THE LAND AND FRESH-WATER MOLLUSKS OF THE STANFORD EXPEDITION TO BRAZIL.

BY FRED BAKER, M.D.

It was my good fortune to accompany the Stanford Expedition to Brazil, Dr. J. C. Branner, Director, in the summer of 1911, and I have been requested by Dr. Branner to report on the land and fresh-water mollusks. For apparently good reasons, the report on the marine mollusks will occupy a later paper.

Mollusks were taken at nearly all points visited by the members of the Expedition, and a large number were sent to me after my return to the United States by the Goeldi Museum of the city of Pará, through the kindness of the Acting Director, Dr. Emilia Snethlage, and from the Museu Rocha in the city of Ceará, through the kindness of Mr. Francisco Dias da Rocha, who owns this museum and who deserves great credit for his scientific spirit and untiring work in bringing together this very valuable collection. I beg to acknowledge this great courtesy, as well as the assistance rendered to me personally and to the other members of the Expedition during our stay in Pará and Ceará by these well-known Brazilian naturalists.

After about four months spent in northeastern Brazil, six members of the Expedition returned to the United States, leaving Mr. W. M. Mann and the writer. We made the trip up the Amazon and Rio Negro to Manáos. There we met Mr. R. H. May, of the contracting firm of May, Jekyll & Randolph, who were then completing the Madeira-Mamoré R. R. around the falls of the Madeira and Mamoré Rivers, to give access to the rich rubber country on the navigable waters of the tributaries of the Madeira River system and to furnish a feasible route into Bolivia from the north. On his invitation, we went aboard one of their steamers down to Itacoatiara, below the mouth of the Madeira River, thence up the Madeira to Porto Velho, the starting point of the railroad. At this point we were tendered all the facilities of the road and we were the guests of the contractors for about two months, travelling over the whole line to the Guajara-Assú Falls, the upper falls of the Mamoré River, just above which point navigable water is reached and the terminus of the road is to be located. On this portion of the trip we crossed

the river into Bolivia on three occasions. I wish here to extend my most sincere thanks to Messrs. May, Jekyll & Randolph for their courtesy, which made the work done on this part of the trip possible, and to the many employés of the Madeira-Mamoré Co. who rendered us assistance and personal courtesies in very large measure during this most delightful journey.

By a curious difference in the time of the dry season of the different districts visited, all the work of the Expedition was done during the dry season in each district, except that the rainy season was just beginning as we left the Madeira River and during our last short stay in Pará. Everywhere we found shells æstivating, and it is probable that this accounts for the somewhat limited list of species actually taken by the members of the Expedition and for the large number of dead shells which made up much of the collection.

The ground covered by the Expedition and by the locations from which the mollusks here reviewed were taken can be divided easily and naturally into two distinct districts, the second of which, on account of the great extent of the country included and because a distance of nearly five hundred miles intervenes between the two nearest locations, can be again divided conveniently into two districts. The first, northeastern Brazil, includes about all of the States of Rio Grande do Norte and Ceará; it is scantily timbered as a rule, dry, with an average rainfall of from ten to twenty inches, and a climate not unlike that of Southern California, Arizona, and New Mexico. The coast region is generally low, with a few low ranges of mountains, the interior higher. In this district are included Natal, Pirangý, Paparý, Estremoz, Ceará-Mirim, Taipú, Baixa Verde, Limoeira, and the Mossoró region, Ceará, Maranguape Mountain, Mongúba, Buturité, Quixadá, and Camocim.

The other main district, with Maranhão on the outskirts, includes all other locations mentioned in this paper, beginning with Pará and ascending the Amazon and its tributaries, the Tocantins, Jarý, Jamauchim, Maccurú, Tapajoz, Madeira, Mamoré, and various other small streams. This district is an immense, low, alluvial plain, almost universally heavily timbered, in most of which there is a long rainy season, the annual rainfall averaging up towards a hundred inches in many years, filling many streams more than bank full and producing great sloughs and lakes. Naturally, the climates of the two districts are radically different, although a considerable number of species overlap. As noted above, it is convenient to divide this district into two at any point between the mouth of the Tapajoz

River and Itacoatiara, leaving in the first subdistrict Maranhão, Pará, and all points on the lower Amazon and its tributaries up to, and including, the Tapajoz and including in the second subdistrict Itacoatiara on the Amazon and all of the Madeira River and its tributaries.

The shells here reported represent 43 genera, 93 species, and 20 subspecies, of which 33 species and 12 subspecies seem to be new.

The types of all of the species and subspecies are deposited in the collection of the Academy of Natural Sciences of Philadelphia, and cotypes of many of them will be deposited in the collection of the Leland Stanford Jr. University at Palo Alto, California, and in the Museu Goeldi at Para, Brazil.

In the following list, the species and subspecies are considered with reference to the three districts herein marked out, column *one* representing the first district, including Rio Grande do Norte and Ceará; column *two* representing the second district, extending from Maranhão to the Rio Tapajoz and its tributaries, and column *three* representing the third district, including Itacoatiara and the whole of the Madeira River System.

INDEX OF SPECIES AND SUBSPECIES WITH GENERAL LOCATIONS.

SPECIES AND SUBSPECIES.	1	2	3	Page.
Ampullaria bridgesii Rve	x	x	x	660
" *crassa* Swains	.....	x	.....	660
" *figulina* Spix	x	x	.....	659
" *gigas* Spix	.....	x	x	659
" *insularum* Orb	x	x	.....	659
" *lineata* Spix	x	.....	x	660
" *nobilis* Rve	.....	x	.....	660
" *peristomata* Orb	.....	x	x	660
" *testudinea* Rve	x	x	.....	660
Anodontites bartschi n. sp	.....	x	.....	668
" *dalli* n. sp	.....	x	.....	667
" *ensiformis* Spix	.....	.....	x	667
" *trapesialis anserinus* Spix	.....	x	.....	667
Anostoma depressum Lam	x	.....	.....	643
" *octodentatum* F. de Wald	x	.....	.....	644
Bifidaria servilis Gld	x	.....	.....	646
Bulimulus erectus Rve	.....	x	.....	635
" *pubescens* Moric	x	.....	.....	635
" *rochai* n. sp	x	.....	.....	636
" " *suturalis* n. subsp	x	.....	.....	637
" " *taipuensis* n. subsp	x	.....	.....	636
" *tenuissimus* Orb	x	x	x	635
Cœcilioides gundlachi Pfr	x	.....	.....	646
Castalia ambigua Lam	.....	x	x	664
" *quadrilatera* Orb	.....	x	.....	664

Species and Subspecies.	1	2	3	Page.
Corona regalis Hupé	.....	.....	x	639
" *regina* Fér	.....	x	.....	639
Diplodon kelseyi n. sp	.....	x	.....	665
" *obsolescens* n. sp	.....	x	.....	666
Doryssa bullata Lea	.....	x	.....	651
" *cachœiræ* n. sp	.....	x	.....	655
" " *sulcata* n. subsp	.....	x	.....	656
" *globosa* n. sp	.....	x	.....	651
" *heathi* n. sp	.....	x	.....	653
" *iheringi* n. sp	.....	x	.....	654
" *inconspicua* Brot	.....	x	.....	650
" *rex* Pils. n. sp	.....	x	.....	650
" " *regina* Pils. n. subsp	.....	x	.....	651
" *starksi* n. sp	.....	x	.....	652
" *transversa jaryensis* Pils. n. subsp	.....	x	.....	649
" " *var.* near *Macapa* Moric	.....	x	.....	650
" " *tapajosensis* Pils. n. subsp	.....	x	.....	649
" *tucunarëensis* n. sp	.....	x	.....	656
Drymœus branneri n. sp	.....	.....	x	637
" *expansus* Pfr	.....	.....	x	637
" *linostoma suprapunctatus* n. subsp	.....	.....	x	638
Entodina jekylli n. sp	.....	.....	x	630
Euglandina striata Müller	.....	x	x	627
Eupera undet. sp	x	.....	.....	663
Gundlachia bakeri Pils. n. sp	.....	x	.....	663
Guppya mayi n. sp	.....	.....	x	632
Happia snethlagei n. sp	.....	x	x	629
Helicina guajarana n. sp	.....	.....	x	626
" *lirifera* Ancey	.....	.....	x	625
" *schereri* n. sp	x	.....	.....	625
Hemisinus brasiliensis Moric	.....	x	.....	657
" *flammeus* n. sp	.....	x	.....	657
" " *elongatus* n. subsp	.....	x	.....	656
Hyria corrugata exasperata Sby	.....	.....	x	664
" *jamauchimensis* n. sp	.....	x	.....	664
Idiopyrgus pilsbryi n. sp	x	.....	.....	658
Leptinaria imperforata n. sp	.....	.....	x	646
" *lamellata* P. & M	.....	.....	x	645
" " *concentrica* Rve	.....	x	x	645
" *perforata* n. sp	.....	.....	x	645
Littoridina manni n. sp	x	.....	.....	658
Marisa cornu-arietis Linn	.....	x	.....	661
Odontostomus inflatus Wagner	x	.....	.....	640
" " *costulatus* Ancey	x	.....	.....	641
" " *fasciatus* P. & M	x	.....	.....	641
" " *maranguapensis* n. subsp	x	.....	.....	641
" *scabrellus cylindricus* n. subsp	x	.....	.....	642
Opeas beckianum Pfr	x	.....	x	644
" *gracile* Hutton	.....	.....	x	644
" *octogyrum* Pfr	x	x	x	644
" *opella* Pils. & Van	.....	x	.....	645
Orthalicus sultana Dillw	.....	.....	x	639
Oxystyla pulchella Spix	x	x	.....	638
" " *prototypus* Pils	x	.....	.....	638
Physa rivalis M. & R	x	x	.....	661
Planorbis anatinus Orb	.....	x	.....	661

Species and Subspecies.	1	2	3	Page.
Planorbis cimex Moric	x	.....	.....	661
" *cultratus* Orb	x	.....	.....	662
" *depressissimus* Moric	x	.....	.....	662
" *guadeloupensis* Sby	x	.....	.....	661
" *peregrinus* Orb	x	.....	.....	662
" *stramineus* Dkr	x	.....	.....	662
Plekocheilus pintadinus Orb	.....	.....	x	635
Prisodon obliquus Schum	.....	x	.....	665
" *syrmatophorus* Meusch	.....	x	.....	665
Psadara derbyi cearana n. subsp	x	.....	.....	634
Segmentina paparyensis n. sp	x	.....	.....	662
Solaropsis rugifera Dohrn	.....	.....	x	633
Streptaxis abunaensis n. sp	.....	.....	x	629
" *comboides lævigata* Orb	.....	.....	x	627
" *cookeana* n. sp	x	.....	.....	628
" *deformis* Fér	.....	.....	x	627
" *deplanchei* Drouet	x	.....	.....	628
" " *quixadaensis* n. sp	x	.....	.....	628
" *subregularis* Pfr	x	.....	.....	627
Strobilops brasiliana n. sp	.....	x	.....	647
Strophocheilus cantagallanus Rang	x	.....	.....	634
" *maximus* Sby	.....	.....	x	634
" *oblongus* Müller	x	x	.....	634
Succinea pusilla Pfr	x	.....	.....	647
Subulina octona Brug	x	x	x	644
Systrophia eatoni n. sp	.....	.....	x	631
Thysanophora cæca Guppy	x	.....	.....	632
Tomigerus clausus Spix	x	.....	.....	642
" *lævis* Ihering	x	.....	.....	642
" *pilsbryi* n. sp	x	.....	.....	643
" *rochai* Ihering	x	.....	.....	642
Zonitoides parana n. sp	.....	x	.....	632
Totals in each district	49	52	34	

It will be seen, therefore, that 49 species and subspecies were taken in the first district, 52 in the second, and 34 in the third. The following statements show the districts in which representatives of the various genera were taken.

Twelve genera represented in the first district only: *Anostoma, Bifidaria, Cæcilioides, Eupera, Idiopyrgus, Littoridina, Odontostomus, Psadara, Segmentina, Succinea, Thysanophora, Tomigerus.*

Eight genera represented in the second district only: *Diplodon, Doryssa, Gundlachia, Hemisinus, Marisa, Prisodon, Strobilops, Zonitoides.*

Seven genera represented in the third district only: *Drymæus, Entodina, Guppya, Orthalicus, Plekocheilus, Solaropsis, Systrophia.*

Five genera represented in all three districts: *Ampullaria, Bulimulus, Opeas, Strophocheilus, Subulina.*

Three genera represented in the first and second districts: *Oxystyla, Physa, Planorbis.*

Six genera represented in the second and third districts: *Anodontites, Castalia, Corona, Euglandina, Happia, Leptinaria.*

Two genera represented in the first and third districts: *Helicina, Streptaxis.*

Thirty-seven species and subspecies were taken in the first district only; thirty-six species and subspecies from the second district only; twenty-two subspecies from the third district only.

Four species were taken in all three districts.

Six species in the first and second districts; six species were found common to the second and third districts, and two species to the first and third districts. As the collections are very incomplete, it is not necessary to list the species taken in each district here, but the degree of endemicity is roughly indicated by this summary.

A list of the locations from which the collection was taken, with the latitude and longitude figured for some of the less known places as accurately as it could be done from the ordinary maps, is published on succeeding pages.

In conclusion, I wish to acknowledge my great obligation to Dr. Branner for inviting me to become a member of the Expedition and to the other members of the party for many kindnesses; to Professor F. W. Kelsey, of San Diego, California, who has prepared all the photographs used in the reproductions for this paper; to Dr. H. von Ihering, of São Paulo, Brazil, for furnishing valuable papers on Brazilian mollusks; to Dr. Paul Bartsch of the National Museum for comparing doubtful species of the *Ampullariidæ* with the collections of that institution, and in largest measure to Dr. H. A. Pilsbry, of the Academy of Natural Sciences of Philadelphia, for a very large amount of help in the determination of species of all groups and for most valuable assistance in the preparation of this paper.

Locations of Stations Mentioned in this Paper.

Natal, Lat. 5° 50′ S., Long. 35° 30′ W.
Pirangý, about 20 miles down the coast from Natal.
Paparý, about 30 miles southerly from Natal.
Estremoz, Central R. R., 17 kilometers from Natal.
Ceará-Mirim, Central R. R., 34 kilometers from Natal.
Taipú, Central R. R., 56 kilometers from Natal.
Baixa Verde, Central R. R., 84 kilometers from Natal. Present terminus of railroad.

Carnaubinha, near head of Natal estuary.
Jacoco, 7 kilometers from Ceará-Mirim.
Limoeira, near western line of State of Rio Grande do Norte.
Mossoró, near eastern line of State of Ceará.
Ceará, Lat. 3° S., Long. 38° 30′ W.
Maranguape Mountain, about 20 kilometers southwest of Ceará.
Mongúba, Ceará & Baturité R. R., 27 kilometers from Ceará.
Baturité, Ceará & Baturité R. R., 100 kilometers from Ceará.
Quixadá, Ceará & Baturité R. R., 187 kilometers from Ceará. Present terminus of railroad.
Serra de Ibiapaba, State of Ceará.
Serra de Baturité, near Baturité.
Camocim, on coast west of Ceará.
Pará, Lat. 1° 35′ S., Long. 48° 25′ W.
Island of Mexiana, on Equator, Long. 49° 30′ W.
Maranhão, Lat. 2° 30′ S., Long. 44° W.
Rio Jarý, flows into Amazon from the North at a point in Lat. 1° 5′ S., Long. 51° 40′ W.
Paraná de Almeirim, north bank of Amazon above Rio Jarý.
Arumanduba, Campos country in the same district.
Baiao, Rio Tocantins, Lat. 2° 40′ S., Long. 49° 30′ W.
Serra do Ereré, Igarapé Pucú, near Monte Alegre and the Igarapé Paituna are in the same general district at Lat. 2° S., Long. 54° W.
Rio Jamauchim, Lat. 5° 30′ S., Long. 54° 15′ W.
Tucunaré, Rio Jamauchim, Lat. 4° 30′ S., Long. 55° 50′ W.
Rio Iriri, Lat. 4° 5′ S., Long. 54° W.
Rio Curuá, left side Rio Iriri, Lat. 6° 40′ S., Long. 54° 20′ W.
Rio Tapajoz, Lat. 4° 30′ S., Long. 55° 50′ W.
Boim e Pinhel, Lat. 2° 55′ S., Long. 55° 10′ W.
Ilha de Goyana, Lat. 4° 30′ S., Long. 55° 50′ W.
Rio Maccurú, Lat. 1° 30′ S., Long. 54° W.
Rio Nhamundá, Fazenda Paraiso, near Faro, Lat. 2° 20′ S., Long. 56° 45′ W.
Itacoatiara, Lat. 3° 30′ S., Long. 59° 30′ W.
Porto Velho, the lowest point on the Madeira-Mamoré R. R., about 600 miles above the mouth of the Madeira River and 6 kilometers below the lowest falls of the Madeira.
Camp 33, M. & M. R. R., also called Abuná, Brazil, 219 kilometers above Porto Velho.
Camp 35, M. & M. R. R., 238 kilometers above Porto Velho.
Camp 39, M. & M. R. R., 284 kilometers above Porto Velho.
Camp 40, M. & M. R. R., 292 kilometers above Porto Velho.
Camp 43, M. & M. R. R., 325 kilometers above Porto Velho.
Camp 46, M. & M. R. R., 359 kilometers above Porto Velho.
Guajara-Assú Falls, 364 kilometers above Porto Velho.
Abuná, Bolivia, about 5 kilometers below Camp 33, on the opposite side of the Madeira River.

List of Species with Descriptions of those which seem to be New.

HELICINIDÆ.

Genus **HELICINA** Lamarck.

Helicina lirifera Ancey.

Helicina lirifera Ancey, Jour. of Conch., vii, p. 96, 1892. Wagner, Conchylien Cabinet, *Helicinidæ*, p. 286.

A single, half-grown specimen was taken at Camp 40, M. & M. R. R., and about thirty specimens, mostly dead and of various ages, were taken at Camp 39.

In his original description Ancey says, "In front scarcely noticeably, or not at all descending." The largest specimens taken descend positively, though not greatly, in front for about half a turn, leaving the sharp keel of the preceding whorl fully exposed. I suspect that Ancey's description was based on specimens not fully matured, and it seems better to add this point to the description of his species, rather than create a new subspecies, inasmuch as these shells agree perfectly in all other respects with his description. The mature specimens have 5 whorls; no specimen with over $4\frac{1}{2}$ whorls fails to show the characteristic drop of the last whorl.

Helicina schereri n. sp. Pl. XXI, figs. 1, 2.

Shell thin, imperforate, turbinate, subglobose, with slightly convex sides; color yellowish to reddish bronze; apex obtuse, slightly mammillate, smooth for about one whorl, then everywhere sculptured with nearly even and evenly spaced, narrow, spiral keels with broader interspaces, about seven or eight keels showing on each whorl, the keels weakening and becoming more crowded and less distinct on the base, but extending to the umbilical region and dipping deeply into the aperture in some apparently mature specimens; keels everywhere crossed by sharply retractive, crowded growth lines which are exaggerated into distinct costulæ in places on the lower whorls. Whorls $4\frac{1}{4}$, somewhat convex, the last subangulate at the beginning, but becoming well rounded toward the mouth, scarcely descending in front; sutures very distinct. Aperture broadly semilunar, oblique; peristome very evenly rounded, somewhat thickened and slightly expanded, but not reflected, the upper extremity joining the parietal wall at an angle slightly under 90 degrees, the lower extremity rounding broadly into the columella; columella short, nearly vertical, broadened above; parietal wall slightly convex, with a callus varying in apparently mature specimens from a small band seen only deep within the mouth to a broad, thin

layer extending for nearly a quarter turn beyond the mouth and heavily thickened at the umbilical region.

