Thyone	$8T+2t$.
Pseudocucumis	$10T+10t$.
Thyonidium	$10T+10t$.
Amphicyclus	$14(T+T')+10t$.
Actinocucumis	16 to $18(T+T')+2t$.
Orcula	10 to $15(T+T')+5t$.
Phyllophorus	12 to $16(T+T')+5$ to $6t$ [1].

I have tried, in the phylogenetic table which I append, to combine with the approved mode of presenting hypotheses the objective method used so successfully by Prof. Huxley in some of his later communications to this Society.

At the side I mark the stages of 10T, $8T+2t$, and $10T+10t$; along the middle rise the stichopod forms, to the left those that are more or less heavily armed, and to the right the strictly sporadiform forms.

An inspection of this table shows that the forms are now seen to be too closely and intimately allied to allow of the sharp differentiation into three groups which was suggested by Prof. Semper.

If, however, we have lost an artificial scheme, we have perhaps got one step nearer to a clear perception of the genetic relationship of the genera of the Dendrochirotæ; and, after all, it is better for us to recognize the tangled web and woof of the animal kingdom than, in these days, to be content with definitions overloaded with exceptions, or distinguishing marks that tell us nothing of the past, and give us but uncertain aid in the present. The day of linear classifications is gone.

3. An Account of the Land and Freshwater Mollusca collected during the Voyage of the 'Challenger' from December 1872 to May 1876. By Edgar A. Smith.

[Received April 4, 1884.]

(Plates XXII. & XXIII.)

The object of the voyage of the 'Challenger' having been "to investigate scientifically the physical conditions and natural history of the deep sea all over the world," it is not surprising that the number of terrestrial and fluviatile Mollusca brought home by the Expedition is comparatively small. Evidently no real attempt was made at collecting, but only such species appear to have been picked up as presented themselves to members of the scientific staff when on shore at the various localities. The whole collection comprises only 152 species, some of which, however, possess considerable interest, and several are new to science.

The following Report has been drawn up in as brief a manner as

[1] *Echinocucumis* would apparently have the formula of $8t+2T$, and is possibly a slightly degraded form; I have omitted it from the phylum.


1.


3.


6b.


6.


11.


3a.


4.


4a.


6a.

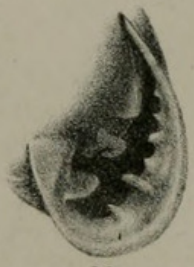

12.


10.


12a.


8.


1a.


10a.

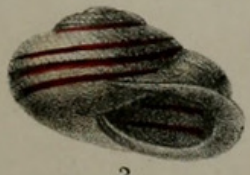

7.


9.


9a.


2a.


5.


2.


11a.

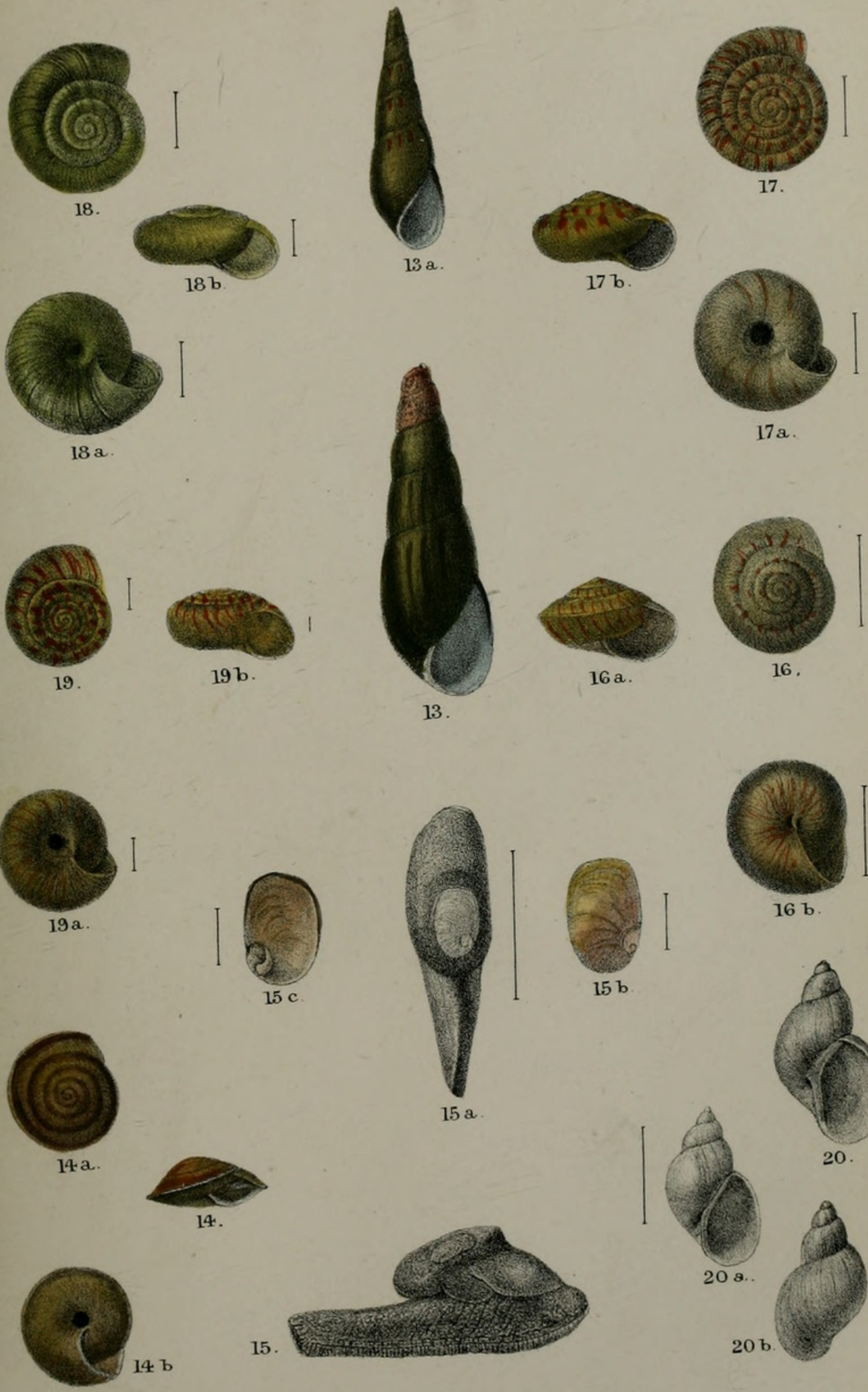

5a.

R. Mintern, del. et lith.

Mintern Bros. imp.

