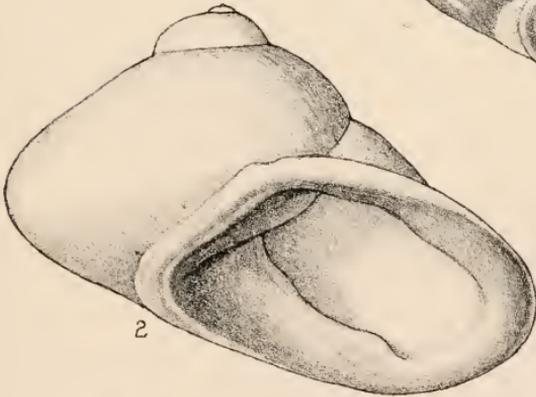
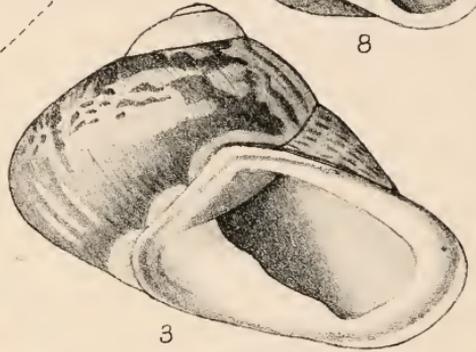
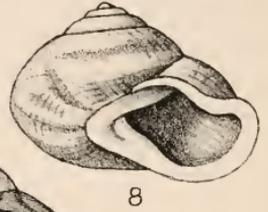
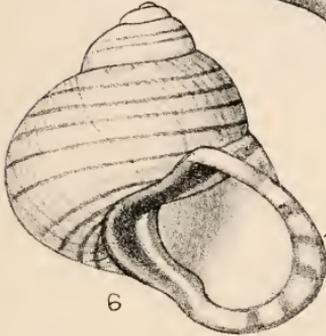
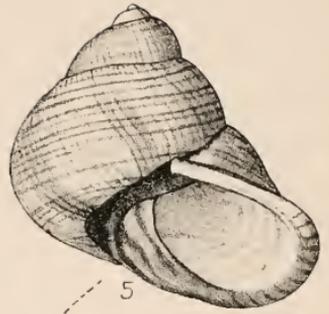
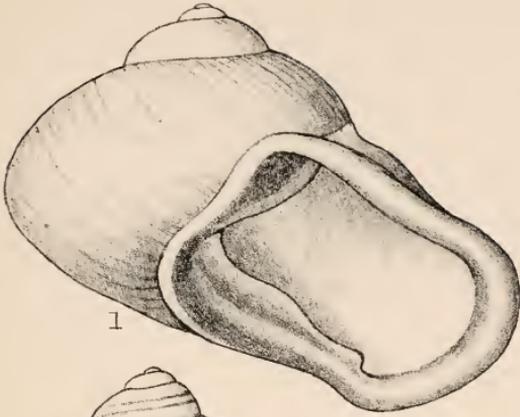


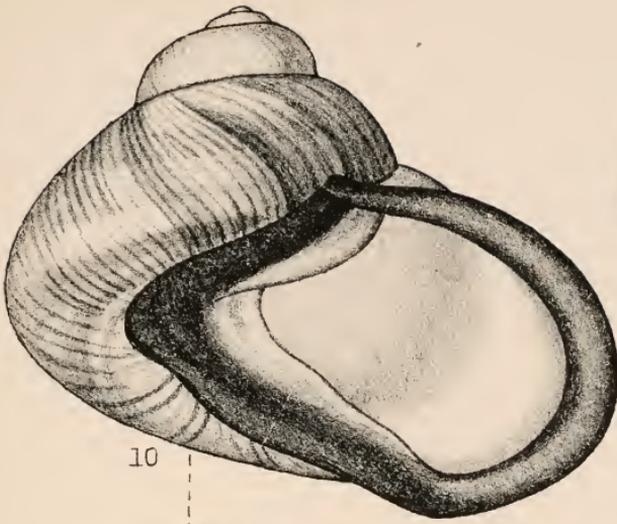
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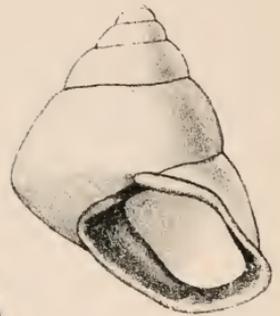
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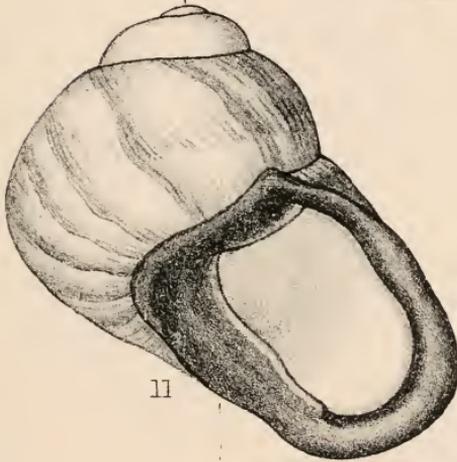




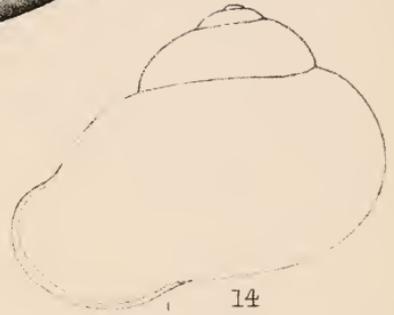
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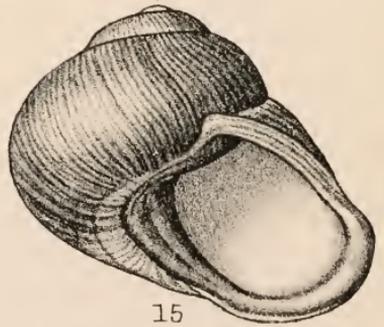
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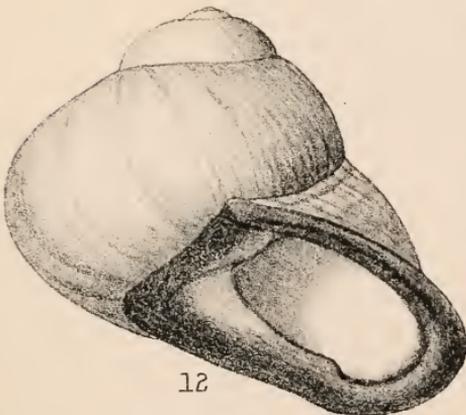
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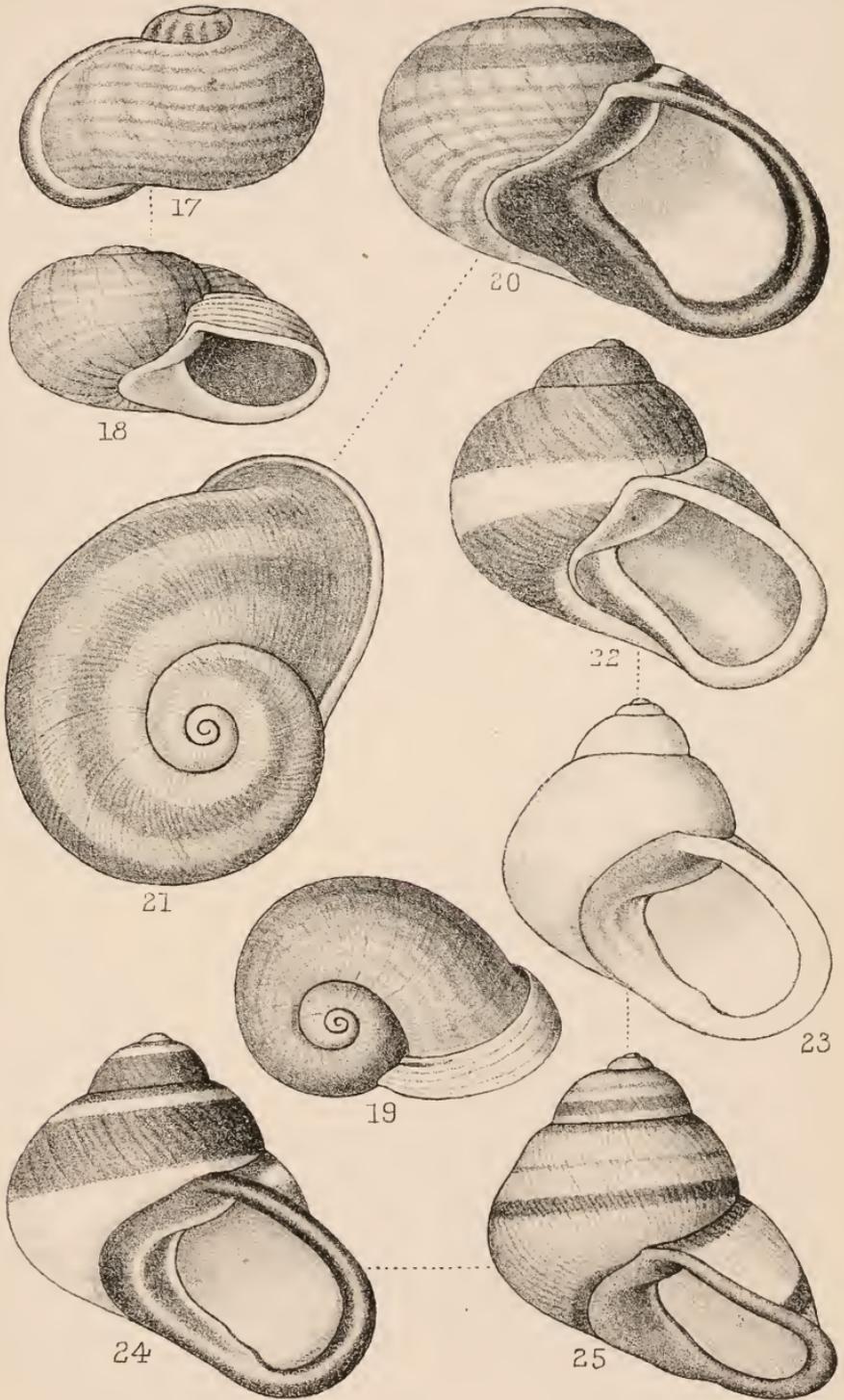
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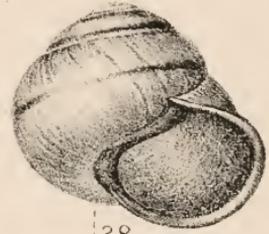




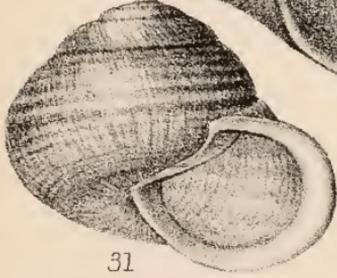
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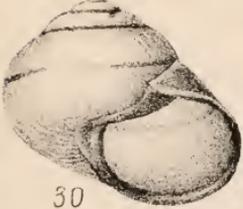
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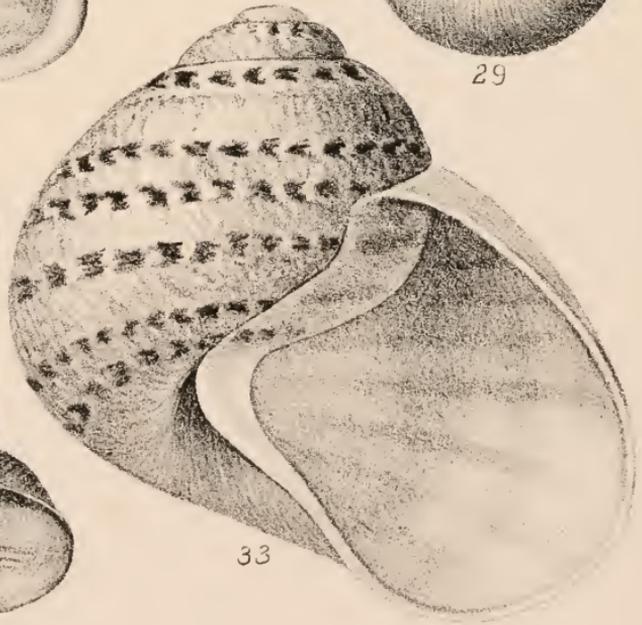
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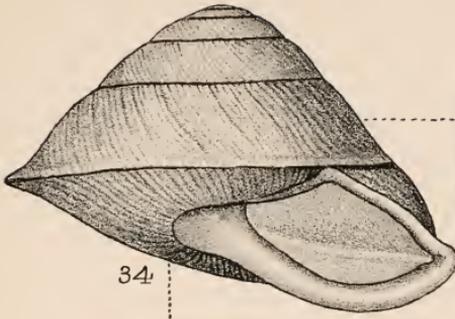
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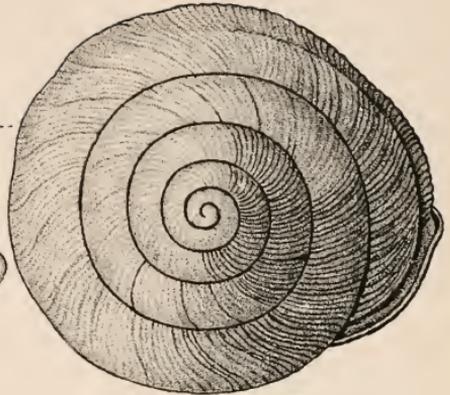
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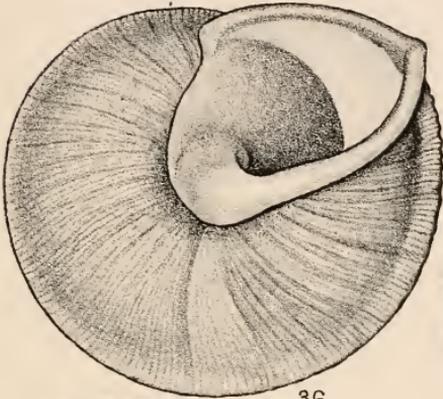
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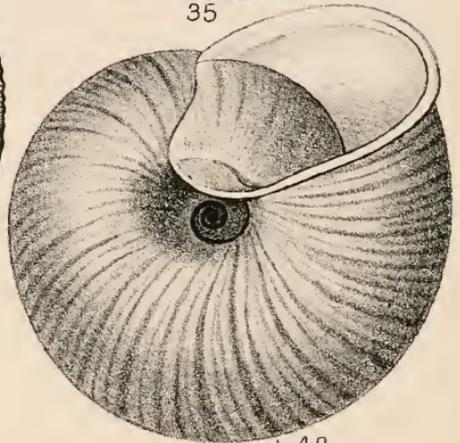
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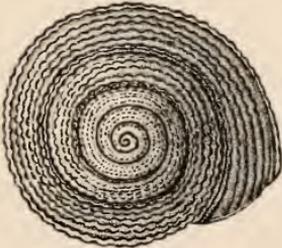
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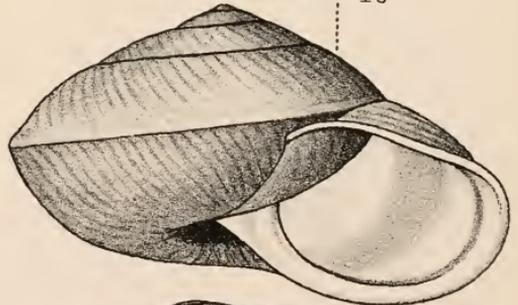
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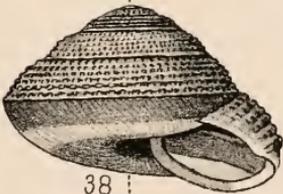
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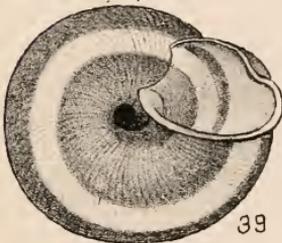
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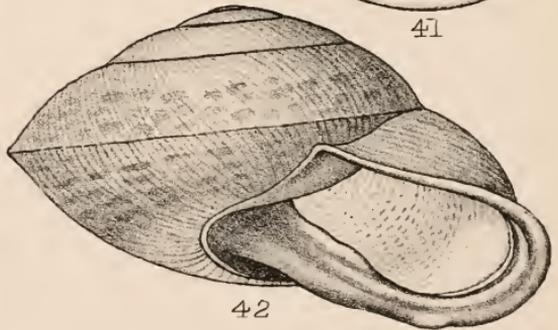
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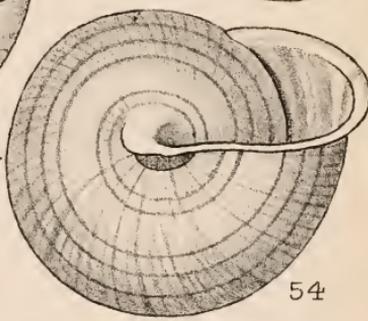
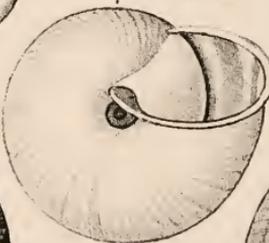
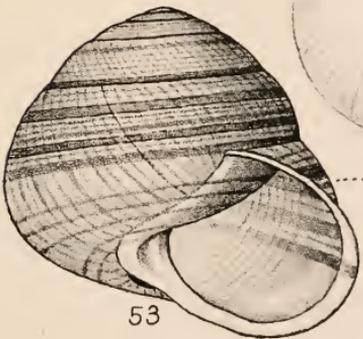
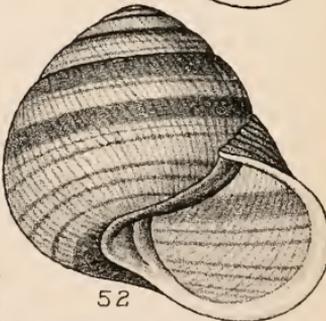
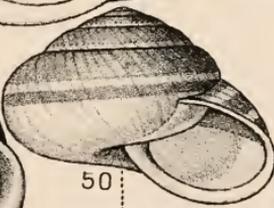
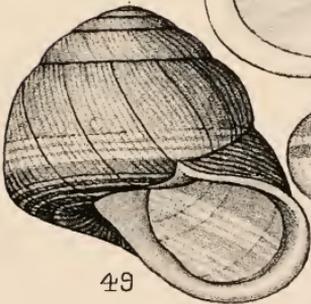
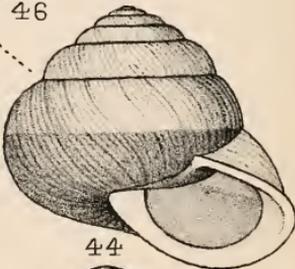
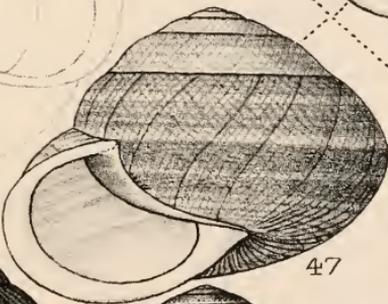
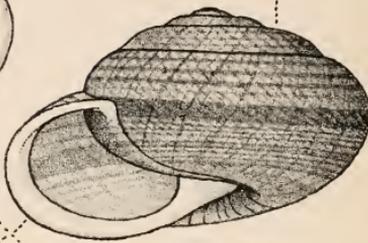
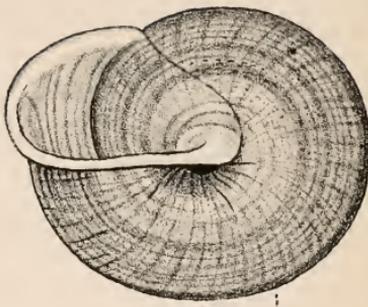
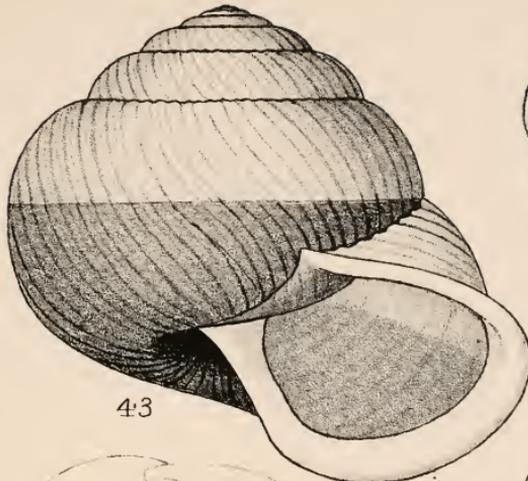
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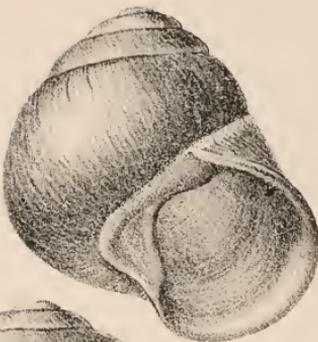


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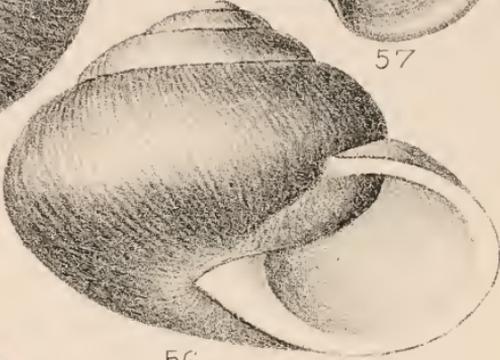