Greatest diam. 5.5, least diam. 4.75, alt. 4.5 mm.

About forty specimens of this very pretty species were taken under dead leaves near the limestone quarries at Ceará-Mirim. About a quarter were living and seemed to be æstivating. A single specimen of the same species "from the State of Ceará" was sent by Mr. Rocha. The species may be distinguished by its small size, thin texture, and coarse spiral sculpture, and it is not related to any described species. It is named for Dr. C. A. Scherer, of the Medical Corps of the Madeira-Mamoré R. R., who was our host at Camp 39 and who aided us greatly in our hunt for zoological material.

Helicina guajarana n. sp. Pl. XXI, fig. 3.

Shell rather thin, imperforate, subglobose, with straight sides; epidermis thin, color light yellow throughout, slightly shining; apex rather acute, slightly mammillate; nepionic $1\frac{1}{2}$ whorls suggestive of *Drymæus*, but with the pits placed irregularly, though somewhat on spiral lines; post-nepionic whorls everywhere marked by microscopically distinct, very strongly retractive growth lines which are sharply decussated by equally protractive, fasciculated, incised lines, which divide and anastomose irregularly, the growth lines becoming more nearly vertical as they pass the periphery and approach the umbilical region, while the incised lines become more nearly spiral and less distinct. Whorls $4\frac{1}{2}$, slightly convex; periphery of the last whorl scarcely angulate except over the first quarter turn, not descending in front; sutures distinct. Aperture subelliptical, subhorizontal; peristome rather evenly rounded, thickened and expanded moderat ly, joining the columellar base with a distinct angulation; columella short, nearly vertical, spreading above into the broad, thin callus which covers the slightly convex parietal wall.

Greatest diam. 6.5, least diam. 5.25, alt. 5.75 mm.

One living and two dead specimens of this species were taken near the Guajara-Assú Falls. The species is somewhat related to the larger *H. bourguignatiana* Ancey, but is differently colored and has a less marked angle at the junction of the columella and basal lip.

Helicina laterculus n. sp. Pl. XXI, figs. 4, 5.

Shell globose-depressed, rather thin, of a dull red color, smooth except for faint growth-lines. Spire low-conoidal; whorls $4\frac{1}{4}$, very slightly convex, the last rounded peripherally. Aperture small; outer lip thin, a little expanding, and very narrowly reflected. Colu-

mella callus rather small and coarsely pitted. Alt. 3.75, diam. 4.75 mm.

Pará.

OLEACINIDÆ.

Genus **EUGLANDINA** Crosse and Fischer.

Euglandina striata (Müller).

Helix striata Müller, Hist. Verm., II, p. 149.
Oleacina striata (Müller), Tryon, Man. Conch. (2), I, p. 32, pl. 5, fig. 64.
Euglandina striata (Müller), Pilsbry, Man. Conch. (2), XIX, p. 176.

Two dead specimens were taken at Camp 39, M. & M. R. R., and two near the Guajara-Assú Falls; four living specimens taken on the Island of Mexiana and a young specimen from the Rio Maccurú were sent from the Goeldi Museum.

Euglandina n. sp. ?

At Camp 39, M. & M. R. R., three specimens were taken which seem to differ from all South American species, but which were too young to warrant a name and description.

STREPTAXIDÆ.

Genus **STREPTAXIS** Gray.

Streptaxis deformis Férussac.

Helix deformis Férussac, Hist. Nat. Moll., pl. 32, a, fig. 1.
Streptaxis deformis Fér., Tryon, Man. Conch. (2), I, p. 74, pl. 27, fig. 10.

Seventeen specimens were taken at Itacoatiara, only a few mature.

Streptaxis comboides lævigata Orbigny.

Streptaxis comboides Orb., var. *lævigata* Orbigny, Voyage dans l'Amérique Méridionale, Mollusques, p. 234.

Two dead, immature specimens were taken at Abuná, Bolivia, and two mature and one immature at Camp 46, M. & M. R. R. This species has heretofore been known only from Orbigny's description. He procured his type of the var. *lævigata* from the Mission of San José, Chiquitos Province, Bolivia, nearly 200 miles from these locations. Our specimens are a slightly smaller race (diameter 8, instead of 10 mm.), with the tooth of the outer lip a little less prominent than would seem to be called for by Orbigny's description, but they almost surely fall into this variety.

Streptaxis subregularis Pfeiffer.

Philippi Abbild. II, 13, p. 127. Tryon, Man. Conch. (2), I, p. 68, pl. 12, figs. 16–18.

One mature and two immature specimens were taken on the Maranguape Mountain at an altitude of about 500 ft. and two mature specimens, "from the State of Ceará," were sent by Mr. Rocha.

Streptaxis deplanchei Drouet.

Streptaxis deplanchei Drouet, Moll. Guyane Franç., 56, t. q., figs. 6–9. Conchylien Cabinet, *Streptaxis*, XXXIII, p. 15. Man. Conch. (2), I, p. 79, pl. 16, figs. 80–82.

About eighty specimens were taken at Ceará-Mirim and two specimens, "from the Coast region of the State of Ceará," were sent by Mr. Rocha.

Streptaxis deplanchei quixadaensis n. subsp.

A single specimen was taken about a mile below Quixadá which differs from the type in being a little larger (diam. 7 mm.), with only a perceptible trace of the inner parietal nodule; a half-grown specimen taken in the same locality is probably of the same subspecies.

Streptaxis cookeana n. sp. Pl. XXII, figs. 5, 6, 7.

Shell depressed, with low, conoidal spire with the lateral outlines but slightly convex, perforate, the umbilicus about .5 mm. in diameter, twisted so as to appear closed above the last whorl, but actually extending to the apex; thin, pellucid, glossy, very faintly yellowish; the first $1\frac{3}{4}$ nepionic whorls nearly smooth, the rest closely, irregularly, and finely costulate, the costulæ slightly arcuate and strongly retractive, about as wide as the interspaces, in places indistinct, but showing about 13 to the millimeter on the penultimate whorl; costulæ obsolete on the base except at the mouth of the umbilicus where they are intensified rather abruptly, forming about twelve vertical ribs which extend inward over nearly the whole of the last whorl. Whorls $5\frac{3}{4}$, increasing regularly in width for $4\frac{1}{2}$ whorls, when the apparent width is modified by the characteristic distortion of the genus; sutures distinct, almost impressed. Aperture slightly broader than high, very roundly triangular; peristome moderately expanded, slightly recurved over the umbilicus, white; parietal wall covered by a thin callus uniting the extremities of the outer lip; no apertural teeth present. Young shells perfectly regular, with a wider umbilicus than in the adult and showing frequent varices (one to three to a whorl) on the base, which give the young shells the appearance of *Scolodonta* and suggest the possibility that some species assigned to *Scolodonta* may prove to be the young of *Streptaxis*.

Alt. 6, greatest diam. 9.75, least diam. 7, width of aperture 3.25, alt. of aperture 3 mm.

Animal grayish, marked by orange-yellow colored ocular tentacles and a line of the same color extending backward from the base of each tentacle; young and adult animals are the same in color.

This was the commonest species of *Streptaxis* at Ceará-Mirim, nearly two hundred specimens having been taken; and four each were taken at Estremoz and Baixa Verde, mostly under dead leaves and debris, but more rarely under stones and dead wood. The species, which seems to be new, is related to *S. glaber* Pfr., but it is larger, with slightly fewer whorls, a distinctly striate spire and no parietal teeth. It is named for Miss J. M. Cooke, of Point Loma, California, who has added many species and varieties of shells to the known fauna of Southern California and Lower California.

Streptaxis abunaënsis n. sp. Pl. XXII, figs. 8, 9, 10.

Shell quite heavy, rather high, the spire markedly convex and rotund, umbilicus moderately open; light horn colored, with a thin, fugaceous, yellowish-brown epidermis; nepionic whorl smooth, followed by a series of broad, low, rounded, strongly retractive, slightly arcuate costulæ with moderate interspaces (about nine to the millimeter on the penultimate whorl), becoming obsolete over the whole of the last whorl, except at the mouth of the umbilicus, where they can be seen with a glass. Whorls about 6, the first three rather narrow and crowded, the last two much broader, the shell showing the characteristic distortion of the genus; sutures distinct, but not impressed. Aperture somewhat triangular, a little broader than high, very distinctly angulated at the juncture of the lip with the parietal wall; peristome white, slightly reflected above, the reflection increasing to the lower juncture with the parietal wall which it meets at an angle of about 90 degrees; a slight groove behind the basal lip, running into the umbilicus.

In five specimens there are three nearly equidistant teeth within the mouth, about in the middle of the parietal wall and of the basal and outer lips, the parietal tooth being narrow and high and directly entering for about $1\frac{1}{2}$ millimeters. In a sixth specimen the parietal tooth is wanting altogether, although the other characteristics are well marked.

Alt. 6.25, greatest diam. 8, least diam. 6.25, width of aperture 2.5, alt. of aperture 2.25, diam. of the umbilicus .7 mm.

Two living and four dead specimens were taken at Camp 33, M. & M. R. R., this point being known as Abunã in Brazil.

This species, which seems to be new, is closely related to *S. cumingianus* Pfr., from which it differs chiefly by the striation of the spire and larger size.

Genus **HAPPIA** Bourguignat.

Happia snethlagei n. sp. Pl. XXII, figs. 3, 4.

Shell very widely, perspectively umbilicate, thin, translucent,

light horn colored, with a thin, grayish-yellow epidermis; nepionic $1\frac{1}{2}$ whorls smooth, and, beginning on the second whorl, everywhere sculptured with fine, irregularly sized and grouped, retractive, arcuate costulæ, showing under a strong glass as if they were sharp edged, with broad, rounded interspaces; most specimens also showing some evidence of obsolete spiral striations on the last two whorls. Whorls 5, slightly convex above, well rounded below and broadening decidedly toward the mouth for the last quarter turn; periphery well rounded, sutures slightly impressed, the upper aspect of the shell being flattened to the middle of the last turn, then slightly descending. Aperture oblique, lunate, as if one fifth of a circle were cut out by the convexity of the penultimate whorl; peristome sharp, showing a slight reflection for about one millimeter before joining the lower parietal wall; extremities of the peristome approaching, joining the parietal wall nearly at right angles, the upper nearly horizontally, the lower nearly in a vertical direction. Alt. 6, greatest diam. 12.5, least diam. 10.5, alt. of penultimate whorl at the mouth 4.5, alt. of mouth 5.25, least diam. of mouth 4 mm.

The animal is dark gray with lemon-yellow tentacles.

About 150 specimens of this species were taken at Camp 39, M. & M. R. R., a few only living, seven at Camp 40, four living and seven dead at Camp 46, one dead at Porto Velho and four living specimens were sent by Mr. C. W. Eaton, of the engineering force of the Madeira-Mamoré R. R., without location noted; also one living and fourteen dead specimens, taken at the Serra do Ereré, were sent from the Goeldi Museum by the Director, Dr. Emilia Snethlage, to whom the species is dedicated.

Genus **ENTODINA** Ancey.

Entodina jekylli n. sp. Pl. XXII, figs. 11, 12, 13.

Shell widely, perspectively umbilicate, grayish corneous; nucleus nearly smooth, and, commencing on the second whorl, everywhere sculptured with prominent, narrow costæ (about eleven to the millimeter at the beginning of the last whorl), separated by broad interspaces, nearly vertical on all but the last whorl, where they become arcuately retractive; costæ slightly less prominent below the periphery, but showing distinctly as they dip into the umbilicus, as well as on the preceding whorls within the umbilicus. Whorls $4\frac{3}{4}$, convex, periphery well rounded, sutures deep. Aperture diagonal, irregular, a broad oval below, partially separated by the teeth from a small, oblique oval above; lip shortly reflected, very

slightly thickened, the extremities joined by a trigonal, dentiform callus and with an obtuse tooth near the upper extremity. Alt. 1.5, greatest diameter 3.5, least diam. 3 mm.

About twenty specimens of this striking species were taken just below the surface of the ground, between the buttresses of an old stump at Camp 39, M. & M. R. R. The species is named for Mr. A. B. Jekyll, of the firm of contractors, who made our trip to the Madeira and Mamoré Rivers possible and who extended to us so many personal courtesies. It differs from *E. reyrei* Souverbie by its smaller size, the absence of a swelling behind the lip and by the tooth on the outer lip.

Genus **SYSTROPHIA** Pfr.

Systrophia eatoni n. sp. Pl. XXII, figs. 14, 15.

Shell widely, perspectively umbilicate, rather thin, diaphanous, shining, grayish or grayish-yellow, the yellowish tint apparently depending on an extremely thin, fugaceous epidermis; spire submersed, embryo nearly smooth, and, beginning on the second whorl, everywhere sculptured with irregularly sized and spaced costulæ, retractive on the early whorls, but arcuate on the last whorl, and becoming protractive as they cross the base and dip into the umbilicus; obsolete spiral markings present on the last whorl and perceptible with a strong glass on the early whorls; sutures deep and well defined; periphery evenly rounded except on the last eighth turn, where an oblique flattening of the upper portion produces a subangulation. Whorls 10, slightly convex above, more rounded below, very narrow, the last more than treble the width of the penultimate; not descending in front. Aperture obliquely subtriangular; lip white, thickened but not expanded, depressed above, extremities distant; callus uniting the extremities thin, but well defined externally; no internal teeth.

Alt. 5.75, greatest diam. 14.5, least diam. 12.5 mm.

This species is closely related to *S. stenogyra* Pfr., but it differs by being smaller, with scarcely so many whorls and a narrower aperture, and by the lip being thickened but not expanded. *S. helicycloides* Orb. is more depressed, with a distinct impression extending over the last third of the last whorl. A single, half grown specimen was taken at Abuná, Bolivia, six living specimens at Camp 35, M. & M. R. R., and seven living specimens were sent from some point not noted on the same railroad by Mr. C. W. Eaton, of the engineering force, for whom I have named the species.

ZONITIDÆ.

Genus **ZONITOIDES** Lehm.

Zonitoides parana n. sp. Pl. XXI, figs. 12, 13, 14.

Shell umbilicate (the diameter of the umbilicus being contained $4\frac{3}{4}$ times in that of the shell), depressed, with low-conic spire, light brown, rather glossy, with fine, close sculpture of almost exactly vertical growth lines. Whorls 5, very slowly increasing, the last rounded at the periphery. Aperture lunate.

Alt. 1.5, diam. 0.9 mm.

A single specimen of this minute species was taken at Pará. The genus is uncertain, but the texture of the shell is that of *Zonitoides* rather than of *Thysanophora* or any Patuloid genus.

Genus **GUPPYA** Mörch.

Guppya mayi n. sp. Pl. XXI, 6. 7.

Shell very narrowly perforate, conical, with a very obtuse apex and well-rounded base, the last whorl distinctly, but not sharply angulate, the apical angle being about 90 degrees; translucent, slightly shining, with a thin, dull straw-colored, fugaceous epidermis; everwhere sculptured with fine, irregularly spaced, retractive, radiating costulæ of varying sizes, crossed by more regular, very finely incised lines, very closely and nearly evenly spaced. Whorls 5, convex; sutures well defined, especially above the last whorl. Aperture semilunar, very oblique, slightly broadened above by the angle of the last whorl; peristome sharp, very slightly reflected on the basal portion and more distinctly as it approaches the umbilicus.

Alt. 3, greatest diam. 3.65, least diam. 3.4 mm.

Seven specimens of this species, which seems to be new, were taken with the last species at Camp 39, M. & M. R. R. It is more elevated than *G. seminlini* Moricand and has more whorls. It is named for Mr. R. H. May, of the contracting firm of May, Jekyll & Randolph, who, with Mr. Jekyll, made our trip to the Madeira-Mamoré R. R. possible and in every way delightful.

HELICIDÆ.

Genus **THYSANOPHORA** Strebel and Pfeffer.

Thysanophora cæca Guppy.

Helix cæca Guppy, Tryon, Man. Conch. (2), III, p. 55, pl. 9, fig. 23.
Thysanophora cæca Guppy, Pilsbry, Man. Conch. (2), IX, pl. 16, fig. 4.

Eight specimens of this West Indian shell "from the Serra de Baturité, State of Ceará," were sent by Mr. Rocha. This seems to be the first report of its having been taken south of the Amazon.

Genus **SOLAROPSIS** Beck.

Solaropsis rugifera Dohrn. Pl. XXII, figs. 1, 2.

Helix rugifera Dohrn, Jahrbuch. d. deutsch. Mal. Gesell., 1882, p. 100.

Pilsbry, in *Man. Conch.* (2), v, p. 195, quoted Dr. Dohrn's remarks and description of this species as follows: "I possess, unfortunately, only a single specimen of this species, not fully adult, which I received years ago with other species from eastern Peru. On account of the sculpture, which differs remarkably from that of all allied forms, I have decided to give it an (admittedly) incomplete description, in the hope that someone may be able to complete it. *H. selenostoma* Pfr., which is its nearest species in contour, is more narrowly convoluted, proportionally higher, and more narrowly umbilicated."

"Broadly umbilicate, deplanate, thin, obliquely rugose plicate, the plicæ vanishing beneath, brownish corneous, flammulate at the sutures and narrowly 2-banded in the middle of the whorl with reddish; spire plane, apex rather smooth; suture moderately profound; whorls nearly 5, convex, the last rounded, not descending in front; umbilicus equalling $\frac{1}{4}$ the diameter, funnel-shaped; aperture a little oblique, rounded lunar, peristome (unknown)."

Using a perfectly mature specimen, I would amplify this description as follows:

Shell broadly umbilicate, deplanate, thin; embryonic $1\frac{1}{2}$ whorls smooth, a fine radiating sculpture beginning on the second whorl and showing minute spiral lines under a strong glass, the sculpture becoming distinctly rugose plicate on the third whorl and continuing to the periphery of the last whorl, from which point, the rugosity disappearing, the plicæ continue well into the umbilicus as well marked, irregularly sized and spaced costulæ, everywhere crossed by fine, irregularly spaced spiral lines which show most distinctly on the costulæ; brownish corneous, flammulate at the sutures, and narrowly, interruptedly, 2-banded with reddish, the lower band placed at the periphery, the upper half way between this and the flammules, except on the last quarter turn, where the flammules extend to the second band; spire plane; sutures moderately deep; whorls $5\frac{1}{4}$, convex, the last rounded, scarcely descending in front; umbilicus equaling about $\frac{1}{4}$ the diameter, perspective; aperture a little oblique, rounded lunar; peristome white, very slightly reflected throughout, the reflection becoming more marked at the junction of the basal part with the parietal wall.

In none of the specimens, however young, does the sculpture entirely disappear on the basal portion of the last whorl as noted by

Dohrn, and in the mature specimen it can be distinguished on the early whorls within the umbilicus.

Alt. 13, greatest diam. 27, least diam. 22.5, diam. of the umbilicus within the last whorl 5 mm.

One mature living and eight immature specimens were taken between Camps 38 and 39, M. & M. R. R., and two immature specimens at Camp 46.

Dr. von Ihering's var. *juruana* was taken at a point about half way between the original location and these points on the Madeira and Mamoré Rivers.

Solaropsis sp. undet.

A single specimen of this genus, too young to identify, taken at Pará, was sent from the Goeldi Museum.

Genus **PSADARA.**

Psadara derbyi cearana n. subsp. Pl. XXII, fig. 19.

A single mature specimen "from the State of Ceará" was sent by Mr. Rocha and a half-grown specimen was taken on the Maranguape Mountain. It differs from the type by being larger, with fewer whorls. Comparative measurements follow:

P. derbyi v. Ihering, whorls $4\frac{1}{2}$, diam. 12 mm.

P. derbyi cearana, whorls $4\frac{1}{4}$, greatest diam. 16.5, least diam. 13.7, alt. 8.25 mm.

Genus **STROPHOCHEILUS** Spix.