NEW TERRESTRIAL AND FLUVIATILE MOLLUSCA
FROM THE "CHALLENGER" EXPEDITION.

BRITISH MUSEUM
Z D
NATURAL HISTORY



R. Mintern, del. et lith.

Mintern Bros. imp.

NEW TERRESTRIAL AND FLUVIATILE MOLLUSCA FROM THE "CHALLENGER" EXPEDITION.

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Z D
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possible, and very few references have been made to books, and little or no synonymy given, as in most instances the species are well known, and there is no likelihood of such as are mentioned being misunderstood without reference to descriptions and figures.

Japan.

Only a single pulmonate mollusk was brought from this country, namely *Philomycus bilineatus* of Benson, found at Yokohama. This species was originally described from specimens collected by Dr. Cantor at Chusan, and has also been recorded from Amur, and in the British Museum there are two specimens from the island of Formosa. The striping of the mantle appears to vary. Benson's example had a median stripe along the back and one on each side, just as in one of the two specimens from Chusan in the British Museum, the other having only the two laterals, the central part of the back being spotted and dotted with black, but not distinctly lined. The Formosan Slugs previously referred to have five stripes, two on each side and a central one. The 'Challenger' specimen has only a single lateral broad band on each side, the middle of the dorsal surface being black-dotted but not definitely striped.

Malay or Eastern Archipelago.

Twenty-two species of land and freshwater shells (none of them new forms) were collected at the Philippines, Moluccas, Ké, and Aru Islands. They are as follows:—

1. Nanina citrina, Linn.

Hab. Amboyna, and Ké Dulan, Ké Islands.

Six specimens of immature growth were collected at the former locality, representing three varieties of this polymorphous species. All are thin and have a silky upper surface, with the exception of the apex, which is glossy, as is the case with the lower surface. One example is uniformly pale greenish yellow, with an opaque yellow peripheral zone and a narrow infrasutural band of the same tint. Two others are similarly ornamented, but in addition have a rich brown zone above the opaque yellow one at the periphery. The remaining three examples are pinkish brown above, and pale, semi-transparent, and faintly yellow below, encircled at the middle by the usual whitish band, which is margined above with a zone of somewhat darker hue than the general tint of the upper surface, into which it insensibly blends. There is also a white narrow line beneath, but at the suture.

The five shells from Ké Dulan, a locality hitherto I believe unassigned to this species, are remarkable for their solidity, one of them also being unusually conical in the spire. They are glossy, lacking the silky appearance obtaining in the Amboyna examples, which may be present perhaps only in younger specimens. They are lemon-yellow and differently banded. Two have a broad opaque

whitish zone at the periphery and a very narrow one a little above; also a broad band beneath the suture, and the linear one, above referred to, immediately above. The remaining specimens differ in having, above the peripheral white band, a rich brown one, which is continuous up the spire just above the sutural line.

2. Helix (Philina) bigonia, Férussac.

Hab. Melanipa, Basilan Straits, Philippines.

The single dead shell at hand is of a rather depressed form, the body-whorl in consequence being more acute or subcarinate around the middle. The species has been recorded from Samar, another island of the Philippine group.

3. Helix (Planispira) zonaria, Linn.

Hab. Amboyna.

4. Helix (Planispira) tortilabia, Lesson.

Hab. Amboyna, Moluccas, and Aru Islands.

The specimens from both these localities belong to the variety D in Martens's account of the land-shells of the 'Preussische Expedition nach Ost-Asien,' being wax-yellow, unbanded, and having a white peristome. On p. 392 of this work he questions the correctness of Amboyna as the home of this species; but in this instance the Cumingian collection is not at fault, as so frequently is the case.

5. Helix (Albersia) zonulata, Férussac.

Hab. Aru Islands, and Amboyna, Moluccas.

6. Helix (Camæna) sanziana, Hombron and Jacquinot.

Hab. Melanipa Island, Philippines.

This species was collected by Mr. Cuming at Samboanga, south of the island of Mindanao. This place is not far from Malanipa, a very small island in the strait between the former, Mindanao, and Basilan to the south.

7. Helix (Geotrochus) pileus, Müller.

Hab. Aru Islands.

8. Helix (Geotrochus) gærtneriana, Pfeiffer.

Hab. Aru Islands.

9. Helix (Helicobulimus) sarcinosa, Férussac.

Hab. Hoilo, Philippines.

10. Bulimus (Orthostylus) faunus, Broderip.

Hab. Cebu, Philippines.

11. Bulimus (Canistrum) fulgetrum, Broderip.

Hab. Hoilo, Philippines.

12. Leptopoma melanostoma, Petit.

Hab. Amboyna, Moluccas.

Both the white- and black-lipped varieties were met with at the above locality. This species is usually regarded as an Aruan shell, so it is interesting to find it ranging further northward. Of the eleven Amboynan specimens at hand, only two have a black peristome, which may not, however, at all closely indicate the proportional number existing in nature—indeed, may be altogether misleading, for this variety may in truth predominate.

13. Leptopoma vitreum, Lesson.

Hab. Melanipa Island, Basilan Strait, Philippines.

Of five specimens from this locality two are totally white, one livid lilac, one faintly stained with brown, getting darker towards the apex, and the remaining one coloured like the last but marked in addition with several obliquely wavy pale brown lines.

14. Helicina idæ, Pfeiffer.

Hab. Amboyna, Moluccas.

15. Pythia scarabæus, Linn.

Hab. Amboyna, Moluccas; Ké Dulan, Ké Islands; Dobbo, Wokan, and Wanumbai, Aru Islands.

A series of about thirty specimens from Ké Dulan shows that *P. castanea*, Reeve (non Lesson), is merely a variety of this species, which is subject to variation in size and markings. They average about 24 millim. in length and 14 millim. in width.

P. pantherina, A. Adams, also appears to be a mere variety, possessing no distinctive features. In some stages of growth in certain specimens the umbilicus is altogether closed, in others partly so, whilst in large shells it is fairly wide and deep.

16. Pythia wallacei, Pfeiffer (var.).

Hab. Amboyna, Moluccas.

The typical form of this species was described from specimens collected by Mr. Wallace at Batchian, another of the Molucca Islands. The Amboyna specimen obtained by the 'Challenger' differs in having the whorls of the spire rather more convex, and the upper parietal denticle is not prolonged upwards quite so distinctly, which, however, may be due to age, for it is not apparently full-grown. In the British Museum there are four specimens from the Aru Islands which are similarly abnormal with regard to this tooth, in other respects corresponding very closely with the Batchian shells.

17. Melania sobria, Lea.

Hab. Pasananca, near Zamboanga, island of Mindanao.