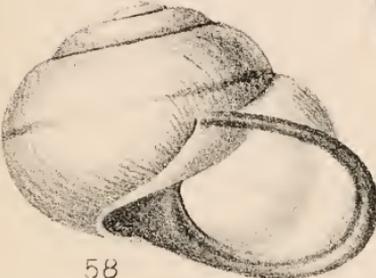
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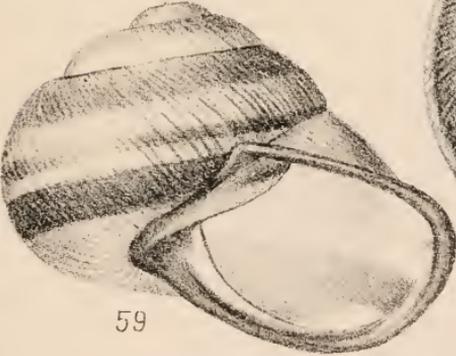
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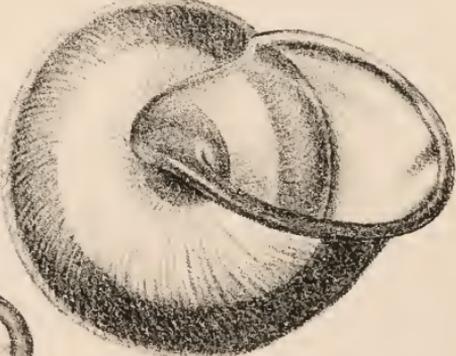
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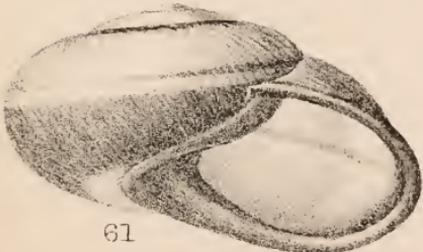
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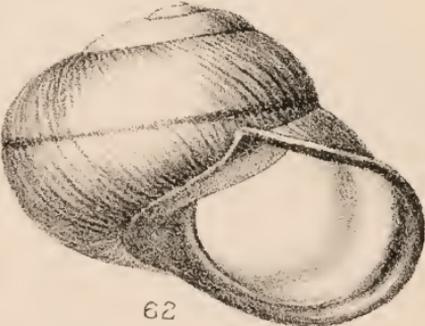
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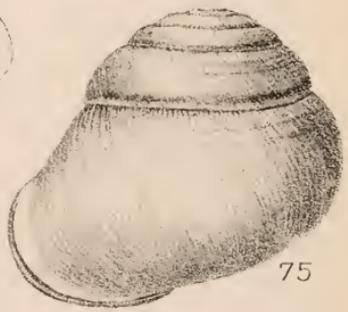
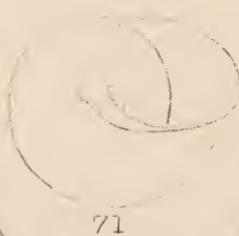
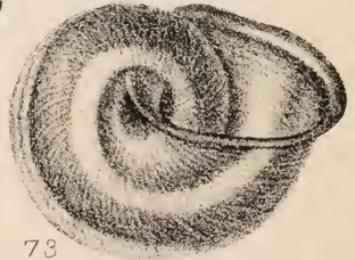
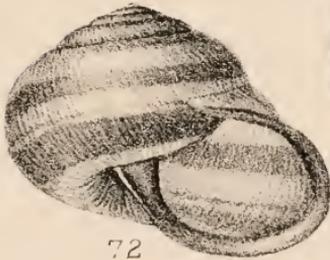
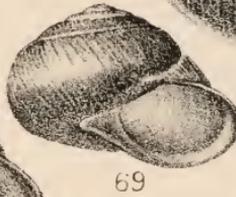
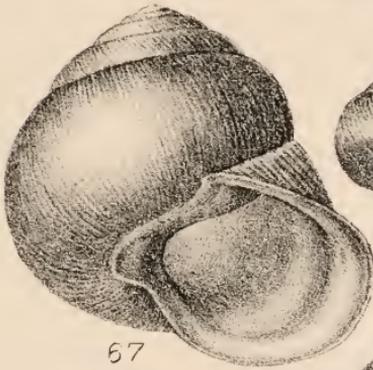
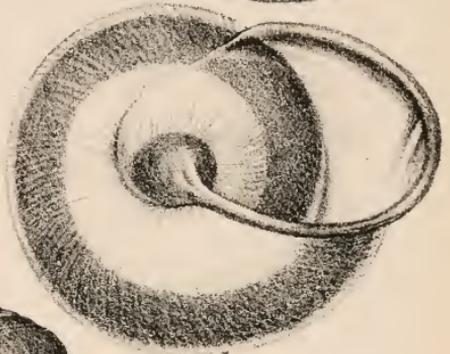
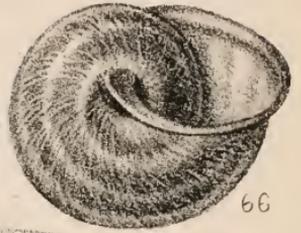
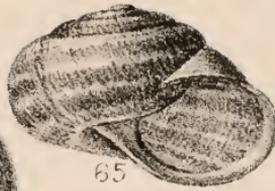
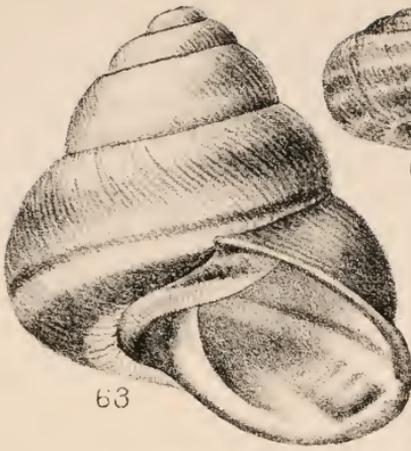
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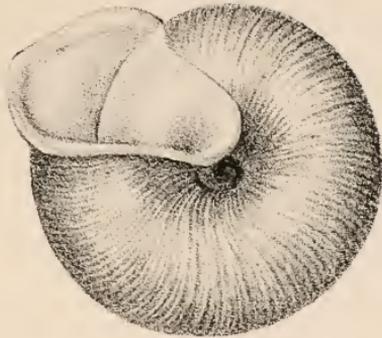


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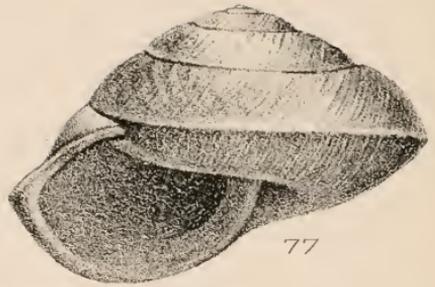


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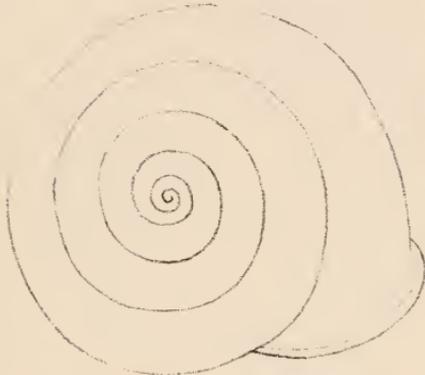




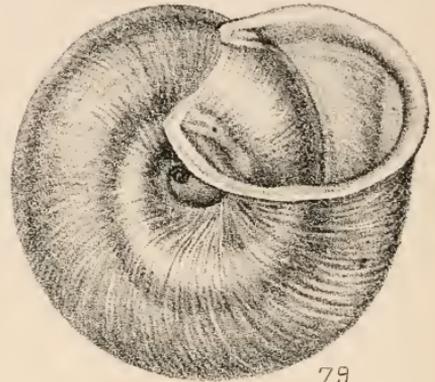
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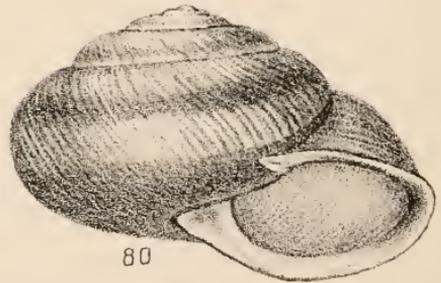
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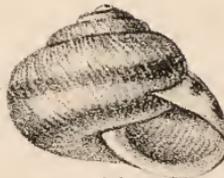
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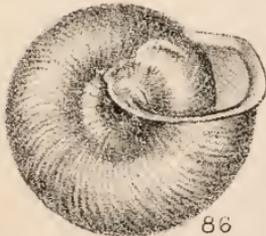
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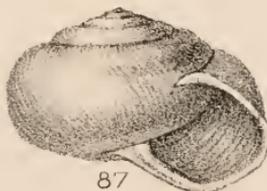
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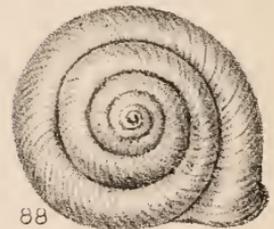
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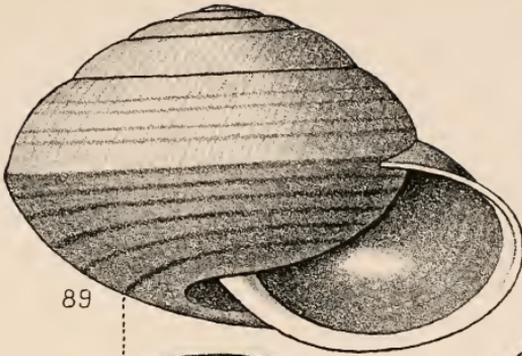
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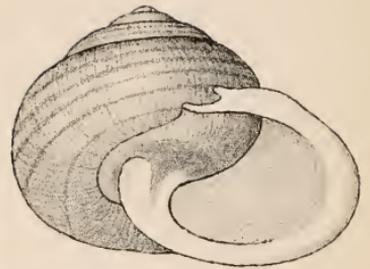
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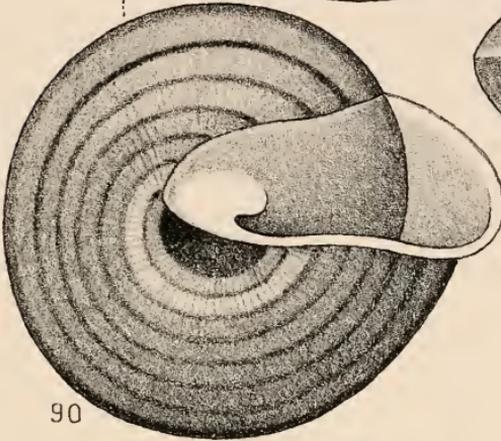
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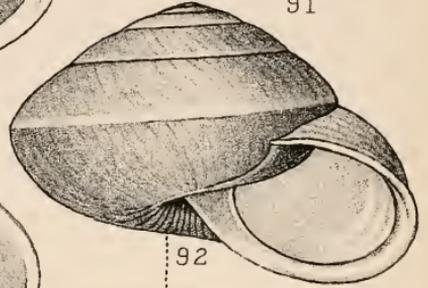
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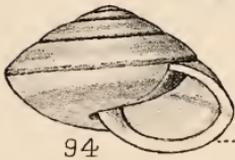
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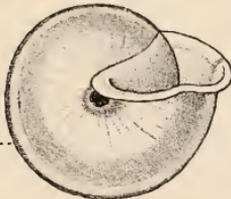
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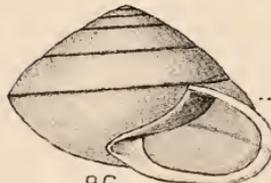
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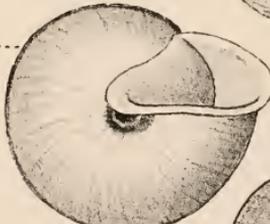
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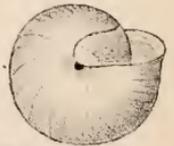
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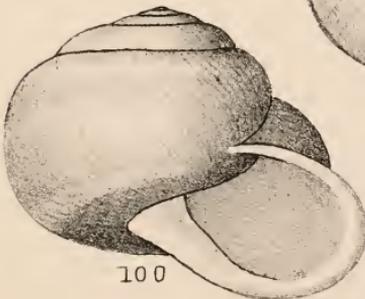
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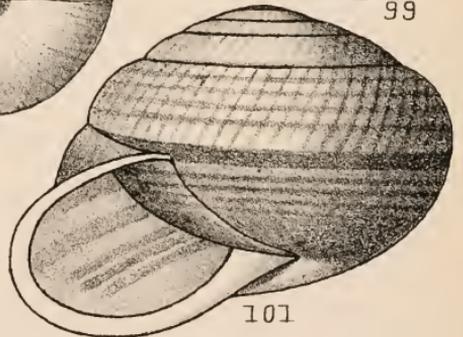
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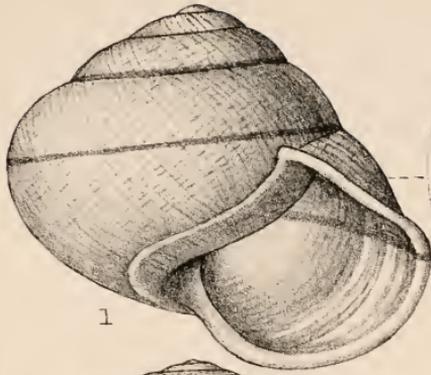
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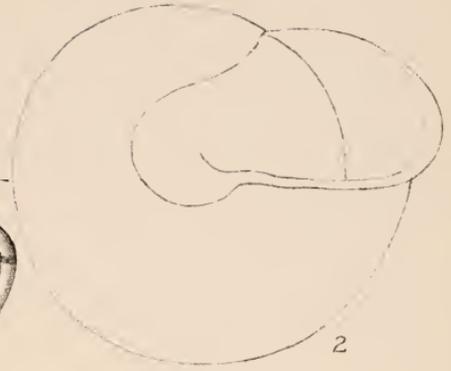
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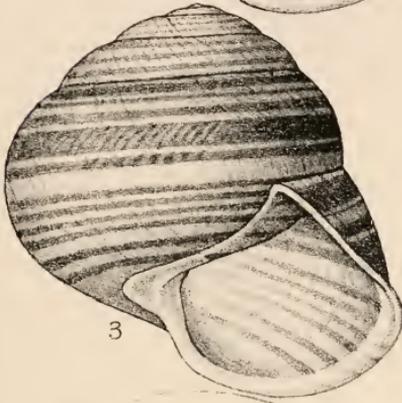
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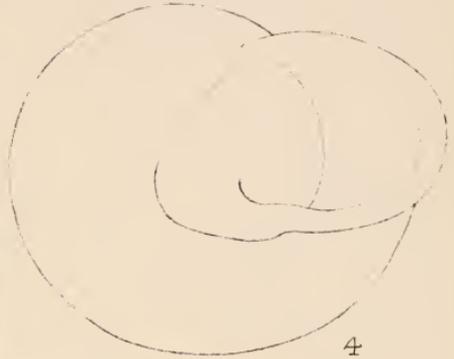
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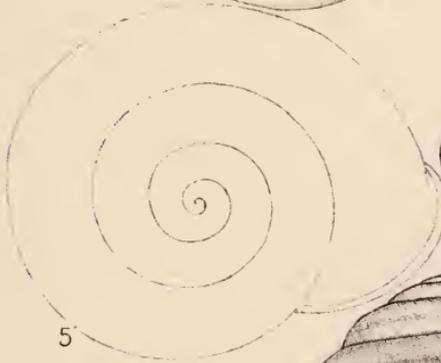
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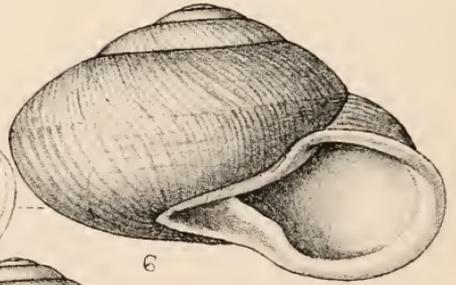
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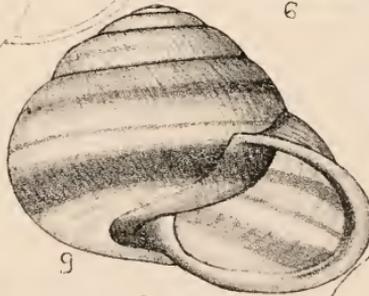
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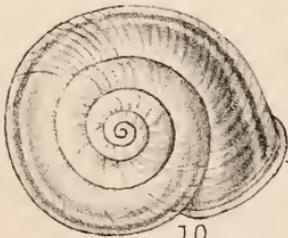
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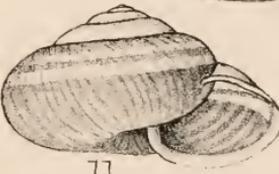
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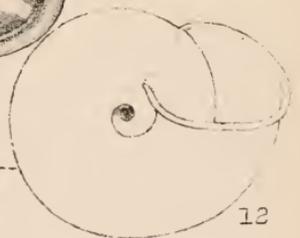
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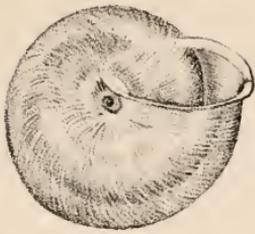
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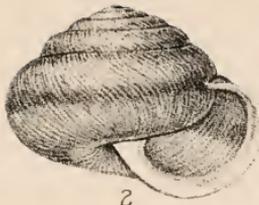
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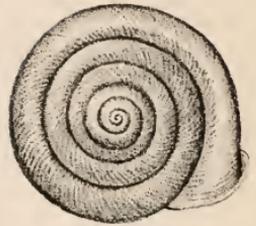
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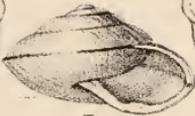
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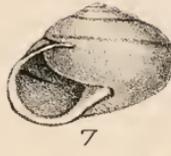
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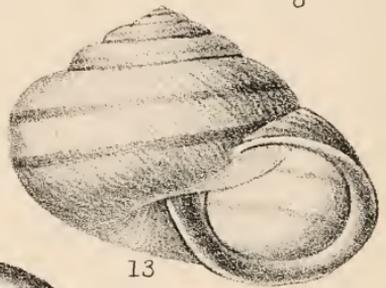
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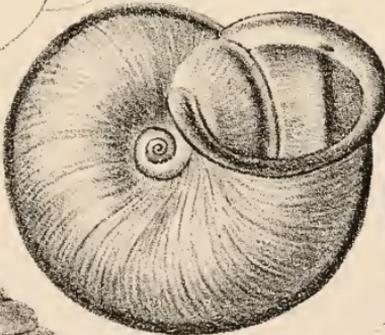
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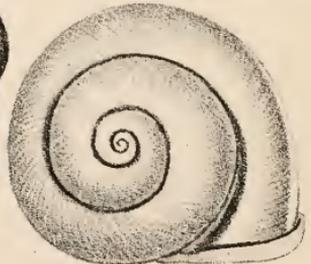
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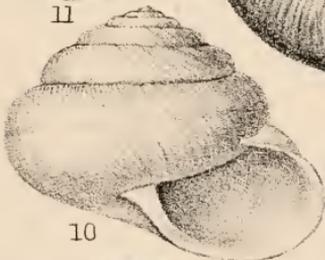
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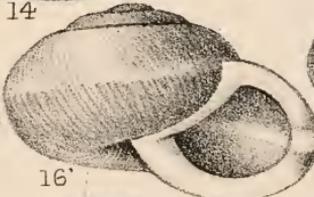
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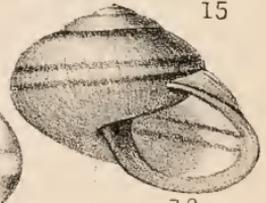
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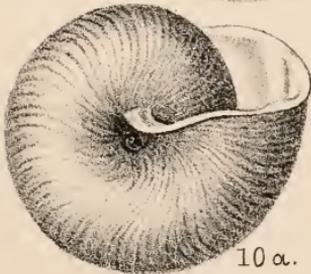
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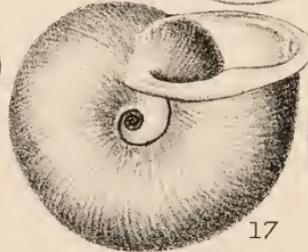
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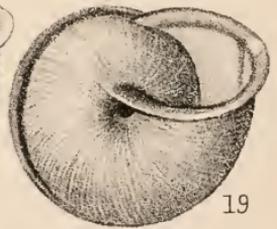
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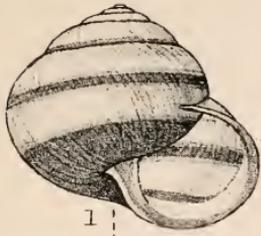
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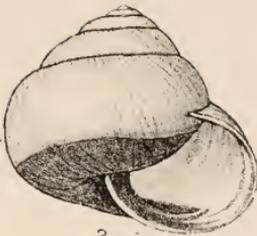
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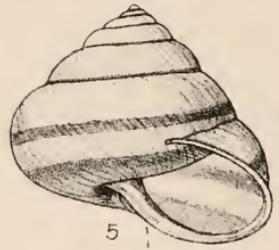
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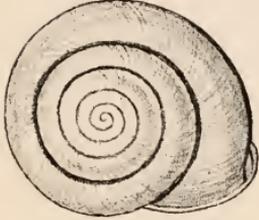
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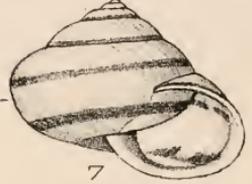
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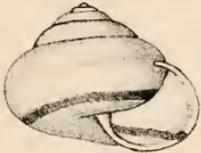
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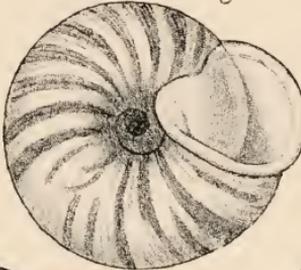
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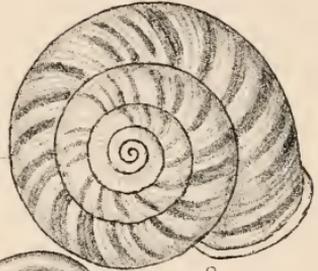
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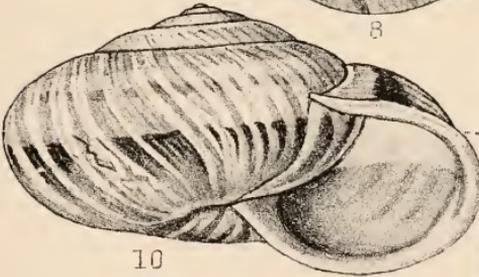
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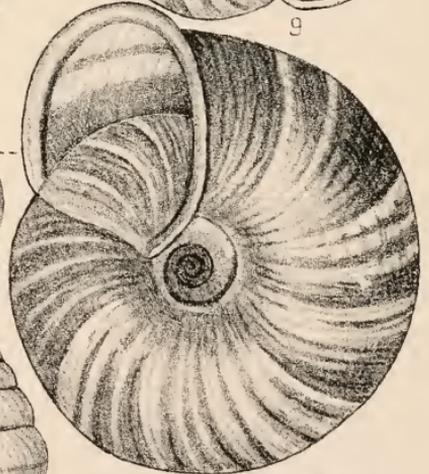
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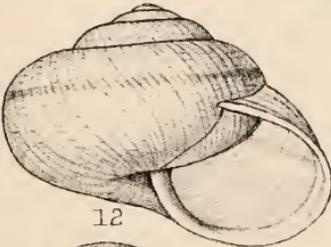
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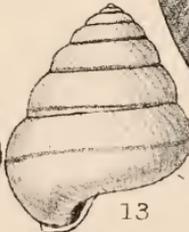
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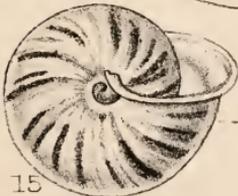
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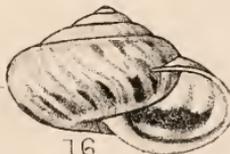
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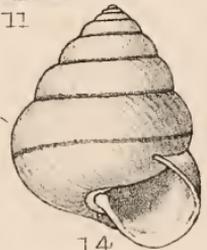
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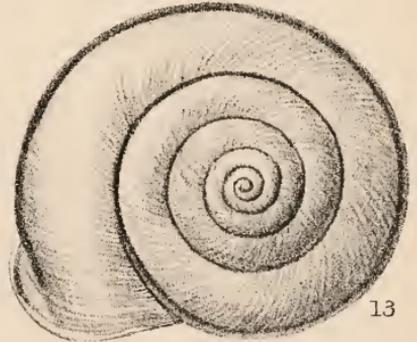
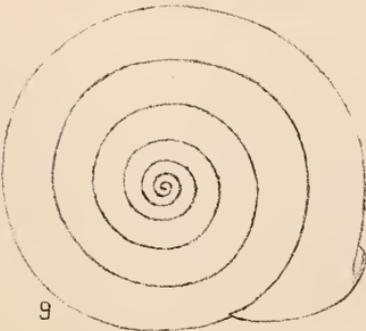
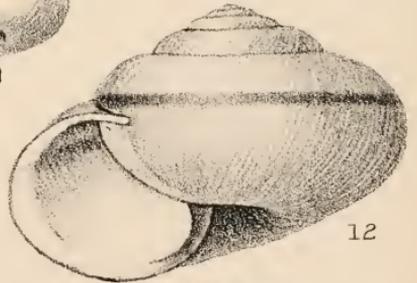
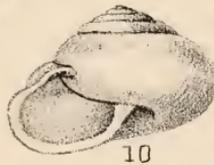
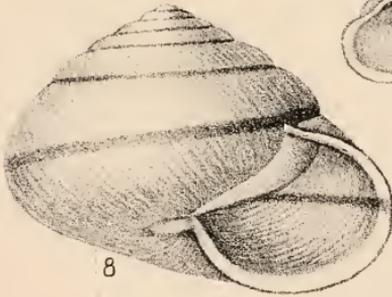
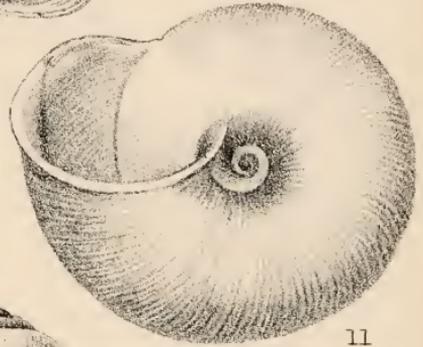
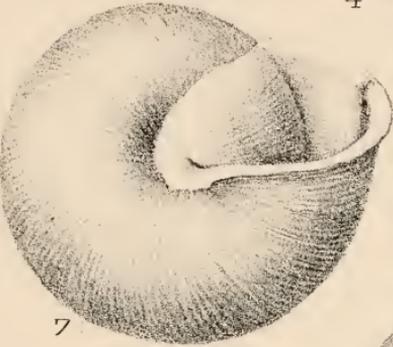
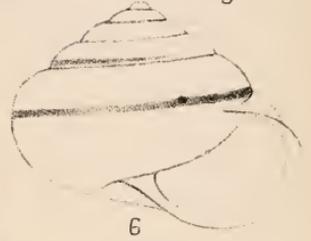
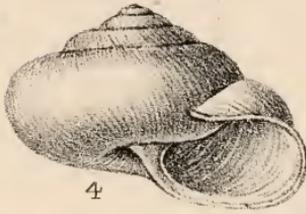
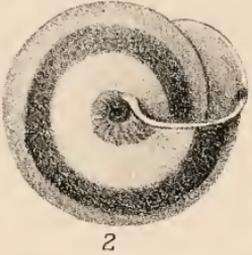
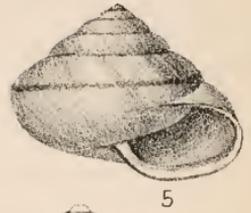
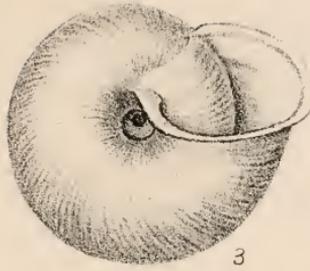
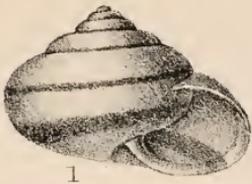
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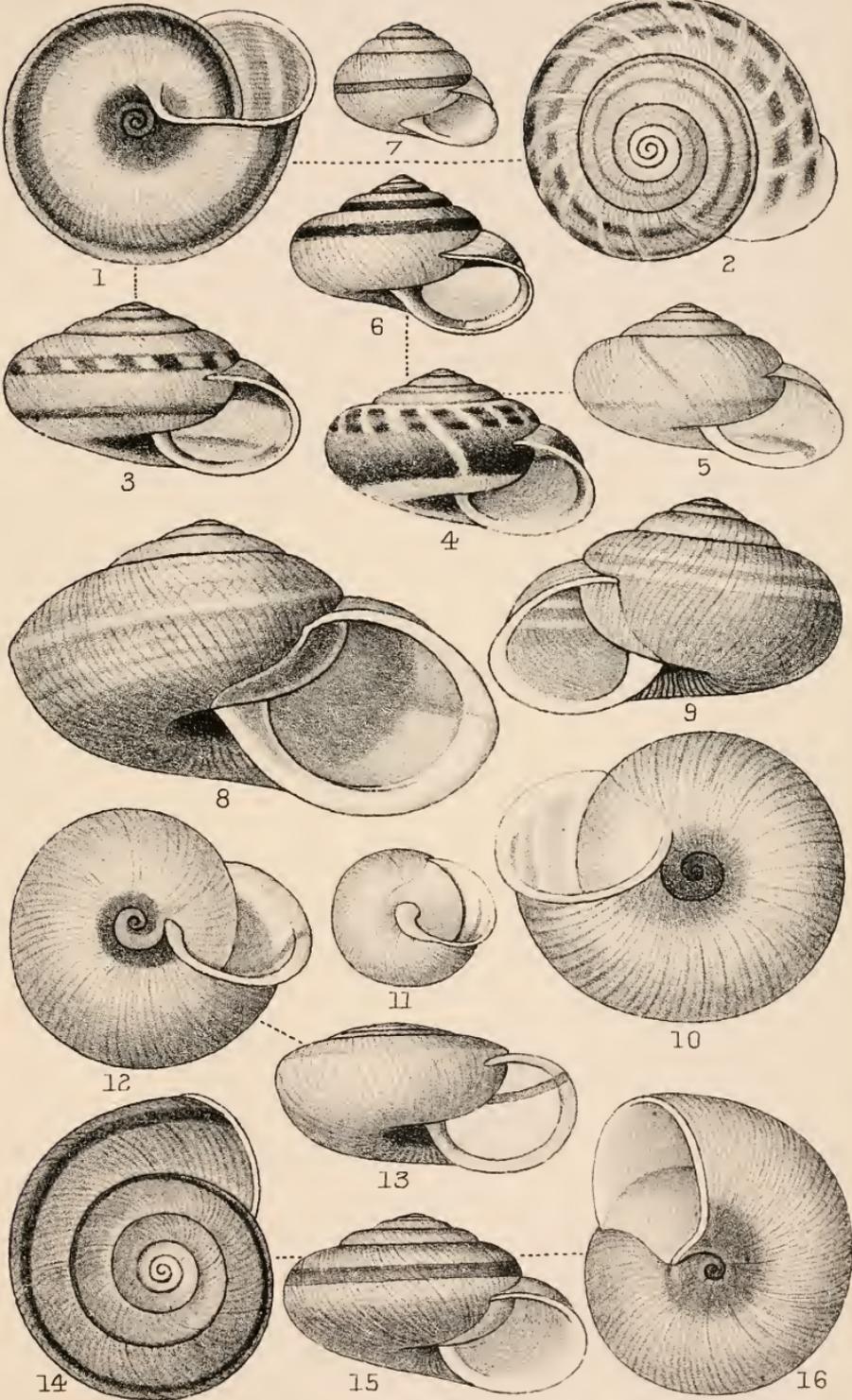