Strophocheilus (Borus) maximus (Sowerby).

Cochlogena maxima Sby., Appendix to Tank. Cat., p. 7 (1825, unrecognizable description).
Bulinus maximus Sby., Conch. Illustr., fig. 63 (1841?).
Strophocheilus (Borus) maximus Sby., Pilsbry, Man. Conch. (2), X, p. 15, pl. 4, fig. 5.

A single living specimen was taken between Camps 45 and 46, Madeira & Mamoré R. R., and dead specimens were taken quite commonly all the way from Camp 39 to Camp 43.

Strophocheilus (Borus) cantagallanus (Rang).

Helix cantagallana Rang, Ann. Nat. Sci., XXIV, p. 50 (1831).
Strophocheilus (Borus) cantagallanus (Rang), Pilsbry, Man. Conch. (2), X, p. 22, pl. 16, fig. 24; pl. 17, figs. 28, 29.

A single dead specimen was taken at Carnaubinha near the head of the Natal estuary.

Strophocheilus (Borus) oblongus (Müller).

Helix oblonga Müller, Hist. Vermium, II, p. 86, and of Gmelin, Born and Dillwyn.
Strophocheilus (Borus) oblongus (Müller) Pilsbry, Man. Conch. (2), X, p. 29, pl. 14, figs. 70–73.

Two mature specimens "from the interior of the State of Ceará" were sent by Mr. Rocha and one mature specimen taken on the Serra de Ibiapaba, State of Ceará, and an immature specimen taken on the Rio Maccurú were sent from the Goeldi Museum.

BULIMULIDÆ.

Genus **PLEKOCHEILUS** Guilding.

Plekocheilus (Eurytus) pintadinus (Orbigny).

Helix pintadina Orb., Mag. de Zool., 1835, Cl. V, No. 61, p. 8.
Bulimus pintadinus Orb., Voyage dans l'Amér. Mérid., pl. 29, figs. 11, 12.
Plekocheilus (Eurytus) pintadinus (Orb.) Pilsbry, Man. Conch. (2), X, p. 93, pl. 36, figs. 84, 85.

A single dead specimen of this handsome species, in a good state of preservation, was taken near the Guajara-Assú Falls. The species was described and figured from a single dead specimen, deposited in the Museum of Natural History in Paris. It was taken in the foot hills of Bolivia, several hundred miles from the Guajara-Assú Falls. These two specimens are the only ones reported, so far as is known to the writer.

Genus **BULIMULUS** Leach.

Bulimulus (Bulimulus) erectus (Reeve).

Bulimus erectus Rve., Conch. Icon., pl. 58, fig. 392.
Bulimulus (Bulimulus) erectus Rve., Pilsbry, Man. Conch. (2), XI, p. 60, pl. 10, fig. 99.

Two specimens taken at Arumanduba, Paraná de Almeirim, were sent from the Goeldi Museum.

Bulimulus (Bulimulus) tenuissimus (Orbigny).

Helix tenuissima (Fér.) Orbigny, Mag. de Zool., 1835, p. 11 (name only).
Bulimus tenuissimus ("Fér. dans sa collection") Orb., Voyage, p. 272.
Bulimulus (Bulimulus) tenuissimus Orb., Pilsbry, Man. Conch. (2), XI, p. 64, pl. 10, figs. 91, 92.

This species was rather common at Ceará-Mirim; it was found at Estremoz and Pirangý, a single specimen was taken at Maranhão, six at Itacoatiara, and about twenty living specimens were taken near the water works of Pará. A single specimen taken at the Serra do Ereré was sent from the Goeldi Museum. Most specimens show the spiral striation and slightly open umbilicus of *B. tenuissimus*, and all have a very characteristic wrinkle-striate embryonic sculpture, extending over about $1\frac{1}{2}$ whorls.

Bulimulus (Rhinus) pubescens (Moricand).

Helix (Bulimus) pubescens Moric., Mem. Soc. Phys. et Hist. Nat. Genève, XI, p. 157, pl. 5, figs. 21–23 (1846).
Bulimulus (Rhinus) pubescens Moric., Pilsbry, Man. Conch. (2), XI, p. 81, pl. 13, figs. 15, 16, 19; pl. 15, fig. 23.

About a dozen typical specimens were taken at Ceará-Mirim.

Bulimulus (Rhinus) rochai n. sp. Pl. XXIII, figs. 19, 20.

Shell deeply and rather narrowly umbilicate, ovate conic, rather solid, corneous in the young, the last whorl in the adult sometimes showing a tendency to spiral banding in the darkest specimens, but more frequently becoming whitish and translucent; surface shining; first $1\frac{1}{2}$ nepionic whorls with finely crinkled striæ, then finely, closely and irregularly retractively striate, the striæ cut by a few distant incised spiral lines, with intervening obsolete lines which disappear on the base and lower part of the last whorl; spire conic, with slightly convex sides; apex obtuse. Whorls 7, slightly convex, the last rounded oval, not descending in front; sutures sharply defined, moderately deep. Aperture subvertical, ovate, about one-half as wide as high, nearly one-half the length of the shell, whitish to corneous, corresponding to the color of the last whorl, very rarely showing any banding inside; peristome obtuse, very slightly reflected below, whitish; columellar margin dilated above and reflexed; a broad, thin parietal callus uniting the extremities of the lips.

Very young specimens show the characteristic pilation of the subgenus, but it is entirely absent in all mature specimens.

Alt. 24, diam. 13.5, alt. of aperture 11, diam. of aperture 5.75 mm.

This species, which seems to be new, is similar to *B.* (*Protoglyptus*) *durus* Spix in size and general appearance, but it differs by having fine, crinkled striæ in the embryo, whilst *durus* has vertical ribs. It is more solid than *B. vesicalis uruguayensis* Pilsbry, and it has spiral striæ, a slightly expanded outer lip and a broader columella. It differs from *B. sarcochilus* by being stouter and having a larger aperture. It is remarkable among the species of *Rhinus* by having hairs only in the young, no trace of them remaining in the adult stage.

This is one of the commonest shells at Ceará-Mirim, generally found living about an inch underground, under sticks and stones. About a dozen living and dead specimens were taken at Jacoco, about seven kilometers from Ceará-Mirim, one living and several dead at Baixa Verde, and a single dead, but well-preserved mature specimen was sent to Dr. Branner by Mr. G. A. Waring, of the Brazilian Geological Survey, from "the plains southeast of Limoeira, State of Ceará, near the Rio Jaguaribe." The species is named for Mr. Francisco Dias da Rocha, of the city of Ceará, who has done so much through the collections made for his Museu Rocha to extend our knowledge of the State of Ceará along all natural-history lines.

Bulimulus (Rhinus) rochai taipuensis n. subsp. Pl. XXIII, fig. 17.

About twenty specimens of this well-marked variety were taken at

the fossil beds on the Central R. R., 46 kilometers from Natal, below the station of Taipú, half a dozen were taken at Estremoz and a single dead specimen, taken at Camocim, was sent from the Goeldi Museum. It differs from the type in its more slender shape and slightly smaller size.

The whorls are $7\frac{1}{4}$, alt. 23, diam. 12 mm.

Bulimulus (Rhinus) rochai suturalis n. subsp. Pl. XXIII, figs. 13, 14.

This is a fairly well-marked variety, differing from the type by being thinner, smaller in size, slightly more globose, with fewer whorls, never more than six, the spire being distinctly chestnut colored with an extension showing in a light brown band on the lower curve of the suture.

Alt. 17, diam. 12.

Ten living specimens were taken at Mongúba, a station on the Ceará & Baturité R. R. about 27 kilometers from Ceará, and eleven specimens sent by Mr. Rocha "from the State of Ceará" correspond in shape with this variety, but lack the sutural band."

Genus **DRYMÆUS** Albers.

Drymæus expansus ? (Pfeiffer).

Bulinus pulchellus Sowerby, Conch. Illust., fig. 91, not *Bulimus pulchellus* Broderip, P. Z. S., 1832, p. 106.
Bulimus expansus Pfeiffer, Monogr., II, p. 60.
Drymæus expansus Pfr., Pilsbry, Man. Conch. (2), XI, p. 222, pl. 34, figs. 1–5.

A single, half-grown specimen taken at Camp 46, M. & M. R. R., seems to be referable to this species.

Drymæus branneri n. sp. Pl. XXIII, figs. 1, 2, 3, 4.

Shell broadly and openly rimate, ovate conic, thin, diaphanous, shining, white or light brown, typically marked in chestnut by a narrow band beginning within the mouth just below the upper lip attachment and continuing around the last whorl, below the periphery, to a point about three millimeters behind the flare of the lip, and two interrupted bands, above and parallel to this, disappearing before reaching the penultimate whorl, the tendency being in most shells to a lessened development of these markings; embryonic $1\frac{1}{2}$ whorls with typical Drymæus sculpture, the remaining portion of the shell being everywhere sculptured with irregular, retractive costulæ cut by close, finely incised, wavy lines, subobsolete on the earlier whorls; spire conic, with slightly convex outlines; apex obtuse. Whorls $5\frac{1}{2}$ to $5\frac{3}{4}$, slightly convex, the last well rounded, very convex below, slightly ascending in front. Aperture short oval, very slightly oblique, showing the external markings within; peris-

tome yellow, outside and in, edged narrowly with white, rather broadly and flatly reflected, the terminations very slightly approaching above; columellar lip with a thick, prominent flange enclosing the umbilical chink, dilated; parietal callus very thin.

Alt. 23.5, diam. 14.5, alt. of aperture 12.5 mm. Type.
" 25, " 15, " " " 12.5 mm.

This species is related to *D. strigatus* Sby., but it differs by being more obese, by the greater development of spiral striation, and in having a yellow lip instead of violet as in *D. strigatus*. *D. similaris* Moricand is similar in shape and color of the lip, but it differs conspicuously in color pattern.

Two dead specimens were taken at Camp 40, M. & M. R. R., and several dead specimens at Camp 39, only one being perfect and as well preserved as a living shell. Many of these shells, as well as many others taken on the right of way of the M. & M. R. R., were more or less damaged by fire used in clearing.

Drymæus linostoma suprapunctatus n. subsp. Pl. XXIII, figs. 5, 6, 7, 8.

Shell oblong, thin, diaphanous, glossy, shining, appearing nearly smooth to the naked eye, but, under a glass, showing typical *Drymæus* sculpture on the nepionic $1\frac{3}{4}$ whorls; afterward with irregular growth lines and fine, indistinct, wavy incised spiral lines throughout; dirty white, occasionally becoming roseate toward the lip, with wide, well-spaced, longitudinal flames of brown or brownish-violet, interrupted or crossed by a spiral row of dots just above the periphery of the whorl. Whorls 6, slightly convex, separated by deep, smooth sutures; spire conic, obtuse at the apex; last whorl subcylindrical, more than two thirds the total length. Aperture large, oval, a little oblique, light colored within except where the external markings show through, and shading to roseate on the lip in some specimens; peristome rather broadly expanded but not recurved; columella twisted, with an extremely narrow flange so reflected as to leave little or no umbilicus; extremities approaching sharply; parietal callus very thin.

Alt. 26.5, diam. 11.5, alt. of last whorl 18.5, alt. of mouth 12.25 mm. Type. A specimen with broken spire measures alt. ?, diam. 12, alt. of last whorl 19.5, alt. of mouth 13 mm.

This variety differs from the type of *D. linostoma* (Orb.) by the interruption of the vertical stripes and the development of a spiral series of dots above, by the closure of the umbilicus and by the pale aperture. In *linostoma* the umbilicus is distinct, the stripes are continuous and the peristome of a deep violet color. *D. subsimilaris*

Pilsbry and *D. hidalgoi* Da Costa are closely related to *suprapunctatus* in color pattern, but the former is a much more slender shell and the latter is larger, umbilicate, and with a deep violet aperture. A considerable number of dead and more or less charred and broken specimens were taken at Camp 39, M. & M. R. R.

Drymæus sp. undet.

A single young specimen was taken near the Guajara-Assú Falls and two half-grown specimens taken at the Serra do Ereré were sent from the Goeldi Museum. All have typical apical *Drymæus* sculpture and, as they do not fall into any of the species here described, they are too young to diagnose with certainty.

Subfamily ORTHALICINÆ.

Genus **OXYSTYLA** Schluter.

Oxystyla pulchella (Spix).

Achatina pulchella Spix, Testac. Brasil., pl. 9, fig. 2.
Oxystyla pulchella (Spix), Pilsbry, Man. Conch. (2), XII, p. 135, pl. 28, figs. 27–29.

The typical form was rather rare, but a few specimens were taken with the following variety at Ceará-Mirim and one specimen was taken at Paparý; two specimens taken at Pará were sent from the Goeldi Museum.

Oxystyla pulchella prototypus Pilsbry.

Man. Conch. (2), XII, p. 137, pl. 28, figs. 32–37.

A single immature specimen was taken near Baturité, on the Ceará & Baturité R. R., one hundred kilometers from Ceará; half a dozen dead specimens at Baixa Verde, and several thousand at Ceará-Mirim, where they were æstivating, the mature specimens on the trunks and lower branches of various trees, the immature specimens packed away very closely in knot holes and crevices between the branches of the same trees. As Dr. Pilsbry remarks, *l.c.*, "This is an earlier, less differentiated form of the species, of which *pulchella* is an extreme and more local development. It is more widely distributed than the typical form, occupying the northwestern and southern peripheral portions of the range of the species." To this I can now add *the northeastern portion of the range of the species.* He says further, "The largest specimen of *prototypus* before me measures 45½ mill. long, with 6½ whorls." The largest specimen taken by the Stanford Expedition measures alt. 55, diam. 36, longest axis of the aperture 34 mm., being excess of all measurements given by him for either the type or the variety. Our specimens are all lighter in

color than those in the collection of the Academy of Natural Sciences, probably owing to the dryness of the climate of northeastern Brazil.

Genus **CORONA** Albers.

Corona regalis (Hupé). Pl. XXIII, figs. 21, 22.

Bulimus regalis Hupé, in Castelnau, Exped. dans l'Amér. du Sud. Mollusques, p. 34, pl. 10, fig. 3 (1857).
Corona regalis (Hupé) Pilsbry, Man. Conch. (2), XII, p. 180, pl. 35, figs. 13, 14, 19; pl. 34, figs. 9–12; pl. 34*a*, figs. 26, 27; pl. 33, figs. 3, 6.

One specimen in fine condition was taken at Camp 43, M. & M. R. R., and others in various states of disorganization at various points along the right of way as far down as Camp 39; also two dead specimens at Porto Velho. The specimen figured differs from those in the collection of the Academy of Natural Sciences of Philadelphia by the conspicuous blotches on the last $1\frac{1}{2}$ whorls and in showing a darker, richer green color.

Corona regina (Férussac).

Helix (*Cochlitoma*) *regina* Férussac, Tabl. Systemat., p. 40, No. 342.
Corona regina (Fér.), Pilsbry, Man. Conch. (2), XII, p. 177, pl. 33, figs. 1, 2, 4, 5.

A single fine specimen taken near St. Antonio da Cachoeira on the Rio Jarý was sent from the Goeldi Museum.

Genus **ORTHALICUS** Beck.

Orthalicus sultana meobambensis Pfr. Pl. XXII, fig. 18.

Helix sultana Dillw., Descriptive Cat., II, p. 920 (1817).
Bulimus meobambensis Pfr., P. Z. S., 1855, p. 96.

One living specimen taken at Camp 35, M. & M. R. R., is especially large and fine, differing from the specimens in the collection of the Academy (*Man. Conch.*, XII, pl. 47, fig. 8) by a slightly smaller mouth proportionally, a more rounded outer lip, and in being more brilliantly colored. It measures alt. 81.5, diam. 51, alt. of mouth 46, diam. of mouth 29.5 mm.

Several embryonic shells, all showing the characteristic sculpture of this genus, were taken at Camp 39, just under the surface of the ground.

Subfamily ODONTOSTOMINÆ.

Genus **ODONTOSTOMUS** Beck.

Odontostomus (Cyclodontina) inflatus (Wagner).

Pupa inflata Wagner, Testac. Bras., p. 20 (1827).
Odontostomus (*Cyclodontina*) *inflatus* Wagner, Pilsbry, Man. Conch. (2), XIV, p. 60, pl. 11, figs. 43–45.

One specimen "from the State of Ceará" was sent by Mr. Rocha.

Odontostomus (Cyclodontina) inflatus fasciatus (Potiez et Michaud).

Pupa fasciata P. & M., Galerie, I, p. 165, pl. 16, figs. 19, 20.
Odontostomus (Cyclodontina) inflatus fasciatus P. & M., Pilsbry, Man. Conch. (2), XIV, p. 61, pl. 11, fig. 43.

This was one of the commonest shells at Ceará-Mirim and at Baixa Verde, where it was taken, living and dead, generally æstivating under stones and debris. It was also taken living at the fossil beds below Taipú. Nearly all specimens taken have four buccal teeth and are nearly typical.

Odontostomus (Cyclodontina) inflatus costulatus Ancey. Pl. XXIII, figs. 11, 12.

Odontostomus inflatus Wagner, var. *costulata* Ancey, Jour. de Conchyl., LII, p. 303, 1904.

Two specimens were taken below Quixadá, the present terminus of the Ceará & Baturité R. R. It has not before been figured.

Odontostomus (Cyclodontina) inflatus maranguapensis n. subsp. Pl. XXIII, fig. 18.

Shell umbilicate, shining, translucent, gray throughout except an indistinct buff line below the lower suture and a narrow, scarcely perceptible chestnut band behind the peristome, intensified at the suture and in two blotches, one opposite the upper palatal tooth and one at the basal side of the umbilicus, both being perceptible within the mouth; spire turreted-conic, with slightly convex sides, apex obtuse; nepionic $1\frac{3}{4}$ whorls very finely and nearly evenly decussated, the spiral lines becoming obsolete on the second whorl and showing thereafter as minute wrinkles, chiefly in the grooves of the distinct, irregular, retractive costulæ (about four to the millimeter on the penultimate whorl) which cover all the remaining whorls, dip deeply into the umbilicus and extend lightly over the parietal wall. Whorls 8, separated by a narrow, deep, but not channelled, suture, scarcely convex, the last having two pits behind the outer lip, one midway and the other near the base, and a slight depression paralleling the end of the suture. Aperture nearly vertical, round oval, obstructed by a low, entering ridge corresponding to the lower pit and taking the place of the lower palatal tooth, and three distinct teeth: a compressed parietal lamella, a large vertical columellar lamella with a horizontal continuation below which includes the oblique, twisted umbilicus, and a moderate-sized upper palatal lamina in the middle of the outer lip; peristome light gray, broadly expanded and very slightly reflected, the channels characteristic of the section being rather shallow.

Alt. 18, diam. 7.25, alt. of mouth 6 mm.

One specimen was taken on the Maranguape Mountain; a second, the type, at Mongúba, on the Ceará & Baturité R. R., about 27 kilo-

meters from Ceará, and two specimens "from the State of Ceará" were sent by Mr. Rocha. All are identical except that the specimens sent by Mr. Rocha are somewhat bleached and show the brown markings very indistinctly. The variety, differs from *O. inflatus fasciatus* P. and M., the common *Odontostomus* of the region, in being smaller and lacking the characteristic brown markings, and from *O. inflatus costulatus* Ancey in being smaller, with fewer teeth.

Odontostomus (Cyclodontina) scabrellus (Anthony) Dohrn. var. **cylindricus** n. subsp. Pl. XXIII, figs. 15, 16.