The two specimens from the above locality belong to the same type as those collected by Mr. Cuming on the island of Siquijor (vide Reeve, Conch. Icon. f. 32). They are yellowish olive, with a

yellowish band beneath the suture, the uppermost whorls of the spire (some of which are obliquely costate) being ornamented with squarish spots both above and at the lower part.

This species is quoted by Dr. Brot from Halmaheira, Solomon Islands, and Wokan, Aru Islands.

18. Melania ærea, Reeve.

Hab. Camiguin Island, Philippines.

It is not mentioned either by Reeve or Brot from which of this group of islands their specimens were obtained. The two 'Challenger' shells are smaller than the type figured by Reeve, being only $1\frac{1}{4}$ inch long. One of them has rather more convex whorls than the other, with their upper part comparatively unsculptured; the latter, on the contrary, being spirally sulcate throughout. Both are more or less coated with a dark reddish earthy deposit.

19. Melania, sp.

Hab. Aru Islands.

Four specimens of a small *Melania* were collected, which approach very closely to several species, judging from the published figures. They are very like *M. christobalensis* of Brot (Conch.-Cab. pl. 21. figs. 16, 16 *a*), except that the whorls are shorter. Beneath a black earthy coating they are olivaceous, merely sculptured by lines of growth, and all eroded at the upper part of the spire, leaving only four volutions remaining. As many as thirteen species have already been recorded from the Aru Islands.

20. Neritina variegata, Lesson.

Hab. Aru Islands.

The colours of the eleven specimens from these islands are, with the exception of a small part of the body-whorl above the columella, entirely concealed by a black earthy deposit. The red patch on the columella is very vivid in some of them and paler in others. The aperture is bluish white outside and greenish within the operculum, which corresponds exactly with the description given by Dr. von Martens (Conch.-Cab. ed. 2, p. 99). All the specimens have the apex more or less eroded, but not to the extent of *N. wallisianum*, Récluz, which is but a large variety of this species, of which there are specimens in the British Museum from the Fiji and Navigator Islands.

21. Neritina cornea, Linn.

Hab. Amboyna.

For the distribution of this species see Martens's monograph in the 'Conchylien-Cabinet.'

22. Neritina brevispina, Lamarck.

Hab. Camiguin, Philippine Islands.

Of the three specimens collected all agree in having the suture bordered below with an interrupted black band, but otherwise are

differently coloured. Two are olivaceous, and dotted over with small triangular yellowish black-bordered spots, the third being more yellow and minutely speckled all over with black. Although the shells differ so much in painting, their opercula are precisely similar, agreeing perfectly with the description given by Martens in the work referred to previously.

Admiralty Islands.

Of the twelve species of land and freshwater Mollusca obtained at these islands nine appear to be undescribed. This is not altogether surprising, as they were chiefly collected in a small island (Wild Island) off the north-west of the main island, which in all probability had not, previously to the visit of the 'Challenger,' been visited by any naturalist or collector.

1. Athoracophorus virgatus. (Plate XXII. figs. 1, 1 *a*.)

Animal (in spirit) nearly three times as long as broad, widest across the middle, much flattened and somewhat tapered posteriorly, convex above, not carinated, of a buff colour, with five irregular stripes down the back of a blackish tint, smooth, with only faint indications of a central and lateral groove, as in the type of the genus. Foot very broad, uniformly buff, thin-margined at the sides. Respiratory orifice small, situated about midway between the centre of the dorsal surface and the margin of the foot; from the opening a narrow groove runs obliquely forward to the middle of the back, and, then bifurcating, passes outside the ocular tentacle on each side. Oral opening (in contraction) surrounded by a thickened rim, tripartite above. Horny jaw with a concave cutting-edge and a small triangular projection at the middle, laterally produced beyond the side margins. The shell is represented (one specimen only has been examined) by eight minute calcareous particles of different shapes and sizes (the largest being about $1\frac{2}{3}$ millim. long) situated on the central line of the back a little in front of the respiratory orifice.

Length 27 millim., diam. 10, height 8.

Hab. Wild Island.

This species differs from *A. bitentaculatus* of New Zealand in the more lateral position of the respiratory opening.

2. Helix (Geotrochus) moseleyi. (Plate XXII. figs. 2, 2 *a*.)

Shell imperforate, obtusely and depressedly conoid, moderately solid, seldom totally whitish, generally encircled with one or more narrow brown lines. Whorls 4, convex, sculptured with fine lines of growth and minute indented wrinkly striæ, except upon the two nuclear whorls, which are smooth, pellucid, destitute of the spiral brown lines, and form a very obtuse apex; the last whorl is obtusely angled at the periphery, convex beneath, and descends obliquely in front rather suddenly. The aperture is a little oblique, and exhibits the external banding. Peristome white, much expanded and reflexed on the outer and basal margin. Columellar margin oblique,

reflexed and appressed over the umbilical region, and joined to the extremity of the outer lip by a thin callosity.

Greatest diameter 23 millim., smallest 19, height 15.

Hab. Wild Island.

The bands on this interesting species are usually three in number, one just below the periphery and two above it. In some specimens there is an additional one above, in others there are but two altogether, sometimes both above the middle, or again one of them being beneath; in other examples there may be only a single line either above or below the centre; and, finally, others are altogether unbanded. It recalls to mind *H. eddystonensis*, Reeve, which differs in being umbilicated, more acute at the periphery, more conical in the spire, with a sharper apex.

3. Helix (Geotrochus) labillardierei. (Plate XXII. figs. 3, 3 *a*.)

Shell small, imperforate, somewhat trochoid, totally white, or with a broad suffused brownish band below the middle of the body-whorl, or entirely light pinkish brown, always tipped with dark brown at the apex. Whorls 5, rather rapidly enlarging, moderately convex, sculptured with fine lines of growth and microscopical spiral striæ; last rather sharply keeled at the middle, scarcely descending in front, and a little convex beneath. Aperture small, oblique, coloured like the exterior. Peristome white, broadly expanded, very slightly reflexed, thickened within the basal edge by a pale pinkish ridge.

Greatest diameter 15 millim., smallest $12\frac{1}{3}$, height $10\frac{1}{2}$.

Hab. Wild Island.

Two characters are quite constant in this species—the dark coloured apex, and the peculiar thickening within the basal margin of the aperture. *H. helicinoides*, Hombron and Jacquinot, is related to this species, but differs in wanting the above peculiarities.

