

MOLLUSCA.

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WITH INTERCALATIONS ON ANATOMY

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THE material upon which this study of the land and fresh-water Mollusca is based, in addition to the collection formed by Mr Perkins, consists in a great measure of the collection in the British Museum (Natural History), where the bulk of Newcomb's and Pfeiffer's type-specimens are to be found. Thanks to the kindness of Prof. A. Hyatt, an examination has been made of the type-specimens of the species described by Gulick, of the genus *Leptachatina*, and now preserved at Boston. Mr D. D. Baldwin, of Maui, has also very kindly sent over a number of specimens and Mons. Ancy has lent the types of some species described by him. A collection formed in the Islands by Mr Hutchison has also been placed in my hands for examination by Mr Fulton.

Lt.-Col. H. H. Godwin-Austen, F.R.S., has enabled me to add to the interest of this work in a great degree, by very kindly dissecting some of the species and permitting me to incorporate here the results; it is hoped that he may be able to give a further account of the anatomy in the *Achatinellidae*.

To Mr Edgar A. Smith, I desire, in conclusion, to express my most grateful thanks for his unflinching help and courtesy.

§ 1. General Remarks on the Mollusca.

To the student of the Mollusca, the Hawaiian Islands fauna is probably more familiar by name than that of many better known places, owing to the occurrence there of the well-known Achatinelloid group of forms.

Tables of the distribution of the fauna are given below, but a few general remarks here may be of interest.

The Limacidae yield nothing very peculiar or very striking and the few forms peculiar to the Islands may well have been developed from introduced European ancestors.

The Zonitidae are scattered over the Islands; all are peculiar, but they are nearly related to forms found in other islands of the Pacific: similar remarks apply to the Endodontidae, one group of which (*Pterodiscus*), however, appears to be peculiar.

The presence—and that strongly contested—of only a single indigenous species of the Helicidae again indicates affinities with Polynesia.

The Pupidae as a family, have a very wide geographical range, and hence no deductions can be drawn from their presence; it should be noted that here—if the identification be correct—the fauna includes a species not peculiar to the Islands.

With reference to the Achatinellidae it may at once be noted that several divisions of the family may be made. First, the brightly coloured forms which fall into the genus *Achatinella* proper and which are replaced in the Southern Pacific Islands by the genus *Partula*. The metropolis of distribution of all these forms seems to be Oahu, save in the case of the subgenus *Partulina* when Maui and Molokai appear to divide the honour. No species has been found on Kauai and only two on Hawaii at the other end of the group. Species have been described by authors upon coloration and band-formations; in my opinion numbers even of the 'species' here admitted will prove, when their anatomy is carefully investigated, to be varying forms of one common species. Consider, for example, such a shell as *Tachea nemoralis* dealt with in the same manner as the Hawaiian forms have been! Still, even when reductions are made, the fauna will remain remarkable for its numerical strength in species.

Secondly, passing through *Perdicella* and *Newcombia*, confined to the islands of Molokai and Maui, we come to the second great division, typified by *Leptachatina* and *Amastra*. Here, while the metropolis again seems to be Oahu, Kauai, the oldest island geologically considered, ranks well with the rest.

Thirdly, passing through the interesting and recently described *Thaanunia* of Oahu, we come to *Carelia*, which is confined to Kauai save for one subfossil species on the Island of Niihau (the only mollusc on that island).

Fourthly, we have the little group of *Auriculella* and *Frickella*, which leave the impression that they are linking forms between *Achatinella* and *Tornatellina*, and, again, belong in the main to Oahu. It should be borne in mind, as illustrating the peculiarity of the fauna, that only about half a dozen out of, approximately, 330 species of Achatinellidae are found on more than one island, and indeed some of these may be due to errors of identification. In our present state of knowledge a faunal list is largely influenced by the 'personal equation' of the writer.

From the residue of the fauna but little is to be learnt; the development of *Succinea* appears abnormal and further research will probably reduce the so-called 'species' of this group.

The following general conclusions may, however, be drawn :

1. The Molluscan fauna is nearly related to that of the Polynesian islands, and shows hardly any trace of continental influence, Asiatic or American.
2. The species are nearly always confined to one island ; but it is very doubtful if, as has been stated, "each valley has its peculiar species."
3. When the genera found are confined to the islands, the majority of living species usually occur on Oahu.

I give below tables of distribution ; but, owing to the fauna being so restricted in distribution, have not added percentages of peculiar species.

(1) Families Limacidae, Zonitidae, Endodontidae, Helicidae, Pupidae.

Species peculiar to one Island.

	Limacidae.	Zonitidae.	Endodontidae.	Helicidae.	Pupidae.	Total.
Kauai		3	8			11
Oahu		7	3		4	14
Molokai		1	1			2
Lanai	1	2				3
Maui	1	5	2			8
Hawaii	1	3	1	1	2	8

Species occurring in more than one Island.

Limacidae. Two species (*L. gagates* and *Agriolimax laevis*) are found elsewhere, and may have been introduced. One species is common to Kauai and Maui, one to Maui and Hawaii, and one to Kauai, Oahu, and Maui.

Zonitidae. One species common to Kauai, Oahu, and Maui ; one to Oahu, Molokai, and Lanai ; and one, respectively, to Kauai and Maui, Maui and Oahu.

Philomycidae. One found in Kauai, Oahu, and Hawaii, and one in Oahu only ; these species, however, are not peculiar to the Hawaiian fauna.

Endodontidae. Two species are common to Kauai and Oahu ; one, respectively, to Kauai and Lanai, Maui and Oahu, Lanai and Oahu, Lanai and Molokai ; while three are of uncertain habitat.

Helicidae. One species—introduced—in Kauai and Oahu.

Pupidae. One in Kauai, Oahu, and Hawaii ; one, respectively, in Kauai and Oahu, Oahu and Hawaii ; further, a single species is found outside the Islands.

(2) Achatinellidae. In view of their interesting characters I have here dealt with the distribution by genera.

Species occurring in only one Island.