A single dead specimen was sent to Dr. Branner by Mr. G. A. Waring, of the Brazilian Geological Survey, "from the plains southeast of Limoeira, State of Ceará, near the Rio Jaguaribe." It differs from the type by the much more convex lateral outlines of the spire, which is therefore wider above, the contour of the shell being somewhat cylindric, while in *scabrellus* it tapers much more regularly; the costulation is also decidedly finer than in *scabrellus*. It has only four teeth, the sutural, suprapalatal, and basal folds of *scabrellus* being absent, but this deficiency may be due to immaturity. The whorls are 10; alt. 22.7, diameter 7.5 mm.

Genus **TOMIGERUS** Spix.

Tomigerus clausus Spix.

Tomigerus clausus Spix, Testac. Bras., pl. 15, figs. 4, 5. Pilsbry, Man. Conch. (2), XIV, p. 106, pl. 7, figs. 68–70.

Specimens were taken, living and dead, rather commonly at Ceará-Mirim and Baixa Verde and less commonly at Estremoz, Maranguape Mountain, and the fossil beds below Taipú and at Quixadá and two or three other points on the Ceará & Baturité R. R. Mr. G. A. Waring sent two dead specimens "from 30 or 40 miles south of Mossoró, State of Ceará. Four specimens taken at the Serra de Ibiapaba and three from Comocim, State of Ceará, were sent from the Goeldi Museum.

Tomigerus rochai von Ihering.

Proc. Malac. Soc. London, VI, April 4, 1905.

A single specimen "from the State of Ceará" was sent by Mr. Rocha and a half-grown specimen taken at Camocim, State of Ceará, was sent from the Goeldi Museum.

Tomigerus lævis von Ihering.

Proc. Malac. Soc. Lond., *l.c.*

Three specimens "from the State of Ceará" were sent by Mr. Rocha and a single specimen taken at Camocim was sent from the Goeldi Museum.

Tomigerus cumingii 'Newcomb' Pfeiffer.

Tomigerus cumingii Newcomb MSS, Pfeiffer, Zeitschr. f. Malak., 1849, p. 67. Pilsbry, Man. Conch. (2), XIV, p. 108, pl. 7, figs. 64–66.

About twenty dead specimens were taken at Ceará-Mirim and three from "the coast region of the State of Ceará" were sent by Mr. Rocha.

Tomigerus pilsbryi n. sp. Pl. XXIII, figs. 9, 10.

Shell compressed-ovate, greatly distorted as if by pressure on the apertural side, imperforate, with a long, straightened umbilical suture ending in a deep excavation behind the columellar lip; first $1\frac{1}{2}$ whorls smooth, and, beginning on the second whorl, everywhere sculptured with very fine, irregular, retractive striulæ, most marked on the last half whorl, which shows, under a glass, a slight tendency to the corrugation which is characteristic of several species of the genus; spire conic, apex rather acute. Whorls $4\frac{3}{4}$, very slightly convex, the last greatly distorted, with an oblique groove behind the outer lip and another behind the basal lip parallel to the umbilical suture; sutures well defined. Aperture vertical, somewhat triangular, with three lamellæ on the parietal wall, the upper beginning in a slight thickening of the upper extremity of the peristome and entering sinuously and obliquely, three on the sloping columellar margin and a large, obliquely entering, plate-like fold within the outer lip, its upper end bifid; peristome broadly expanded and reflected, white; color slaty-white, shining, with a narrow brown line marking the last two turns of the suture, a faint, narrow, brownish band distinguishable on the last half turn of the body whorl and a pale brown border along the umbilical suture, continued radially upon the base some distance back of the basal lip.

Alt. 13, greatest diam. 17, least diam. 9.25 mm.

A single specimen of this species was taken at Ceará-Mirim. It is related to *T. lævis* von Ihering in being nearly smooth and colorless and to *T. rochai* von Ihering in general contour, but it is larger than the former and differs from the latter in its lower spire and less angular aperture. The upper parietal fold is even more closely united to the peristome than in *T. clausus*. It differs from all known species by its much more compressed and distorted shape.

Genus **ANOSTOMA** F. de Waldheim.

Anostoma depressum Lamarck.

Lamarck, An. s. vert., VI, pt. 2, 101. Pilsbry, Man. Conch. (2), XIV, p. 110, pl. 6, figs. 48–54.

This species was rather common at Baixa Verde and a single dead

shell was taken at Pirangý, twenty miles south of Natal. A single dead specimen taken at Camocim was sent from the Goeldi Museum. The living shells were taken under rocks where they were æstivating.

Anostoma octodentatum F. de Waldheim.

Museum Demidoff, III, p. 230 (1807).

One specimen was taken at Baixa Verde associated with the more common *A. depressum*, a single specimen taken at Camocim was sent from the Goeldi Museum and a third specimen taken "30 or 40 miles south of Mossoró, State of Ceará," was sent to Dr. Branner by Mr. G. A. Waring. All were dead, making the determination rather difficult, and each had only seven teeth, but as each has the columellar lamella which is lacking in all specimens of *depressum*, it seems justifiable to assign them to this species.

ACHATINIDÆ.

Genus **SUBULINA** Beck.

Subulina octona (Bruguière).

Bulimus octonus Brug., Encycl. Meth., I, p. 325 (1792).
Subulina octona Brug., Pilsbry, Man. Conch., (2), XVIII, p. 72, pl. 12, figs. 8, 9.

Specimens of this widely distributed species were taken at Ceará, Pará, Itacoatiara, and Camp 39, M. & M. R. R.

Genus **OPEAS** Albers.

Opeas gracile (Hutton).

Bulimus gracilis Hutton, Jour. Asiat. Soc., Bengal, III, 1834, p. 84.
Opeas gracile Hutton, Pilsbry, Man. Conch., (2), XVIII, p. 125, pl. 18, figs. 3–6.

About thirty specimens were taken at Itacoatiara and a single specimen at Camp 39, M. & M. R. R.

Opeas beckianum (Pfeiffer).

Bulimus beckianus Pfr., Symbolæ ad Hist. Heliceorum, III, p. 82 (1846).
Opeas beckianum Pfr., Pilsbry, Man. Conch., (2), XVIII, p. 189, pl. 27, figs. 42–46, 54, 55.

This species was taken in considerable numbers at Camp 39, M. & M. R. R., and a very small variety was common at Ceará-Mirim.

Opeas octogyrum (Pfeiffer).

Bulimus octogyrus Pfr., Malak. bl., III, 1856, p. 45.
Opeas octogyrum Pfr., Pilsbry, Man. Conch., (2), XVIII, p. 206, pl. 29, figs. 75–79.

One or more specimens were taken at each of the following places: Ceará-Mirim, Quixadá, Pará, Itacoatiara, and Camp 39, M. & M. R. R. A single specimen "from the State of Ceará" was sent by Mr. Rocha.

Opeas opella Pilsbry and Vanatta.

Proc. A. N. S. Phil., 1905, p. 785, fig. 1; Man. Conch., (2), XVIII, p. 186, pl. 24, fig. 36.

About forty specimens of this species, originally reported from the Hawaiian Islands, were taken in the park at Pará. Dr. Pilsbry kindly made the diagnosis, so there is no doubt of their identity. In the *Manual of Conchology*, p. 187, Dr. Pilsbry says, "I do not regard *O. opella* as a native Hawaiian species." It is difficult to imagine the route by which this species travelled from Pará to the Hawaiian Islands, but it was probably carried on plants.

Genus **LEPTINARIA** Beck.

Leptinaria lamellata (Potiez et Michaud).

Achatina lamellata P. and M., Galerie de Moll. ou catal. Moll. et Coq. du Mus. de Douai, I, p. 128, pl. 11, fig. 8 (1838).
Leptinaria lamellata P. and M., Pilsbry, Man. Conch., (2), XVIII, p. 288, pl. 42, figs. 39, 40; pl. 43, fig. 50.

Seven specimens were taken at Camp 39, M. & M. R. R.

Leptinaria lamellata concentrica (Reeve).

Achatina concentrica Rve., Conch. Icon., V, pl. 19, fig. 106 (June, 1849).
Leptinaria lamellata concentrica Rve., Pilsbry, Man. Conch., (2), XVIII, p. 290, pl. 46, figs. 1–4.

Two specimens were taken at Camp 39, M. & M. R. R., three at Itacoatiara and ten near the water works of the city of Pará. A single dead specimen, taken at the Serra do Ereré, was sent from the Goeldi Museum.

Leptinaria perforata n. sp. Pl. XXI, fig. 11.

Shell broadly perforate, rather coarse, dirty white, but showing slightly translucent in the young specimen; coarsely, rather distantly striate, with numerous fine intermediate striulæ showing under a glass; striæ slightly retractive, arcuate, and becoming sinuous on the lower whorls, dipping deeply into the broad and deep umbilicus. Whorls $6\frac{1}{2}$, of which the embryonic $1\frac{1}{2}$ are smooth, or with a trace of spiral marking showing under a glass; vertical striæ beginning on the second whorl and becoming strong on the third; whorls very convex above, almost shouldered, but less convex below; sutures deep, but not impressed. Aperture irregularly trapezoidal, slightly broader below; outer lip simple, thin, forming nearly a right angle with the parietal wall, but quickly descending and becoming sinuous; columella nearly straight, slightly reflected, but free from, and scarcely covering the umbilicus; a rather broad, thin parietal callus joining the extremities of the peristome and extending over the columella.

Alt. 4.75, diam. 2.6, alt. of mouth 1.3 mm.

The type and one half-grown specimen were taken at Camp 39, M. & M. R. R.

This species differs from all South American Leptinarias by the broad umbilicus and the sinuous outer lip.

Leptinaria imperforata n. sp. Pl. XXI, fig. 19.

Shell imperforate, oblong conic, thin, pellucid, glossy, waxy hyaline, very delicately striulate except on the smooth $1\frac{1}{2}$ nepionic whorls; striulæ slightly arcuate, nearly vertical, but tending to become retractive on the base; all except the embryonic whorls showing an obsolete spiral striation under a glass; apex rather obtuse. Whorls 5, convex, the last on its posterior aspect exactly equalling half the total length. Aperture irregularly oval; peristome unexpanded, simple, curving broadly below the columellar extremity; columella short, not reaching to the base, nearly straight and vertical, obliquely truncate, the anterior portion twisted sharply inward, thus leaving no trace of an umbilicus or umbilical fold.

Alt. 4.6, diam. 2, length of aperture 1.6, diam. of aperture .85 mm. One mature and two immature specimens were taken at Camp 39, M. & M. R. R.

The species is closely related to *L. anomala* Pfr., from which it differs by lacking the columellar reflection and the umbilicus, and by its more slender shape and slightly narrower aperture.

FERUSSACIDÆ.

Genus **CÆCILIOIDES** Férussac.

Cæcilioides (Geostilbia) gundlachi (Pfeiffer).

Achatina gundlachi Pfr., Zeits. f. Malak., 1850, p. 80.
Cæcilioides gundlachi (Pfr.), Pilsbry, Man. Conch., (2), XX, p. 43.

Eight specimens were sent by Mr. Rocha, "taken in my garden," in the city of Ceará. The species has been reported from the West Indies and Demerara, but not hitherto from Brazil.

Genus **SYNAPTERPES** Pilsbry.

Synapterpes sp. undet.

Four nepionic shells, probably of this genus and possibly new, but too young for exact diagnosis, were sent by Mr. Rocha. They were taken on the Maranguape Mountain near Ceará.

PUPILLIDÆ.

Genus **BIFIDARIA** Sterki.

Bifidaria sevilis (Gould).

Pupa servilis Gld., Boston Journ. N. H., IV, p. 356, pl. 16, fig. 14.

Four specimens, taken "in the state of Ceará," were sent by Mr.

Rocha. They are slightly shorter than typical Cuban specimens and the whorls are a little more convex.

Genus **STROBILOPS** Pilsbry.

Strobilops brasiliana n. sp. Pl. XXI, figs. 8, 9.

Shell rather narrowly perforate, broadly conic with slightly convex outlines, subcarinate at the periphery, and with a moderately rounded base; color light chestnut, a thin, close epidermis present; apex obtuse; first $1\frac{1}{2}$ whorls nearly smooth, and, beginning on the second whorl, everywhere sculptured with irregularly spaced, narrow, sharp, strongly retractive costæ, much weakened on the base, but extending into the umbilicus, separated by broad, nearly flat interspaces marked by growth lines, the costæ being rather close on the third whorl and widely separated on the last (about six to the millimeter on the penultimate whorl). Whorls $5\frac{1}{2}$, moderately convex; sutures well impressed. Aperture irregularly triangular; peristome thickened and slightly reflected, extremities not approaching and joined by a heavy callus, which is sharply defined externally and dips deeply into the mouth, over which are laid two revolving lamellæ which reach the exterior edge of the callus, one very large just exterior to the middle of the parietal wall and a second of less than half the size half way between this and the columella; columella marked near the top by a third quite prominent revolving lamella, leaving a very narrow slit between it and the parietal wall; base showing externally two revolving lines, probably representing internal basal revolving laminæ.

Alt. 2.22, greatest diam. 2.61, least diam. 2.4 mm.

Eight living specimens, all apparently mature, were taken under the bark of a decaying tree in the dense forest surrounding water works of the city of Pará.

The species is the first representative of this genus to be taken south of the Amazon River, so far as is known to the writer.

SUCCINEIDÆ.

Genus **SUCCINEA** Draparnaud.

Succinea pusilla Pfeiffer.

Mon. Hel. Viv., III, p. 18;-Conchyl. Cabinet, *Succinea*, pl. 5, figs. 27–29.

Two dead specimens, one taken at Baixa Verde, a second from Ceará sent by Mr. Rocha, agree in the main with this species as described by Pfeiffer with some doubt as from Ceará. They are somewhat larger and do not show the obsolete decussation mentioned by him, but this may be due to their being worn.

Fresh-water Shells.

MELANIIDÆ.

No specimen of this family was taken by the members of the Stanford Expedition, the following species being represented by specimens sent from the Goeldi Museum.

Genus **DORYSSA** H. and A. Adams.

A rather extensive series of shells of this genus from the lower Amazon and its tributaries seemed to unite the species *inconspicua* Brot, *transversa* Lea, and *macapa* Moricand in so puzzling a manner that the writer referred the whole group to Dr. Pilsbry for critical examination. Dr. Pilsbry kindly assorted the shells and wrote the following notes and descriptions of new species and varieties, and he has allowed their publication in this paper.

"The Doryssas of the lower Amazon Valley are all, so far as authentically localized specimens are available, specifically distinct from those of Pernambuco and southward, and also from those of Guiana, though obviously related to the latter, as would be expected from the intercommunication of inland waters. Aside from certain species described from 'South America,' 'Brazil,' or 'Amazon,' and as yet without known local habitation, the following have been reported from the lower Amazon Valley:

"*D. aquatilis* (Reeve), *Melania branca* Reeve, and *M. charpentieri* Reeve, Rio Branco.

"*D. macapa* (Moricand), Macapá.

"*D. transversa* (Lea). Guiana, Cuming coll., probably incorrect; Amazon River, Brot.

"*D. bullata* (Lea), *Melania ventricosa* Moricand, *M. batesii* Reeve. Macapá.

"*D. lumbricus* (Reeve). Pará.

"*D. inconspicua* Brot. Brazil.

"An upper Amazon form, *D. consolidata* (Brug.), has been reported from the Rio Branco, whether correctly or not is uncertain. Up to this time, no species of *Doryssa* has been reported from the southern affluents of the Amazon.

"*D. transversa, macapa, aquatilis,* and *inconspicua* are modifications of a single type of shell, and, until far more material is at hand, it will not be possible to say whether they are to be regarded as so many distinct species or as local races of one wide-spread species. Each river seems to have its slightly individualized race or races, but the localities are still so scattered that we have no adequate knowledge of how much intergradation exists.

"**Doryssa transversa** (Lea).

"*Melania transversa* Lea, Proc. Zool. Soc. London, 1850, p. 186.
"*Melania transversa* Lea, Reeve, Conch. Icon., fig. 196*a–c*.

"The typical form is a larger shell, with more spiral grooves than the forms noticed below. Its exact location is unknown.

"**Doryssa transversa jaryensis** Pilsbry, n. subsp. Pl. XXIV, figs. 1 to 7.

"The shell is spirally grooved, five grooves on each whorl of the spire, becoming weaker on the last whorl in most specimens. Minute spiral lineolation is clearly developed. Axial sculpture of slightly arcuate or nearly straight folds, which rarely persist as far as the last whorl, usually being present on the spire or upper whorls only. The whorls are nearly flat. Color Dresden-brown, Isabella color, or honey-yellow, with small, irregularly scattered black spots, or with numerous spots, more or less arranged in axial rows or confluent into streaks which nearly cover the surface in some shells. Uncleaned shells are black from a coating of iron oxide. Apex truncate.

"Length 30, diam. 12 mm.; $4\frac{1}{2}$ whorls remaining.
" 32, " 11.25 " 6 " "

"Rio Jarý, St. Antonio da Cachoeira, in bed of river immediately above the great falls. Twenty-four specimens.

"Figs. 5, 6, 7 represent typical specimens. Fig. 3 is the most strongly sculptured shell of the lot. Fig. 2 is not fully mature, retaining more of the early whorls.

"**Doryssa transversa tapajozensis** Pilsbry, n. subsp. Pl. XXIV, figs. 8, 9, 11, 12.

"The shell tapers to a rather broad truncation in adult individuals. Spiral grooves, five on each whorl of the spire, continuing on the last whorl, and usually darker colored than the intervals, which are of a dull citrine or olive-citrine shade. Microscopic lineolation weak or subobsolete on the later whorls. Axial folds narrow, numerous, typically well developed only on the earlier whorls, being weak, irregular, or wanting on the later one to three whorls; sometimes, however, continued to the last whorl.

"Length 25, diam. 11.2 mm.; $4\frac{1}{4}$ whorls remaining.
" 23.7, " 11.5 " $3\frac{1}{4}$ " "
" 29, " 11.7 " 5 " " Roughly sculptured individual.

"Rio Tapajoz, seven specimens.

"While the form with obsolete axial sculpture and spiral dark greenish lines is rather distinct in appearance, it intergrades with more strongly sculptured shells which closely resemble the sculptured form of *D. t. jaryensis*, which, however, has more distinct

spiral lineolation. The sculptured form is evidently more primitive, the derivative smooth forms being different in the two rivers.

"Three similar shells were received from the Rio Jamauchim, an affluent of the Tapajoz on the right side. The smooth phase is here light citrine with greenish-black lines in the grooves, and the sculptured phase is somewhat larger. See Pl. XXIV, figs. 8, 9. A quite young shell of the sculptured form is honey-yellow, with very few small black spots.

"**Doryssa transversa,** var. near **macapa** Moric. Pl. XXIV, figs. 13, 14.

"This form has very strong sculpture. Spiral grooves 6 or 7 on each whorl of the spire. Microscopic spirals weak or wanting on the last whorl. Axial folds strong, slightly curved, a little protractive, on the last whorl straight or sigmoid. Color russet, indistinctly variegated with black streaks or bands.

"Length 44.5, diam. 16 mm.; 7 whorls remaining.
" 30, " 13.7 " 4 " "

"Rio Maccurú, four specimens, and a single specimen from the Rio Jarý probably belongs here.

"Differs from *D. macapa* by the truncate top and better-developed sculpture, but seems too near that for separation. It is doubtless a form of the polymorphic *transversa*.

"**Doryssa inconspicua** Brot.

"Conchylien Cabinet, p. 355, figs. 2, 2*a*.

"Nine specimens come from the Ilha de Goyana, Rio Tapajoz, nine from the Rio Maccurú, and one from Tucunaré on the Rio Jamauchim.