4. Helix (Hemiplecta) infrastriata. (Plate XXII. figs. 4, 4 *a*.)

Shell thin, semitransparent, corneous, narrowly perforate, depressedly concavely conical. Whorls 6, slightly convex, slowly enlarging, margined above the suture with a thread-like keel, very slightly glossy, sculptured with fine lines of growth, and more or less with microscopic spiral striæ; spire somewhat elevated, with concave outlines; last whorl acutely carinate at the middle, not descending in front, a little convex beneath, glossy, marked with lines of increment and fine concentric wavy striæ. Aperture oblique, angularly lunate. Peristome thin, not expanded or reflexed. Columellar margin almost perpendicular, expanded and reflexed over the narrow perforation.

Greatest diameter 15 millim., smallest 13, height $10\frac{1}{2}$.

Hab. Dentrecasteaux Island, Admiralty Group.

This species bears some resemblance to *H. eucharis*, Deshayes (non Reeve), but has a more concave spire, is more sharply keeled, and somewhat differently sculptured. The single shell described

does not probably indicate the full dimensions attained by the species, for it has the appearance of being rather young.

5. Helix (Hemiplecta?) cartereti. (Plate XXII. figs. 5, 5 *a*.)

Shell narrowly perforate, rather solid, depressedly conical, fulvous brown above, rather paler beneath. Whorls 7, moderately convex, slowly enlarging, divided by a deepish suture, sculptured with oblique lines of growth and very minute microscopic spiral striæ; last whorl with an obtuse keel at the periphery, somewhat wrinkled beneath, peculiarly contracted a little behind the aperture; the latter narrowly lunate, flesh-tinted within, subhorizontal. Peristome strong, not reflexed or expanded, slightly dilated over the perforation. Spire shortly conical, with faintly convex outlines.

Greatest diameter 22 millim., smallest 18½, height 15.

Hab. Wild Island.

This is a very distinct form, remarkable for the peculiar pinched character of the last whorl a little behind the aperture. *H. novæ-hiberniæ* has a faint resemblance to it, but is more regular in growth, brown-banded above the periphery, with a different form of aperture. I have named the species after Capt. Carteret, who discovered this group of islands in 1767.

6. Helix (Chloritis) dentrecasteauxi. (Plate XXII. figs. 6, 6 *b*.)

Shell depressed, narrowly umbilicated, light brown, marked with fine lines of growth, and everywhere finely punctate, and probably pilose in a fresh condition. Spire slightly sunken below the body-whorl. Volutions 5, convex above, separated by a deepish suture, slowly enlarging; the last somewhat inflated, a little descending anteriorly, having two indentations—one, elongate, about the middle of the whorl, at a short distance from the lip, the other nearer the labrum, just under the base, both forming denticular prominences within. Aperture oblique, narrowly lunate. Peristome whitish, thickened, reflexed everywhere, the extremities being united by a thin callosity spreading over the whorl.

Greatest diameter 17 millim., smallest 14, height 10.

Hab. Wild Island.

This remarkable species is readily distinguished from its allies by the peculiar indentations on the body-whorl forming within the aperture pseudo-denticles. As compared with Pfeiffer's figure of *H. eustoma* (Novitat. Conch. ii. pl. 38. f. 3–5), also from the Admiralty Islands, it will be seen that this species has a more depressed spire, a narrower umbilicus, and a narrower aperture.

7. Partula hartmanni. (Plate XXII. fig. 7.)

Shell elongate, conical, thin, semipellucid, white, narrowly umbilicated. Whorls 5½, slightly convex, sculptured with minute microscopic spiral striæ and fine oblique lines of growth, which give the upper edge of the whorls a slightly puckered appearance; last

whorl long, a little contracted behind the aperture, and marginate beneath the suture near the lip. Aperture almost perpendicular, somewhat ear-shaped, dirty whitish within, together with the peristome equalling rather less than half the total length of the shell. Lip somewhat flattened and expanded. Columellar margin reflexed, not twisted or tubercular; outer margin above well bent over towards the columella, with which it is united by a thin callus.

Length $16\frac{1}{3}$ millim., diam. 7; aperture 8 long, $5\frac{1}{2}$ broad.

Hab. Wild Island and Pigeon Island.

P. elongata, Pease, and *P. gracilis* of the same author, from the Tahiti group, closely resemble this species. The former is rather larger and broader, not so strongly spirally striated, and more or less striped with pale brown. The latter has a longer aperture, rather more convex apical whorls, and a peculiar bulging at the lower part of the body-whorl. *P. minuta*, Pfr., also from the Admiralty Islands, is similarly sculptured, but of a totally distinct form.

8. Cyclostoma infans. (Plate XXII. fig. 8.)

Shell small, moderately umbilicated, thinnish, light brownish red, more or less variegated and streaked with white above, turbinate-conoid, obtusely angled at the periphery. Whorls 5, considerably convex, divided by a deep suture; upper ones rather more lightly coloured than the last, faintly spirally striated; last whorl crossed by oblique lines of growth, encircled above the middle by about ten thread-like liræ, with the lower part rather more finely lirate, scarcely at all descending in front. Aperture subcircular, brown within, with a pale narrow band at the periphery. Peristome thin and scarcely expanded on the outer margin, a little thickened at the base of the columella, which has the free edge somewhat sinuated. Columella and upper extremity of the outer lip united by a thin glossy callus.

Greatest diameter $5\frac{2}{3}$ millim., smallest $4\frac{1}{3}$, height 6.

Operculum shelly, white, slightly concave, consisting of four whorls, exhibiting a few spiral striæ and a central nucleus.

Hab. Wild Island.

This species appears to be closely related to *Cyclotus poirierii*, of Tapparone-Canefri, from the southern part of New Guinea. It is a little smaller, has a whorl less, and the peristome is not double as in that species. *Cyclostoma pygmeum*, from New Ireland, is of a different form, has stronger sculpture on the base of the body-whorl, and a different columellar margin.

9. Helicina ponsonbyi. (Plate XXII. figs. 9, 9 *a*.)

Shell small, globose-conical, uniformly yellow, or sometimes with a reddish band around the lower part of the upper whorls, which becomes paler upon the last, and is situated just above the periphery. Volutions $4\frac{1}{2}$, a little convex; the last rather globose, rounded at the periphery, not descending in front, expanded somewhat at the aperture, sculptured with fine lines of growth and indi-

cations of spiral striæ on the under surface. Spire shortly conical, obtuse at the apex, with almost straight lateral outlines. Aperture moderately large, yellow within, subsemicircular. Peristome semi-pellucid, slightly expanded and thickened, generally margined externally with a whitish stripe. Columellar side of the aperture oblique, coated over the umbilical region with a glossy yellow callosity, slightly channelled at the base.

Greatest diameter 6 millim., smallest 5, height 5.

Operculum thin, slightly concave externally, minutely rugose, yellowish on the straight or columellar side, brownish or reddish brown towards the outer edge, which is very finely carinate.

Hab. Wild Island and Pigeon Island.