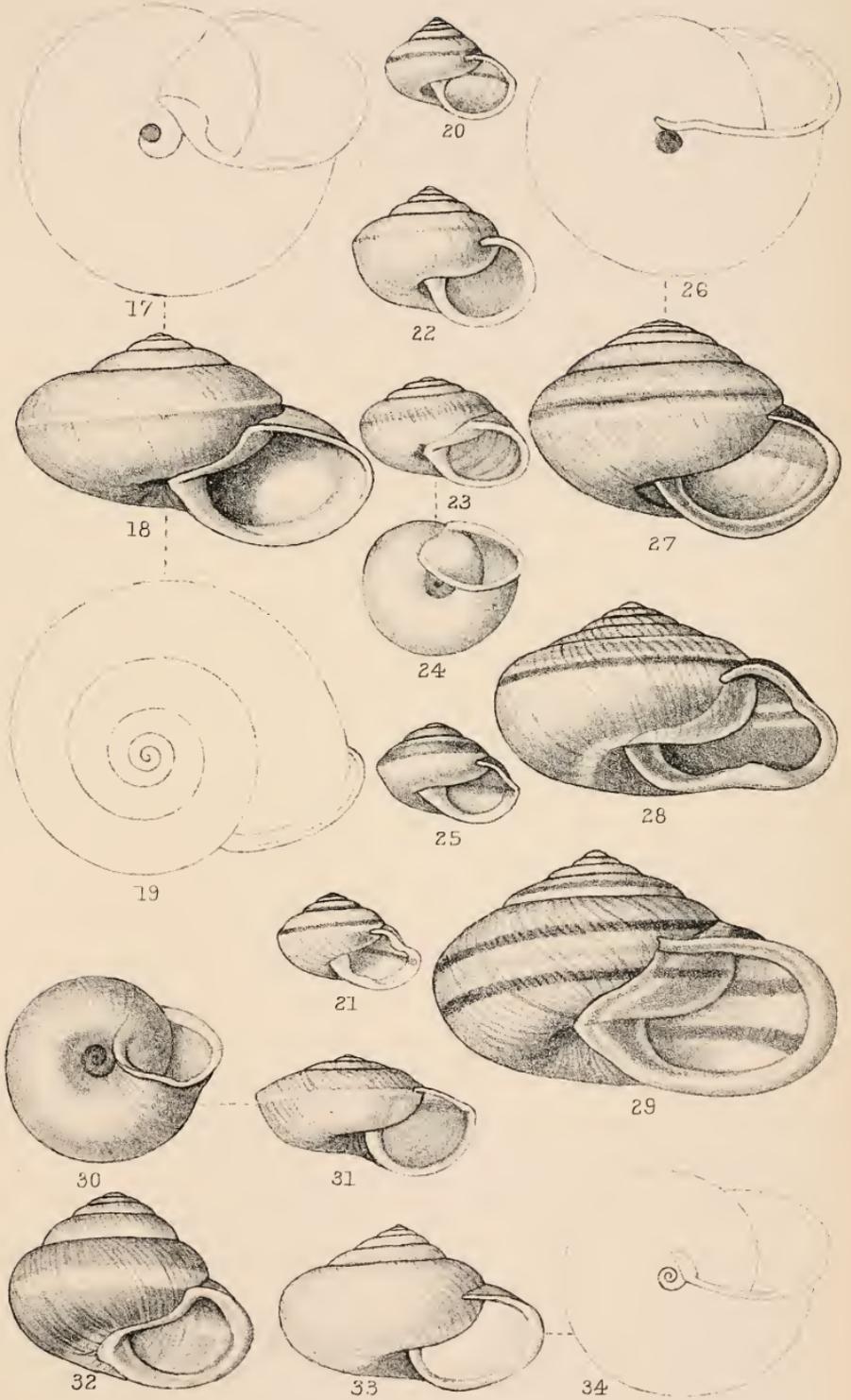
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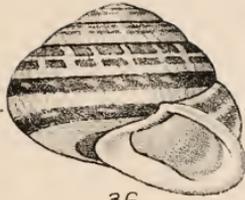




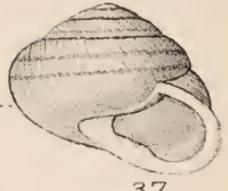




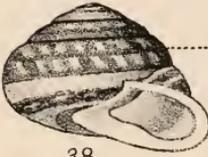
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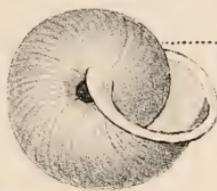
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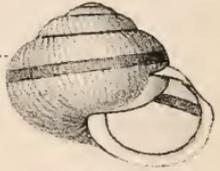
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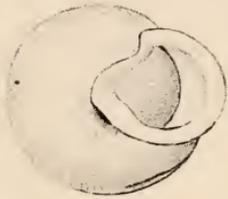
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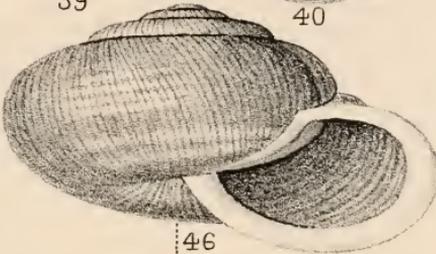
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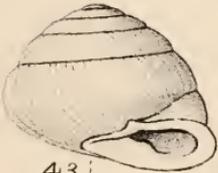
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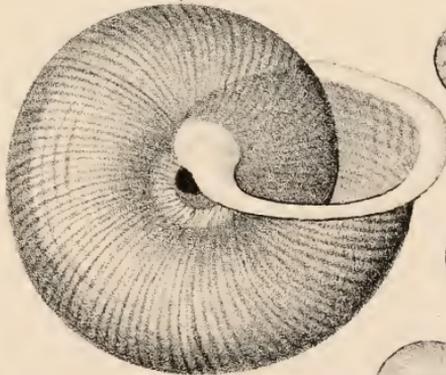
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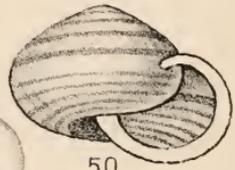
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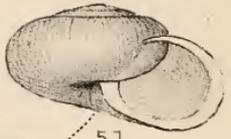
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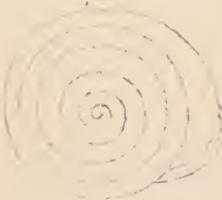
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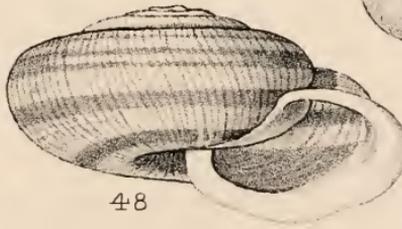
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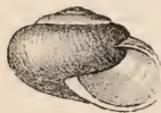
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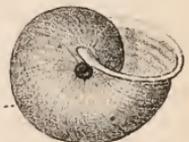
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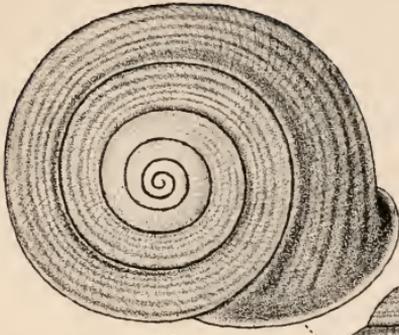
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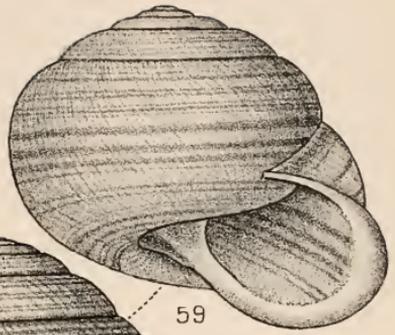
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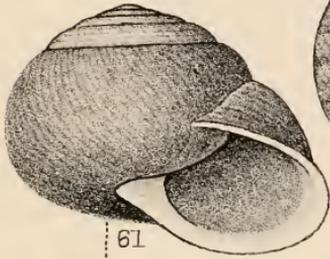
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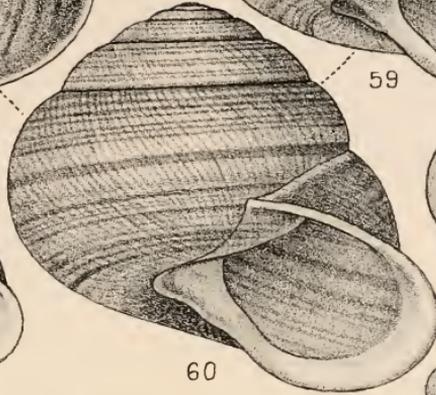
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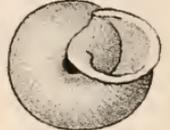
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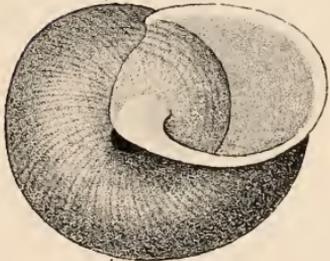
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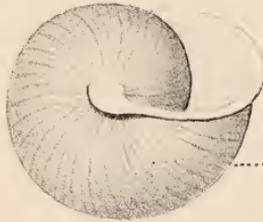
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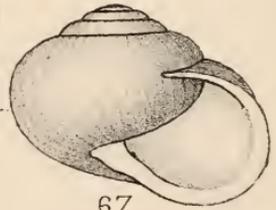
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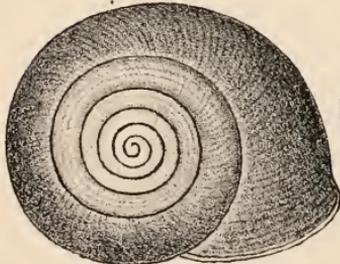
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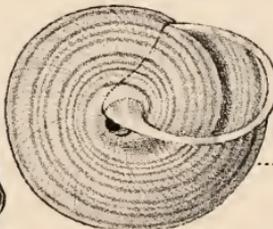
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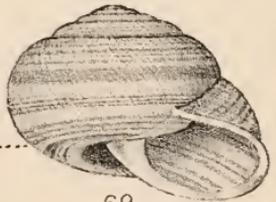
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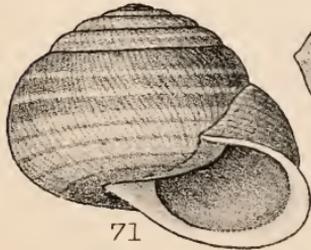
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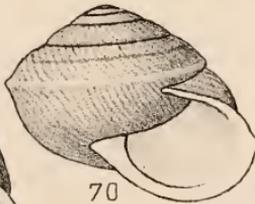
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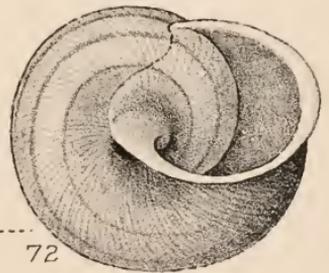
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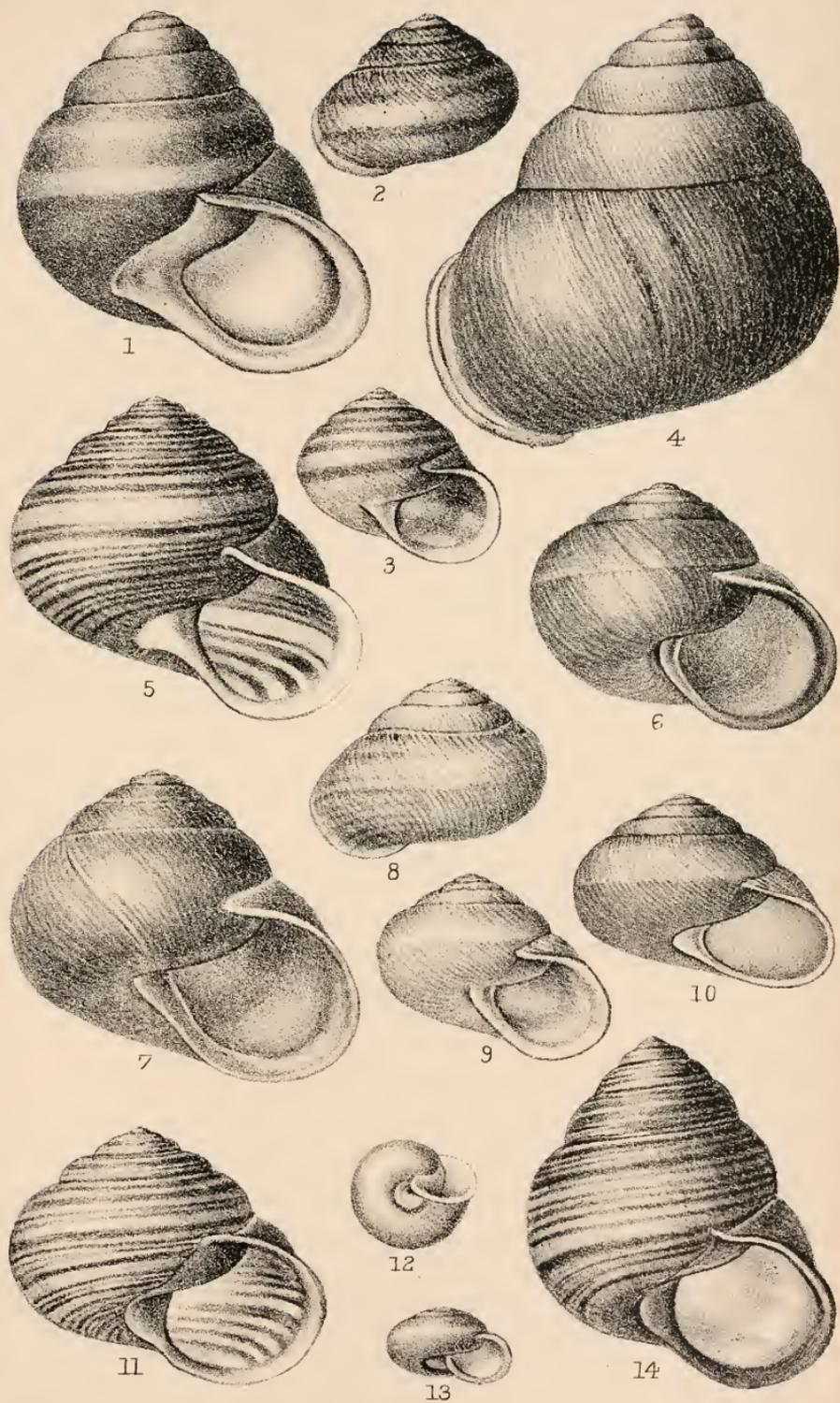
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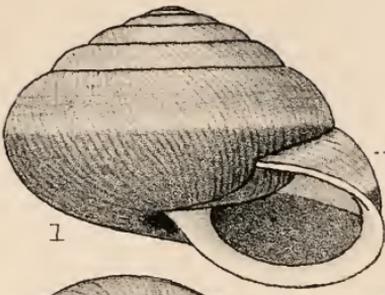