"The species is perhaps distinct by its small size, etc., but it is very near some forms of *transversa*.

"**Doryssa rex** Pilsbry, n. sp. Pl. XXIV, figs. 10, 15.

"Shell large, tapering to a narrow truncation. Spiral grooves about 6 on the whorls of the spire, becoming wider on the last whorl, where the intervals are coarse and cord-like. Microscopic lineolation obsolete. Axial ribs slightly protractive, irregular, or obsolete on the last half whorl, about 12 on the penultimate whorl. Upper whorls nearly flat. Suture deepening on the last whorl, which is produced in a prominent keel defining a broad, horizontal shoulder below the suture, as in *D. devians* Brot. Color dull olive-citrine, in places passing into chestnut.

"Length 71.5, diam. 28 mm.; $7\frac{1}{2}$ whorls remaining.
" 67, " 24.5 " $7\frac{1}{2}$ " "
" 73, " 27.5 " $8\frac{1}{2}$ " "

"Rio Jarý, six specimens, one very immature.

"Similar to *D. rex regina*, but having coarser spirals, a larger aperture and more deviating last whorl. These two are more nearly related to *D. macapa* Moric. than to *transversa* by the greater number of spirals. With present knowledge, they seem specifically distinct from both. The young stage resembles *D. transversa jaryensis*.

"**Doryssa rex regina** Pilsbry, n. subsp. Pl. XXIV, figs. 16, 17.

"The shell is large and tapers to a narrow truncation. Spiral grooves numerous, strongest on the last whorl, seven or eight on the penultimate whorl; microscopic lineolation obsolete on the later whorls. Axial folds strong, slightly protractive, extending upon the last whorl, about 12 on the penultimate whorl. Upper whorls nearly flat, penultimate whorl more convex. Suture deepening on the last whorl, which in its last half forms a narrow horizontal shoulder below it. When cleaned of the rusty black incrustation, the spire is tawny, becoming more yellowish above, indistinctly maculate with black, last whorl bay.

"Length 67.5, diam. 22.7 mm.; $7\frac{1}{2}$ whorls remaining.
" 68, " 21.5 " 9 " "

"Rio Jarý, St. Antonio da Cachoeira, ten specimens.

"This is related to the preceding form, in which the same characters are more exaggerated. In specimens evidently adult, and of the same length, *D. rex regina* is decidedly narrower with a shorter aperture. Very likely a distinct species."

Doryssa bullata (Lea).

Melania bullata Lea, Obs. Gen. Univ., XI, p. 85, t. 22, fig. 29.

Twenty-four specimens come from the Rio Jarý near St. Antonio da Cachoeira "in the bed of the main river, immediately above the great falls."

Doryssa globosa n. sp. Pl. XXV, figs. 1, 2.

Shell rather light for the genus, globose conic, with sides nearly straight and forming an apical angle of about fifty degrees, covered with a dense epidermis shading from yellow-olive on the base to dark brown above, having well-developed spiral keels and vertical ribs, the former better developed than the latter which become obsolete on the base, their intersection being markedly tuberculate, the tubercles elongate on spiral lines; lines of growth strong, with fine spiral striæ, showing in places under a glass, in the interspaces of the spiral keels; first two whorls with four spiral keels, the last two with five, the added keel beginning in the suture and becoming

the lowest on the last two whorls; base with nine keels, nearly equally spaced and nearly equal, except the first, which shows a slight tendency to tuberculation; interspaces rather broader than the keels; last two whorls with twenty vertical ribs, the preceding with eighteen; apex eroded, with about four whorls remaining; upper whorls moderately convex, the last, with the base, well rounded; sutures well marked. Aperture slightly oblique, broadly ovate, whitish, shading to yellowish on the columella, smooth, except on the parietal wall, over most of which the epidermis and basal keels extend for more than a whole turn within the shell, leaving a narrow space above occupied by a callus carrying a shallow posterior canal; outer and lower lips, though somewhat broken, seeming to be moderately sharp and crenulated by the external sculpture; columella very concave, scarcely revolute, somewhat flattened externally, the surface thus formed extending to the effuse lower lip.

Estimated alt. 46, actual alt. 41, greatest diam. 28, length of aperture 20.5 mm.

A single dead specimen of this species was taken in the Igarapé de Paituná near Monte Alegre, Fazendo Ponto.

Doryssa starksi n. sp. Pl. XXV, figs. 5, 6, 13, 14.

Shell varying from broadly ovate conic to rather narrowly conic, very solid and heavy and with a very dense epidermis; color varying from dark olive-brown to nearly black; sculpture varying, some specimens showing both strong, nearly vertical to slightly retractive ribs and spiral keels throughout the whole shell, others having weak vertical ribs only on the last whorl and spiral keels which become nearly obsolete on the upper whorls; the most globose specimen (type) with the vertical ribs more marked than the spiral keels. Apex eroded in all specimens, the remaining whorls of the type $3\frac{1}{2}$, scarcely convex; last whorl with eleven very strong vertical ribs, the penultimate with fifteen, the next with sixteen, the ribs weakening towards the apex; spiral keels five, with a sixth forming in some specimens in the lower sutures or by intercalation; well-marked growth lines and very distinct incised spiral striæ over the whole shell, the latter visible under a strong glass; intersections of the ribs and keels producing tubercles which are slightly produced spirally; tubercles of the third, fourth, and sometimes the fifth keels of the last whorl generally much enlarged, producing a subangulation at the periphery; base moderately rounded, showing faint continuations of the vertical ribs and marked by seven or eight subequal keels with broader interspaces, the interspaces narrowing slightly

towards the bottom, the keels showing some tendency to irregular tuberculation. Aperture very oblique, oblong ovate, subangulate above and below, whitish within, tending to yellowish on the columella; parietal wall with a rather strong callus above in which lies a well-marked posterior canal, below covered by an extension of the epidermis and spiral sculpture which reaches well within the mouth; outer lip crenulated by the external sculpture, rounded rather evenly into and through the lower lip, which is effuse in a nearly horizontal plane, the so-called "auger-shaped lip" of Lea; columella slightly concave, scarcely revolute, nearly vertical, and joining the shovel-shaped base nearly at a right angle.

Estimated altitude of the type 55.5, actual alt. 45.5, diam. 27.5, length of aperture 21, width of aperture 12 mm.

The slenderest specimen with $4\frac{1}{2}$ remaining whorls measures alt. 49.5, diam. 25 mm.

Nine specimens come from the Rio Iriri, an affluent of the Rio Xingú on the left side. The species, which seems to be new, is somewhat related to *D. pernambucensis* Rve., which is a much more slender shell. It is named for Professor E. C. Starks, of Stanford University, a member of the Expedition.

Doryssa heathi n. sp. Pl. XXV, figs, 3, 4, 7.

Shell turreted, solid, tapering somewhat irregularly to the beginning of the last whorl, at which point a definite spiral constriction begins which extends to the aperture; spire varying greatly in different specimens, only one of which (type) is mature, some tapering regularly, others almost pupæform; epidermis very dense, shining; color varying from dark olive-brown to almost black; initial whorls lost in all specimens, remaining whorls, except the last, nearly smooth, but showing growth lines and, under a glass, minute spiral striæ everywhere, and a tendency to the formation of low, rounded spiral keels, two at the top and one at the bottom of each whorl; sutures well impressed, producing slight shouldering in some specimens; sculpture changing abruptly at the beginning of the last whorl, at which point a distinct, slightly tuberculate vertical rib appears, followed by fourteen others which are more marked and crossed by five well-defined spiral keels, the periphery of the whorl being distinctly biangulate by the development of two rows of strong tubercles on the third and fourth keels, the first and second keels becoming moderately tuberculate on the last quarter turn, the last keel being slightly tuberculate throughout; base well rounded, circled by four nearly equal and equally spaced keels, which roughen as they advance,

showing a tendency to become tuberculate. Apex eroded in all specimens, about 4 whorls of the type remaining intact, the variability of the immature specimens making it impossible to estimate how many are lacking. Aperture oblique, of an evenly distorted pear shape, light colored within except where the epidermis extends over the lower portion of the parietal wall for about half a turn, separating the dirty white callus on the upper portion, with its indistinct posterior canal, from the yellowish nacre of the concave, slightly revolute columella; outer lip sharp, crenulated by the external sculpture; basal lip effuse at a point rather distant from the base of the columella.

Alt. 44.5, diam. 17, length of aperture 13 mm.

Eleven specimens were taken, presumably with the last species, in the Rio Ririí.

This species is related to *D. rixosa* Ihering by the smooth initial whorls, tending to show spiral sculpture, but it differs in the development of strong, tuberculate, vertical ribs on the last whorl and in the oblique, concave, revolute columella. It is named for Dr. Harold Heath, of Stanford University, a member of the Expedition.

There is a curious relationship shown by the members of the group including *D. rixosa* and the last three species, passing from the elongate *D. rixosa* with only spiral sculpture, showing mostly on the last whorl, through the elongate *D. heathi* with a similar spire, but having on the last whorl strong vertical ribs and spiral keels with a subangulation by the two rows of tubercles, and through the stouter *D. starksi* with a very similar sculpturing of the last whorl, but with the earlier whorls ranging from rather smooth to heavily sculptured and tuberculate, to the globose *D. globosa* with its almost regular costate and tuberculate sculpture throughout. In all, unless it be *D. rixosa*, which I have had no opportunity of examining, the keels are in series of fives, and in the last two there is a marked tendency to the elongation of the tubercles along spiral lines. All are very distinct species, but it is not improbable that two or more of them may ultimately have to be united with varietal rank when the field shall have been fully explored and full suites of all the species secured.

Doryssa iheringi n. sp. Pl. XXV, fig. 8.

Shell turreted conic, solid, tapering regularly; epidermis rather heavy, slightly shining, light chestnut to very dark brown, the lighter specimens marked by small, irregular, and irregularly placed black spots; initial whorls lost in all specimens, remaining whorls rather flat, showing obsolete vertical ribs at the top which fade into

exaggerated growth lines below, and very indistinct, rather distant, spiral incised lines which become fairly well marked on the base and part of the last whorl, producing low, flattened costæ; sutures slightly impressed. Apex eroded in all specimens; greatest number of whorls persisting $5\frac{1}{2}$. Aperture oblique, pyriform, bluish-white within, the external black spots showing through when they are present; outer and lower lips thin and sharp, lower lip much produced and curving sharply and smoothly into the base of the columella; more mature specimens with a dense, but limited callus on the parietal wall above the strongly concave and slightly revolute columella.

The type with $4\frac{1}{2}$ whorls measures, alt. 35, diam. 13, length of aperture 15.5 mm.

The longest specimen with $5\frac{1}{2}$ whorls measures alt. 38.5, diam. 13.25 mm.

This species, which seems to be new, is related to *D. heathi* from which it differs by its smaller size and lighter weight, more regular form and more slender shape, and by the absence of the microscopic spiral lines which are very characteristic of the latter species. There is a tendency to a somewhat similar change of sculpture on the final whorl. More mature specimens may show the present species to be only a variety of *D. heathi*.

Five specimens, varying somewhat in shape, but of nearly the same apparent age, come from the Rio Jarý at St. Antonio da Cachoeira. The species is named for Dr. Hermann von Ihering, of the Museu Paulista at São Paulo, Brazil.

Doryssa cachoeiræ n. sp. Pl. XXV, fig. 9.

Shell very regularly turreted conic, of medium weight, with a dense epidermis varying from light yellow-olive in young shells to apparently nearly black in those more mature; everywhere marked with small, irregularly placed and shaped spots, which occasionally coalesce to form longitudinal stripes, these spots well defined in young shells, but only perceptible by transmitted light in the older and darker ones; all specimens everywhere marked with fine, close incised spiral striæ, barely perceptible with the naked eye, and overlying about nine low, broad, flattened, nearly equal spiral cords which cover the whole base of the more mature specimens; apical angle about 35 degrees; nepionic whorls eroded in all specimens, but probably not more than three, slightly roughened, but without defined sculpture, and, beginning rather abruptly on the postnepionic whorls, the rather regular growth lines are soon decussated by the

more distinct spiral striæ over the whole shell; periphery of the last whorl sharply angulate. Remaining whorls of the largest specimen (type) 4½, with probably two or three postnepionic whorls wanting, nearly flat; sutures lightly impressed. Aperture oblique, elongate pyriform; outer lip thin, simple, joining the parietal wall at an acute angle, straight for over half its length, then curving sharply into the produced basal lip; columella concave, smooth, scarcely revolute, subangulate at its junction with the basal lip; parietal wall with a thin, brown callus overlying, but not completely obscuring the epidermis and basal sculpture where it extends well within the aperture.

Alt. 19.5, diam. 8.5, length of aperture 7.75 mm.

This species is distinguished from *D. hohenackeri* Phil. of Surinam, by its smaller size, conic form, and absence of axial folds.

Three specimens come from the Rio Jarý and sixteen specimens from near St. Antonio da Cachœira, "in a side arm of the Rio Jarý full of rapids."

Doryssa cachoeiræ sulcata n. subsp. Pl. XXV, fig. 10.

Three specimens taken in the Rio Jarý with three of the type specimens differ from the type by being less sharply angulate at the periphery of the last whorl and by being sculptured throughout the whole shell with a continuation of the low spiral cords found only on the base of the type. The whorls of the subspecies are also less positively flattened than those of the type.

Doryssa tucunareënsis n. sp. Pl. XXV, figs. 11, 12.

Shell of moderate weight, ovate conic, with nearly straight sides, covered by a thin epidermis; color yellowish-brown to chestnut and marked by small, sparsely scattered black spots which are generally irregularly placed, but may form axial rows; everywhere marked by low-rounded, distinct, but not prominent, nearly equal spiral cords, five to a whorl, with six or seven on the base, the intervening spaces rather sharply incised and narrower than the cords; about twenty vertical to slightly protractive and arcuate axial ribs present on the early whorls, never very prominent, and becoming obsolete on the last whorl and base; growth lines very prominent over the whole shell. Apex eroded, remaining whorls 4, very slightly convex and indistinctly shouldered above; sutures scarcely impressed. Aperture markedly oblique, broad ovate, whitish within except where the external maculæ show through; outer and lower lips sharp and slightly crenulated by the external sculpture, base effuse; columella very convex, rounding into the parietal wall which is covered by a well-marked callus with a distinct posterior canal.

Estimated alt. 30, actual alt. 25.5, diameter 14.75, length of aperture 11.5, width of aperture 7.75 mm.

Two specimens of this species were taken at Tucunaré on the Rio Jamauchim. The sculpture is of the type of the *D. transversa* group, being somewhat similar to that of *D. inconspicua*, but the shell is very much more obese than any member of that group.

Genus **HEMISINUS** Swainson.

Hemisinus brasiliensis (Moricand).

Melanopsis brasiliensis Moric., Mem. de la Soc. de Phys. et d'Hist. Nat. de Genève, VIII, p. 144, pl. 3, figs. 12, 13 (1837).

About fifty specimens come from Alcobaça on the left bank of the lower Tocantins.

Hemisinus flammeus n. sp. Pl. XXV, fig. 15.

Shell ovate conic, rather heavy; epidermis rather light, slightly shining; color yellow-olive, marked with long, black flames, generally rather narrower than the intervening light spaces; growth lines showing distinctly, and everywhere marked by rather shallow, distant spiral sulci, obsolete above in some specimens, and becoming more defined and closer on the base. Apex lost in all specimens, remaining whorls $2\frac{1}{4}$ to 4, scarcely convex, indistinctly shouldered below the sutures, subangulate below the periphery of the last whorl. Aperture oblique, narrowly elliptical, very acutely angled above, bluish-white within except where the external flammules show through; outer lip thin, sharp, rather evenly curved to an angle with the produced, truncate base; parietal wall without callus, the epidermis and external sculpture extending within the aperture beyond the lein of vision; columella slightly concave above, nearly straight and vertical below, obliquely truncate at the base; anterior canal well marked. Type with 3 whorls, alt. 23.5, diam. 11.5, length of aperture 13, width of aperture 6.5 mm.

Most mature specimen with $2\frac{1}{2}$ whorls, alt. 22, diam. 12 mm. Six specimens of this species, come from the Rio Jamauchim. It is smaller and rather more slender than *H. zebra* Rve., which it resembles in color pattern and seems to be more closely related to *H. venezuelensis* Rve. and *H. bicinctus* Rve., but differs radically from both of them in color pattern and somewhat in general contour and shape of whorls.

Hemisinus flammeus elongatus n. subsp. Pl. XXV, fig. 16.

Two specimens taken in the Rio Jamauchim, at a different date and possibly at a different location from the preceding, differ from

the type by being more slender, more irregularly flammulate, less distinctly shouldered below the sutures, and by having the spiral sulci more persistent and deeper and the aperture broader and shorter.

Alt. 21, diam. 9, length of aperture 9, width 4.25 mm.; whorls $3\frac{1}{2}$.

AMNICOLIDÆ.

Genus **LITTORIDINA** Souleyet.

Littoridina manni n. sp. Pl. XXVI, fig. 15.

Shell distinctly rimate, but not perforate, rather thin, ovate conic, of a dark olivaceous-yellow color, lightly marked by growth lines, crossed by more distinct, irregularly sized and spaced spiral costulæ, showing under a glass on the last two whorls; spire straightly conic, apex minute, slightly obtuse and dimpled. Whorls $4\frac{1}{2}$, all moderately convex and regularly increasing; sutures well defined, but not impressed. Aperture very slightly oblique, ovate, white; peristome simple, continuous, very evenly curved, and showing a very delicate, whitish thickening within; outer lip joining the parietal wall at an angle of about ninety degrees; inner margin continuous, in contact with the preceding whorl; a delicate, deeply sinused callus joining the extremities and extending well within the aperture. Alt. 3.17, diam. 2, alt. of mouth 1.15 mm.

Two specimens differing slightly in size were taken on the north bank of the chief affluent of Paparý Lake near its mouth.

The species resembles *L. charruana* Orb., but differs by the presence of spiral striations and by the distribution of callus within the mouth. I have named the species for Mr. W. M. Mann, the entomologist of the Expedition, who alone, of the members of the Expedition, accompanied me on that portion of the trip extending up the Amazon and to the Madeira and Mamoré Rivers, and who aided me greatly in the collection of mollusks.

Genus **IDIOPYRGUS** Pilsbry.

Idiopyrgus pilsbryi n. sp. Pl. XXVI, figs. 13, 14.

Shell perforate, turreted, solid, opaque, olive-green, becoming lighter on the last whorl; spire tapering regularly to the apex, which is eroded in both specimens; surface smooth except for faint growth lines, rather dull. Whorls $4\frac{1}{2}$, all strongly convex, separated by deep sutures. Aperture oval, oblique, the basal margin only slightly advanced, the outer lip retracting upward; peristome continuous, outer lip slightly expanded, somewhat thickened within, with a rounded sinus just below the upper insertion and a small sinus at

the juncture of the outer and basal margins; columella and parietal margins continuous, forming a raised ledge across the parietal wall.

Alt., estimated in full, 4.1, diam. 2.15, length of aperture 1.15 mm.

Two specimens were taken with the last near the head of Paparý Lake.

This species differs from *I. souleyetanus* Pils. by its darker color, fewer whorls and slightly smaller size. It is the second species of the genus to be taken, the other, *I. souleyetanus* Pils., having been taken at Rio Doce, state of Espíritu Santo, in southern Brazil. In his description Dr. Pilsbry remarks, "It is probably a straggler from the fauna of eastern Brazil, of which little is known," a shrewd deduction which the discovery of *I. pilsbryi* confirms. The species is named for Dr. H. A. Pilsbry, who characterized the genus.

AMPULLARIIDÆ.