	ACHATINELLA group.				<i>Peridella</i> .	<i>Newcombia</i> .	<i>Anastra</i> .	<i>Leptachatina</i> .	<i>Thaamonia</i> .	<i>Carelia</i> .	<i>Auriculilla</i> and <i>Frickella</i> .	Total.
	<i>Achatinella</i> s. s.	<i>Bulinella</i> .	<i>Partulina</i> .	<i>Achatinellastrum</i> .								
Kauai							7	15		8	1	31
Oahu	17	19	1	29			40	33	1		10	150
Molokai			9	2	3	8	15	3			2	42
Lanai			3				12	5				20
Maui			16	3	5	1	17	4			1	47
Hawaii			2				3	7			1	13

The only forms of Achatinellidae found on more than one island are in the genera *Leptachatina* and *Auriculilla*; in the former one species is said to be found on Kauai and Oahu, and two on Maui and Oahu; in the latter similar notes occur with regard to Oahu and Maui, Molokai and Lanai, Maui and Molokai, and (doubtfully) Oahu and Hawaii.

Further a single subfossil species of *Carelia* is recorded from Niihau; and the following are of uncertain habitat: *Bulinella* 1, *Partulina* 3, *Achatinellastrum* 1, *Anastra* 7, *Leptachatina* 6, and *Auriculilla* 2.

(3) The residue of the fauna.

Species occurring in only one Island.

	<i>Tornatellina</i> .	STENOZYRIDAE.	<i>Succinea</i> .	LIMNAEIDAE.	<i>Melania</i> .	<i>Palaudetrina</i> .	<i>Helicina</i> .	<i>Neritina</i> .	Total.
Kauai	3		3	2					8
Oahu	1		2	3	1	1	3		11
Molokai									0
Lanai	1		1						2
Maui	3		4	1	1				9
Hawaii	2	1	12	1					16

Species occurring in more than one Island.

Tornatellina. One species, said to be found in Oahu, occurs in the Tonga Islands. Two species are common to Kauai and Oahu, one to Hawaii and Oahu, and one to Kauai, Oahu, and Hawaii.

Stenogyridae. *Opeas junceus* is said to be found in all the Islands, and both this and *O. prestoni* (Hawaii) occur elsewhere. One species is of uncertain habitat.

Succinea. Two species in Oahu, Molokai, and Hawaii; one in Lanai, Oahu, and Maui; one in Kauai and Hawaii, one in Maui and Molokai.

Limnaeidae. One species in 'all the Islands'; one in Kauai and Oahu, one in Oahu and Maui; three of uncertain habitat.

Melania. One common to Kauai, Oahu, Maui, and Molokai; one to Kauai and Oahu; one to Kauai and Molokai; one of uncertain habitat.

Helicina. One common to Kauai, Oahu, Lanai, and Molokai; one to Maui and Lanai.

Neritina. One common to Maui, Oahu, and Hawaii; two of uncertain habitat. Two said to be found in 'all the Islands.'

These three tables show that Kauai has 50 species peculiar to it, Oahu 175, Molokai 44, Lanai 25, Maui 64, Hawaii 37.

§ 2. Systematic account of the fauna.

Fam. LIMACIDAE.

Amalia Moquin-Tandon.

Amalia M.-T. Hist. Moll. France, 1855, II. p. 19 [first species *Linax gagates*, Drap.].

Milax Gray, Cat. Pulm. Brit. Mus. 1855, p. 174 [has the same type; there are, also, older names supposed to be identical, but founded on erroneous characters or improperly described].

While dealing with slugs it may be convenient to note that Semper has recorded a species stated to be very near *Linax tenellus* Nilsson; further Dr Cooper is said to have seen a species of *Janella* from these islands, but I have been unable to trace his note from the reference given (see Collinge, P. Malac. Soc. London, II. p. 50).

(1) *Amalia babori* Collinge.

Amalia babori Collinge, P. Malac. Soc. London, II. (1897), p. 294.

HAB. Maui, at 5000 ft., Haleakala.—Hawaii, 2000 to 4000 ft., Olaa to Kilauea (Perkins).

(2) *Amalia gagates* Draparnaud.

Limax gagates Draparnaud, Tabl. Moll. France, 1801, p. 100; Hist. Moll. France, 1805, p. 122, pl. IX. figs. 1, 2.

Amalia gagates Drap., Collinge, P. Malac. Soc. London, II. p. 49.

HAB. Maui (Perkins).

AGRIOLIMAX Mörch.

Agriolimax Mörch, J. Conchyl. XIII. (1865), p. 378.

As to the correct name for this genus, see Cockerell and Collinge, Conchologist, II. pp. 199, 200.

(1) *Agriolimax bevenoti* Collinge.

Agriolimax bevenoti Collinge, P. Malac. Soc. London, II. (Nov. 1897), p. 295.

HAB. Kauai, at 4000 ft.—Oahu, 2000 ft., Honolulu.—Maui, 5000 ft., Haleakala (Perkins).

(2) *Agriolimax globosus* Collinge.

Agriolimax globosus Collinge, P. Malac. Soc. London, II. (April 1896), p. 47.

HAB. Hawaii, Mauna Loa (Perkins).

(3) *Agriolimax laevis* Müller.

Limax laevis Müller, Hist. Vermium, II. (1774), p. 1.

Agriolimax laevis Müller, Collinge, P. Malac. Soc. London, II. p. 295.

HAB. Kauai, at 2000 ft., Lihue.—Maui, 5000 ft., Haleakala (Perkins).

(4) *Agriolimax perkinsi* Collinge.

Agriolimax perkinsi Collinge, P. Malac. Soc. London, II. (April 1896), p. 47.

HAB. Lanai, at 2000 ft. (Perkins).

(5) *Agriolimax* (?) *sandwichiensis* Souleyet.

Limax sandwichiensis Souleyet, Voy. Bonite, Zool. II. (1852), p. 497, pl. XXVIII. figs. 8—11 [animal and shell].