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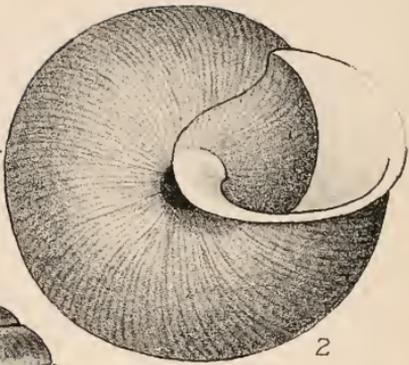


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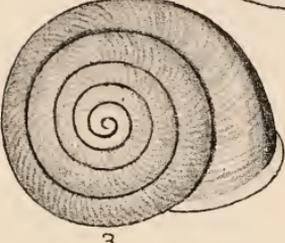




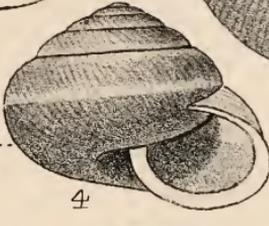
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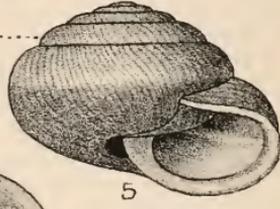
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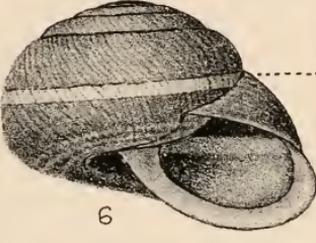
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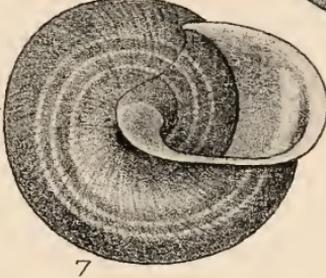
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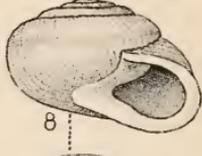
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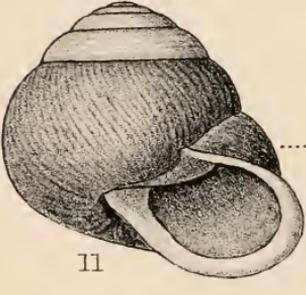
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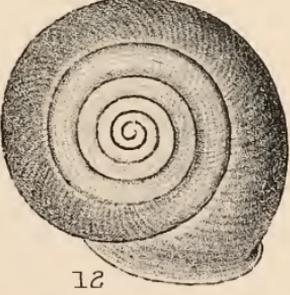
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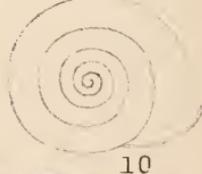
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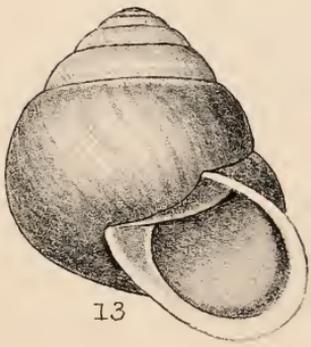
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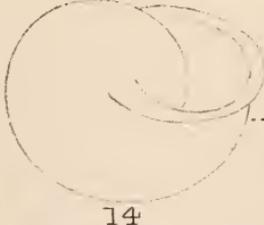
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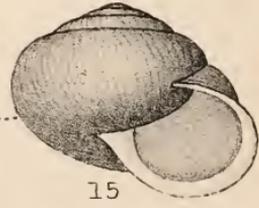
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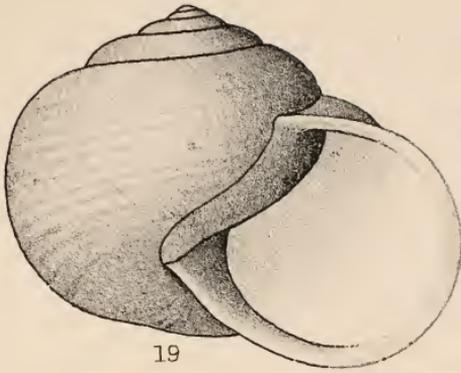
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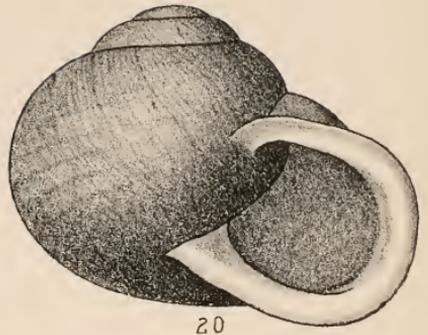
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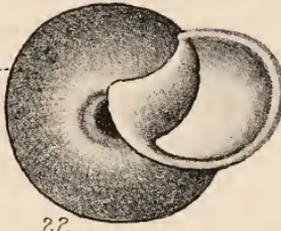
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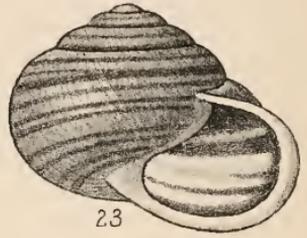
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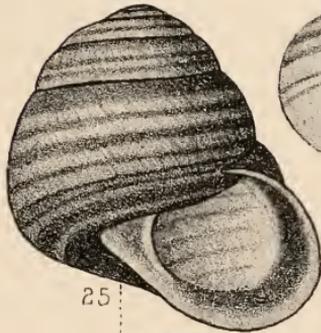
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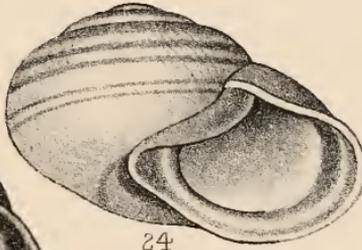
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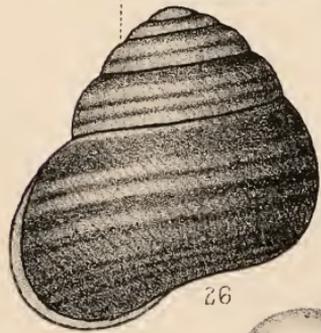
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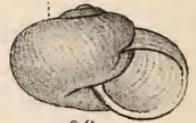
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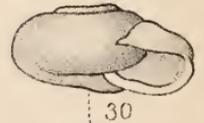
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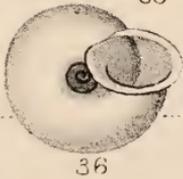
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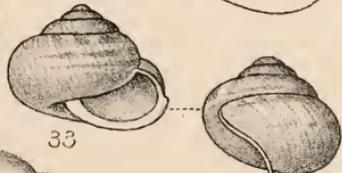
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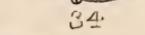
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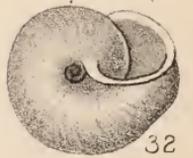
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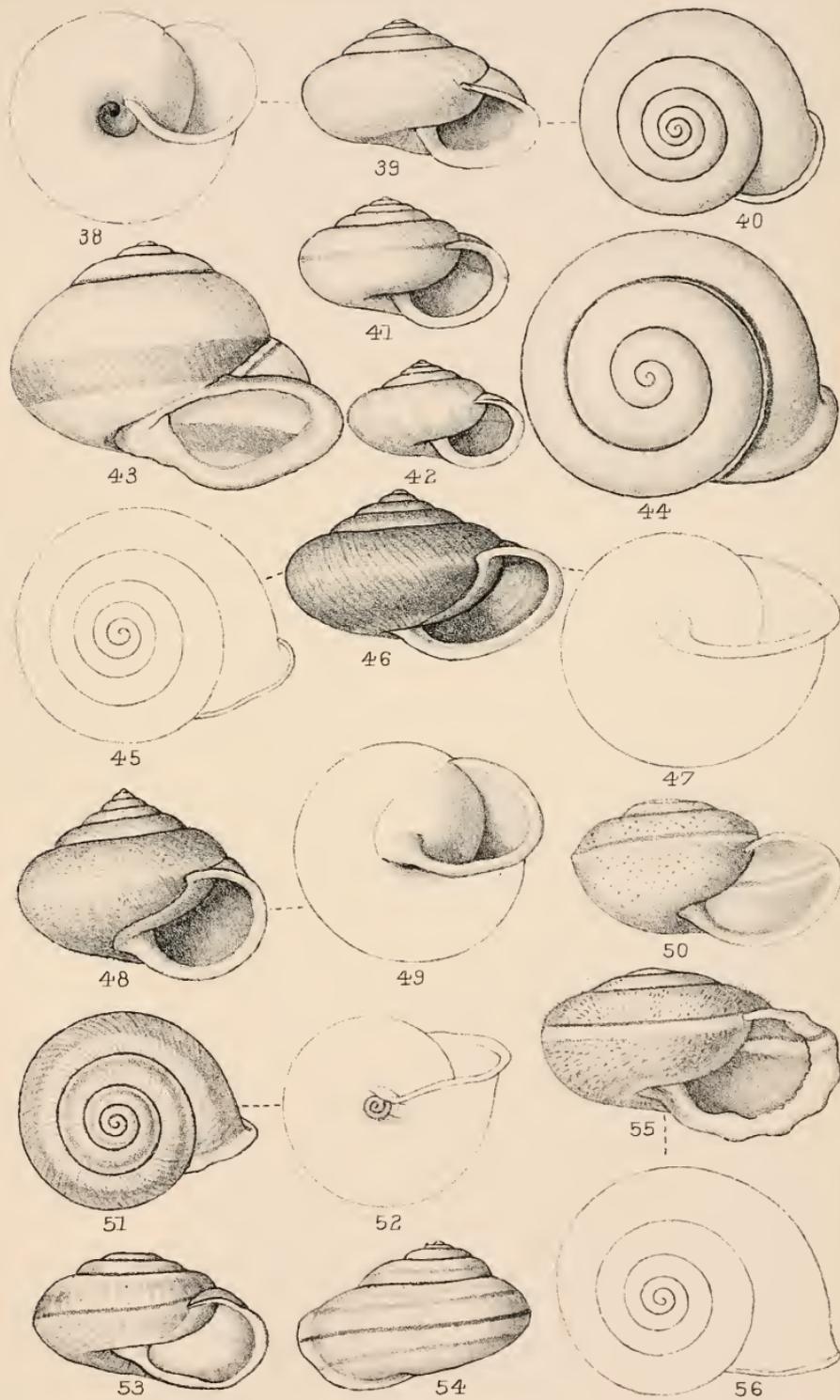
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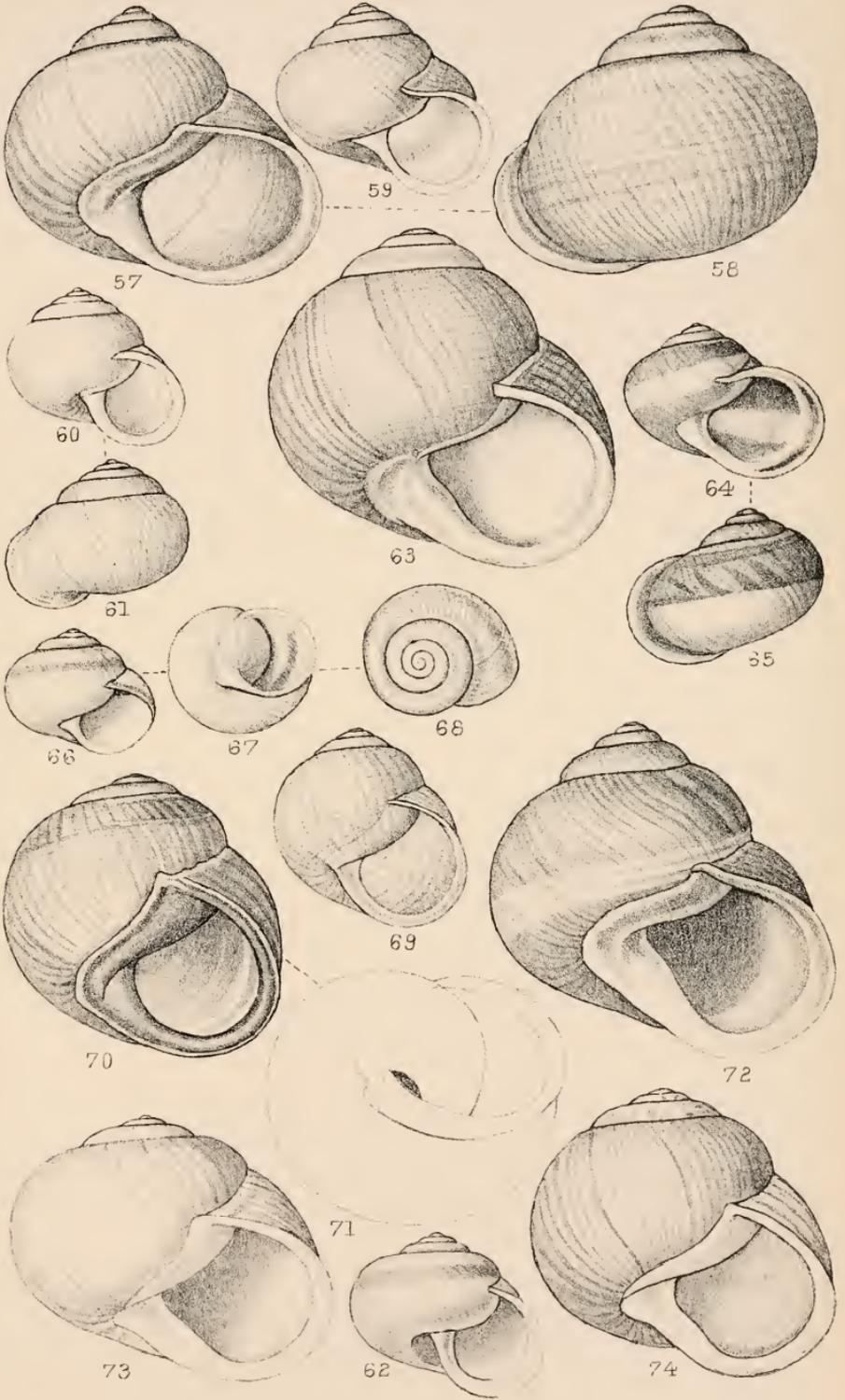


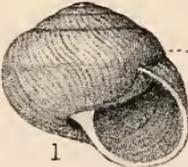
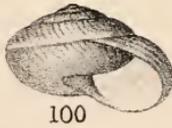
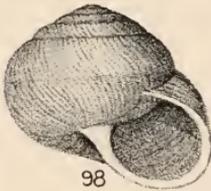
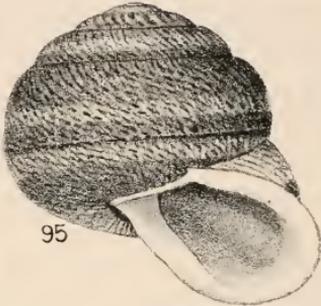
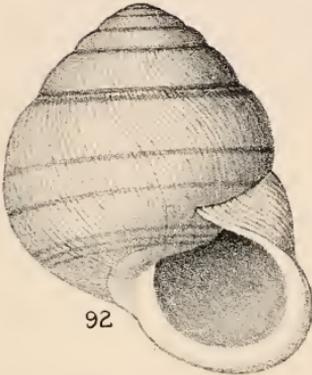
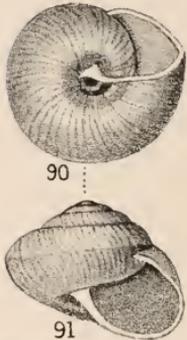
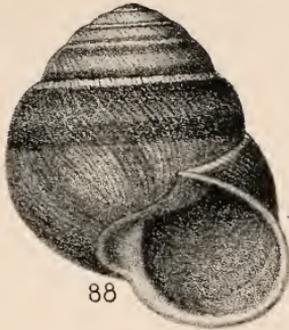
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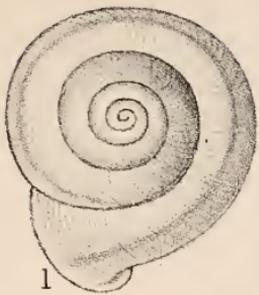


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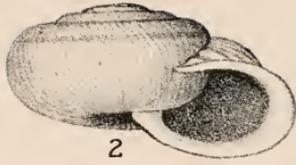