Genus **AMPULLARIA** Lamarck.

Ampullaria gigas Spix.

Testac. fluv. bras., p. 1, tab. 1, 2.

Ten specimens were taken at Itacoatiara and one large and four half-grown specimens were sent from the Goeldi Museum, the first taken on the Island of Mexiana, two at Baião on the right bank of the Rio Tocantins, and two at Arumanduba, Paraná de Almeirim.

Ampullaria figulina Spix.

L.c., p. 4, tab. iv, fig. 4.

Dead shells of this species were taken quite commonly on the shores of Lake Estremoz and three specimens taken in the Igarapé de Paituna, near Monte Alegre, Fazenda Ponto, and eight taken "in the wet plains near Arumanduba," Paraná de Almeirim, were sent from the Goeldi Museum.

Ampullaria insularum Orbigny.

Voyage dans l'Amér. Mérid., p. 371, pl. 51, figs. 1, 2.

This shell was rather common in the streams about Paparý, associated with the commoner *A. testudinea* Rve., and the Goeldi Museum sent seven specimens taken in the Rio Nhamundá at Fazenda Paraiso, near Faro, six from Boim e Pinhel, on the right bank of the Rio Tapajoz, three from Monte Alegre, Igarapé Pucú, and five from Arumanduba, Paraná de Almeirim. Von Ihering (*Anal. Mus. Nac. Bs. As.*, VI, Aug. 3, 1898) considers this species synonymous with *A. gigas* Spix. All shells examined, while showing the same general form and deep sutures, were easily separated by the much lighter weight of the shells and the more open umbilicus.

Ampullaria lineata Spix.

L.c., p. 3, tab. v, fig. 2.

Four specimens were taken in the artificial lake on the water front at Ceará, a single specimen near the Guajara-Assú Falls on the Mamoré River, and two specimens were sent by Mr. G. A. Waring "from the lower portion of the Rio Mossoró in the state of Rio Grande do Norte.

Ampullaria nobilis Reeve.

Conch. Icon., 1858, pl. ii, fig. 8.

Five specimens were taken in a small stream in the suburbs of Pará and ten taken on the Island of Mexiana, one from the Rio Jamauchim and one from Baião on the right bank of the Rio Tocantins were sent from the Goeldi Museum.

Ampullaria peristomata Orbigny.

Magazin de Zoologie, 1835, p. 32; Voyage, pl. 52, figs. 4–6.

Three or four specimens of this species, which is characteristic of the head waters of the Madeira River System, were taken on a sand bank below the Guajara-Assú Falls and about thirty specimens at Camp 43, M. & M. R. R.; three specimens were sent from the Goeldi Museum, one each from the Rios Tapajoz, Jamauchim, and Maccurú. Two specimens brought through without water proved to be alive and in good condition when put into water at the Academy of Natural Sciences in Philadelphia about two months later.

Ampullaria testudinea Reeve.

Conch. Icon., X, pl. xxiv, fig. 114 (1856).

This was the commonest *Ampullaria* at Paparý and at Ceará-Mirim; three young shells were taken at Maranhão, and a single specimen from the Rio Maccurú was sent from the Goeldi Museum.

Ampullaria bridgesii Reeve.

Conch. Icon., X, pl. xi, fig. 50, (1856).

About forty specimens were taken at Pará, a single very large and heavy dead specimen at Camp 43, M. & M. R. R., two specimens were sent by Mr. G. A. Waring from "the lower portion of the Rio Mossoró, Rio Grande do Norte," and four were sent from the Goeldi Museum, one from the Igarapé de Paituna near Monte Alegre, Fazenda Ponto, two from the Rio Maccurú, and one from the Igarapé Pucú, Monte Alegre.

Ampullaria crassa Swainson.

Zoological Illustrations, No. 28, tab. 136.

Six specimens taken "in the water-filled stone holes in the dry bed

of a small affluent of the Rio Jarý near the great falls" near St. Antonio da Cachœira were sent from the Goeldi Museum. They seem to fall into this species, although they are proportionally slightly narrower than is typical for the species.

Genus **MARISA** Gray.

Marisa cornu-arietis Linne.

Syst. Nat., X, p. 771, No. 590.

A single specimen of this species, taken at Alcobaça, on the Rio Tocantins, was sent from the Goeldi Museum.

PHYSIDÆ.

Genus **PHYSA** Draparnaud.

Physa rivalis (Maton and Rackett).

Bulla rivalis M. and R., Trans. Linn. Soc. London, VIII, 1807, p. 126, pl. 4, fig. 2.

Physa sowerbyana Orbigny, in Sagra, Hist. fis. polit. e nat. de la Isla de Cuba, Moluscos, p. 101, pl. 13, figs. 11–13, 1845.

About fifty specimens were taken in an artificial lake in the park in front of the Cathedral of Pará, half a dozen in Paparý Lake, and a single dead specimen taken at Ceará-Mirim seems to be the same.

Physa sp. undet.

Forty or fifty young specimens taken at Maranhão seem somewhat different from the preceding, but may be the same. They are too young to diagnose with certainty.

PLANORBIDÆ.

Genus **PLANORBIS** Müller.

Planorbis anatinus Orbigny.

P. anatinus (Planorbe des Canardes) Orb., Voyage, V, pt. 3, p. 361, pl. 45, figs. 17–20.

About twenty-five specimens were taken with *Physa rivalis* in the artificial lake in Pará.

Planorbis cultratus Orbigny.

In Sagra, *l.c.*, p. 105, No. 115, pl. xiv, figs. 5, 8.

Half a dozen specimens were taken near the mouth of the principal affluent of Lake Paparý. This is the southern known limit for the species.

Planorbis cimex Moricand.

Thirteen specimens were taken with the preceding.

Planorbis guadeloupensis Sowerby.

Genera of Shells, *Planorbis*, fig. 2, (1824?).

This shell was taken commonly with the preceding two near Lake

Paparý and was not rare on the shores of Lake Estremoz, all specimens having been taken dead. So far as is known to the writer, this species has not been taken before in South America, and this is the southern known limit for the species.

Planorbis stramineus Dunker.

Conchylien Cabinet, p. 4, pl. v, fig. 7*a*.

Specimens were taken with the preceding at Paparý Lake, at Ceará-Mirim, and at Ceará. There are about half a dozen very similar forms of *Planorbis* described from South America, not figured or imperfectly figured, quite possibly reducible to one or two species. *Planorbis stramineus* Dunker seems to be the first of these to be described.

Planorbis depressissimus Moricand.

Mem. de la Soc. de Phys. et d'Hist. Nat. de Genève, VIII, 1839, p. 143, pl. 3, figs. 10, 11.

One specimen of this species "from the Coast Region of Ceará" was sent by Mr. Rocha.

Planorbis peregrinus Orbigny.

Magazin de Zoologie, 1835, p. 26; Voyage, p. 348, pl. 44, figs. 13–16.

One specimen "from the Coast Region of Ceará" was sent by Mr. Rocha.

Segmentina paparyensis n. sp. Pl. XXVI, figs. 9, 10, 11.

Shell dextral, broadly, rather deeply umbilicate, rather solid, planorboid, everywhere sculptured with minute, retractive, sharp costulæ, irregularly sized and spaced, the interspaces being broader, and showing on the base, under a strong glass, minute spiral striations formed by the crinkling of the radiating costulæ; light horn colored. Whorls 4, regularly increasing, the last subangulate below the periphery behind the outer lip for about $\frac{1}{3}$ turn, scarcely angulate below, very sharply descending at the mouth; apex depressed, only the last two whorls reaching the upper level of the shell. Aperture very oblique, subhorizontal, rounded; lip simple, not thickened nor sharpened, slightly reflected at the lower angle, extremities approaching, and joined by a slight callus in some specimens; apertural lamellæ five, two parietal and three (palatal) on the outer wall; upper parietal lamella about central, the lower about midway between this and the columellar junction and appearing about half the size on external inspection, both showing a nearly triangular section, the lower sides being nearly horizontal, the upper ascending; lower palatal lamella beginning near the suture and extending nearly

transversely across the base, and slightly up the outer side, straight and rather evenly arched; remaining palatal lamellæ deep within the shell, nearly horizontal, short, the lower one slightly larger.

Greatest diam. 6, least diam. 5.25, alt. 2 mm.

Two specimens of this species, which seems to be new, were taken near the mouth of the main affluent of Paparý Lake with the species noted above.

It differs from *S. janeirensis* Clessin by the unusually deep descent of the last whorl at the aperture.

Genus **GUNDLACHIA** Pfeiffer.

Gundlachia bakeri Pilsbry, n. sp.

Several specimens of this species were taken with *Physa rivalis* and *Planorbis anatinus* in the artificial lake in Pará. They were not noticed at the time of collection, but were discovered in a bottle of alcoholics containing the *Physa rivalis* and *Planorbis anatinus* noted above. They are described by Dr. Pilsbry in a supplementary paper.

SPHÆRIIDÆ.

Genus **EUPERA** Bourguignat.

Eupera. Pl. XXVI, fig. 12.

Shell rather small, delicate, very inequipartite, compressed, transversely oblong, subrhomboidal, narrowing positively, and well rounded anteriorly, the lower margin moderately curved, the posterior broad and subtruncate, angulate above at the extremity of the hinge line, subangulate below, sharply compressed posteriorly below the hinge line, producing a sulcus extending from the umbo to the posterior end of the valve at an angle of about thirty degrees from the horizontal; everywhere sculptured with nearly even and evenly spaced concentric costulæ, about twelve to the millimeter on the middle of the valve and considerably finer near the beaks; color a slightly glistening yellow horn color, maculated irregularly and rather closely with small purplish to black dots distributed in rather radiating patterns and massing posteriorly to an irregular line along the posterior sulcus. Beaks small, closely approaching, and pointing forward, calyculate; cartilage moderately exposed; hinge line narrow, straight posteriorly, very slightly curved anteriorly, armed with a single, almost obsolete cardinal in each valve, two moderately strong, simple laterals in the right valve and a simple anterior and a strongly bifid posterior lateral in the left valve.

Length 6, diam. 3, alt. 4 mm.

About twenty specimens of this species were taken from the roots of the water hyacinth on the left bank of the main affluent of Lake Paparý. In view of the difficulty of the group, several closely similar forms being described, some of them imperfectly, it has been thought best to leave this species nameless. The description and figure should enable some future reviser to determine the Lake Paparý form.

UNIONIDÆ.

Genus **CASTALIA** Lamarck.

Castalia ambigua Lamarck.

An. sans Vert., VI, 1819, p. 67.
Tetraplodon ambiguus Lam., Simpson, Proc. Nat. Mus., Vol. XXII, p. 863.

One perfect, dead specimen and with several valves, were taken just below the Guajara-Assú Falls, and about twenty dead specimens were taken on a sand bank below Camp 43, M. & M. R. R.; three valves taken on the Ilha de Goyana, in the Rio Tapajoz, and one from the Ilha Itaiúna, near Cametá, Rio Tocantins, were sent from the Goeldi Museum.

Castalia quadrilatera Orbigny.

Guerin, Mag. de Zool., No. 62, 1835, p. 42.
Tetraplodon quadrilaterum (Orbigny), Simpson, *l.c.*, p. 864.

A single mature specimen taken in the Rio Jamauchim was sent from the Goeldi Museum.

Genus **HYRIA** Lamarck.

Hyria corrugata Lamarck, var. **exasperata** (Sowerby).

Hyria exasperata Sowerby, Conch, Icon., XVII, 1869, pl. 2, fig. 3.

Simpson (*l.c.*, p. 869) unites the variety with the type. About a dozen specimens were taken at Camp 43, M. & M. R. R., all of which were almost exactly alike, and all of which correspond so exactly with Sowerby's figure that it seems to the writer that the variety must be valid.

Hyria jamauchimensis n. sp. Pl. XXVII, figs. 8, 9.

Shell rather light, compressed, subrhomboidal, inequipartite; beaks low, eroded, but still showing signs of strong radial sculpture which extends over the disk about half way to the margin, the central bars anastomosing and dividing irregularly, a few of them extending brokenly nearly to the edge of the shell; anterior and posterior bars nearly horizontal and more defined; growth lines close, but fairly distinct, decussating the radial sculpture throughout; epidermis rather delicate, light yellow-olive; a small anterior wing with a slightly upturned angle and more distinctly winged posteriorly, the

posterior wing being distinctly twisted to the left side; posterior ridge not prominent, indistinctly duplicated, producing an indistinct biangulation; posterior groove scarcely perceptible; superior margin slightly arcuate, anterior narrowed, sharply curved above and gradually and regularly extending into and through the basal margin in an evenly decreasing curve to the lower, posterior angle; posterior margin obliquely truncate; hinge line sharply curved; right valve with three pseudocardinals, two small, simple, widely diverging, including between them a large, triangular middle pseudocardinal which is split into six irregular denticles, and a long, narrow, low-arched lateral lying well within the margin of the posterior wing; left valve with three pseudocardinals, the anterior simple and prominent, the posterior two flattened and irregularly divided into denticles, and two long laterals which coalesce anteriorly over about one-third of their length; anterior muscle scar rather evenly rounded, well impressed, posterior elongate and indistinct; pallial line well marked; nacre pearly-white, iridescent posteriorly; ligament moderate, thickened posteriorly.

Animal unknown.

Length 45.75, width 31, diam. 11.75 mm.

A young specimen of this species which seems to be new, taken in the Rio Jamauchim, was sent from the Goeldi Museum. The sculpture suggests *H. rugossissima* Sby., but is very much finer than in that species.

Genus **PRISODON** Schumacher.

Prisodon obliquus Schumacher.

Ess. Nouv. Syst., 1817, p. 139, pl. xl, fig. 2.
Simpson, *l.c.*, p. 871.

One specimen taken at Boim, on the Rio Tapajoz, was sent from the Goeldi Museum.

Prisodon syrmatophorus (Meuschen).

Mya syrmatophora Meuschen, in Gronovius, Zooph., 1781, pl. xviii, figs. 1, 2.
Prisondon syrmatophorus (Meuschen), Simpson, *l.c.*, p. 870.

Seventeen specimens taken in the Rio Jamauchim were sent from the Goeldi Museum.

Genus **DIPLODON** Spix.

Diplodon kelseyi n. sp. Pl. XXVII, figs. 5, 6, 7.

Shell transversely subrhomboidal, rather heavy, of moderate size, very inequipartite; epidermis dark brown to black, rayless and almost lustreless; dorsal margin markedly curved, the basal nearly straight, narrowly, evenly rounded in front, obliquely truncate

behind, producing a subangulation above and below, scarcely alate; beaks rather low, sculptured with strong ribs, nearly vertical in front, more radiating posteriorly and changing abruptly to nearly horizontal in the posterior sulcus; everywhere marked by strong concentric growth lines which decussate the beak sculpture and become almost lamellate in the posterior sulcus, and very faintly marked by obsolete radiating lines discoverable over most of the shell; posterior ridge low, posterior groove shallow and flat; hinge line much curved, right valve with a large and a small compressed pseudocardinal, which are nearly parallel, the upper (anterior) thin, straight, and regular, the other much heavier, but varying in different specimens, both variously corrugated and lined on their adjacent surfaces and nearly smooth on their distal surfaces, and, on the same valve, a long, slender lateral which is generally roughened on the inner surface and minutely, irregularly serrate on the edge; left valve with two compressed pseudocardinals, one in front of the other, the anterior one roughened and much the larger, and two long, slender, and nearly parallel laterals; beak cavities moderately deep; cicatrices deeply impressed and well defined, the anterior irregularly incised on the posterior edge; nacre not brilliant, bluish-white, slightly iridescent behind.

Length 59.5, width 37.5, diam. 28 mm.

Thirteen specimens of this species, which seems to be new, taken in the Rio Jamauchim, were sent from the Goeldi Museum. The species is named for Professor F. W. Kelsey, of San Diego, Cal., who has kindly undertaken the photographing of the shells illustrated in this paper.

Diplodon obsolescens n. sp. Pl. XXII, figs. 16, 17.

Shell rather thin, elongate subrhomboidal, rather full, very inequipartite; beaks low, eroded, but apparently presenting the peculiar radial sculpture characteristic of the genus; everywhere marked by concentric growth lines and with about two-fifths of the disk marked by extensions of the radial sculpture of the beaks; epidermis rather heavy, black, rayless; anterior margin rather evenly rounded; basal margin nearly straight; posterior margin truncate with evenly rounded upper and lower angles; superior margin slightly curved; hinge line distinctly angulate below the umbones; teeth very poorly developed, the outer (anterior) pseudocardinal of the right valve being restricted to a narrow, scarcely perceptible ridge, the other being broader but only slightly more elevated, the long lateral a little more prominent than either pseudocardinal; pseudocardinals of the left valve equally obsolete, while the two laterals are fairly

developed; location of teeth and general shape characteristic of the genus; beak cavities very shallow, nacre dull bluish-white.

Length 57, width 25.5, diam. 16.5 mm.

One complete specimen and four broken valves of this species, which seems to be new, taken in the Rio Jamauchim, were sent from the Goeldi Museum. All of the specimens are more or less damaged, but it seemed best to describe the species from the material at hand on account of the remarkable obsolescence of the hinge teeth.

Genus **ANODONTITES** Bruguiere.

Anodontites ensiformis (Spix).

Anodon ensiformis Spix. Test. fluv. bras., 1827, p. 31, pl. xxiv, fig. 1.
Glabaris ensiformis (Spix) Simpson, *l.c.*, p. 932.

A single valve was taken at Camp 43, M. & M. R. R.

Anodontites trapezialis Lamarck, var. **anserinus** (Spix).

Anodon anserina Spix, *l.c.*, p. 29, pl. xvii, figs. 1, 2.

A single mature specimen taken in the Rio Jamauchim was sent from the Goeldi Museum.

Anodontites dalli n. sp. Pl. XXVII, figs. 1, 2.

Shell oblong elliptical, rather heavy, moderately full, very inequipartite; beaks rather low, eroded, but apparently nearly smooth; epidermis moderately dense, chestnut colored, light at the beaks, becoming dark at the margins, very slightly shining; rayless; everywhere showing rather distant, low-rounded, concentric growth ridges with many fine, wavy, concentric, incised lines between and overlying them; obsolete radiating lines perceptible without a glass over most of the surface; posterior ridge low, rounded, posterior sulcus shallow and not well defined, much roughened by the growth lines; hinge line nearly straight, about half the length of the shell, with a long, thin ligament, edentulous; anterior margin narrowly and rather evenly rounded, base a long, even curve; posterior margin very obliquely truncate above, sharply rounded below; beak cavities broad and shallow, cicatrices smooth, showing continuous nacreous layers, anterior distinct and well impressed, posterior scarcely defined; nacre silvery-white, iridescent throughout; pallial line distinct.

Animal unknown.

Length 77, width 37, diam. 23 mm.

A single well-preserved specimen of this species, taken on the Island of Mexiana, was sent from the Goeldi Museum. The species is named for Dr. W. H. Dall, of the National Museum.

Anodontites bartschi n. sp. Pl. XXVII, 3, 4.

Shell small, uniformly thin, obliquely subelliptical, moderately full, inequipartite; rather smooth, the growth lines being fine and low, and with obsolete radiating lines produced by a peculiar wrinkle striation irregularly placed, which is not constant, having largely disappeared from the type; epidermis thin, light yellow-olive to dark yellow-olive, rayless; posterior ridge low, with a small, sharp duplication, posterior sulcus shallow; anterior margin subangulate above, regularly and slantingly rounded into the base, the outline of the base becoming nearly straight posteriorly; posterior margin obliquely truncate, forming a straight line contained $2\frac{1}{2}$ times in the greatest length; obtusely angulate above, terminating below in a rather broad posterior point; upper margin and hinge line slightly curved; edentulous with a very narrow, thin ligament; beaks rather full, eroded, but apparently smooth; beak cavities moderate, cicatrices indistinct, the anterior very large; pallial line indistinct; nacre silvery-white, not brilliant, but slightly iridescent throughout.