HAB. Hawaiian Islands (?).

It seems uncertain whether this be really Hawaiian, or even accurately represented; see Collinge, P. Malac. Soc. London, II. p. 46.

Fam. ZONITIDAE.

GODWINIA, n. gen.

This new genus is proposed for the *Vitrina caperata* of Gould, which has, of recent years, usually been placed in *Helicarion*; it will be seen from the valuable anatomical notes of Lt.-Col. Godwin-Austen that there are differences which separate the species from that genus. Probably the *Vitrina tenella* of Gould also belongs here. The types of *Helicarion* Férussac (Tabl. Moll. 1821, pp. xxxi, 24) appear to have been the Australian forms *freycineti* and *cuvieri*.

(1) *Godwinia caperata* Gould.

Vitrina caperata Gould, P. Boston Soc. II. (1847), p. 181; U. S. Explor. Exped. Moll. 1856, pl. 1. fig. 9.

Helix newcombi Pfeiffer, P. Zool. Soc. London, 1854 (Jan. 1855), p. 51; Reeve, Conch. Icon. *Helix*, pl. CLXXXIX. fig. 1321.

Plate XII. figs. 6—12.

HAB. Kauai (Gould, Perkins).—Oahu (Pfeiffer).

Very possibly the habitat of 'Oahu' is a mistake.

"The animal is dark, with a rather broad pale pallial margin; foot with a well defined central area beneath; the specimen was so much contracted that the mucous gland could not be decisively made out; from analogy, however, one should be present. There are no shell-lobes, the mantle-edge is curved and well defined. The right dorsal lobe is small, and the left lobe is long, narrow, and continuous.

"The visceral sac has three coils. The buccal mass has a strong, broad, muscle on the lower posterior side; the oesophagus is short, leading into a very capacious stomach; the salivary gland is in one compact, rounded mass. Jaw solid, dark sienna in colour, with a very straight cutting edge; odontophore long and narrow, with a few large median teeth; at first sight these centrals appear to be simple and straight-sided in form, and they are very nearly so, but closer examination shows that the centre and adjoining teeth have very small notches on the outer side; these are not cusps. The laterals are all curved and aculeate. The dental formula is:

$$18-5-1-5-18$$

$$23-1-23$$

Unfortunately the generative organs were not seen by me, all this portion being lost during dissection, as will sometimes occur in these small species.

"It will be seen from the above characters that this species cannot be placed in the Helicarionidae—the absence of shell-lobes forbids this. Aculeate laterals are hardly ever met with even in the genera of Zonitidae possessing shell-lobes; I can only recall one species, *Macrochlamys castaneolabiata*. The solid jaw, divided foot, and, in all probability, the presence of a mucous gland place it in the Zonitidae. In so many points is it distinct from any of the Indian and Malayan forms that I am acquainted with that I the more regret that the generative organs have still to be made out" (H. H. Godwin-Austen).

(2) *Godwinia* (?) *tenella* Gould.

Vitrina tenella Gould, P. Boston Soc. II. 1847, p. 181; U. S. Explor. Exped. *Moll.* 1856, pl. 1. fig. 10.

HAB. Kauai (Gould),—Maui, Haleakala, 5000—9000 ft. (Perkins).

The specimens found by Mr Perkins appear to be identical with Gould's species, which, so far as I can trace, has not been rediscovered on Kauai. In fresh specimens the lip is margined with black.

VITREA Fitzinger.

Vitrea Fitz., Beitr. Landeskund. Oesterr. III. p. 99.

Fitzinger's type, as I understand him, was *diaphana* Studer.

Until the anatomy of these Hawaiian species is known, I can suggest no better reference than to the present genus.

(1) *Vitrea lanaiensis* Sykes.

Vitrea (?) *lanaiensis* Sykes, P. Malac. Soc. London, II. (1897), p. 298.

Plate XI. figs. 43, 44.

HAB. Lanai, mountains behind Koele (Perkins).

(2) *Vitrea molokaiensis* Sykes.

Vitrea (?) *molokaiensis* Sykes, P. Malac. Soc. London, II. (1897), p. 298.

Plate XI. figs. 45, 46.

HAB. Molokai, forest above Pelekunu (Perkins).

(3) *Vitrea pauxillus* Gould.

Helix pusillus Gould, P. Boston Soc. II. 1846, p. 171 [*non H. pusilla*, Lowe, 1831].

Helix pauxillus Gould, U. S. Explor. Exped. *Moll.* p. 40, pl. III. fig. 46.

Hyalinia baldwini Ancey, Bull. Soc. Malac. France, VI. 1889, p. 192; Sykes, P. Malac. Soc. London, III. pl. XIII. figs. 1—3.

HAB. Maui (Gould); West part of Maui (Ancey); Haleakala, 5000 feet (Perkins).

See, for a note on the synonymy, P. Malac. Soc. London, II. p. 298.

PSEUDOHYALINA Morse.

The original type was, I gather, *Helix exigua* Stimpson.

(1) *Pseudohyalina kauaiensis* Pfeiffer.

Helix karwaiensis Pfeiffer, P. Zool. Soc. London, 1854 [1855], p. 52; Reeve, Conch. Icon. *Helix*, sp. 1256.

HAB. Kauai (Pfeiffer).—Maui and Oahu (Baldwin).

I follow M. Ancey in the generic reference, as I do not know how, at present, the nomenclature may be bettered.

MICROCYSTINA Mörch.

Type *Nanina rinkii*, Mörch.

(1) *Microcystina* (?) *cryptoportica* Gould.

Helix cryptoportica Gould, P. Boston Soc. II. (1846), p. 20; U. S. Explor. Exped. *Moll.*, pl. v. fig. 72.

HAB. Oahu (Pease, Baldwin).

I place this here as the description states "columella valde intorta."

MICROCYSTIS Beck.

For a discussion as to the type, see P. Malac. Soc. London, II. pp. 130—2.

(1) *Microcystis chamissoi* Pfeiffer.