This species is very like *H. modesta*, Pfr., from the island of Tanra, but has a slightly larger mouth, a yellow basal callus instead of a whitish one, and a different operculum, that of *H. modesta* being thicker, more shelly, concave in the centre, with a broad flattened raised rim all round the convex side and a raised but not flattened margin on the straight side.

10. Pythia scarabæus, Linn.

Hab. Wild Island.

A large number of specimens were brought home from this locality. They are, as a rule, rather larger than those obtained by the Expedition at the Ké Islands, having an average length of about 29 millim. and a width of 17. They vary in colour, some being painted like typical variegated forms, and others more uniformly tinted like *P. pollex*, Hinds, and *P. albivaricosa*, Pfeiffer, which might be regarded as local varieties apparently offering no structural differences.

11. Melania arthurii, var.?

Hab. Wild Island, Admiralty Islands.

As far as I can ascertain, no species of *Melania* has been recorded from these islands. The single shell at hand, which had been seized upon by a *Pagurus*, approaches so closely to *M. arthurii* (Brot) that I think it will probably prove only a variety of that species. It is decollated above, four and a half whorls only remaining, of which the two uppermost, however, show the longitudinal costæ occurring in that species. The rest of the surface is spirally densely striated and sculptured with rather elevated lines of growth. It is of a dark brown tint, slightly paler at the margination below the suture, beneath which there is a series of oblique dark oblong spots. The whorls are slightly convex, and somewhat contracted just below the upper marginate edge.

12. Neritina cornea.

Hab. Wild Island.

The two specimens correspond to the form figured by Martens in his Monograph (Conchyl.-Cab. pl. 12. f. 15).

New Hebrides.

The seven species of shells from these islands were all collected at the small island of Api, which "lies south of Amboyna and Maticolo and between these islands and Efate or Sandwich Island," and which, according to Moseley, "had certainly never been landed upon before by any scientific man or naval officer" until the visit of the 'Challenger.' It is not surprising, therefore, that of the few species brought home four are apparently new, although it is with some reluctance that I name forms so variable and puzzling as the Melaniæ of the South-Sea Islands.

1. Helicina sublævigata, Pfeiffer.

Helicina sublævigata, Pfeiffer, Proc. Zool. Soc. 1853, p. 87; Monog. Pneumon. p. 384; Sowerby, Thes. Conch. vol. iii. p. 290, pl. 275. figs. 339 & 340; Conch. Icon. vol. xix. pl. 29. figs. 265 *a*, *b*.

The seven specimens from Api are all much smaller than the types described by Pfeiffer, and belong to the unbanded variety, one of them being of a pinkish-red tinge and the rest yellower. A feature worth noticing, and which has hitherto been overlooked, is the peculiarity of the apex of the spire. The first whorl is convex and smooth, and abruptly defined from the next, which is sculptured at its commencement with three or four strong spiral ridges, which, however, soon disappear.

The figures in the 'Thesaurus' are somewhat enlarged, but give a very fair notion of the form, those in the 'Conchologica Iconica,' on the contrary, being too depressed and too acute at the periphery. Sowerby, in his description in the latter work, characterizes the lip as red, which is very unusual; for out of a dozen shells with perfect lips all have them white at the margin with one exception, in which it is orange like the rest of the aperture.

2. Pythia scarabæus, Linn.

Hab. Api, New Hebrides.

The largest of the specimens from this locality are about 25 millim. in length. They might with equal propriety be named *P. ovatus*, Pfeiffer, *P. savaiensis*, Mousson, or *P. regularis*, Gassies, which I regard in the light of mere varieties. As in the case with the examples from the Ké Islands previously referred to, so also among those from Api, many are found with the umbilicus quite closed and others with it partially open, the former probably being identical with *P. tortuosa*, Mousson. Dr. Cox (Proc. Linn. Soc. New S. Wales, vol. vi. p. 621) has also recorded that some specimens of *P. verreauxi* "are absolutely imperforate, whilst others are openly umbilicated."

3. Pythia apiensis. (Plate XXII. figs. 10, 10 *a*.)

Shell small, ovate, pyramidal, either narrowly perforate or imperforate, livid brownish, with the back of the body-whorl dirty yellowish, irregularly spotted with brownish black, or uniformly

dirty yellowish variegated with brown spots. Whorls 10, nearly flat, faintly marginate beneath the suture, finely striated lengthways. Outer lip considerably expanded towards the lower part, dirty whitish, marked with a few pale brownish spots near the margin and armed within with six denticles, of which the first, second, fourth, and sixth, counting from the upper end, are minute, the third and fifth being a trifle larger and generally of a light-brown or yellowish tint. There are two parietal teeth and a minute tubercle just under the lower one, which is lamelliform, the upper one being very like that of *P. scarabæus*. Columellar tooth transverse, produced a little way across the reflexed margin, which is yellowish at this part, as also are the denticles on this side of the aperture. The labrum is pale externally, and exhibits the usual dark oblique stripe at a short distance from the margin.

Length 19 millim., diam. 12; labrum 11 long, $7\frac{1}{2}$ broad.

This species has the general appearance of a dwarfed form of *P. scarabæus*; but may be distinguished by the different armature of the aperture, which is perfectly constant in all the seventeen specimens examined. It possesses an additional basal denticle on the outer lip, and a minute tubercle on the body-whorl between the columella and the lower of the parietal teeth. The position of the aperture is also more lateral, but rather less so than in *P. ceylonica*.

4. Melania apiensis. (Plate XXII. figs. 11, 11 *a*.)

Shell elongate, subulate, covered with an olive-brown or yellowish-olive epidermis, variegated with oblique red lines beneath the sutures, which, in some specimens, are produced in a wavy manner across the whorls and in others are interrupted at the middle, or, again, some of the stripes may be continuous and others interrupted on the same whorl. Volutions probably about 15 in number, but invariably more or less broken off above, with almost flat sides or but the slightest convex, exhibiting only the very faintest constriction below the suture, which is considerably oblique and deep. The sculpture consists of fine lines of growth and a variable number of spiral striæ, those around the base of the body-whorl and a few at the lower part of the upper whorls being deep and pretty constant, and in some specimens one or two revolving below the suture produce a marginate appearance to the whorls. The aperture is pyriform, of a lead-colour, and the columella white.

Length of six remaining whorls of the largest specimen 70 millim., diam. of last whorl 17.

This form may be only a variety of *M. scipio*, Gould, from the Samoa and Fiji Islands, but coming from another locality offers certain differences in coloration and sculpture which appear to distinguish it. In painting, some specimens agree with *M. figurata*, Hinds; but none of them have the whorls plicate beneath the suture as described by that author.