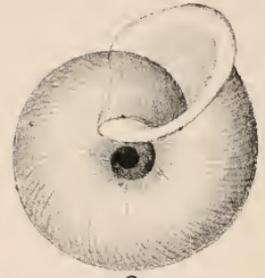




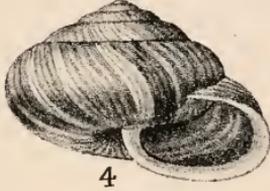
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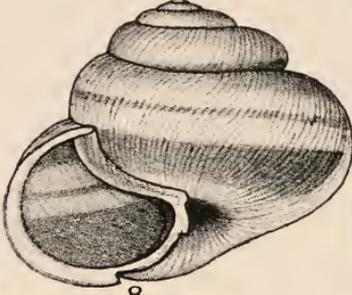
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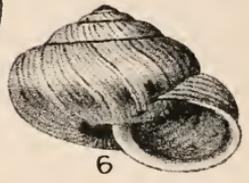
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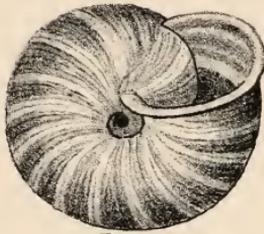
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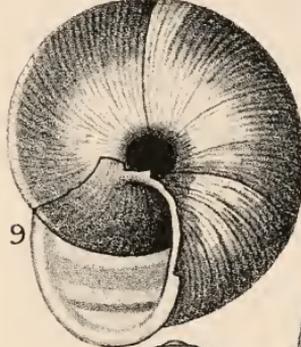
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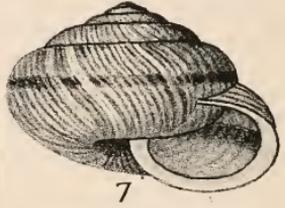
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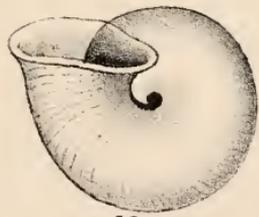
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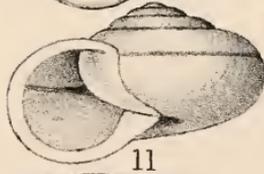
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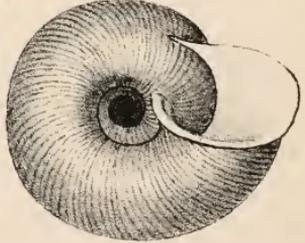
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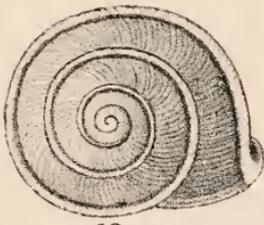
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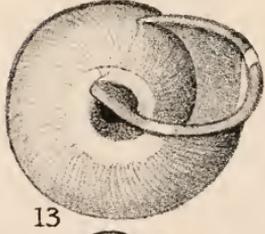
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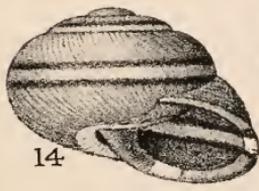
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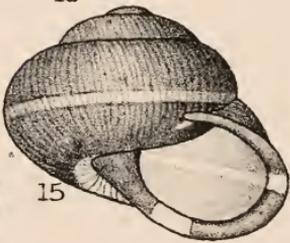
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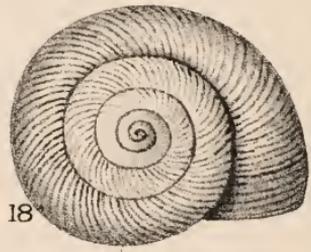
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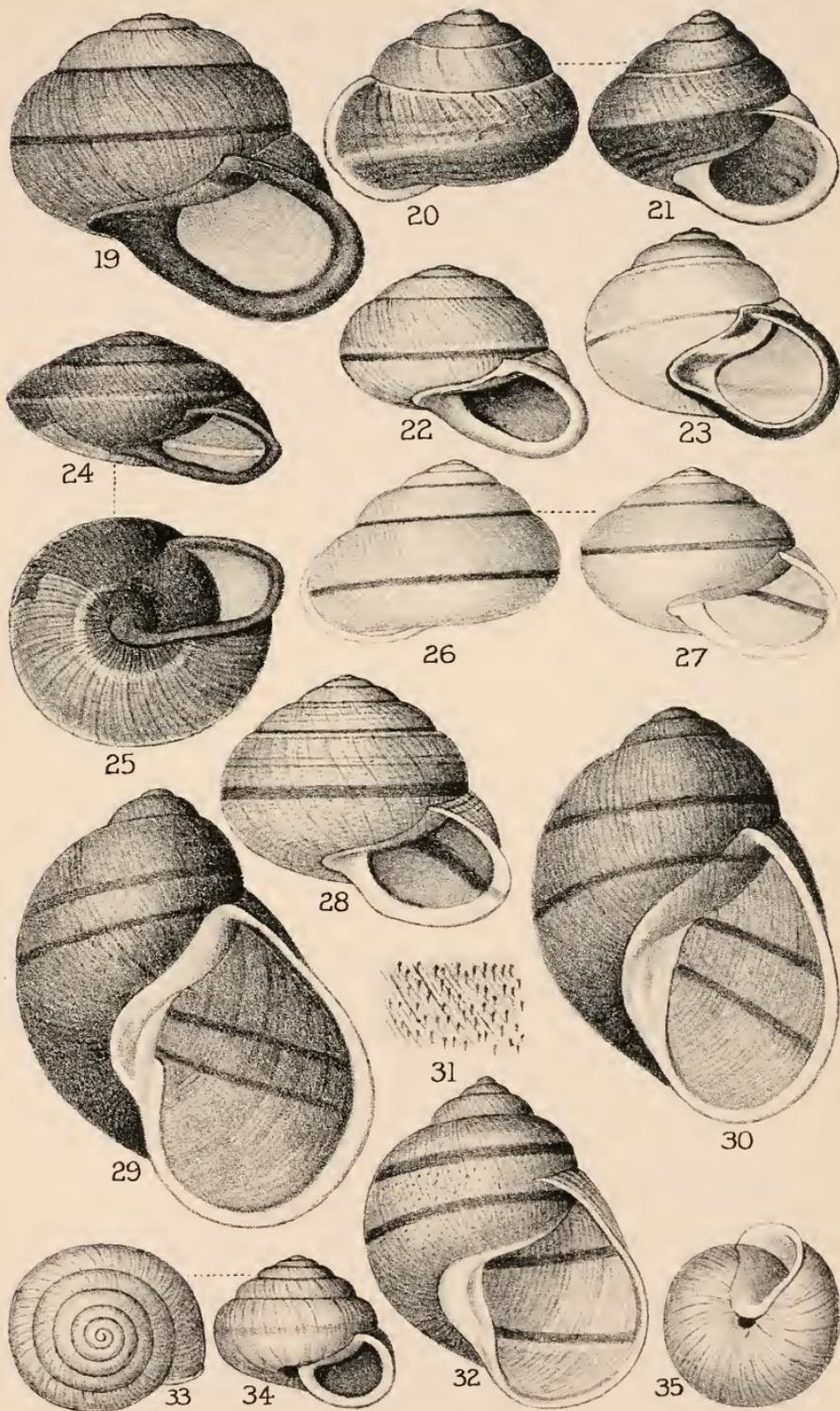
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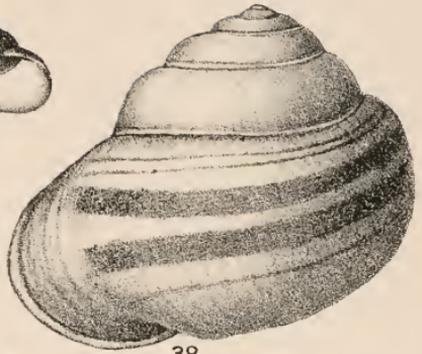




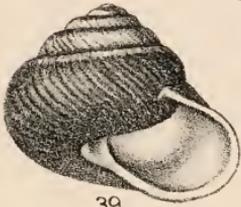
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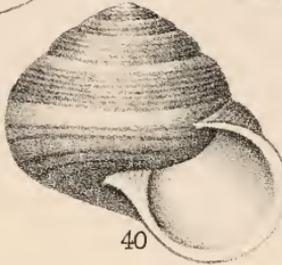
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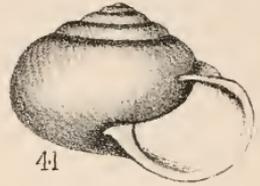
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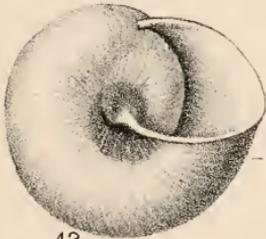
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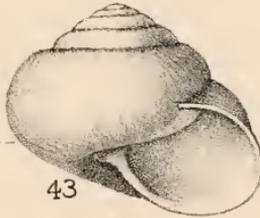
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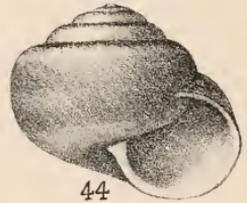
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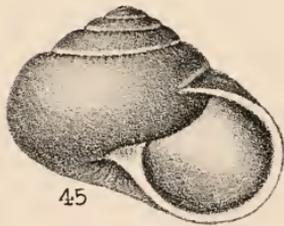
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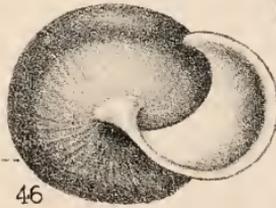
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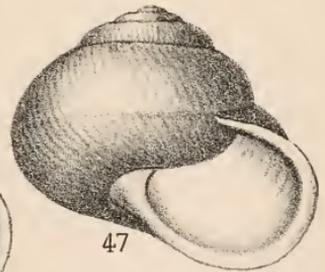
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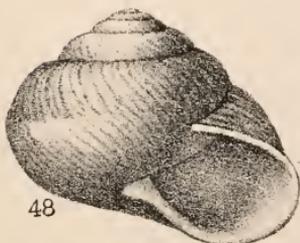
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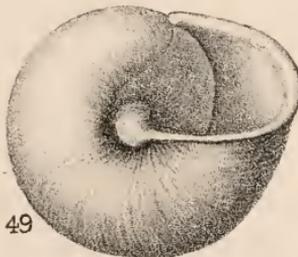
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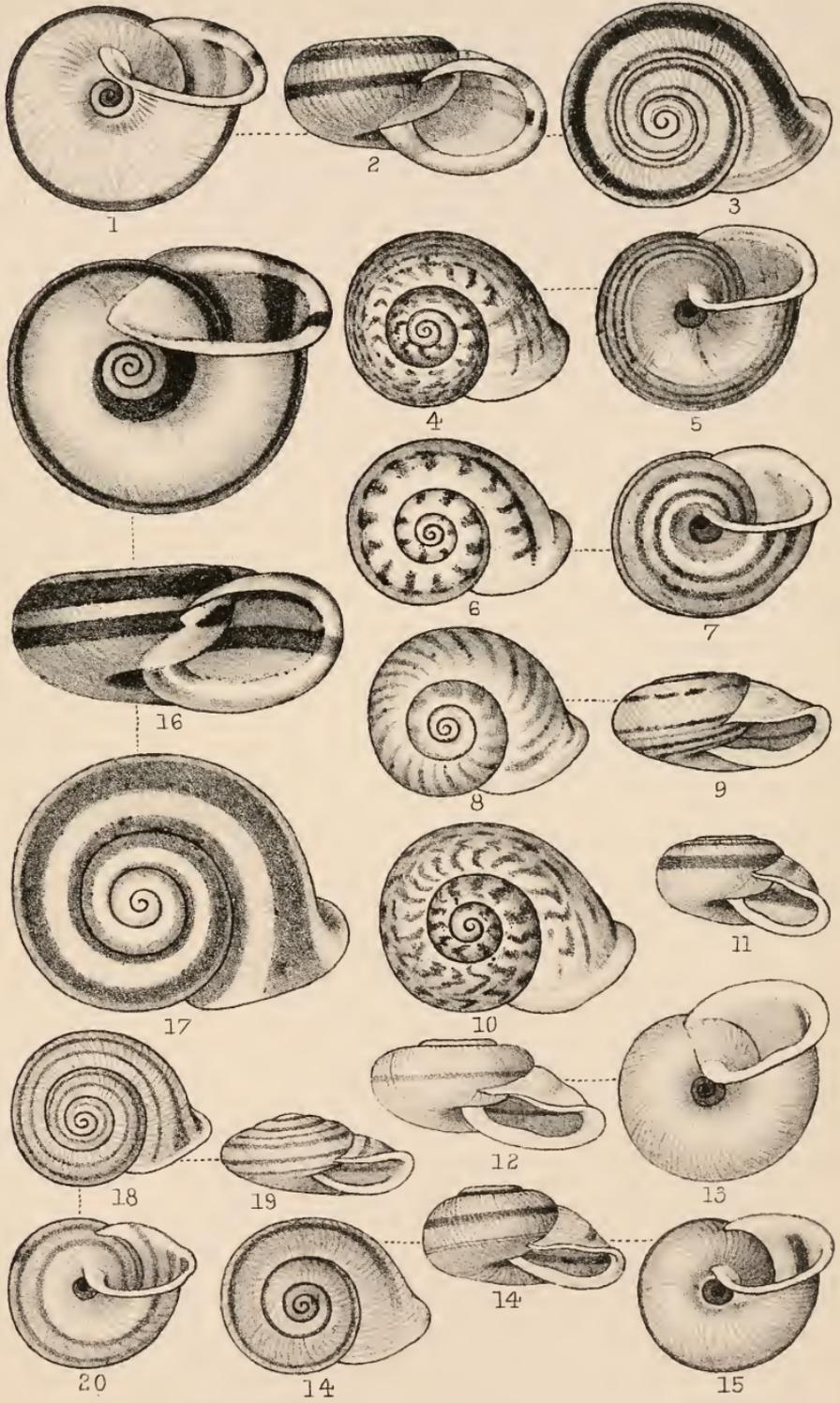
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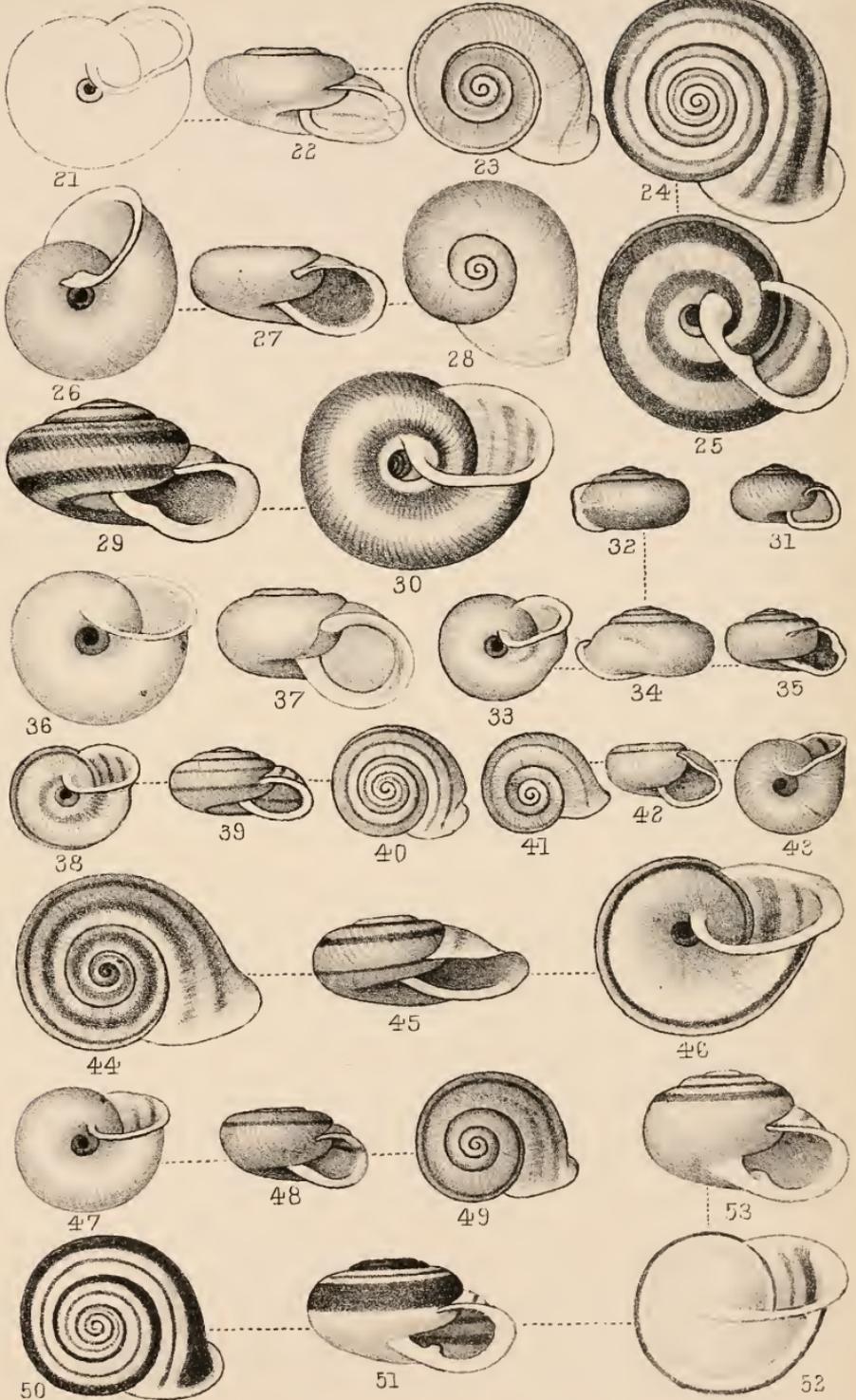


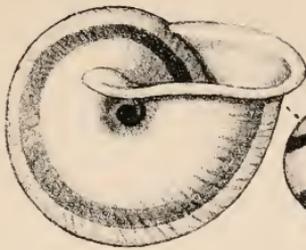
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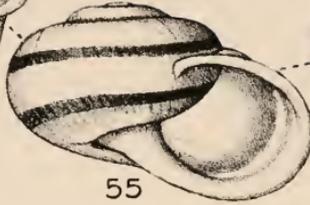
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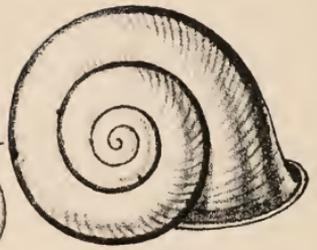




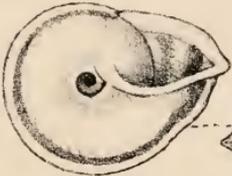
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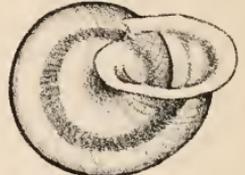
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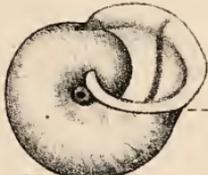
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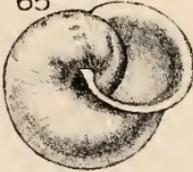
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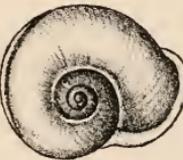
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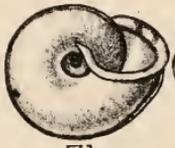
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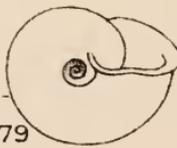
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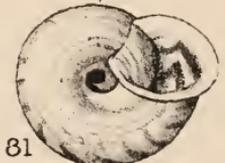
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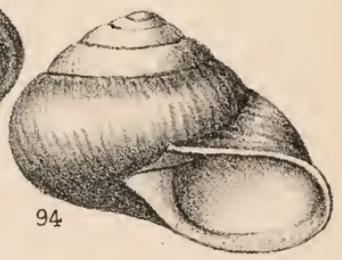
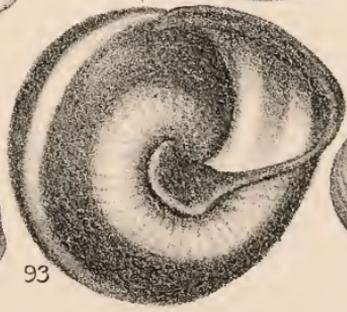
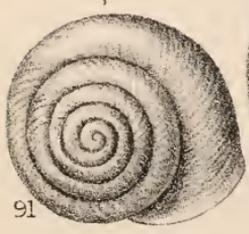
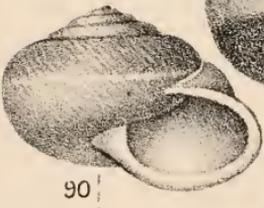
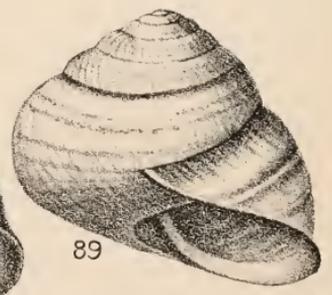
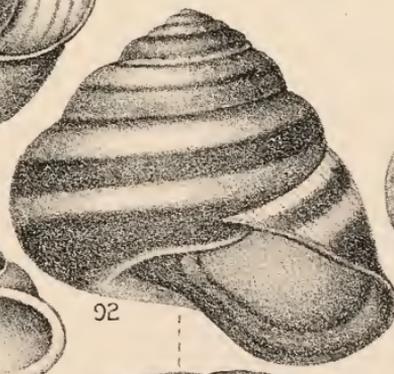
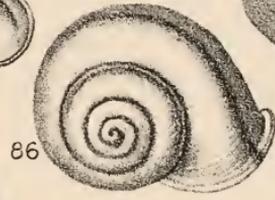
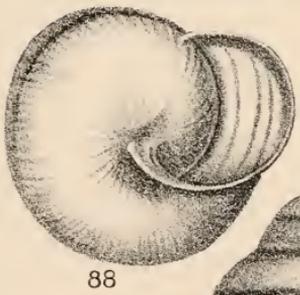
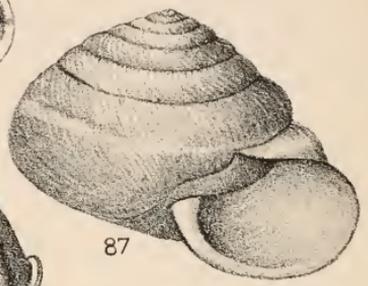
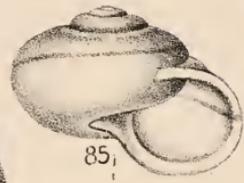
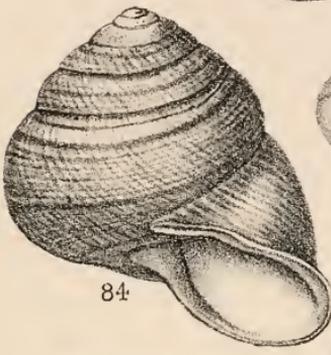
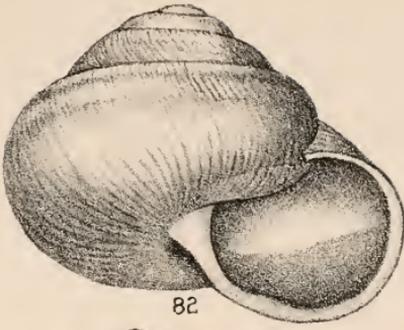
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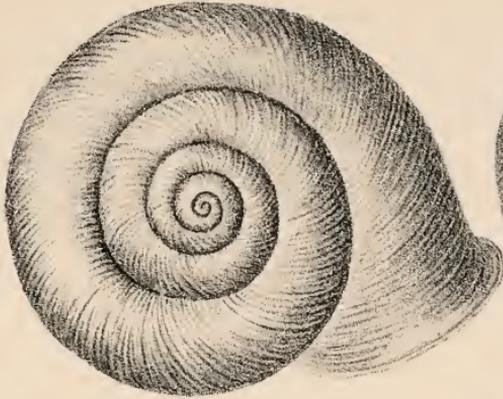


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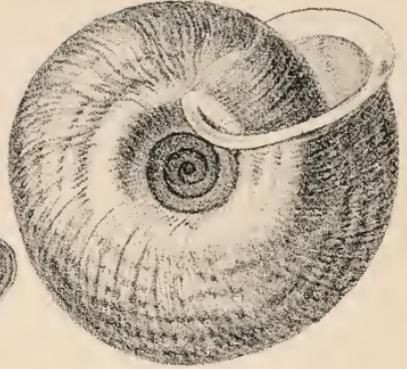


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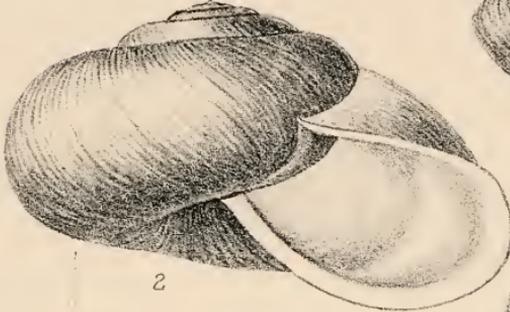