Helix chamissoi Pfeiffer, P. Zool. Soc. London, 1855, p. 91; Bland and Binney, Ann. Lyc. New York, x. p. 338, pl. xv. fig. 3 (jaw and radula; copied in Ann. New York Ac. III. pl. xvii. fig. O).

HAB. Kauai, Waioli and Haena (Baldwin); Makawele and Mountains above Waimea (Perkins).

Bland and Binney give "W. Maui" on the authority of Newcomb, but this seems very dubious; Mons. Ancey gives Oahu, but I think this must be an error. The figures in the *Manual of Conchology* (Vol. II. pl. xxxviii. figs. 74—6) are not good.

PHILONESIA, gen. nov.

Recently¹, I discussed the genus *Microcystis* Beck, and expressed the opinion that these small Zonitoid forms so characteristic of the Hawaiian Islands, and scattered over the Islands of the Central Pacific, could not be placed in that genus. I, further, referred them to *Macrochlamys*, stating that "whether our small forms are in accord with the typical group of this genus anatomically, remains to be proved; but, conchologically, they only appear to differ in size."

Specimens of a form which I refer to the unfigured *Microcystis baldwini* Ancey, and which were collected by Mr Perkins, contained the animal, and Lt.-Col. Godwin-Austen has most kindly made an examination of it. His full report will be found on p. 281, but I may here summarize it by saying that this species does not belong to *Macrochlamys* at all, and the query I suggested has been answered. He points out its affinity to *Sitala* and *Kaliella* and here it is interesting to note that Mr Perkins found a species in the Hawaiian Islands that I have referred to the latter genus.

Under these circumstances, and as the shells are distinct by the conchological characters of the columella from both *Microcystina* and *Lamprocystis*—anatomically, also, from the former—I have ventured to create a new genus and propose to take *Microcystis baldwini* Ancey, as the type. Probably the bulk of the Hawaiian Zonitoid forms belong to this group.

(1) *Philonesia abeillei* Ancey.

Microcystis abeillei Ancey, Bull. Soc. Malac. France, vi. (1889), p. 199.

HAB. Molokai (Ancey); Mapulehu (Baldwin); wet forest above Pelekunu (Perkins).—Oahu, Waianae Mts. (Perkins).—Lanai (Perkins).

All the specimens are young, but I cannot sever them from this species.

¹ P. Malac. Soc. London, II. p. 130.

(2) *Philonesia baldwini* Ancey.

Microcystis baldwini Ancey, Bull. Soc. Malac. France, vi. (1889), p. 204. Plate XII. figs. 1—5.

HAB. Oahu and west part of Maui (Ancey); Head of Panoa Valley, Nuuanu, and Honolulu Mts. (Perkins).

"The animal is brown; spotted and splashed with pure white (Plate XII. fig. 1*a*) on the integument which covers the branchial chamber and visceral sac, these markings shew clearly through the transparent shell and give it a very pretty, mottled appearance. The extremity of the foot is truncated; with a mucous gland. In the specimen examined the foot (Plate XII. fig. 2) is very much contracted, but there is every indication that a small lobe overhangs the mucous gland. The foot, which is regularly segmented, has a central area (Plate XII. fig. 2*a*); the pallial margin appears unusually broad, but this is deceptive and due to the extreme lateral contraction undergone; the two grooves above are similarly widened. The mantle edge has a well-developed, tongue-like, right shell lobe near the respiratory orifice, with an indistinct, narrow, left shell lobe. The right dorsal lobe is black and well developed, the left paler and moderately broad. Tentacles black.

"Plainly seen through the shell were four embryonic shells, lying one behind the other in the uterus, in various stages of development. The enveloping integument is transparent and so thin that the small shells, being comparatively heavy bodies, very readily break away, and the spermatophore adjacent was not made out.

"The odontophore has a formula of

$$30 : 9 : 1 : 9 : 30$$

$$39 : 1 : 39.$$

"The basal plates of the central teeth are quadrate in outline. The central tooth is tricuspid, the side cusps basal, blunt; the central point with convex sides. The median teeth have a blunt cusp only on the outer basal side, the ninth tooth is a narrower basal plate and is intermediate in form, the next eighteen being curved and bicuspid; the most interesting character is seen at this part of the row, for all the succeeding and outermost teeth are tricuspid, occasionally with even four points. The radula is remarkable for the similarity of the outermost teeth to those of *Kaliella barrakpurenensis*¹; those of *Sitala attegaia* and *S. infula*² should also be compared, in which latter the pectiniform teeth are seen on the whole length of the row. The present shell shows an approach to *Kaliella* in a few of the outermost laterals, but it

¹ Land and F. W. Moll. India, 1. pp. 19, 20, pl. v. fig. 11.

² Tom. cit. pl. VIII. figs. 1*e* & 2*e*, after Stoliczka.

must be noted that the median teeth have a single outer cusp, while *Kaliella* has both outer and inner cusps; this latter characteristic is, however, not present in *Sitala*. *Kaliella* has few teeth in the row, *Sitala* many; 33 : 1 : 33, 153 : 1 : 153, respectively. A more important link with the genus *Sitala* is displayed by the presence of right and left shell lobes, which *Kaliella* does not possess; the close parallel lines of contraction across the right shell lobe shew that it has considerable extension in life. Stoliczka also mentions in *Sitala infula* the swollen uterus and the advanced state of development of the ova; pointing to similar embryonic stages in these molluscs. Yet another character is in common, namely, the absence of any amatorial organ. The male organ of the present species is also slightly different; I am unable, having only one specimen to dissect, to examine this in section.

"The jaw is very thin and delicate, and so colourless that its detection and extraction are very difficult. It has a well defined central projection on the cutting edge.