5. Melania turbans. (Plate XXII. figs. 12, 12 *a*.)

Shell elongate, subulate, covered with an olivaceous epidermis,

generally with a few inconspicuous red lines beneath the suture and at the middle of the body-whorl. Whorls 9?, long, very slightly convex, divided by a moderately oblique suture, more or less longitudinally plicate and spirally striate. Aperture about the same as in *M. apiensis*.

Supposed length 63 millim., diam. of last whorl 14 ; aperture 15 long, 10 broad.

The plications in this species are more strongly developed in some specimens than in others, and become somewhat obsolete towards the lower part of the whorls, and being cut across by the spiral striæ, which are not very close together (perhaps a dozen on the penultimate volution), are somewhat subgranose. The striæ also at times are more or less wanting. The apex of this species, as in some others, becomes peculiarly eroded, leaving only the central black column like a piece of thin wire remaining.

6. Melania ordinaria. (Plate XXIII. figs. 13, 13 *a*.)

Shell like *M. turbans*, but with rather shorter whorls, smaller, smooth, without longitudinal plicæ, and with only a few indications of spiral striations, except at the lower part of the body-whorl, where it is finely striated. Body-whorl broader and shell generally more slender ; without red markings as a rule, judging from nine specimens at hand, of which only two exhibit a few short narrow lines below the sutures. It is a less slender species than *M. apiensis*, with less and finer spiral sculpture, and without the conspicuous red markings of that shell.

Probable length 50 millim., diam. 13.

7. Neritina siderea, Gould.

About thirty small specimens of this species were collected at Api. The majority of them are almost entirely black, with the exception of the eroded apex, which is white. Two specimens, however, are white, with numerous wavy black lines leaving a number of small, white, triangular spots. The species has previously been recorded from the Fiji Islands, Roratonga, and Samoa Islands ; and a large variety, collected at the Solomon Islands by Mr. J. Brazier, is mentioned in the Proc. Linn. Soc. vol. xii. Zoology, p. 556.

Fiji Islands.

Only a single novelty appears among the sixteen species collected at these islands, which are as follows:—1. *Placostylus morosus*, Gould ; 2. *P. seemanni*, Dohrn ; 3. *P. rambiensis*, Garrett ; 4. *Helix* (*Xesta*) *pfeifferi*, Philippi ; 5. *H.* (*Trochomorpha*) *latimarginata*, sp. n. ; 6. *Helicina tectiformis*, Mousson ; 7. *H. beryllina*, Gould ; 8. *Neritina prichardi*, Dohrn ; 9. *N. variegata*, Lesson ; 10. *N. sandalina*, Récluz ; 11. *N. porcata*, Gould ; 12. *N. rubida*, Pease ; 13. *Navicella freycineti*, Récluz ; 14. *Nav. macrocephala*, Le Guillou ; 15. *Nav. bougainvillei*, Récluz ; 16. *Batissa tenebrosa*, Hinds. These were not all obtained at one particular island—Nos. 1, 3, 5, 6,

7, 8, 13, and 14 being from Ovalau; 2, 4, 9, 10, 11, 12, and 15 from Kandavu, and No. 16 from the Wai Levu, Viti Levu.

HELIX (TROCHOMORPHA) LATIMARGINATA. (Plate XXIII. figs. 14–14 *b*.)

Shell depressed, acutely keeled, arched above, very slightly convex beneath, deeply and rather narrowly umbilicated, uniformly dull pale brownish. Whorls 5, slowly increasing; the last convex above, compressedly broadly marginate above the suture, sculptured with oblique lines of growth, last near the aperture but very slightly broader than the preceding, compressed both above and below the sharp carina. Aperture small, with the basal margin receding and thickened.

Greatest diam. 15 millim., smallest 14; height 7. Umbilicus about $2\frac{1}{2}$ wide.

This species belongs to the same group as *H. eurydice*, Gould, *H. cressida*, Gould, *H. swainsoni*, Pfr., *H. apia*, Hom. & Jacq., and some others, but does not seem to fall among the varieties of any. The narrowness of the last whorl, the broad margination above the suture (the margination being a little darker than the rest of the surface), the dull uniformly pale brownish colour, the thickened lower margin of the aperture, and the flattish lower surface are the principal distinguishing features of this species.

FRIENDLY ISLANDS.

Eight species collected at Tongatabu have all been previously recorded from these islands, and, with the exception of *Nanina tongana*, are not restricted in their distribution to this group, the majority having been met with at the Samoa Islands somewhat further north. The species are—1. *Nanina perpolita*, Mousson; 2. *N. tongana*, Quoy & Gaimard; 3. *Helix (Patula) gradata*, Gould; 4. *Helicina fulgora*, Gould; 5. *H. musiva*, Gould; 6. *Omphalotropis variabilis*, Pease; 7. *Physa sinuata*, Gould; 8. *Melania inhonesta*, V. d. Busch.

SOCIETY ISLANDS.

The following eight species were collected at Lake Waihiria on the island of Tahiti.

1. NANINA TONGANA, Quoy & Gaimard.

A single specimen only was obtained, agreeing in every respect with others collected at Tongatabu. This appears to be the same species as *Helix conula* of Pease, also founded on Tahitian shells.

2 & 3. PARTULA, sp.

Seven specimens of this genus in worn condition apparently belong to two distinct species which I have been unable to identify, and which it would be unwise to describe as new without paying special attention to the whole of the genus.

4. Succinea humerosa, Gould.

5. Succinea papillata, Gould.

6. Succinea (Truella) infundibuliformis, Gould.

7. Melania lancea, Lea.

The specimens from Lake Waihiria which I regard as belonging to this species have only four or five whorls remaining, which are regularly spirally striate throughout, whilst in the type figured by Reeve (Conch. Icon. fig. 39) eight volutions remain, and the striæ upon the last four are wanting at the upper part.

8. Physa, sp.

A small ordinary form.

Australia.

Examples of nine land and freshwater Mollusks were brought home from Continental Australia, namely:—*Helix bipartita* (Férussac), from Somerset, Cape York, *Parmacochlea fischeri*, also from Cape York, *Neritina souverbiana* from Flinder's Passage, and the rest from Sydney. These are *Helicarion robustus*, *Triboniophorus graeffei*, *Limax flavus*, *Ophiocardelus australis* (Q. & G.), *Melania balonnensis* (Conrad), and *Corbicula minor* (Prime). Among these it is worthy of remark that one, *Limax flavus*, is a European species, and another, *Parmacochlea fischeri*, forms a very remarkable new genus. I herewith append a few notes upon the new and most interesting forms.

Limax flavus, Linn.

Hab. Sydney.