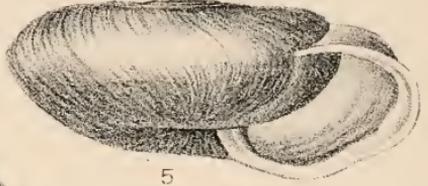
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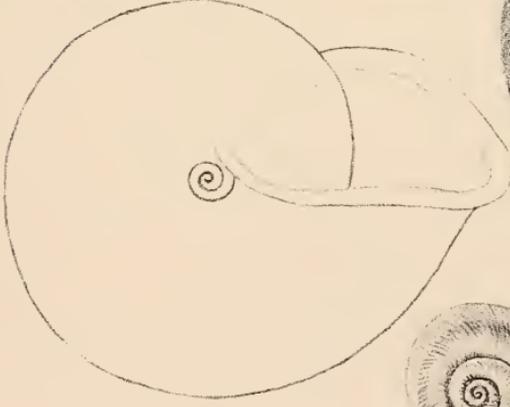
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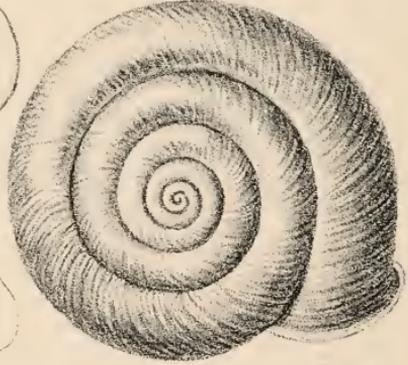
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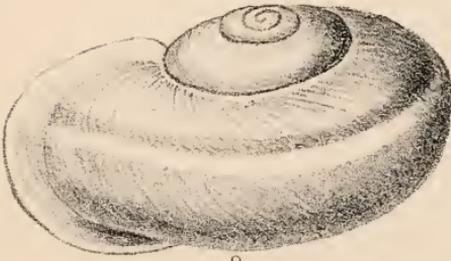
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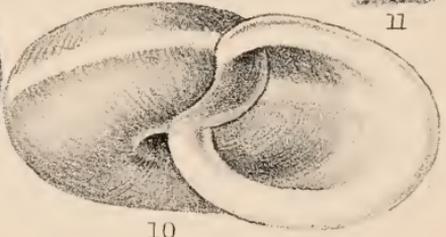
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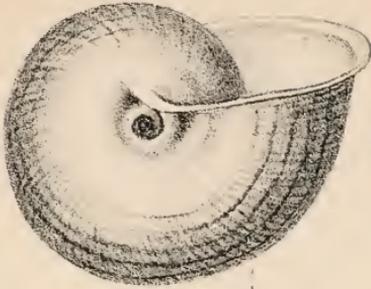
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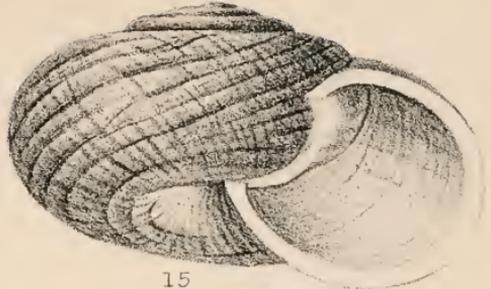
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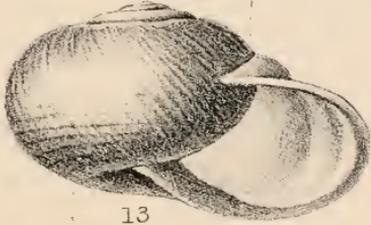
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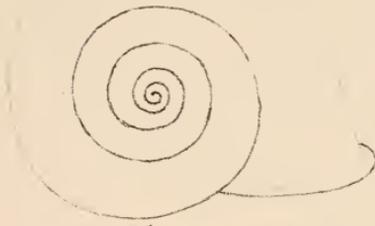
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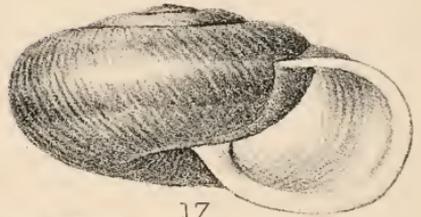
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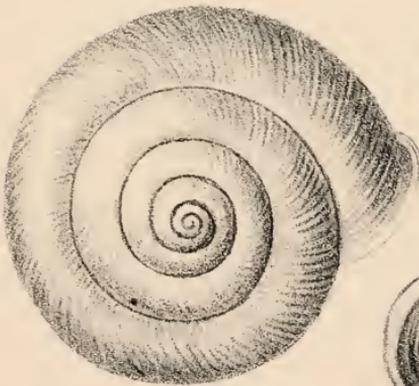
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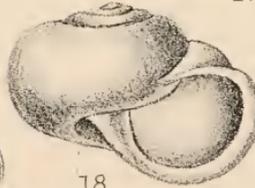
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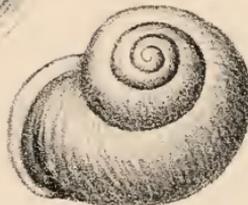
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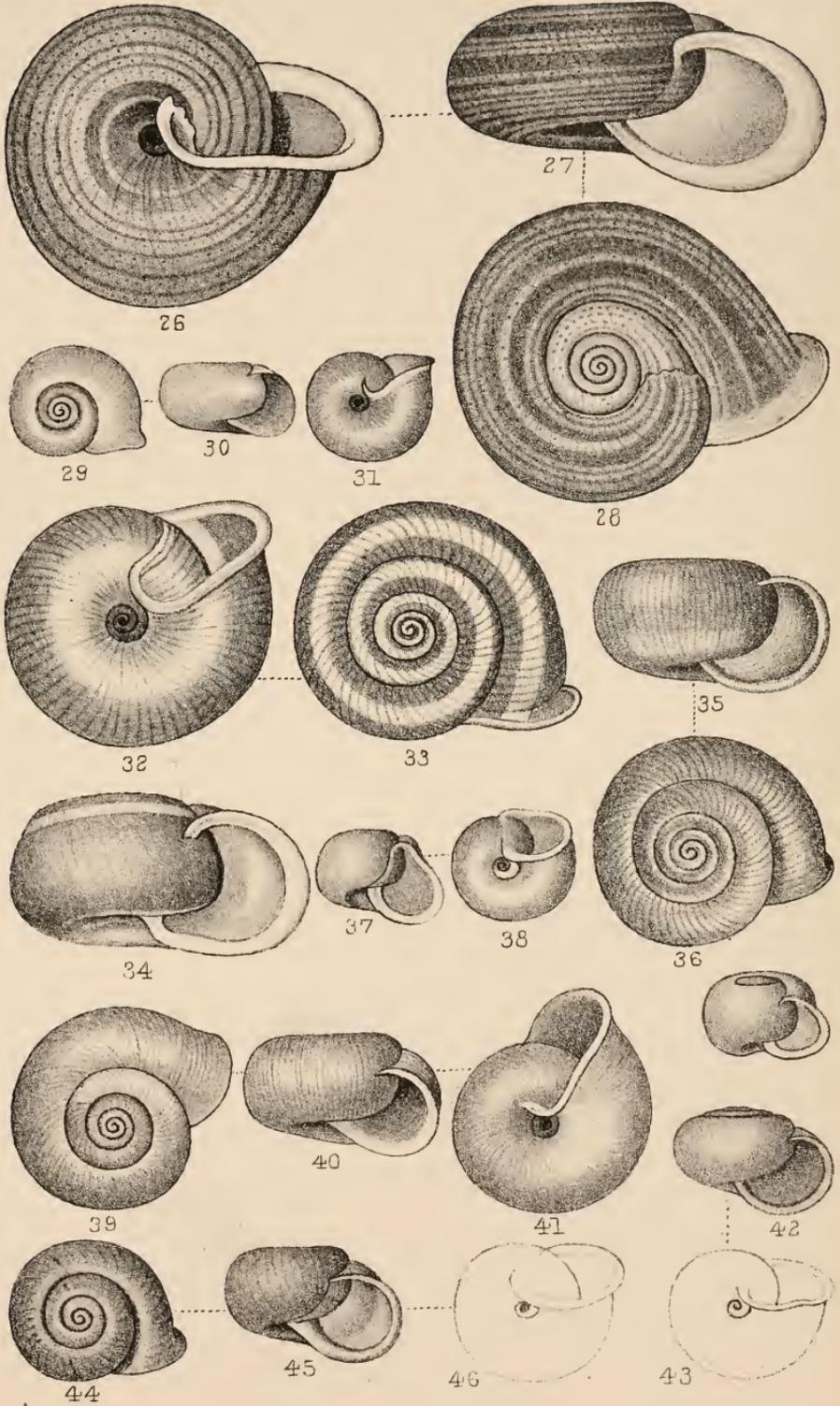
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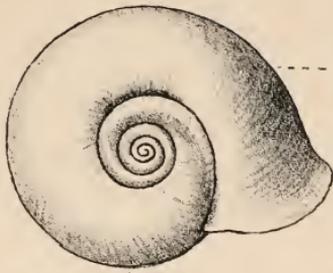


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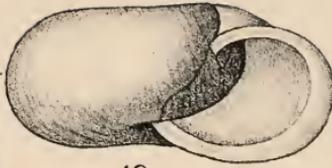


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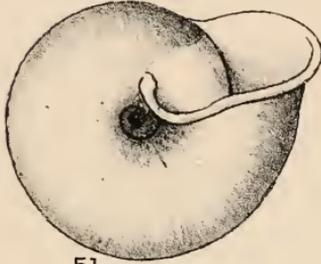
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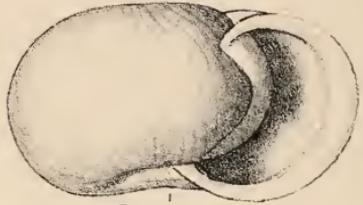
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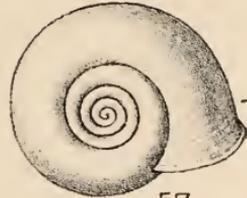
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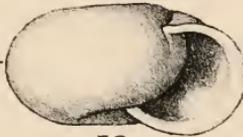
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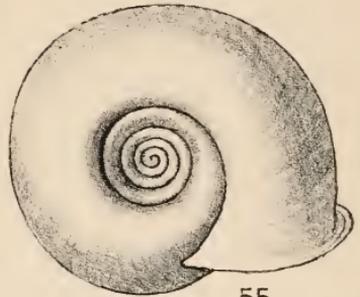
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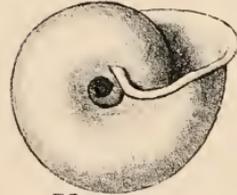
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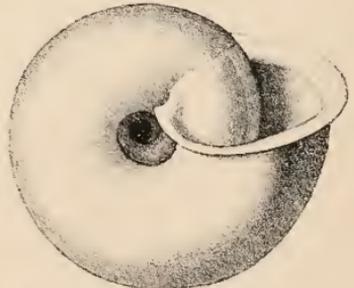
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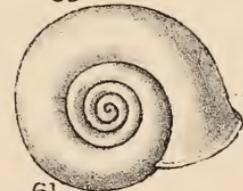
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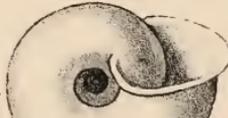
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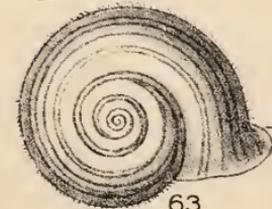
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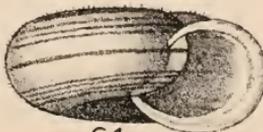
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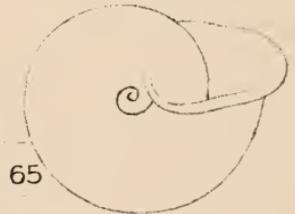
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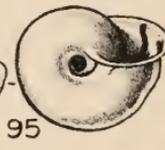
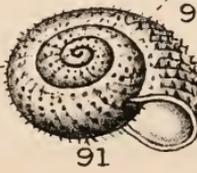
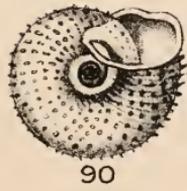
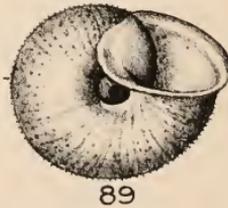
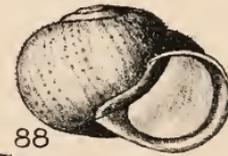
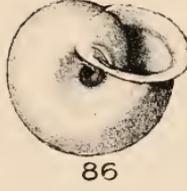
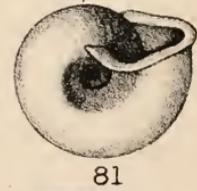
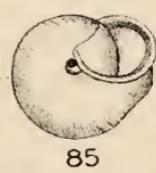
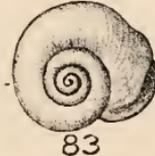
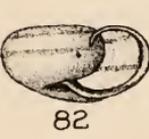
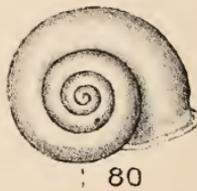
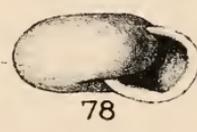
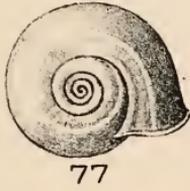
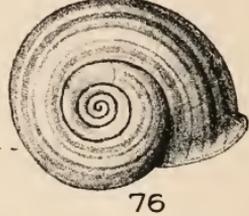
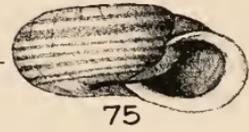
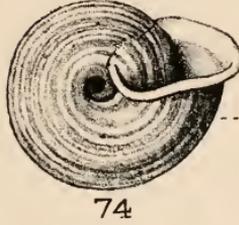
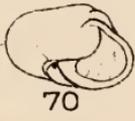
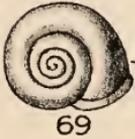
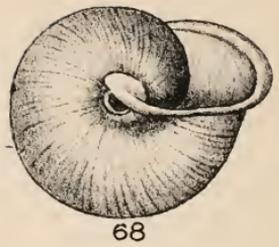
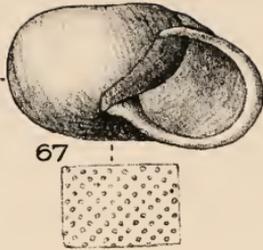
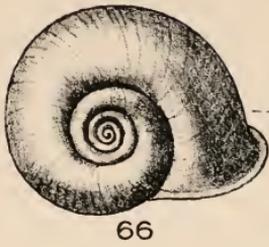
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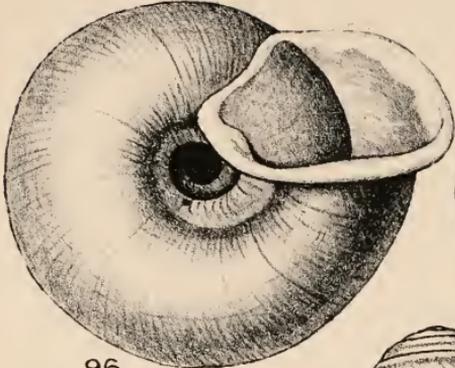


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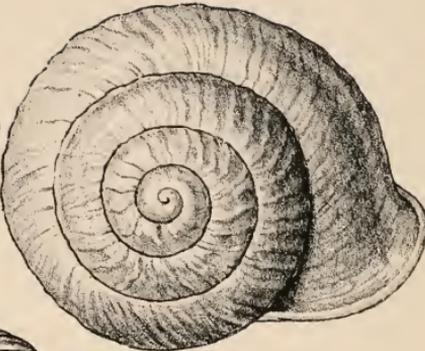


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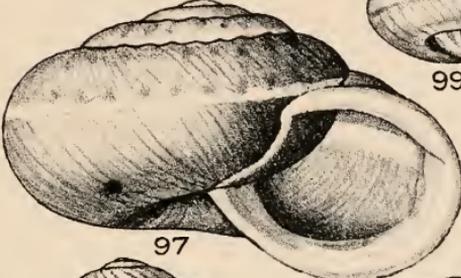




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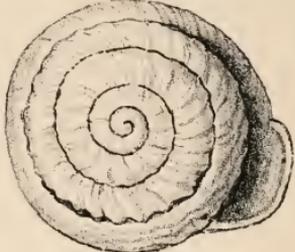
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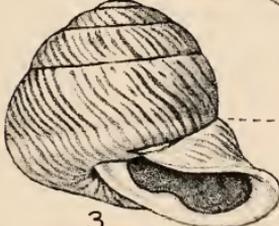
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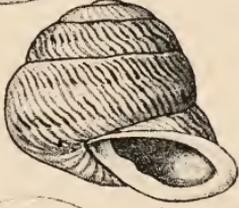
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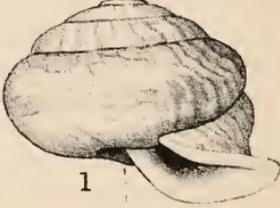
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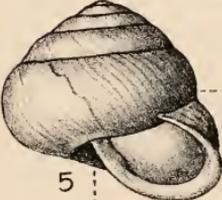
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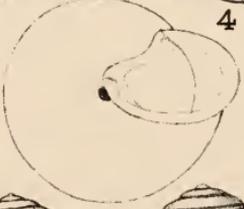
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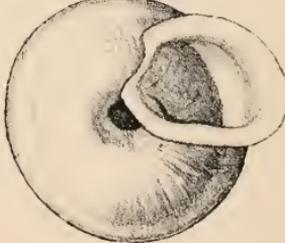
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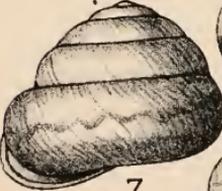
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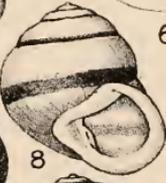
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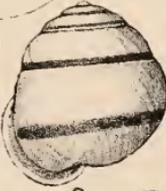
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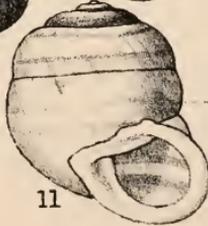
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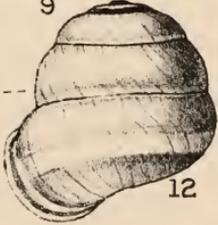
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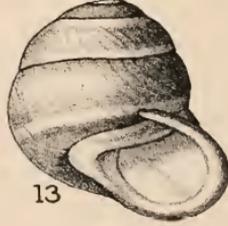
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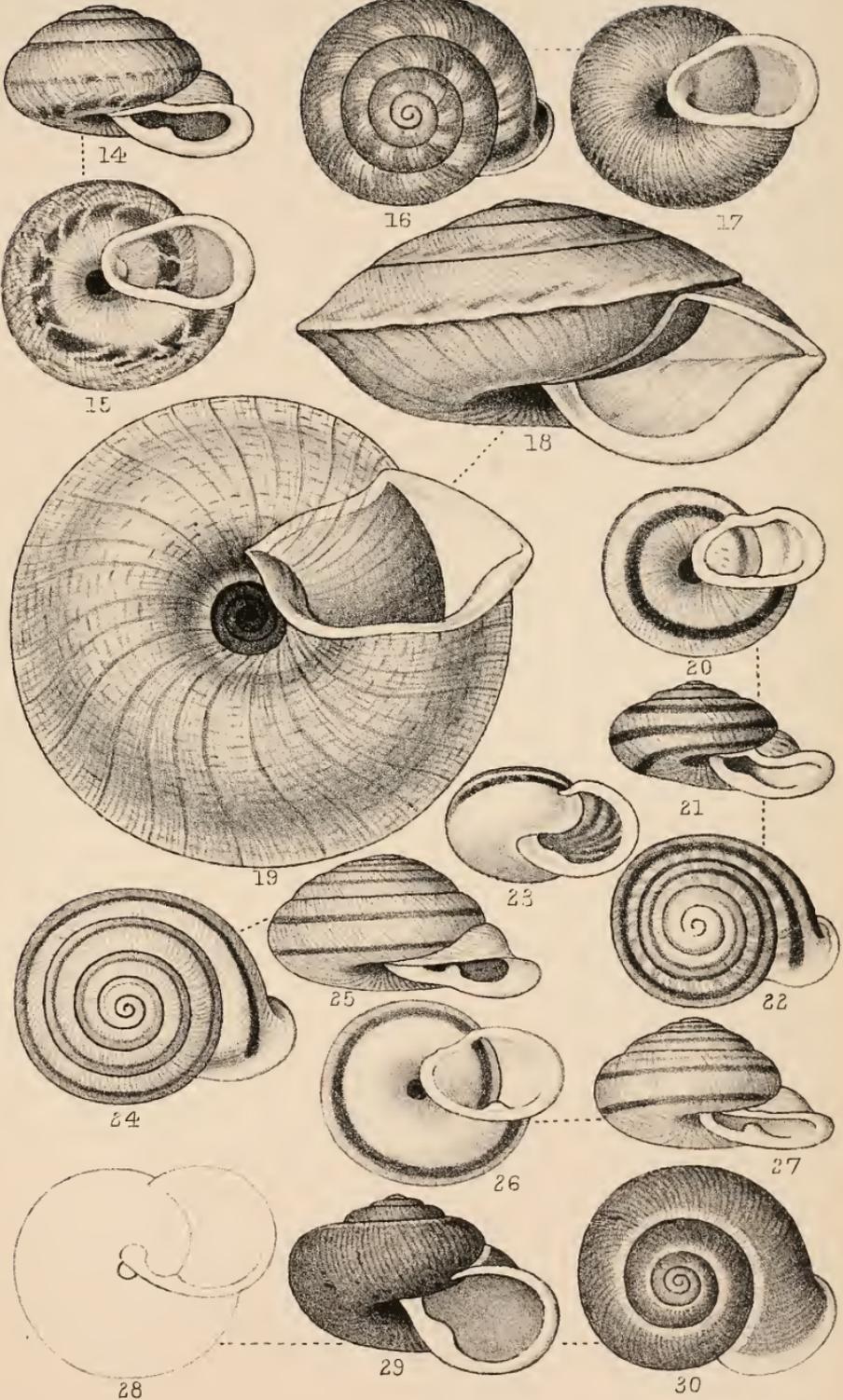
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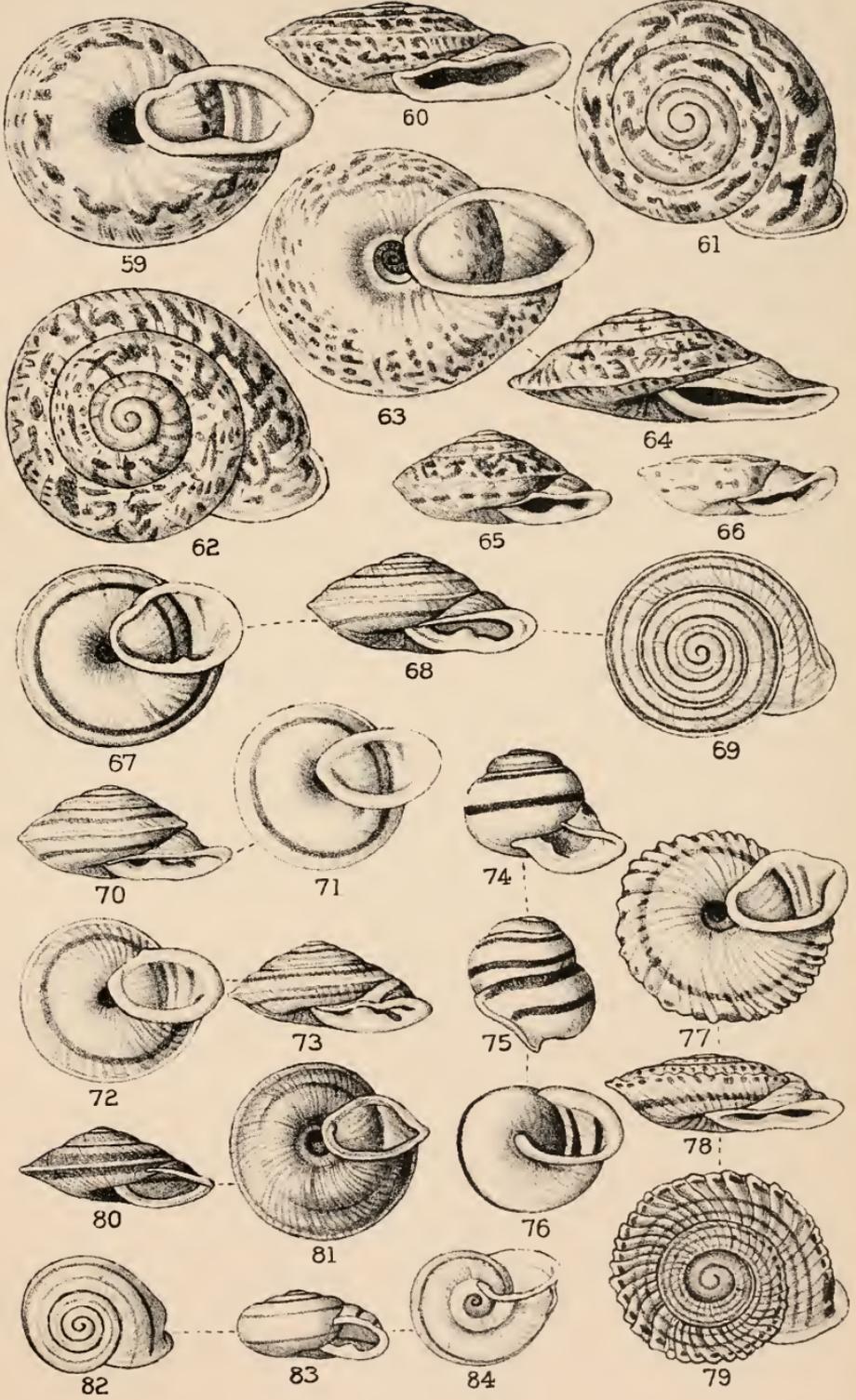
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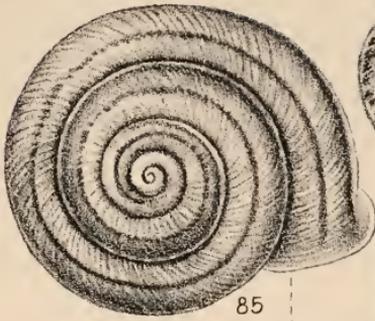