"The generative organs (Plate XII. figs. 3, 3a) cannot be described so fully as one would wish, owing to the expanded state of the uterus. The hermaphrodite duct and albumen gland were perfect: and the male portion thence complete. The prostate—as it is called by Semper, shewn in his figure of *Microcystis myops* as a loose fringe-like set of convolutions—appears in this species as a closely packed and thickened mass of oblong form, flattened on one side, where the oviduct would be lying attached if perfect. The vas deferens is given off at the anterior end. The penis is a thickened muscular tube, broad and bulbous below, tapering upwards to where the very short thickened retractor muscle is given off: the vas deferens at this point has three sharp convolutions; seen with transmitted light a short, sharp, 'kink' occurs in the bulbous portion near the generative aperture.

"The sculpture of the shell, magnified about thirty times, presents a very fine, regular, slightly wavy, longitudinally striated surface; this striation is strongest near the suture, becoming finer outwards. There are about 11 striae to .003 inch. The most advanced embryonic shell consists of 2½ whorls, the sculpture is well shewn on it.

"The point now to be solved is whether we are to retain this species in *Microcystis*. Mr Sykes regards *M. ornatella* as the type of the genus; this was also the opinion of H. Nevill. Further Mr Sykes goes on to say 'Now these small Zonitoids [*i.e.* those of the Hawaiian Islands] hardly fit into the same genus as this species and therefore some other generic title is required for them.' The anatomy now described, shews, for many reasons, that the shell cannot be placed in *Macrochlamys* as Mr Sykes, guided by the shell characters, proposed. In my opinion it is undoubtedly close to *Kaliella*, still closer to *Sitala*, and yet there are sufficient differences in the generative organs to separate this Hawaiian form from both. If we take the shell alone into account, the sculpture presents one character, *viz.* fine, close longitudinal striation, not found in the Indian species of *Sitala*, in which the general surface is smooth, with spiral liration.

¹ P. Malac. Soc. London, II. 1896, p. 131.

The sculpture of *Kaliella* is finer and transverse to the whorl, so differs still more. It therefore may become necessary, if this shell be generally distinct from *M. ornatella*, to create a new genus.

"When we consider the immense area on the Equatorial belt over which *Kaliella*, *Sitala*, and this allied form are distributed, it appears that they fall naturally into a subfamily of their own which may be called the SITALINAE, Godwin-Austen, *nom. nov.*; one that is sufficiently distinct from the Durgellinae on the one hand, with which they are associated over a large portion of their range, and from the Macrochlaminae on the other, where the area of association is more restricted and the differences in the animal much greater." (H. H. Godwin-Austen.)

(3) *Philonesia cicercula* Gould.

Helix cicercula Gould, P. Boston Soc. II. (1846), p. 171; U.S. Explor. Exped. *Moll.* pl. v. fig. 73.

HAB. Hawaii (Gould); Kohala (Perkins).

var. *boettgeriana* Ancey.

Microcystis cicercula var. *boettgeriana* Ancey, Bull. Soc. Malac. France, VI. p. 206.

HAB. Hawaii, Kona (Ancey).

(4) *Philonesia exaequata* Gould.

Helix exaequata Gould, P. Boston Soc. II. (1846), p. 171; U.S. Explor. Exped. *Moll.* pl. v. fig. 61.

Helix disculus Pfeiffer, Zeitschr. für Malak. VII. 1851, p. 68 [*non* Deshayes].

Helix obtusangula Pfeiffer, *l. c.* p. 153.

Nanina discus Pfeiffer, Tryon, Man. Conch. Ser. II. Vol. II. p. 114.

HAB. Kauai (Gould, Perkins).

(5) *Philonesia hartmanni* Ancey.

Microcystis hartmanni Ancey, Bull. Soc. Malac. France, VI. (1889), p. 198.

HAB. Oahu (Ancey); Kalaikoa (Baldwin).

(6) *Philonesia indefinita* Ancey.*Microcystis indefinita* Ancey, Bull. Soc. Malac. France, vi. (1889), p. 203.

HAB. Maui, east part (Ancey); Makawao (Baldwin).

(7) *Philonesia lymanniana* Ancey.*Microcystis lymanniana* Ancey, Mem. Soc. Zool. France, vi. (1893), p. 329.

HAB. Oahu, Waialae (Ancey).

(8) *Philonesia oahuensis* Ancey.*Microcystis oahuensis* Ancey, Bull. Soc. Malac. France, vi. (1889), p. 202.

HAB. Oahu (Ancey); Halemano (Perkins).

I refer, with some doubt, a single specimen found by Mr Perkins, to this unfigured species.

var. *depressiuscula* Ancey.*M. oahuensis* var. *depressiuscula* Ancey, *t. c.* p. 203.

HAB. Oahu (Ancey).

(9) *Philonesia perlucens* Ancey.*Microcystis perlucens* Ancey, Bull. Soc. Malac. France, vi. (1889), p. 207.

HAB. Maui, east part (Ancey).

(10) *Philonesia perkinsi* Sykes.*Macrochlamys perkinsi* Sykes, P. Malac. Soc. London, II. (1896), p. 126.

Plate XI. figs. 41, 42.

HAB. Lanai.—(?) Oahu, a single specimen (Perkins).

(11) *Philonesia platyla* Ancey.*Microcystis platyla* Ancey, Bull. Soc. Malac. France, vi. (1889), p. 196; Sykes,

P. Malac. Soc. London, III. pl. XIII. figs. 13—15.

HAB. Oahu (Ancey); Waianaes Mts. (Baldwin, Perkins).

(12) *Philonesia plicosa* Ancey.*Microcystis plicosa* Ancey, Bull. Soc. Malac. France, vi. (1889), p. 200.

HAB. Oahu (Ancey); Palolo (Baldwin).

(13) *Philonesia sericans* Ancey.*Microcystis sericans* Ancey, P. Malac. Soc. London, III. (1899), p. 268.

HAB. Hawaii, Olaa (Ancey).

(14) *Philonesia subrutila* Mighels.*Helix subrutila* Mighels, P. Boston Soc. II. (1845), p. 19.

HAB. Oahu (Mighels, &c.).—Mr Baldwin gives Kauai, but I doubt this; the species is unknown to me.