Animal unknown.

Greatest length 35.5, width 25, diam. 14 mm.

Three specimens of this species, all probably somewhat immature, taken at Boim e Pinhel, on the left bank of the Rio Tapajoz, were sent from the Goeldi Museum. The species differs from all the round species of *Anodontites* by the truncation of the posterior extremity. It is named for Dr. Paul Bartsch, of the National Museum.

Anodontites sp. undet.

A single specimen of this genus, taken with the preceding, too young to identify, but not corresponding to any of the foregoing species, was sent from the Goeldi Museum.

Appendix: Notes on Gundlachia Pfr., by H. A. Pilsbry.

The peculiar Ancyloids known as *Gundlachia* have been the occasion of some speculation and difference of opinion among conchologists. That *Gundlachia* is dimorphic, sometimes maturing as an *Ancylus* without the intervention of a septate stage, was first intimated by Guppy in 1870[1] and later by several other naturalists. It was observed by the present writer about 1886,[2] and recently by Mr. J. A. Allen, who proved the identity of the septate and non-septate forms by breeding them in jars.

[1] Guppy, *American Journal of Conchology*, VI, 1870, p. 311.

[2] Pilsbry, *Nautilus*, IX, 1895, p. 63. Cf. also Bryant Walker, *Nautilus*, XXI, 1907, p. 14.

Nordenskiold[3] and Dall[4] consider *Gundlachia* to be merely a dry season or winter stage of Ancylus. As Dr. Dall expresses it, "an *Ancylus* which has under favorable circumstances been able to form a calcareous epiphragm and survive the winter, which ordinarily kills the great mass of individuals, and while retaining the shell of the first year, to secrete an enlarged and somewhat discrepant shell during its second summer," this ability not being possessed by all Ancyli.

The rarity and sporadic occurrence of *Gundlachia* are apparently favorable to this view; yet on closer inspection, less favorable than at first appears. Of the Gundlachias I have myself collected, or known from specimens taken in regions where the *Ancylus* fauna is well known, not one can be regarded as a form of any known *Ancylus* of the region. Each one of the known United States forms of *Gundlachia* is specifically distinct from any *Ancylus*, wholly apart from the septum-forming ability. The case would be quite different if the only difference between a *Gundlachia* and some *Ancylus* of the same fauna was the presence of a septum in some individuals.

Ancylus commonly lives over winter in this latitude. I have repeatedly collected specimens in the spring, in which the previous season's growth was distinguishable from the new growth by greater solidity and a coat of iron stain. In the Delaware River I have taken specimens in winter from under stones at low water, in places which had previously been covered with ice. In size they varied from quite small to full grown.

The only case known to me where a *Gundlachia* has been identified with a known species of *Ancylus* is Nordenskiold's reference of a form from the Chaco region to *A. moricandi* Orb. It is quite possible that this identification might be altered on thorough comparison of authentic specimens.

Dr. Dall has proposed a convenient terminology for the post-embryonic stages in the life of *Gundlachia*, as follows:

I. *Ancyloid stage*, shell simple, *Ancylus*-shaped.

II. *Septate stage*, a deck or septum added.

III. *Gundlachia stage*,[5] an Ancylus-like shell added to the margins of the aperture of the septate stage, the latter lying obliquely upon it.

The form in which there is no septate stage, and which is indis-

[3] *Zoologischer Anzeiger*, XXVI, 1903, p. 590.

[4] *Nautilus*, XVII, Jan., 1904, p. 97; *American Naturalist*, XLV, March, 1911, p. 175.

[5] The genus *Gundlachia* was originally described from specimens in the "septate stage," but later was found in the third stage.

tinguishable from *Ancylus*, may be termed the *non-septate form*. It is not merely the ancyloid stage grown large, because the young non-septate never has the shape of the ancyloid stage. When of the same length as that, it is a wider shell. This is certainly the case in the Illinois species which I collected about 1886, and, so far as I can make out, in Mr. Allen's Ohio specimens also. It appears, therefore, that in all post-embryonic stages the septate form differs from the non-septate.

It seems certain that the typical forms of *Ancylus* and the great majority of known species never develop a septate form, which, from Mr. Allen's observations, seems dependent upon physical conditions. Whether *Gundlachia* is to be retained as a genus depends upon whether we consider *the ability to produce the septate form* to be a character of taxonomic value. To me it appears to be so, even though the character is not expressed in all individuals or under all conditions.

Gundlachia bakeri n. sp. Pl. XXVI, figs. 1, 2, 3.

In the second or septate stage the shell is oblong, the width contained twice in the length; sides slightly convex. The obtuse, rounded summit is very close to the posterior end and overhangs the right margin. Back and left slope are strongly convex; posterior and right slopes short and steep. There are a few low, wave-like concentric wrinkles near the embryonic shell and some faint radial lines on the anterior part. The sides curve into the deck, except posteriorly where there is an angle or keel at junction of upper surface and deck. The deck or septum is convex and covers about two-thirds of the lower face. The aperture is oval, its margins elevated, blackish, and a little reflexed.

Length 2.8, width 1.4, alt. 1 mm.

Several dozen specimens were taken during the dry season in an artificial lake or pond in one of the small parks of the city of Pará situated between the public market and the Cathedral. Over a hundred specimens of *Physa rivalis* M. & R., *Planorbis anatinus* Orb., and what the collector supposed to be *Ancylus* were taken from the dead leaves and debris in the pond and preserved together in alcohol. Part of the collecting was done by stripping the leaves. On examination of the bottle after arrival in Philadelphia a number of specimens of the septate form of *Gundlachia* were discovered and the supposed *Ancylus* is probably the non-septate form, presumably of the same species.

The pond is two hundred or more feet long, rather narrow and

winding, and averages three or four feet deep. It empties by an overflow and is supplied by a small fountain which was always playing on the numerous occasions when the park was visited. The large amount of dead leaves and debris on the bottom of the pond makes it probable that it has not been drained for a long time, if ever, since its construction.

This species, named for Dr. Fred Baker, who collected the series, differs from the form figured by Nordenskiold by its smaller size and the far more eccentric apex. The position of the apex will also serve to separate *G. bakeri* from *G. textilina* Guppy of Trinidad and all other known species of the genus. A large series taken is very constant in size and form. Specimens in the first or Ancyloid stage and others with the septum in various degrees of development occurred in the same gathering. There were none, however, in the third or complete *Gundlachia* stage.

With the *Gundlachia* just described there were many specimens of an Ancyloid which may be the dimorphic form alluded to above, in which the septate stage is omitted, or possibly it may be a distinct species of true *Ancylus*.[6] These shells (Pl. XXVI, figs. 4 to 8) are thin, fragile, corneous, and diaphanous, oval, the apex slightly behind the posterior fourth of the length and almost overhanging the right margin; anterior and left slopes convex, posterior and right slopes more or less concave; apex rounded, with a slight apical depression, the embryonic shell minutely pitted; surface elsewhere marked with faint growth lines and minute, unequal radial striæ, wanting on the short slope below the apex.

Length 4.1, width 3, height 1 mm.

With some resemblance to *A. excentricus* Morelet, this form differs by its broader contour and more eccentric apex.

The young shell, 2.4 mm. long (Pl. XXVI, fig. 4), is *much wider* than the ancyloid stage of *G. bakeri* of similar length, the breadth contained only about 1.4 times in the length, while an Ancyloid of the same length is twice as long as broad.

Whether this form will turn out to be the non-septate form of *G. bakeri* or a distinct species of *Ancylus* is an open question, but I incline to the former view.

[6] The South American *Ancyli* do not belong to any of the subgenera established for northern species. In most of them the embryonic shell is punctate, pitted, or pock-marked and of an obtuse, rounded shape, with the usual apical depression. This group may be called *Hebetancylus*, type *A. moricandi* Orb. Others have an acute, hooked apex, also slightly punctate near the margin of the embryonic shell, subgenus *Uncancylus*, type *A. barilensis* Moricand. Both groups are sinistral.

Reference to Plates XXI–XXVII.

PLATE XXI.—Figs. 1, 2.—*Helicina schereri* n. sp.
Fig. 3.—*Helicina guajarana* n. sp.
Figs. 4, 5.—*Helicina latercidis* n sp.
Figs. 6, 7.—*Guppya mayi*, n. sp.
Figs. 8, 9.—*Strobilops braziliana* n. sp.
Fig. 10.—*Leptinaria imperforata* n. sp.
Fig. 11.—*Leptinaria perforata* n. sp.
Figs. 12–14.—*Zonitoides parana* n. sp.

PLATE XXII.—Figs. 1, 2.—*Solaropsis rugifera* Dohrn.
Figs. 3, 4.—*Happia snethlagei* n. sp.
Figs. 5–7.—*Streptaxis cookeana* n. sp.
Figs. 8–10.—*Streptaxis abunaensis* n. sp.
Figs. 11–13.—*Entodina jeckylii* n. sp.
Figs. 14, 15.—*Systrophia eatoni* n. sp.
Figs.16, 17.—*Diplodon obsolescens* n. sp.
Fig. 18.—*Orthalicus sultana meobambensis* Pfr.
Fig. 19.—*Psadara derbyi cearana* n. subsp.

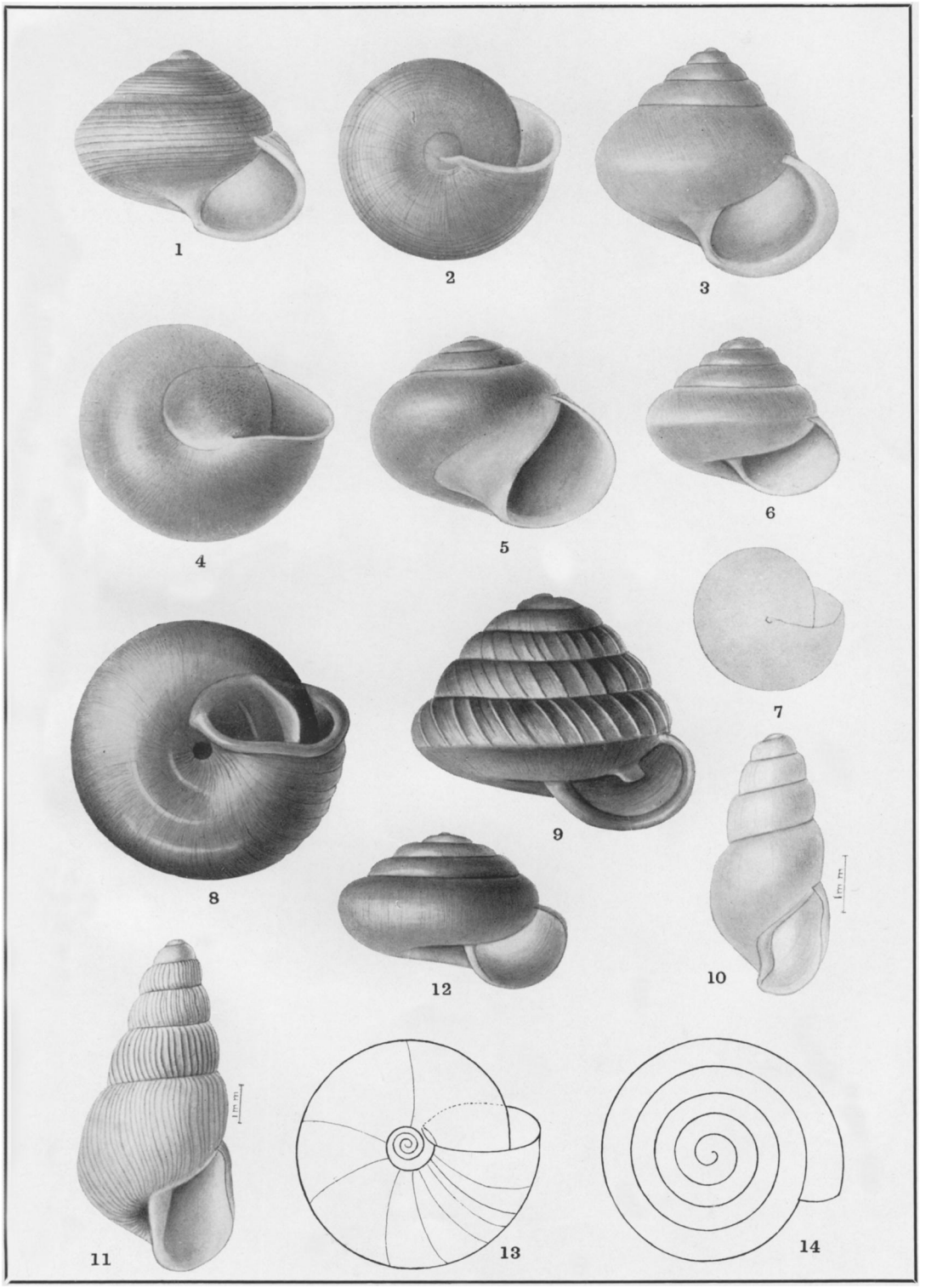
PLATE XXIII.—Figs. 1–4.—*Drymæus branneri* n. sp.
Figs. 5–8.—*Drymæus linostoma suprapunctatus* n. subsp.
Figs. 9, 10.—*Tomigerus pilsbryi* n. sp.
Figs. 11, 12.—*Odontostomus inflatus costulatus* Anc.
Figs. 13, 14.—*Bulimulus rochai suturalis* n. subsp.
Figs. 15, 16.—*Odontostomus scabrellus cylindricus* n. subsp.
Fig. 17.—*Bulimulus rochai taipuensis* n. subsp.
Fig. 18.—*Odontostomus inflatus maranguapensis* n. subsp.
Figs. 19, 20.—*Bulimulus rochai* n. sp.
Figs. 21, 22.—*Corona regalis* Hupé.

PLATE XXIV.—Figs. 1–7.—*Doryssa transversa jaryensis* n. subsp.
Figs. 8, 9.—*Doryssa transversa tapajosensis* n. subsp.
Fig. 10.—*Doryssa rex* n. sp.
Figs. 11, 12.—*Doryssa transversa tapajosensis* n. subsp.
Figs. 13, 14.—*Doryssa transversa*, var. near *macapa*.
Fig. 15.—*Doryssa rex* n. sp.
Figs. 16, 17.—*Doryssa rex regina* n. subsp.

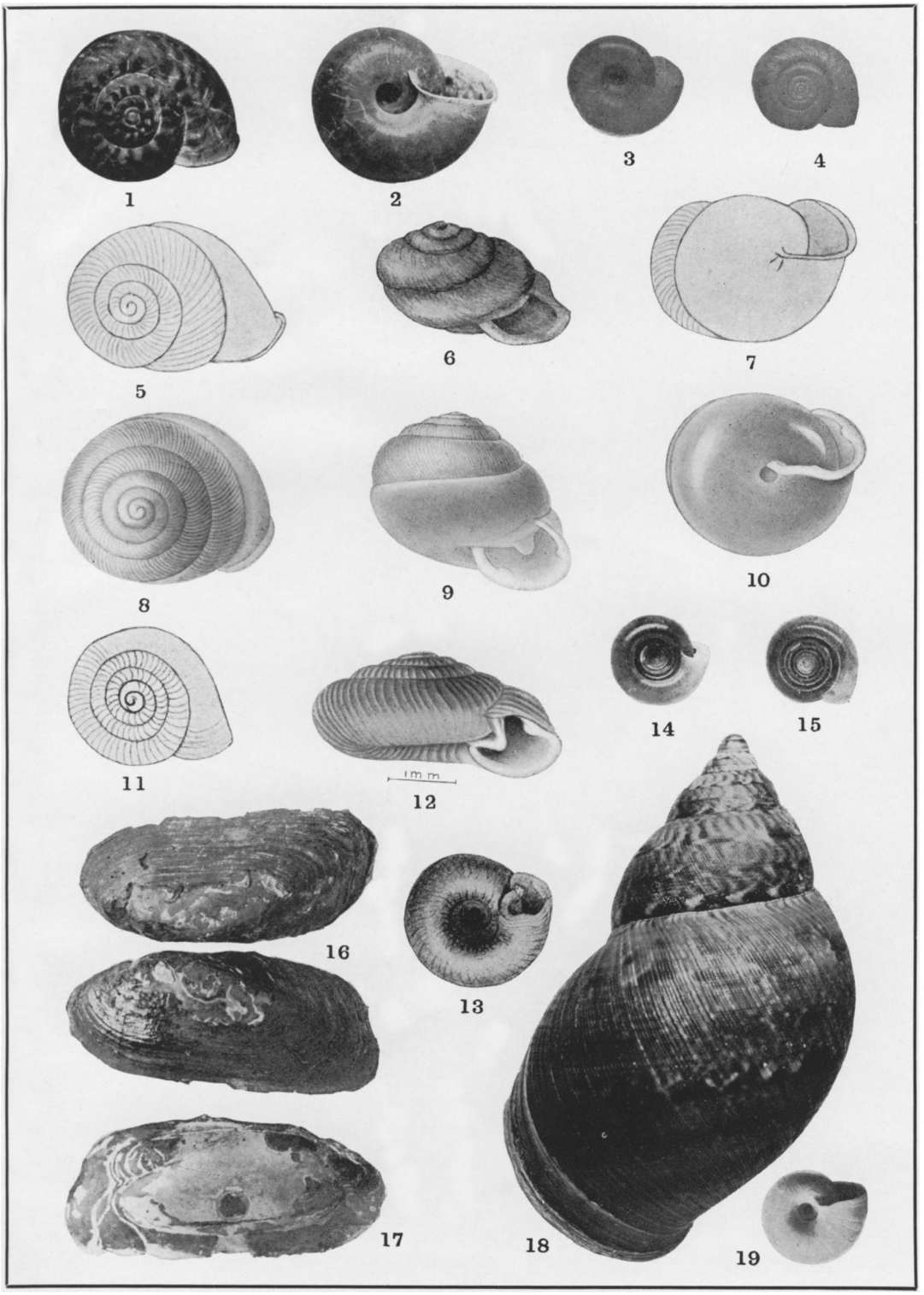
PLATE XXV.—Figs. 1, 2.—*Doryssa globosa* n. sp.
Figs. 3, 4.—*Doryssa heathi* n. sp.
Figs. 5, 6.—*Doryssa starksi* n. sp.
Fig. 7.—*Doryssa heathi* n. sp., young shell.
Fig. 8.—*Doryssa iheringi* n. sp.
Fig. 9.—*Doryssa cachoeiræ* n. sp.
Fig. 10.—*Doryssa cachoeriæ sulcata* n. subsp.
Figs. 11, 12.—*Doryssa tucunareënsis* n. sp.
Figs. 13, 14.—*Doryssa starksi* n. sp.
Fig. 15.—*Hemisinus flammeus* n. sp.
Fig. 16.—*Hemisinus flammeus elongatus* n. subsp.

PLATE XXVI.—Figs. 1, 2, 3.—*Gundlachia bakeri* Pils., n. sp. Dorsal, lateral, and ventral views of the type.
Fig. 4.—*Gundlachia bakeri*. Very young individual of non-septate form.
Figs. 5–8.—*Gundlachia bakeri*. Non-septate form, dorsal, lateral, ventral, and posterior views of the adult stage.
Figs. 9–11.—*Segmentina paparyensis* n. sp.
Fig. 12.—*Eupera* sp. undet.
Figs. 13, 14.—*Idiopyrgus pilsbryi* n. sp.
Fig. 15.—*Littoridina manni* n. sp.