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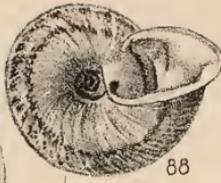








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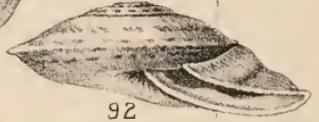
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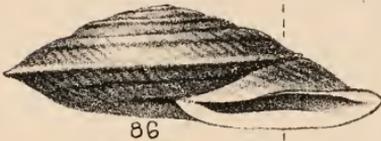
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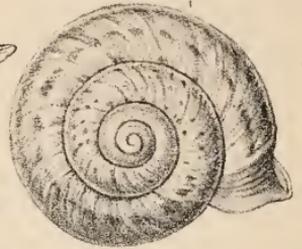
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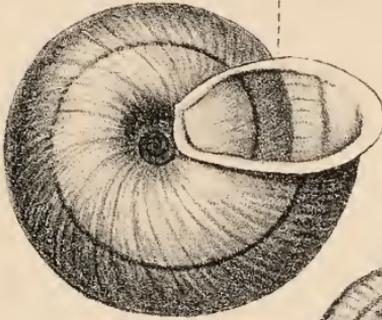
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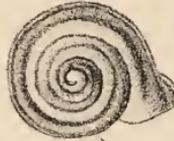
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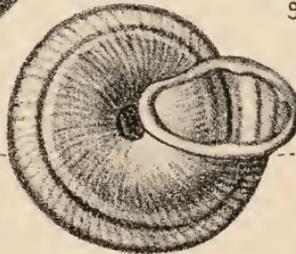
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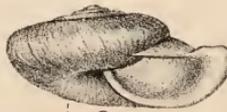
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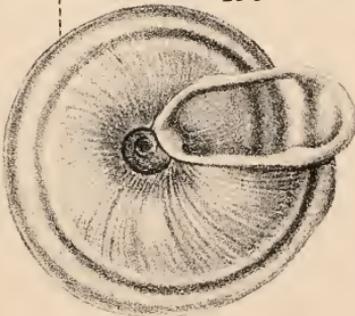
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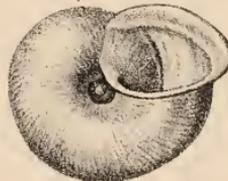
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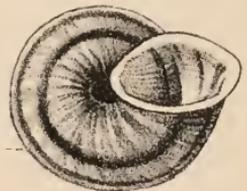
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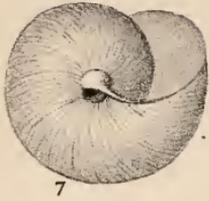
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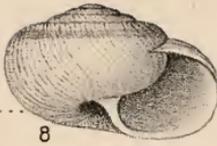
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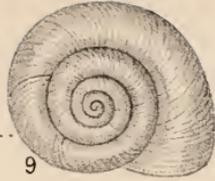
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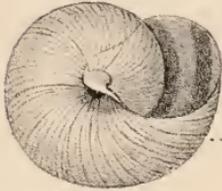
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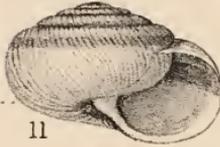
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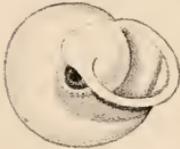
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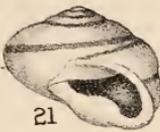
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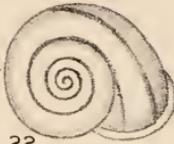
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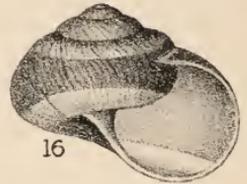
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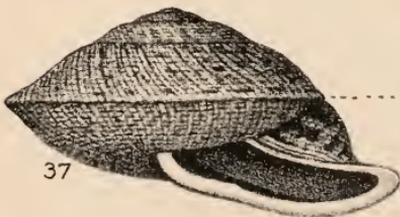
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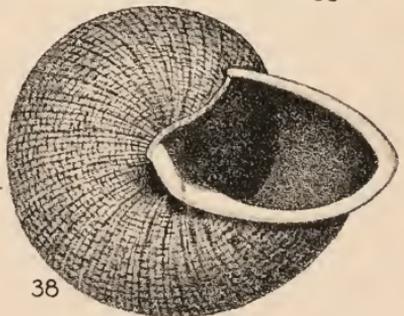
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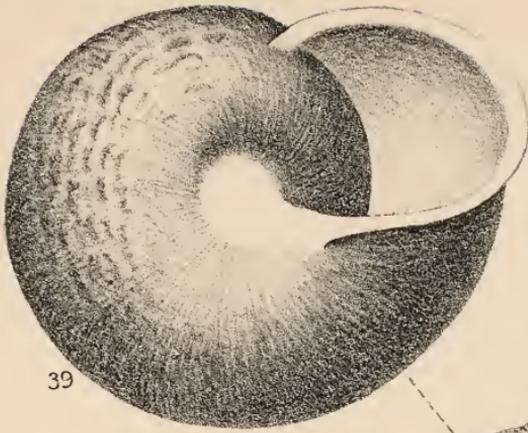
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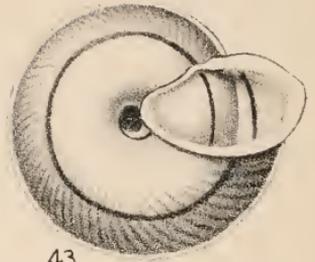
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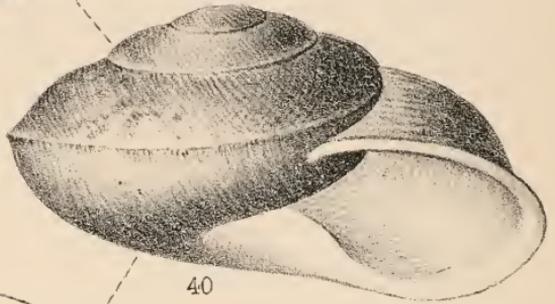
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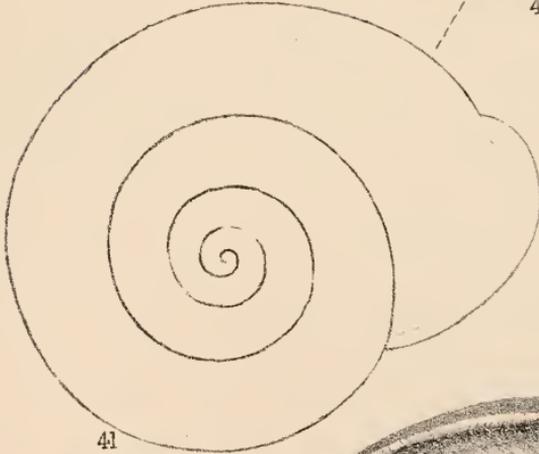
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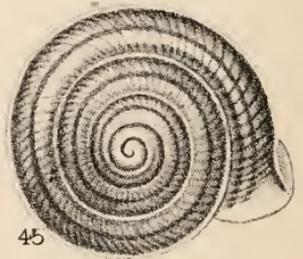
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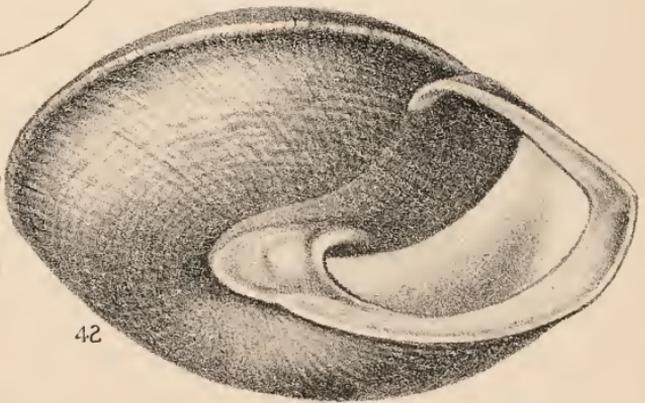
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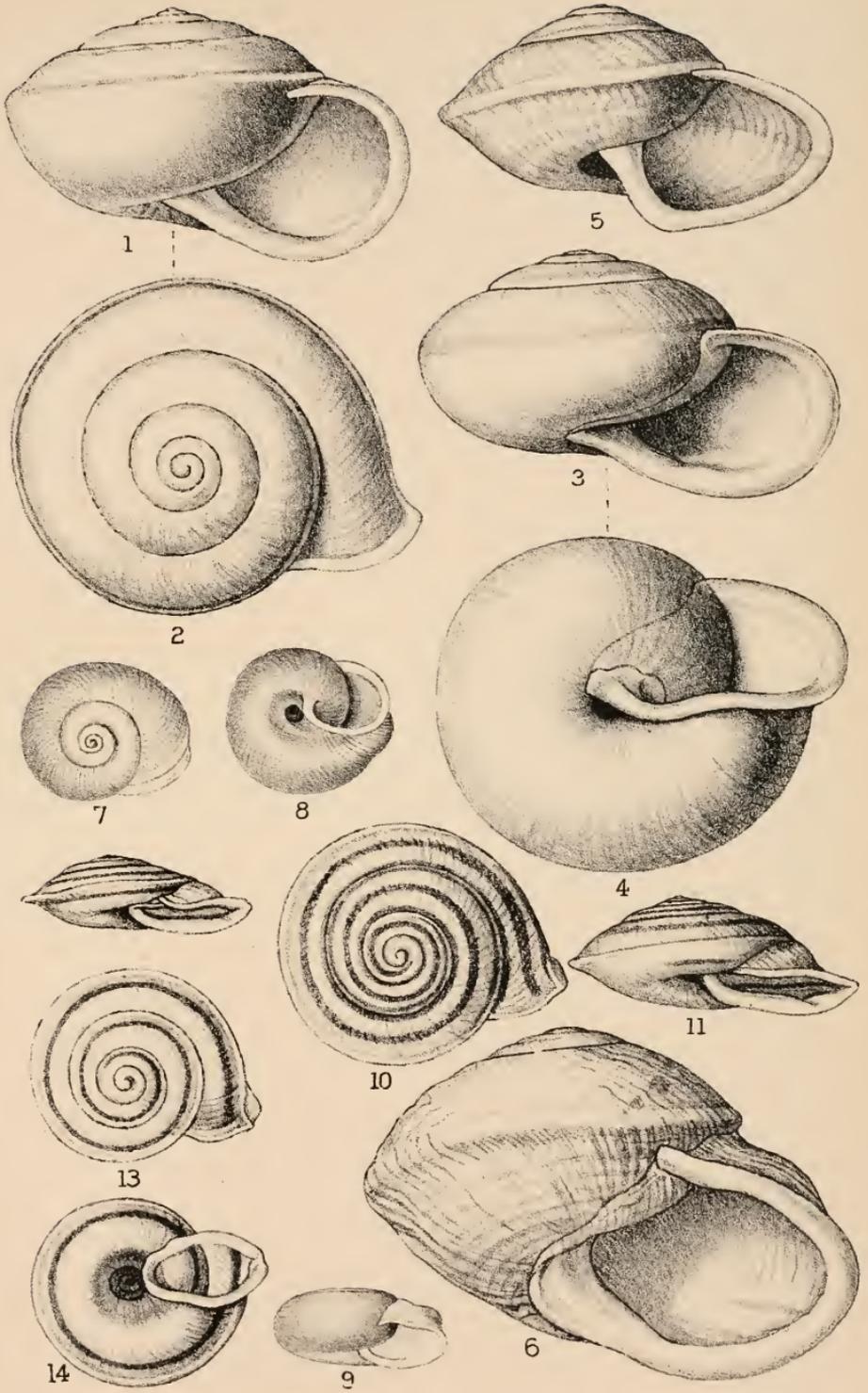
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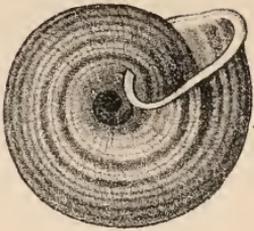


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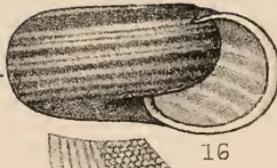