(15) *Philonesia subtilissima* Gould.*Helix subtilissima* Gould, P. Boston Soc. II. (1846), p. 177; U.S. Explor. Exped. Moll. pl. v. fig. 62.

Unknown to me; from the figure I am not certain of its generic position.

HAB. Maui (Gould).

(16) *Philonesia turgida* Ancey.*Microcystis turgida* Ancey, Bull. Soc. Malac. France, VII. (1890), p. 339; Sykes, P. Malac. Soc. London, III. pl. XIII. figs. 5—7.

HAB. Maui (Ancey); Makawao (Baldwin); Mts. at 4000 ft. (Perkins).—A specimen found on Lanai by Mr Perkins, may belong to a variety.

Obs. The *Helix misella* of Férussac has been recorded with a query from the islands, but does not really belong to their fauna.

KALIELLA Blanford.

Type the group of *Helix barrakporensis* Pfr.

(1) *Kaliella konaensis* Sykes.

Kaliella konaensis Sykes, P. Malac. Soc. London, II. p. 299.

Plate XI. fig. 33.

A remarkable little shell which seems to fall between *Kaliella* and *Trochoconulus*.

HAB. Hawaii, Mt. Kona, at 3000 ft. (Perkins).

Fam. PHILOMYCIDAE.

TEBENNOPHORUS Binney.

Tebennophorus Binn., J. Boston Soc. IV. 1844, p. 171 (Type *Limax carolinensis*, Bosc).

(1) *Tebennophorus bilineatus* Benson.

Inciliaria bilineata Benson, Ann. Nat. Hist. IX. 1842, p. 486.

Philomycus bilineatus Benson, Martens, Preuss. Exped. Ost-Asien, Mollusca, p. 16, pl. v. fig. 1.

Tebennophorus australis Bergh?, Collinge, P. Malac. Soc. London, II. p. 50.

Tebennophorus striatus Hasselt, Collinge, *l. c.* p. 295.

HAB. Oahu, Mount Tantalus, Honolulu at 2000 ft.—Kauai, Lihue at 2000 ft.—Hawaii, Oloa at 2000 ft. (Perkins).

See Collinge, J. Malac. VII. 1900, p. 80.

(2) *Tebennophorus striatus* Hasselt.

Meghimatum striatum Hasselt, Bull. Sci. Nat. Geol. III. 1824, p. 82.

Tebennophorus striatus Hasselt, Collinge, P. Malac. Soc. London, II. p. 50.

HAB. Oahu, Mount Tantalus (Perkins).

Fam. ENDODONTIDAE.

ENDODONTA Albers.

Endodonta Alb., Die Heliceen, 1850, p. 89 (first species *Helix lamellosa*, Fér.);
Op. cit. Ed. 2, 1860, p. 90 ("typus *Helix lamellosa*, Fér.").

(1) *Endodonta apiculata* Ancey.

Endodonta apiculata Ancey, Bull. Soc. Malac. France, VI. (1889), p. 189.

HAB. Kauai, Dr Newcomb (Ancey).

(2) *Endodonta lamellosa* Férussac.

Helix lamellosa Férussac, Hist. Moll. I. p. 369, pl. LI. A, fig. 3; Quoy and Gaimard, Voy. Freycinet, Zool. p. 469. Pfeiffer, Conchylien-Cabinet, *Helix*, p. 197, pl. c. figs. 6—8.

Helix fricki Pfeiffer, P. Zool. Soc. London, 1858, p. 21, pl. XL. fig. 3.

According to Mörch (J. Conchyl. XIII. p. 395) this species "dépose ses œufs dans l'ombilic."

The teeth or lamellæ seem to be variable; some specimens shew traces of a second tooth in the upper portion of the outer lip, thus having nine teeth in all. Considerable variation is also shewn in the relative proportions of height and breadth, and in the width of the umbilicus.

HAB. Oahu (Pease, Ancey); Waïanae Mts. and Konahuanui (Baldwin); Mt. Kaala.—Lanai Mts. behind Koele (Perkins).

(3) *Endodonta laminata* Pease.

Helix laminata Pease, Amer. J. Conch. II. (1866), p. 292.

According to the diagnosis this differs from the last by being spirally sculptured as well as transversely ribbed, thereby becoming decussated. The teeth appear to be identical in number and position and I believe it will, eventually, only prove to be a local race.

Tryon (Man. Conch. Ser. 2, III. p. 70) considered it to be a form of *E. cavernula*, Hombr. and Jacq., stating "I have before me two trays of shells named *Helix laminata* Pease, from the 'Sandwich Is.,' one of them from the describer, which undoubtedly represent the same species." Since the two forms differ, from the diagnoses, so widely in the armature, there must, I think, be some error.

HAB. Kauai (Pease); Kahiliwi to Haena (Baldwin).

Sub-genus THAUMATODON Pilsbry.

(4) *Endodonta (Thaumatodon) contorta* Férussac.*Helix contorta* Férussac, Hist. Moll. I. p. 10, pl. LI. A, fig. 2.*Helix intercarinata* Mighels, P. Boston Soc. II. (1845), p. 18.

Specimens found by Mr Perkins, and which I refer to this species, appear to shew considerable variation and may be divided as follows :

A. Six specimens, fairly typical in shape and size, but only one is furnished with five palatal teeth, the others having four.

B. One specimen, darker in colouration, the colour markings being very distinct, palatal teeth five, these being remarkably incrassated.

C. A long series (from Makaweli), larger, slightly more strongly sculptured and very variable in colouration, sometimes the dark brown colour predominating, at others a greenish yellow. All appear to have four palatal teeth only.

HAB. Oahu (various authors).—Kauai (Perkins).

(5) *Endodonta (Thaumatodon) hystricella* Pfeiffer.*Helix hystricella* Pfeiffer, P. Zool. Soc. London, 1859, p. 25.

The original examples of this unfigured species, referred to as in Mus. Cuming, do not appear to be now in the British Museum. Two specimens found by Mr Perkins agree well with Pfeiffer's diagnosis and dimensions ; they also accord in the number of teeth.