A single specimen, only three quarters of an inch in length, was presented to the officers of the 'Challenger' by Dr. Cox of Sydney. In the British Museum there are two others, an inch and three quarters long, which also came from the same locality. After a very careful comparison with British examples, I am unable to detect any differences, and therefore conclude that this species has been introduced into Australia probably along with European plants.

Helicarion robustum, Gould.

Hab. Near Sydney, New South Wales.

There are two specimens which agree perfectly with Gould's description and figure of this species, but I may add that the correct identification of certain closely allied forms is almost impossible without the comparison of actual types. Such forms are *H. freycineti*, Férussac, *H. cuvierii*, Férussac, *Vitrina verreauxi*, *V. virens*, *V. strangei*, *V. leucospira*, all of Pfeiffer, *V. mastersi*, Cox, and *V. inflata*, Reeve.

The animals of the two shells under examination correspond very closely with Férussac's figures (Hist. Nat. Moll., Atlas, vol. i. pl. 9 A. f. 1–4). The sole and side-margins of the foot are buff-colour, the

upper part blackish. The expanded mantle-lappets are also spotted with black. The foot is carinate above for a short distance from the extremity, which is abruptly truncate, having the usual terminal mucous pore.

Parmacochlea, gen. nov.

Animal very like that of *Parmarion*, but differing in the construction of the shell. Shell almost concealed beneath the mantle, flattened, oblong, having the nuclear portion in the form of a minute *Sigaretus*-like shell projecting from beneath.

This genus appears to offer no distinction from *Parmarion* of Fischer, excepting with regard to the shell. This takes the form of a slightly convex thinnish disk, which, viewed externally, appears to consist of two whorls, the nuclear one being very small, transparent white, and shelly. The second is large, glossy, thin, covered with a thin horny epidermis, marked with fine lines of growth, and attached only to the left or curved side of the first whorl, the right side of which is nearly straight. Beneath, the first whorl is white and forms as it were a minute *Sigaretus*-like shell standing out free from the slightly concave last volution, which is more or less tinted like the exterior.

Parmacochlea fischeri. (Plate XXIII. figs. 15–15 *c*.)

In spirit this species has the general lateral aspect of *Parmarion extraneus* as figured by Férussac (Hist. Moll. pl. 8 F. fig. 4). The mantle, however, is carried further forward over the head, the shield is higher in front, the opening in the mantle through which the shell is seen more central, and the truncation at the posterior extremity is inclined in the opposite direction. The foot is narrow, equally tripartite beneath, and marked along the side near the basal edge with three parallel impressed lines, of which the central one is the least conspicuous; it is keeled above for a short distance from the terminal mucous pore, is marked along the sides with divergent backward inclined impressed lines, and is reticulately wrinkled throughout. The mantle is minutely granular, with the respiratory slit a little in advance of the middle.

Length 19 millim., height 8 (in contraction); mantle 12 long. Shell 7 in length, 4 wide.

Hab. Cape York, North Australia.

Only a single specimen of this very interesting form was obtained. I have associated this species with the name of Dr. Paul Fischer, the eminent malacologist of the Jardin des Plantes.

Triboniophorus graeffei, Humbert.

Hab. Sydney.

The species of this genus—*T. graeffei*, Humbert, *T. schütleii* and *T. krefftii* of Keferstein—together with *Aneitia macdonaldii*, Gray, appear to bear externally a great resemblance one to another. If Macdonald's account of his Aneiteum slug be correct, then the

specimens from New Caledonia identified with it by Gray were wrongly determined, for on examining the horny jaw of some of these, they prove to be quite different from that represented by Macdonald (Ann. & Mag. Nat. Hist. ser. 2, vol. xviii. (1856) p. 38), but exactly like the figure given by Keferstein of *Triboniophorus krefftii*. The length and distinctness, or even the total absence of the central longitudinal groove, and those diverging obliquely from it, appear in a great measure due to the manner in which the animal contracts or distends its skin at the time of death. Among the eleven specimens from New Caledonia in the British Museum, this variation is clearly evident, some showing the furrows very strongly, others in a less degree, and in two instances they are totally wanting. *T. krefftii*, with its rugose skin and peculiar lingual dentition, appears clearly distinct from the other species, although all the described forms, including the *Aneitia*, have been considered (perhaps correctly) by Heynemann one and the same species.

Neritina souverbiana, Montrouzier.

Hab. Flinders Passage, North Australia, in 7 fathoms.

This species, as far as at present known, does not inhabit fresh water. It has been previously recorded from Port Jackson and New Caledonia, and being marine may even have a wider range.

New Zealand.

Examples of five species of land and freshwater shells from Wairarapa, Wellington, were presented to the Expedition by Mr. W. T. Locke Travers. They are:—*Latia neritoides*, Gray; *Helix coma*, Gray; *H. glabriuscula*, Pfeiffer; and two species of *Helix* which are apparently undescribed.

Helix (Thalassia) traversi. (Plate XXIII. figs. 16–16 *b*.)

Shell depressed, subconoid, keeled, narrowly perforate, thin, corneous, somewhat glossy, ornamented with fine light red wavy and very oblique lines, which are invisible in certain positions and best seen when the specimen is held up to the light. In addition to these lines there are pale reddish spots beneath the suture. Whorls $5\frac{1}{2}$, rather slowly enlarging, a little convex, sculptured with fine arcuate oblique lines of growth, which are cut across by close-set minute spiral striæ, both on the upper and under surfaces; last whorl moderately sharply keeled, convex beneath, and painted with fine wavy more or less zigzag light red lines radiating from the perforation to the periphery. Aperture oblique, sublunate. Peristome thin, a little thickened, expanded and reflexed in the columellar region.

Greatest diameter $11\frac{1}{2}$ millim., smallest 10, height $7\frac{1}{2}$.

This species must not be confused with *H. zelandiæ*, to which it is closely related. It is a larger shell, more narrowly perforate, and at once known by its minute spiral striæ.

HELIX (PATULA) STOKESI. (Plate XXIII. figs. 17–17 *b*.)

Shell very depressed, moderately umbilicated, obtusely angled at the periphery, pale yellow, irregularly spotted and variegated with reddish subradiating markings above, and dotted and streaked beneath with a lighter tint. Whorls 6, the two apical smooth, glossy, the rest convex, separated by a deep suture, slowly increasing, sculptured with numerous arcuate radiating thread-like liræ; last whorl obtusely angled or shouldered above the middle, and much more finely lirate beneath than above. Aperture obliquely lunate. Peristome thin, very slightly reflexed near the umbilicus.

Greatest diameter $7\frac{1}{2}$ millim., smallest $6\frac{1}{2}$, height 4.