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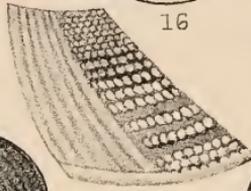
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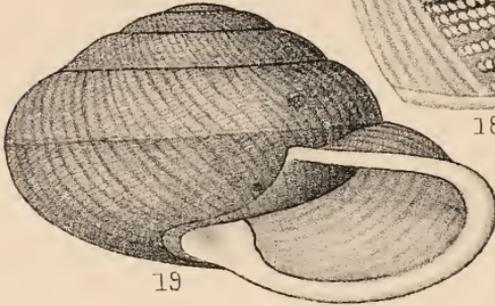
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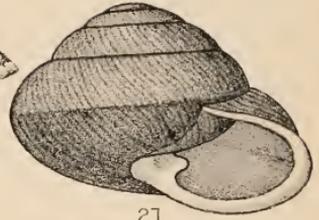
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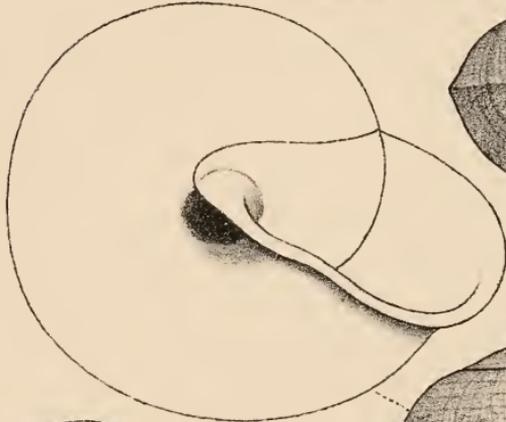
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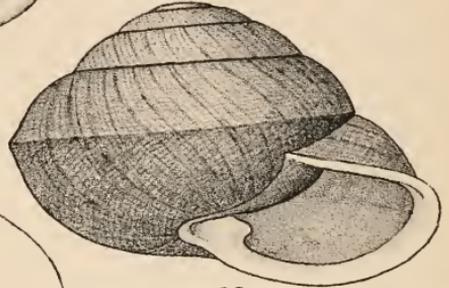
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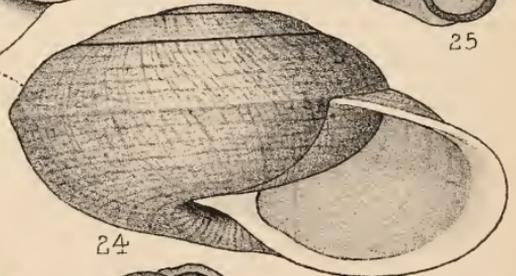
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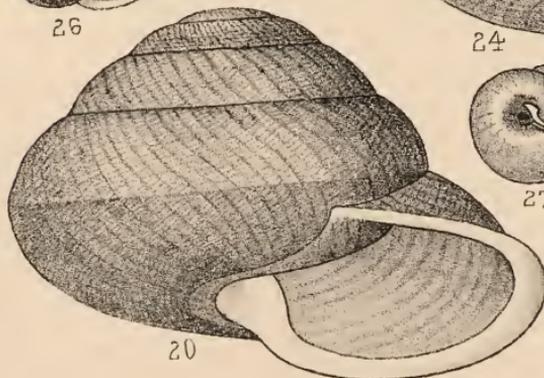
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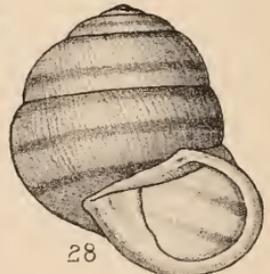
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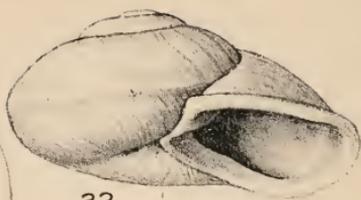
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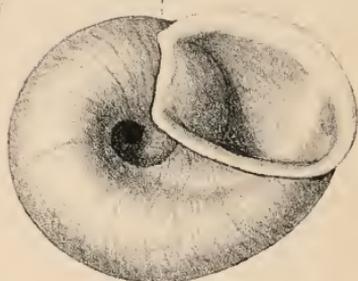
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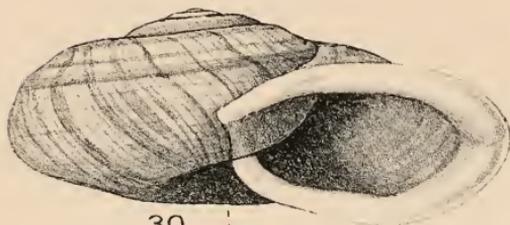
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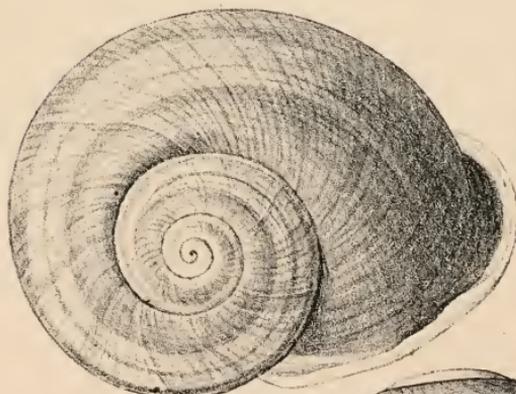
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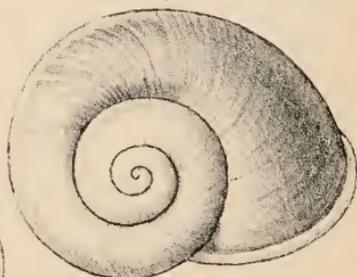
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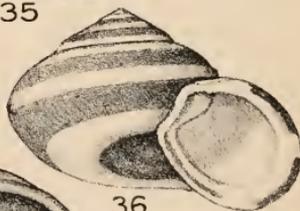
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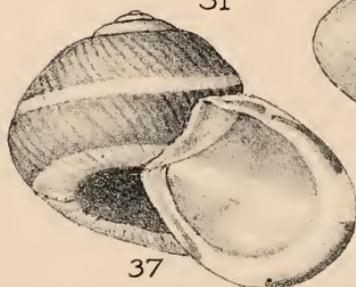
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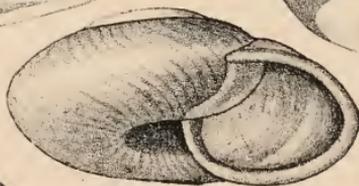
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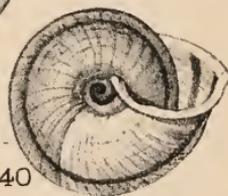
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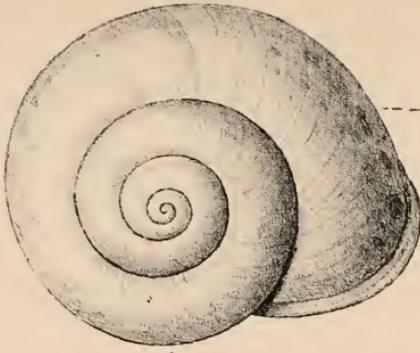
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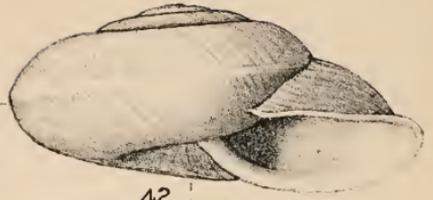
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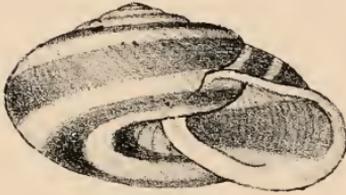
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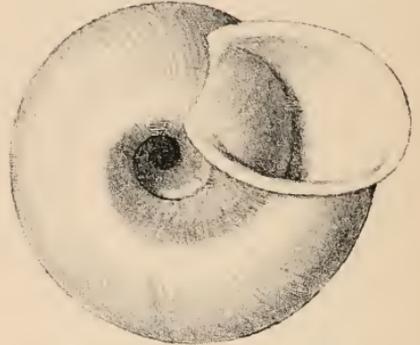
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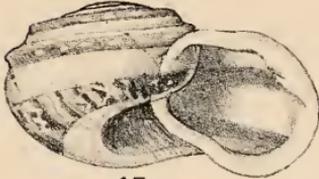
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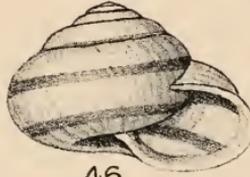
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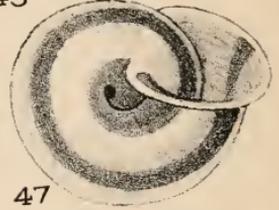
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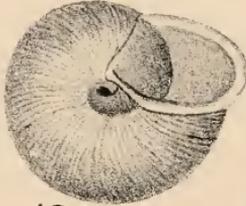
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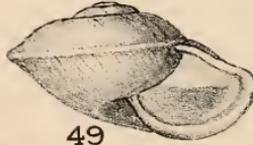
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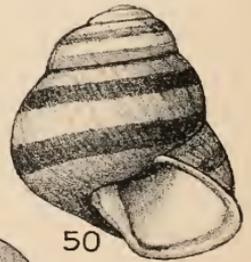
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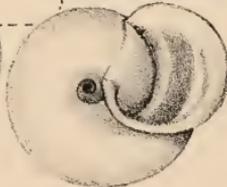
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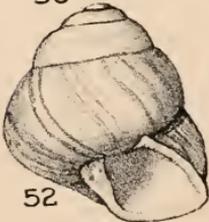
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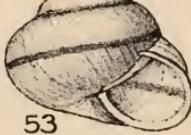
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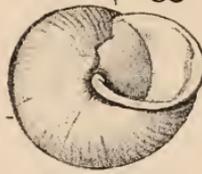
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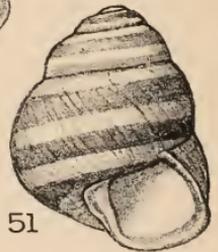
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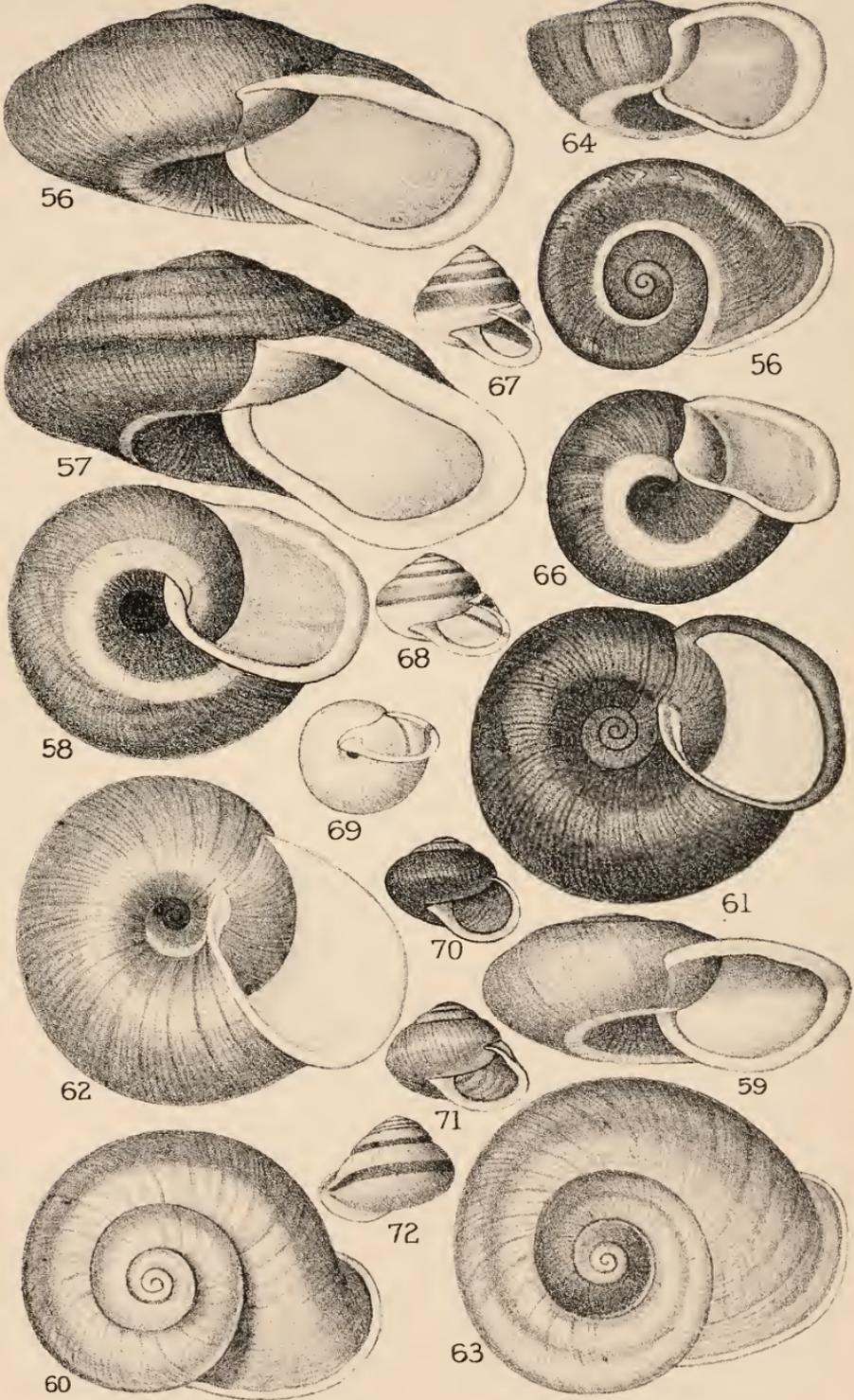
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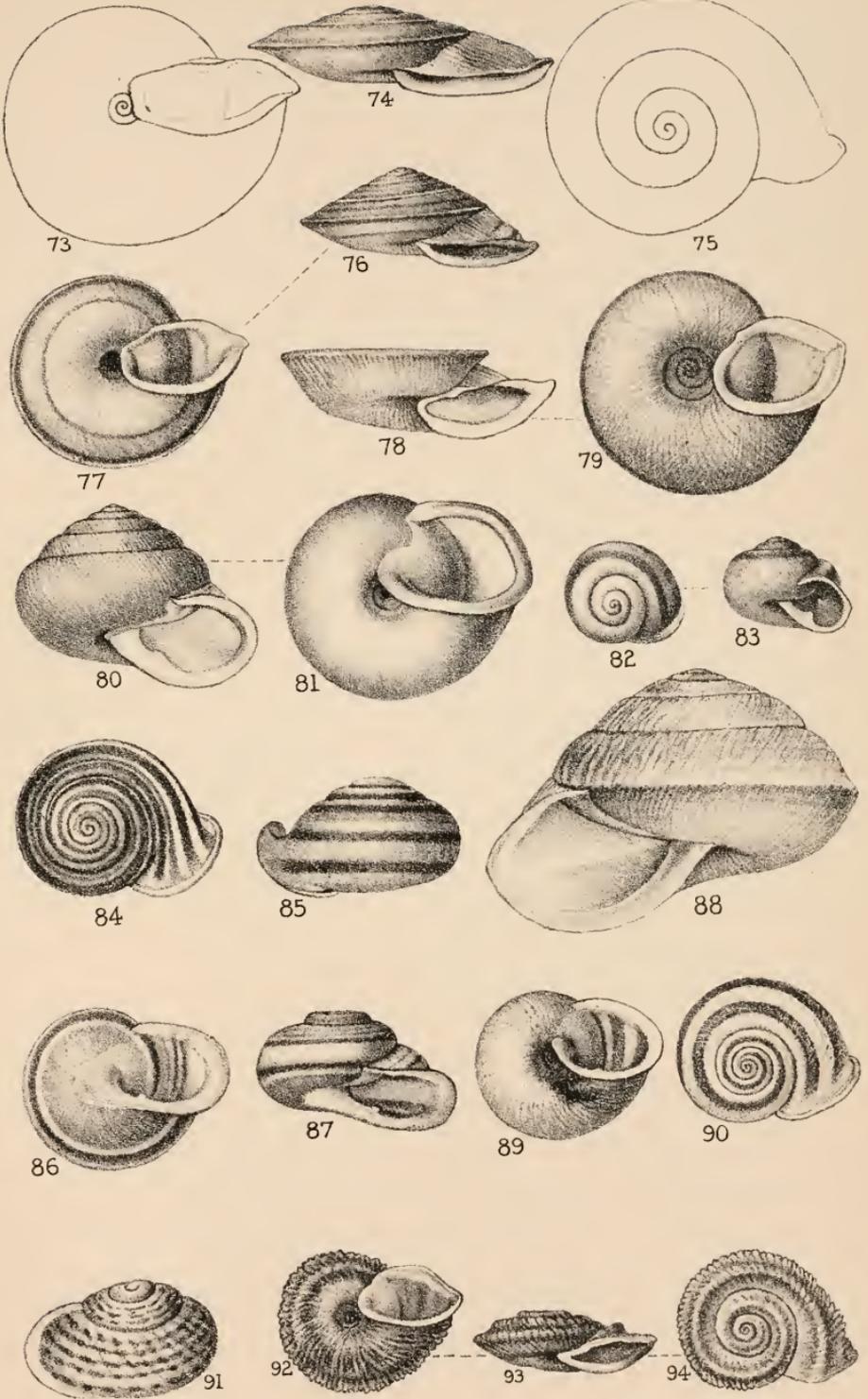


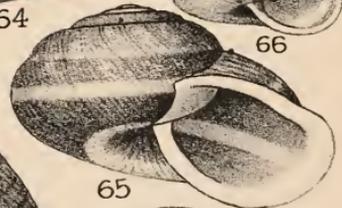
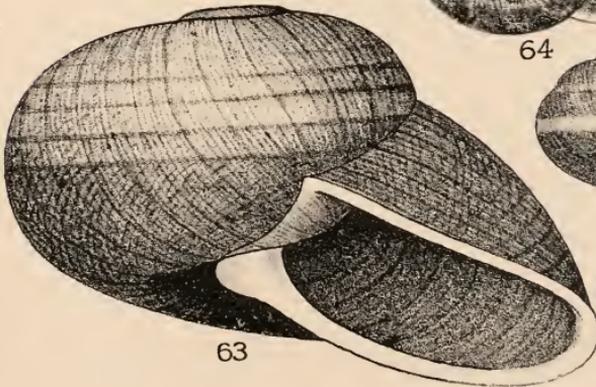
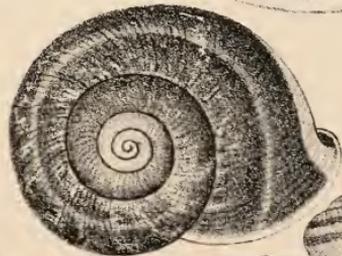
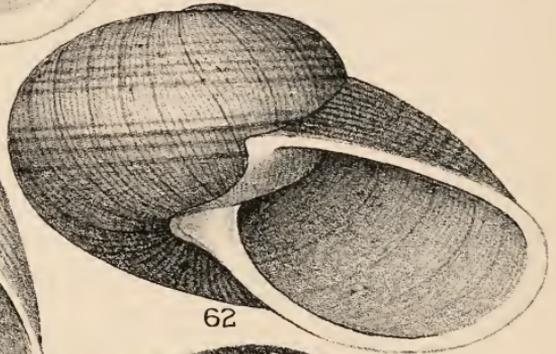
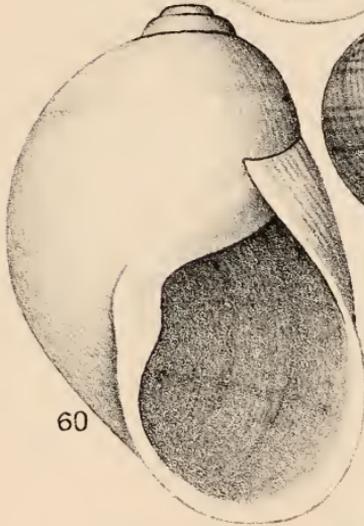
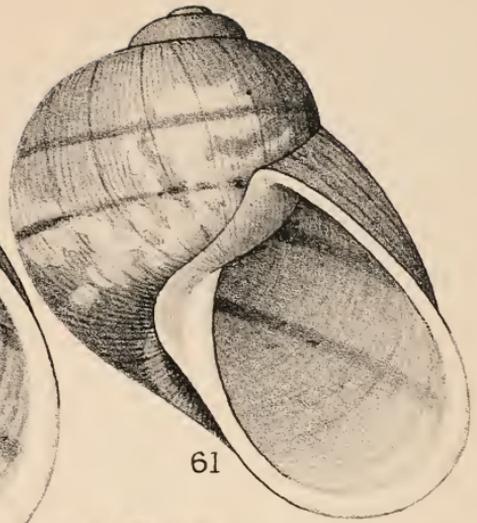
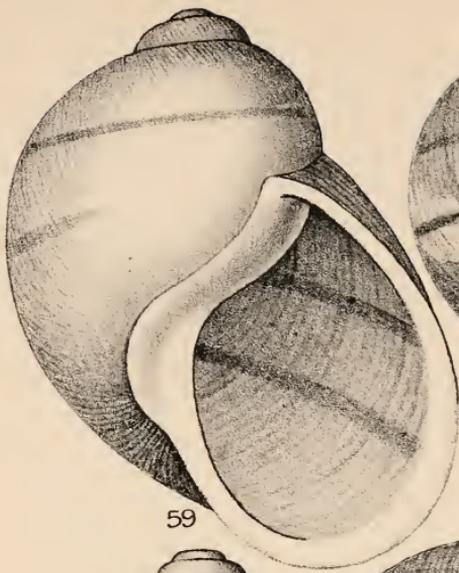
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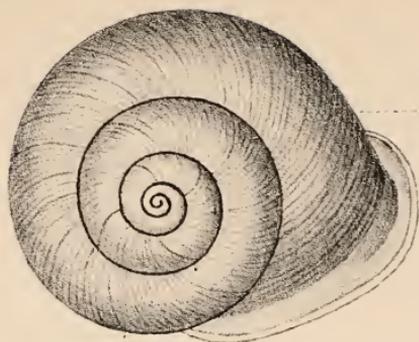


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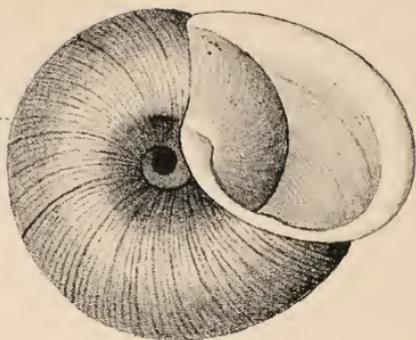




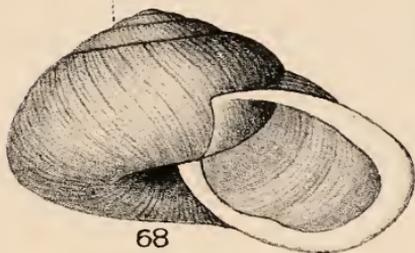




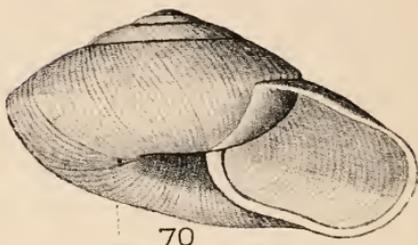
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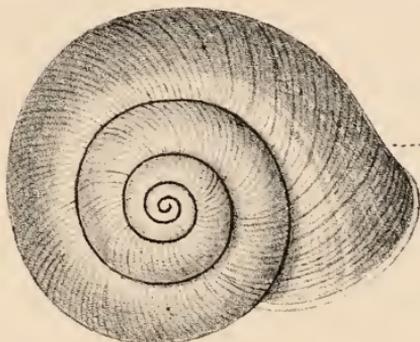
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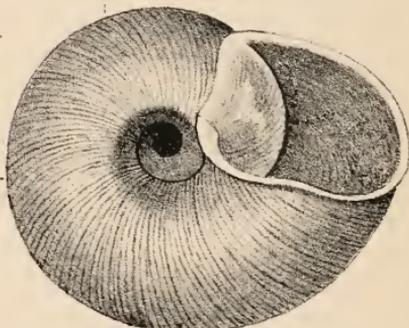
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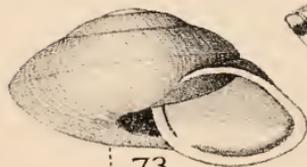
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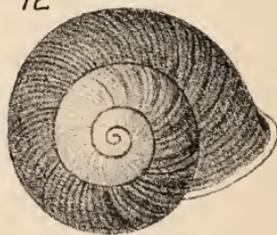
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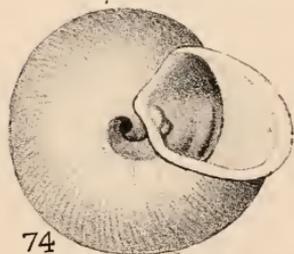
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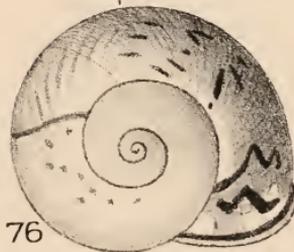
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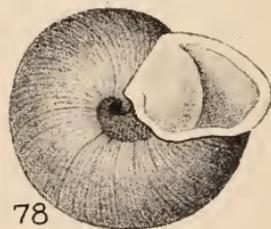
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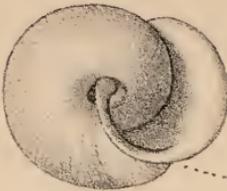
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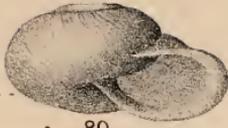
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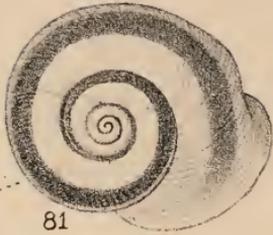
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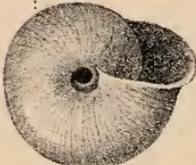
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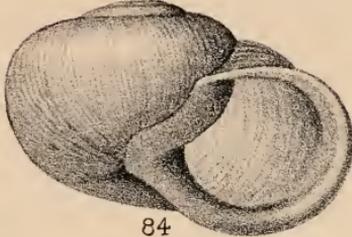
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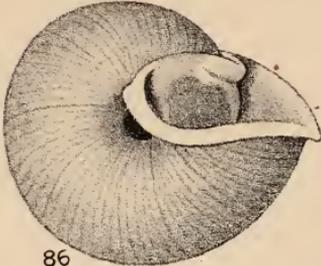
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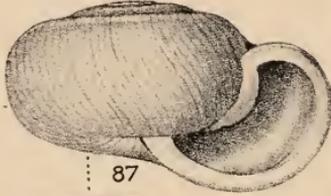
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86



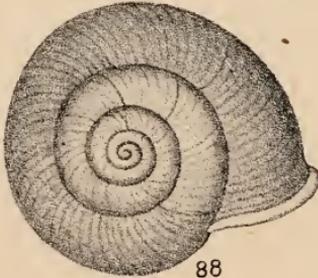
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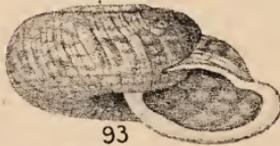
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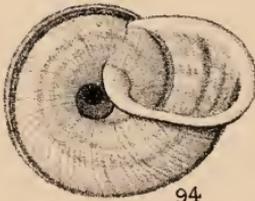
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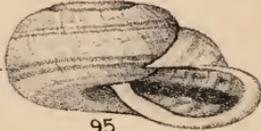
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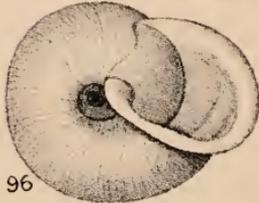
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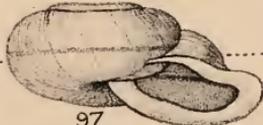
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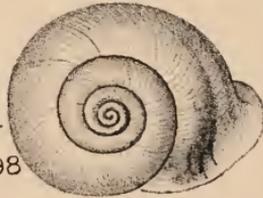
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96



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91