HAB. Kauai (Pease).—Oahu, Kaala (Perkins).

(6) *Endodonta (Thaumatodon) nuda* Ancey.*Endodonta (Thaumatodon) nuda* Ancey, P. Malac. Soc. London, III. (1899), p. 268, pl. XII. fig. 1.

HAB. Hawaii, Olaa (Ancey).

(7) *Endodonta (Thaumatodon) ringens* Sykes.*Endodonta (Thaumatodon) ringens* Sykes, P. Malac. Soc. II. (1896), p. 126.

Plate XI. figs. 39, 40.

In describing this species, I referred to it as having four teeth within the outer lip ; perhaps it would be more correct to say "one basal tooth and three within the

outer lip." The ribs appear to be at varying distances apart. The Molokai specimens appear to belong to a large variety.

HAB. Lanai Mountains, behind Koele.—Molokai in wet forest above Pelekunu (Perkins).

(8) *Endodonta (Thaumatodon) rugata* Pease.

Helix rugata Pease, Amer. J. Conch. II. (1866), p. 291.

HAB. Maui (Pease).

Sub-genus NESOPHILA Pilsbry.

The following table may assist in separating the species of *Nesophila*.

A. Parietal lamellæ absent.—*E. capillata* Pease.

B. Parietal lamella single.—*E. decussatula* Pease; *E. elisæ* Ancey; *E. jugosa* Mighels; *E. lanaiensis* Sykes; *E. stellula* Gould.

C. Parietal lamellæ two.—*E. binaria* Pfeiffer; *E. hystrix* (Mighels MS.) Pfeiffer; *E. paucicostata* Pease.

D. Parietal lamellæ several.—*E. baldwini* Ancey; *E. distans* Pease; *E. tiara* Mighels.

(9) *Endodonta (Nesophila) baldwini* Ancey.

Charopa baldwini Ancey, Bull. Soc. Malac. France, VI. (1889), p. 176.

Mons. Ancey also records a white variety.

HAB. Hawaiian Islands (Ancey).

(10) *Endodonta (Nesophila) binaria* Pfeiffer.

Helix binaria Pfeiffer, P. Zool. Soc. London, 1856, p. 33.

I am unable to trace the type of this species, which should have passed with Cuming's collection into the British Museum.

HAB. Kauai (Pease).

(11) *Endodonta (Nesophila) capillata* Pease.

Helix capillata Pease, Amer. J. Conch. II. (1866), p. 292.

HAB. Kauai (Pease).

(12) *Endodonta (Nesophila) decussatula* Pease.*Helix decussatula* Pease, Amer. J. Conch. II. (1866), p. 291.

HAB. Molokai (Pease); Mountains at 4000 ft. (Perkins).

Mr Baldwin gives "Kauai" as the habitat, but, since he marks it as a species he has not seen, I think there is probably some error.

(13) *Endodonta (Nesophila) distans* Pease.*Helix distans* Pease, Amer. J. Conch. II. (1866), p. 290.

HAB. Kauai (Pease).

(14) *Endodonta (Nesophila) elisae* Ancey.*Pityis elisae* Ancey, Bull. Soc. Malac. France, VI. (1889), p. 180.

Unknown to me.

HAB. ? Hawaiian Islands (Ancey).

(15) *Endodonta (Nesophila) hystrix* (Mighels MS.) Pfeiffer.*Helix hystrix* Pfeiffer, Symb. Hist. Hel. III. p. 67; Gould, U. S. Explor. Exped. Moll. pl. IV. fig. 52*.*Helix setigera* Gould, P. Boston Soc. I. p. 174 [nec Sowerby].It is, of course, not the *Helix hystrix* of Cox, an Australian species.

HAB. Oahu (authors); Mount Kaala, Oahu (Perkins).

(16) *Endodonta (Nesophila) jugosa* Mighels.*Helix jugosa* Mighels, P. Boston Soc. II. (1845), p. 19.*Helix rubiginosa* Gould, P. Boston Soc. II. (1846), p. 173; U. S. Explor. Exped. Moll. pl. IV. p. 49.

The two forms were first united by Pease¹, who stated that the synonymy was accepted by Gould; recently Mons. Ancey² has revived *E. rubiginosa* as a species, referring to it some shells from Oahu. In this state of conflict I have followed Pease, considering that he and Gould were in the best position to form an opinion.

HAB. Kauai, Waioli to Kapaa (Baldwin); Kauai (Perkins, etc.).

¹ J. Conchyl. XIX. (1870), p. 95.² Bull. Soc. Malac. France, VI. (1889), p. 179.

(17) *Endodonta (Nesophila) lanaiensis* Sykes.

Endodonta (Nesophila) lanaiensis Sykes, P. Malac. Soc. London, II. (1896), p. 127.
Plate XI. figs. 37, 38.

Specimens from Kauai which I refer to this species are strongly hispid in the young state, but with age the hairs appear to be rubbed off; none of those from Lanai are very young, and only traces of hairs can be seen. The species appears to be near *E. decussatula*, but it almost lacks decussation and is darker in colour; the interstices of the ribs are closely, finely, striate. Save for the presence of a parietal lamella, the Kauai specimens approach Pease's diagnosis of *E. capillata*.

HAB. Lanai Mountains, behind Koele.—Kauai, Makaweli, on *Dracaena* and *Cheirodendron* (Perkins).

(18) *Endodonta (Nesophila) paucicostata* Pease.

Helix paucicostata Pease, J. Conchyl. XVIII. (1870), p. 395.

Helix filocostata Pease, P. Zool. Soc. London, 1871, p. 454.

HAB. Kauai (Pease).

(19) *Endodonta (Nesophila) stellula* Gould.

Helix stellula Gould, P. Boston Soc. I. (1844), p. 174; U. S. Explor. Exped.
Moll. pl. IV. fig. 52†.

HAB. Maui (Gould).

(20) *Endodonta (Nesophila) tiara* Mighels.