This species very closely resembles *H. coma* of Gray, but is more narrowly umbilicated, just a trifle more finely lirate, and has the body-whorl roundly angulated *above* the middle.

SANDWICH ISLANDS.

Only the three following species, two *Melanias* from Honolulu and a *Neritina* from Hilo on the east coast of Hawaii, were brought home by the expedition.

1. NERITINA CARIOSA, Gray.

The shell figured in Wood's Index Test. Suppl. pl. 8. f. 9, as *Nerita cariosa* is undoubtedly the species from the Sandwich Islands, and not the Mauritian *N. mauritii* as supposed by Von Martens (Conch.-Cab. ed. 2, Monogr. *Neritina*, p. 276). The type is still preserved in the British Museum, having formed part of the late Dr. Gray's private collection, which he a short time before his death presented to the Museum. It has the apex remarkably eroded, and but very little white speckling on the outer surface. Very little importance need be attached to the fact of its locality being given as Africa, for the next species but one, *N. smithii*, a well-known Indian form, is also stated to inhabit that locality.

2. MELANIA MAUIENSIS, Lea.

This species has now been recorded from three of these islands (Maui, Molakai, and Oahu), and in all probability it occurs on Hawaii, the largest of the group.

3. MELANIA NEWCOMBII, Lea?

I am rather uncertain whether the series of little shells from this locality really belong to this species. They are very slender, consist of about five moderately convex whorls (the apex being invariably broken away), which are coated with an earthy deposit, beneath which is a light olive-greenish epidermis. They are sculptured with a few spiral striæ, which become more or less obsolete upon the two last whorls except around the base of the last, where they are usually maintained. The length is 16 millim., width 5, and the aperture is 5 long and 3 wide.

Canary Islands.

Examples of the following species of Helicidæ were collected at Teneriffe :—1. *Vitrina lamarckii*, Férussac ; 2. *Zonites cellaria*, Müller ; 3. *Helix malleata*, Férussac ; 4. *H. adansoni*, Webb & Berthelot ; 5. *H. lactea*, Müller ; 6. *H. apicina*, Lamarck ; 7. *H. circumsessa*, Shuttleworth ; 8. *H. lenticula*, Férussac ; 9. *H. fortunata*, Shuttleworth ; 10. *H. pavida*, Mousson ; 11. *H. phalerata*, Webb & Berthelot ; 12. *H. lancerottensis*, Webb & Berthelot ; 13. *H. lineata*, Olivi ; 14. *Bulimus tarnerianus* (junior?), Grasset.

Of the above species Nos. 2, 5, 6, 8, 12, 13 are not restricted to the Canaries, but range further north, either to North Africa or Europe. For a full account of these species and their distribution, reference should be made to the 'Testacea Atlantica' of Wollaston.

Besides the species already enumerated, two small examples of *Limax canariensis* of d'Orbigny were collected at this locality, agreeing in every particular with d'Orbigny's description excepting size, from which it is concluded that they are but half-grown, being about an inch in length in contraction.

Cape de Verd Islands.

Only two species of Helicidæ were collected at St. Vincent, namely *Helix advena*, Webb and Berthelot, and *H. bollei* of Albers.

Ascension Island.

The only land-shell met with, *Helix* (*Fruticicola*) *similaris* of Férussac, is almost cosmopolitan, and has previously been recorded from this locality. The unbanded variety appears to be more common than that with a peripherial brown zone, judging from the series of 240 specimens at hand.

South Africa.

The following species were obtained in this district: *Limax gagates*, Draparnaud (?=*L. capensis*, Krauss), and *Helix aspersa*, Müller, from the Cape of Good Hope ; also a young specimen of the latter from Sea Point near Cape Town, and *Helix afra*, Pfeiffer, from Simons Bay.

It will thus be seen that the first two of these species are well-known British and European forms, and doubtlessly have been introduced. The single specimen of *H. afra* differs from that described by Pfeiffer in having the perforation entirely closed by the expanded columellar callus. The lip also is quite thin, without any internal thickening, and even in the type itself this is very slight and some distance from the extreme margin, which, being the last-formed part of the shell, has not received so much internal callus.

Bermuda.

All the terrestrial mollusks obtained at this locality are well-known forms, but one, the common European *Limax gagates*, has not, I

believe, been previously recorded from this island. The other species are:—*Helix bermudensis*, Pfeiffer; *H. circumfirmata*, Redfield; *H. microdonta*, Deshayes; *H. vortex*, Pfeiffer; *Bulimus ventrosus*, Férussac; *Succinea bermudensis*, Pfeiffer; *Helicina convexa*, Pfeiffer; *Melampus gundlachi*, Pfeiffer.

St. Thomas, West Indies.

The forms obtained at this island are unimportant and none are restricted to it in their distribution, being met with in other islands of the West-Indian group.

1. Bulimulus exilis, Gmelin.

This species is not restricted to this island, but has also been reported from Guadeloupe, Dominica, Barbuda, and Cayenne.

2. Stenogyra (Subulina) octona, Chemnitz.

3. Helicina subfusca, Menke.

The two specimens under examination approach, although they are not quite so dark in colour, the variety β of Pfeiffer (Monogr. Pneumon. p. 35). It appears to have been found on other islands besides St. Thomas.

4. Megalomastoma antillarum, Sowerby.

Other localities whence this species it said to have been obtained are the islands of St. Vincent and Tortola.

5. Physa rivalis, Maton & Rackett.

A few small specimens from this locality apparently belong to this species. The shell figured by Sowerby (Conch. Icon. vol. xix. fig. 31) is very unlike the drawing, and probably is specifically distinct from *P. rivalis*. The authorship of this species is erroneously attributed by Sowerby (*l. c.*) to his father, whose figure does not at all coincide with that in the 'Conchologia Iconica,' and who moreover rightly gives a West-Indian locality.

6. Hydrobia auberiana, d'Orbigny.

This species, described in Sagra's 'Histoire &c. de l'Isle de Cuba' (vol. ii. p. 8, pl. 7. f. 6–7) as a *Paludestrina*, has a very thin semi-transparent operculum of a roundly ovate form but rather pointed above. It is also found on the island of St. Croix.

Kerguelen and Prince Edward's Island.

Helix (*Patula*) *hookeri* of Reeve, the only land-shell at present known from Kerguelen, has not hitherto been recorded from the latter of the above localities. The specimens from Marion Islands are remarkable in being radiately striped with red, but, with the exception of this slight difference, correspond precisely with normal examples of the species.

Smith, E. A. 1884. "An account of the land and freshwater Mollusca collected during the Voyage of the Challenger from December 1872 to May 1876." *Proceedings of the Zoological Society of London* 1884, 258–281.

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