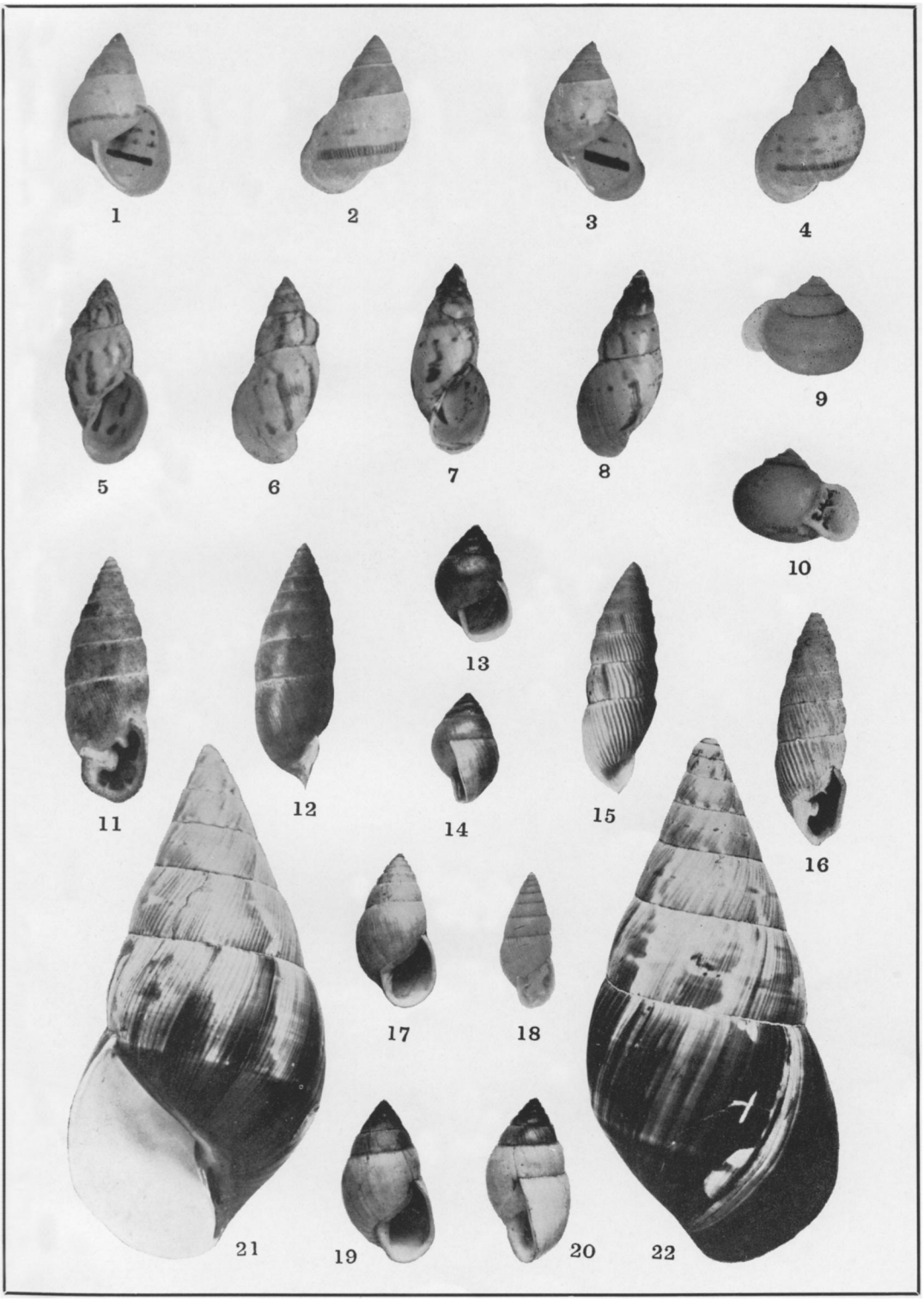
PLATE XXVII.—Figs. 1, 2.—*Anodontites dalli* n. sp.
Figs. 3, 4.—*Anodontites bartschi* n. sp.
Fig. 5.—*Diplodon kelseyi* n. sp., young.
Figs. 6, 7.—*Diplodon kelseyi* n. sp.
Figs. 8, 9.—*Hyria jamauchimensis* n. sp.



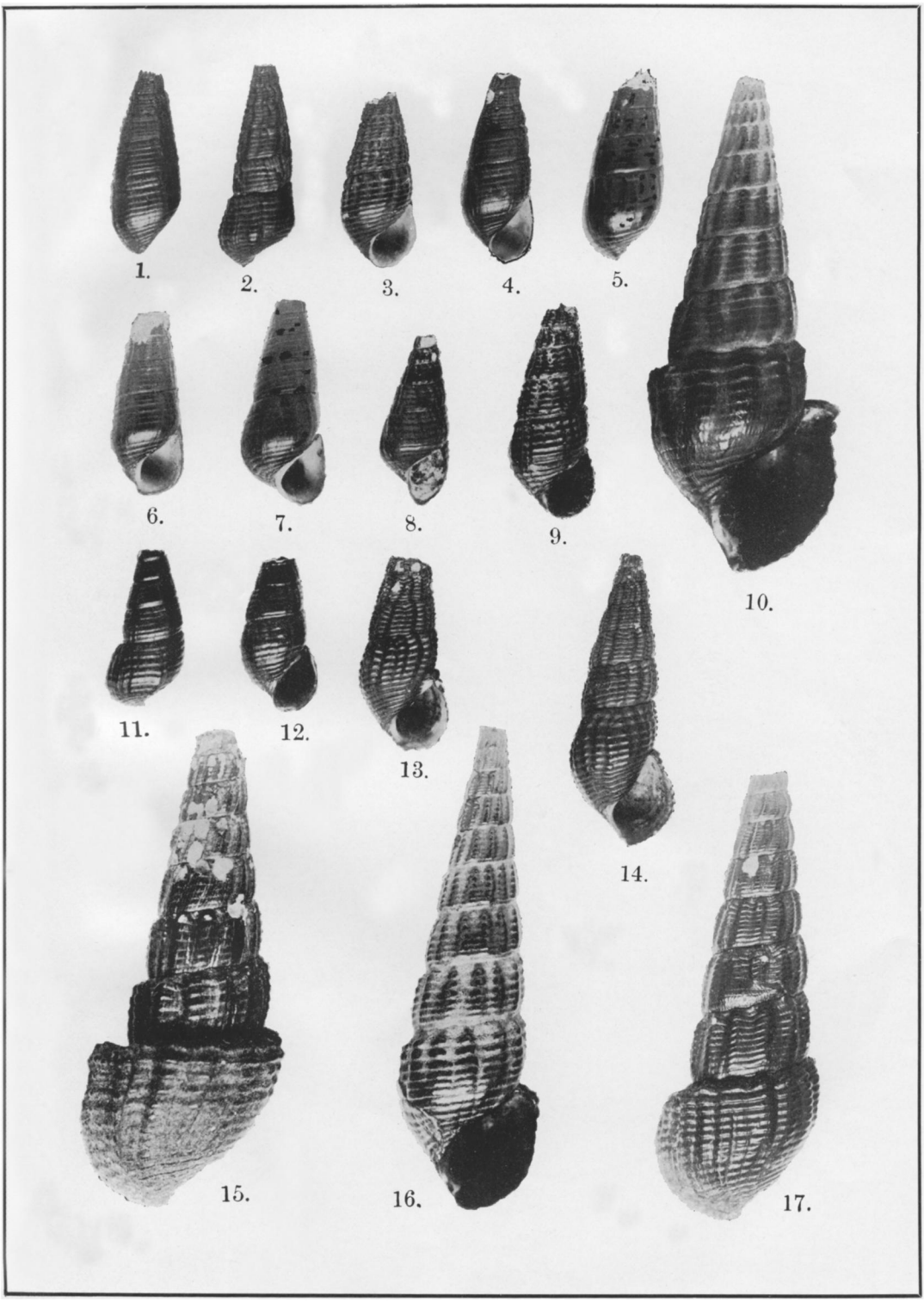
BAKER: MOLLUSKS OF BRAZIL.



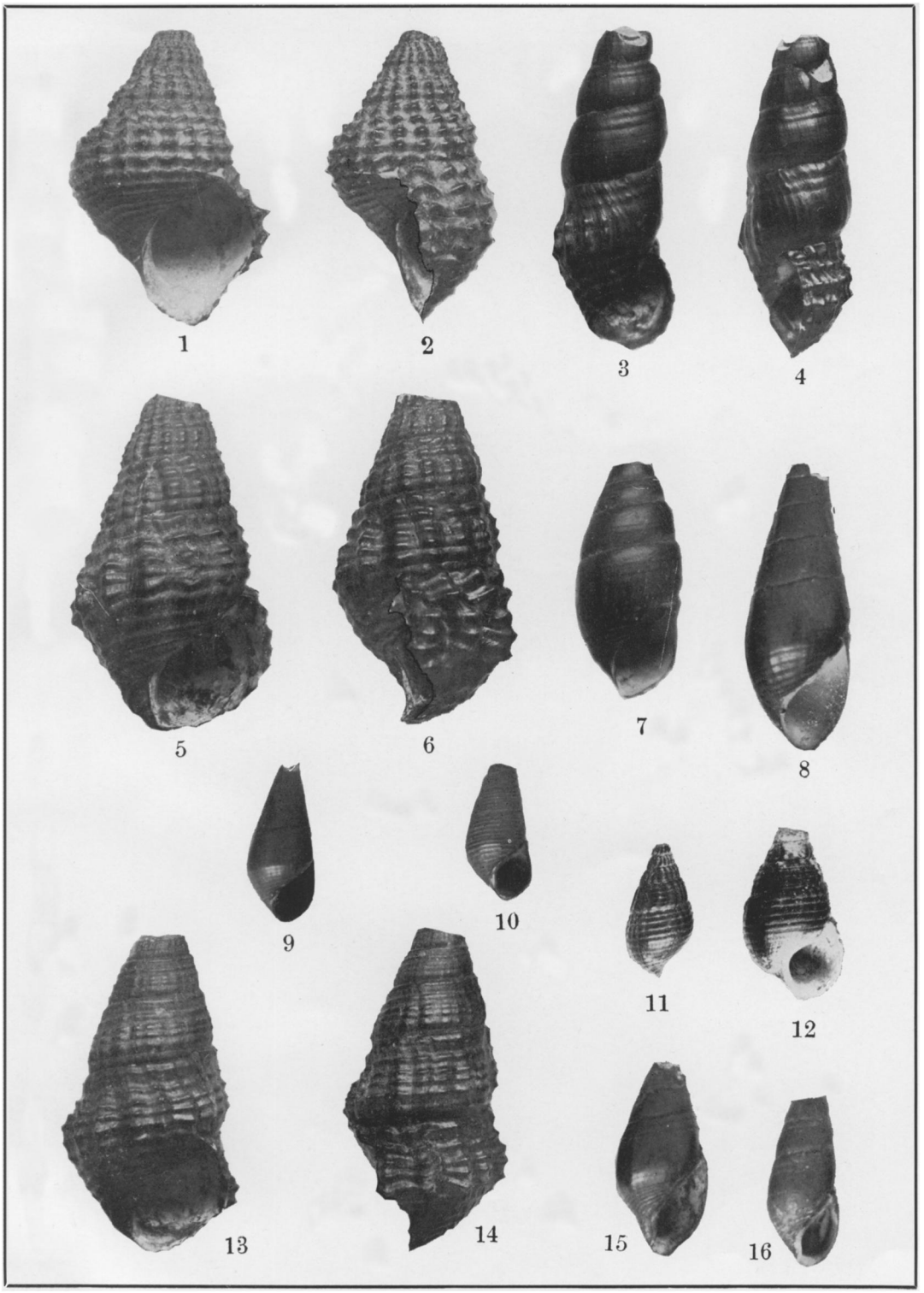
BAKER: MOLLUSKS OF BRAZIL.



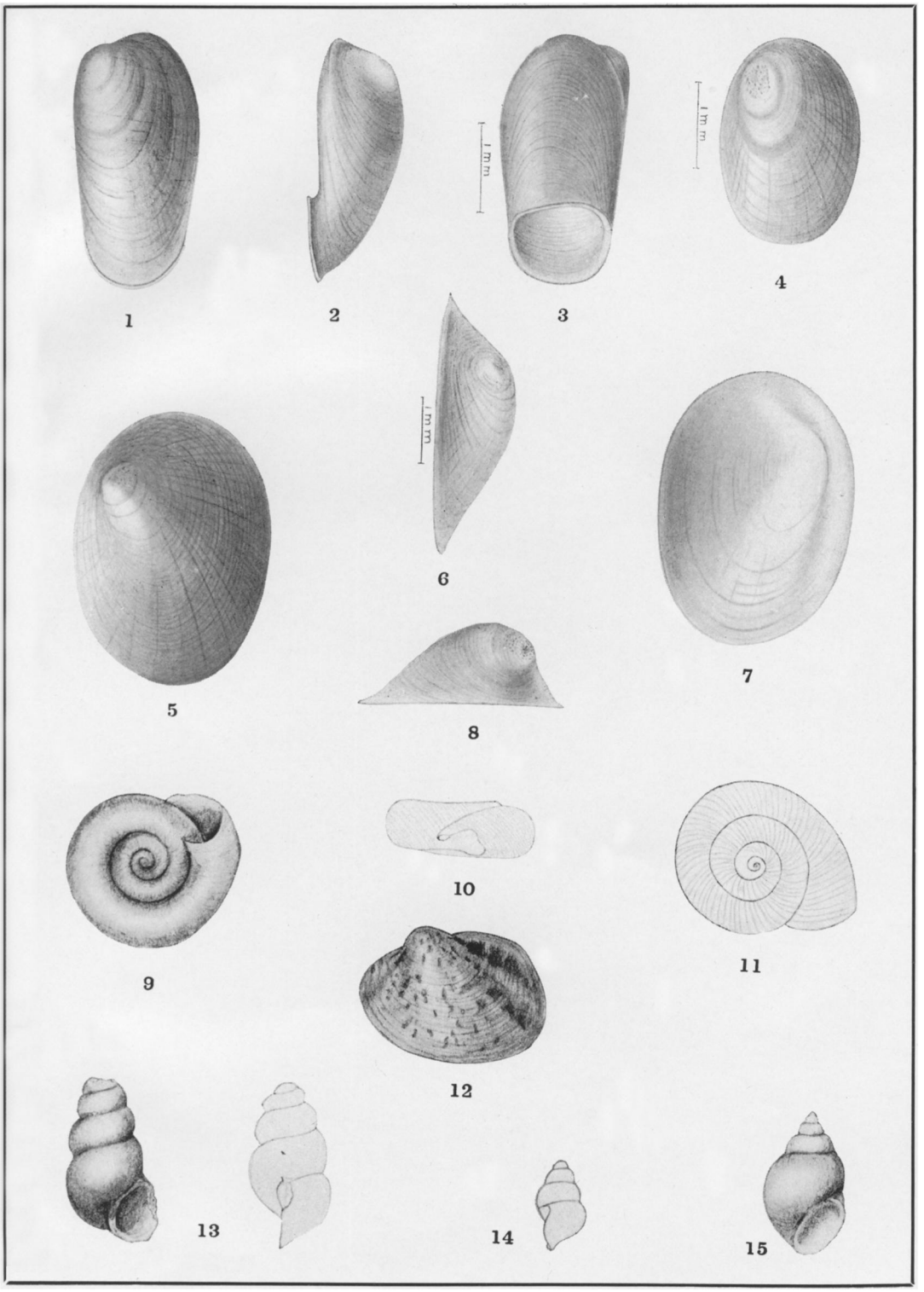
BAKER: MOLLUSKS OF BRAZIL.



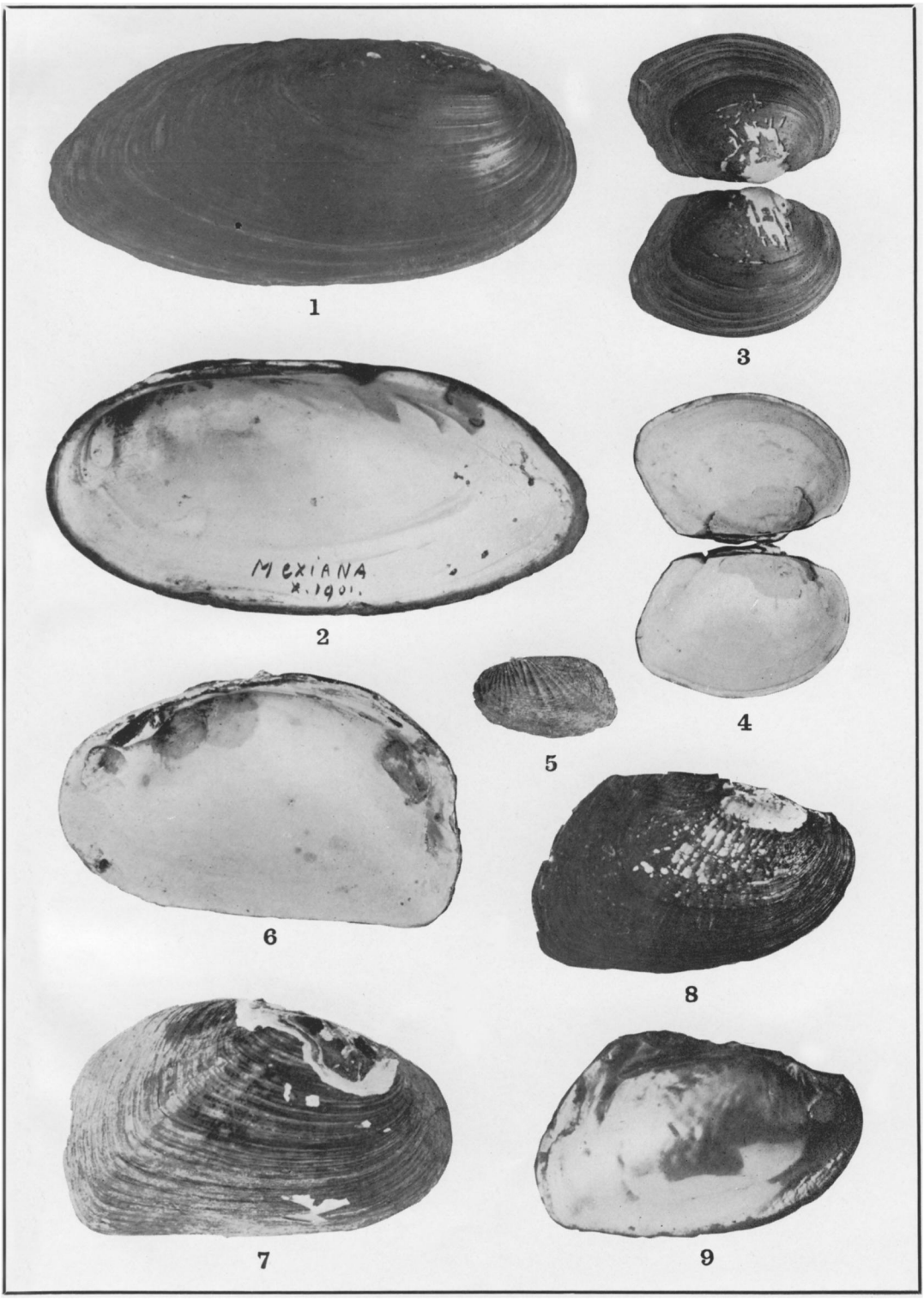
BAKER: MOLLUSKS OF BRAZIL.



BAKER: MOLLUSKS OF BRAZIL.



BAKER: MOLLUSKS OF BRAZIL.



BAKER: MOLLUSKS OF BRAZIL.