Helix tiara Mighels, P. Boston Soc. II. (1845), p. 19; Kuster, Conch.-Cab. *Helix*,
pl. CXXV. figs. 9—11.

According to Mons. Ancey¹ this species possesses several parietal lamellæ; if so, the character has been omitted from the various diagnoses.

HAB. Kauai (various authors).

(21) *Endodonta (Nesophila)*, sp.

Two interesting little specimens with a depressed spire were found on Molokai by Mr Perkins, the exact habitat being "Forest above Pelekunu"; they have 4—4½ whorls, with two parietal lamellæ and no teeth within the other lip, but appear not to be adult.

HAB. Molokai.

¹ Bull. Soc. Malac. France, VI. p. 175.

PTERODISCUS Pilsbry.

Type, *P. wesleyi* Sykes.

(1) *Pterodiscus digonophorus* Ancey.

Patula digonophora Ancey, Bull. Soc. Malac. France, vi. (1889), p. 171; Sykes, P. Malac. Soc. London, III, pl. XIII, figs. 9—11.

HAB. Oahu (Ancey); Waianae Mts. (Baldwin).

(2) *Pterodiscus petasus* Ancey.

Pterodiscus petasus Ancey, P. Malac. Soc. London, III, (1899), p. 268, pl. XII, fig. 4.

HAB. Oahu, Waianae Mts. (Ancey).

(3) *Pterodiscus wesleyi* Sykes.

Endodonta (Pterodiscus) wesleyi Sykes, P. Malac. Soc. London, III, (1896), p. 127.
Endodonta (Pterodiscus) alata Pfeiffer, Pilsbry, Man. Conch. (2) IX, p. 36, pl. IV, fig. 44 [nec *Helix alata*, Pfeiffer].

HAB. Hawaiian Islands.

The following two species, placed in this group by Mr Pilsbry¹, with the habitat of Hawaiian Islands, are unknown to me. They were originally described from "Islands of the Central Pacific" by Pease: the first has been recorded from Tahiti, but never again found there, and Mons. Ancey has suggested a Hawaiian origin; the second has been localized as from (?) Lanai. They are *Helix prostrata* and *H. depressiformis* (P. Zool. Soc. London, 1864, p. 670).

Fam. HELICIDAE.

PAPUINA von Martens.

Papuina Mart., Die Heliceen, Ed. 2, 1860, p. 166 (type *Helix lituus*, Lesson).

(1) *Papuina barnaclei* Smith.

Helix (Merope?) barnaclei Smith, Ann. Nat. Hist. (4) XX, p. 242.

I am informed that careful search has been made, in the neighbourhood indicated, but that no trace of the species can be found. At present, bearing in mind on the one

¹ Man. Conch. (2) IX, p. 36.

hand the improbability of a species of *Papuina* occurring in Hawaii, and on the other the positive statement of the original collector, I can but include it, with this note of warning.

HAB. Hawaii, eight miles from Kailua (Smith).

EULOTA Hartmann.

Eulota Hart., Erd- und Susswasser Gasteropoden, p. 179 (type *Helix fruticum*, Müll.). The date usually given is 1842, but the title-page of the copy in the British Museum bears that of 1840.

(1) *Eulota similaris* Férussac.

Helix similaris Férussac, Prodrôme, 1822, p. 47 (*nom. sol.*); Hist. Moll. I. p. 171, pl. XXV. B, figs. 1—4, XXVII. A, figs. 1—5.

A widely scattered species; presumably not indigenous.

HAB. Kauai (Pilsbry).—Oahu, Tantalus (Perkins).

The following have been described under the term *Helix* and recorded from the Islands.

Helix fornicata Gould, P. Boston Soc. II. (1846), p. 172.

Supposed to come from Kauai. Tryon notes¹: "In the corrigenda to the Mollusca of the Wilkes Exploring Expedition, Dr Gould states that the only specimen was lost, and *H. tongana* Quoy, figured by the artist for this species."

Helix sandwichensis Pfeiffer, P. Zool. Soc. London, 1849, p. 128.

Appears to be the young of a South American *Systrophia*.

Helix exserta Pfeiffer, P. Zool. Soc. London, 1856, p. 32.

Only a fragment of the type remains; it has never been figured.

Fam. PUPIDAE.

PUPA Draparnaud (1801).

Pupa Drap., Tabl. Moll. France, pp. 32, 56 (first species *Turbo muscorum* L.); 1805, Hist. Moll. France, p. 59.

There appears to be a *Pupa* of Lamarck of even date (Syst. anim. sans Vert. p. 88) with *Turbo uva* as type; also, through the kindness of Mr Sherborn, I have

¹ Man. Conch. (2), III. p. 27.

examined the *Muscum Boltenianum*, Ed. 1. 1798, and Bolten proposed *Pupa* (p. 110) for *Voluta flammea* and *V. solidula*. The first species belongs to *Actacon* (1810) and the second is the type of *Solidula* (1807). If, therefore, Bolten's names are to be used, *Pupa* Drap. cannot stand unless it prove to be the same as *Pupa* Humphrey, 1797 (*Mus. Calonianum*).

An excellent study of the Pupidae of Oceania has been written by Dr Boettger; the attention of subsequent authors does not appear to have been sufficiently directed to this paper.

(1) *Pupa acanthinula* Ancey.

Pupa acanthinula Ancey, Mem. Soc. Zool. France, v. (1892), p. 709.

HAB. Oahu, Makiki (Ancey).

(2) *Pupa admodesta* Mighels.

Pupa admodesta Mighels, P. Boston Soc. II. (1845), p. 19; Boettger, Conch. Mittheil. 1. p. 58, pl. XII. fig. 15.

HAB. Oahu (Mighels).

(3) *Pupa bacca* Pease.

Pupa bacca Pease, P. Zool. Soc. London, 1871, p. 462.

HAB. Hawaii, Kalapana (Pease).

(4) *Pupa costata* Pease.

Pupa costata Pease, P. Zool. Soc. London, 1871, p. 462.

HAB. Hawaii (Pease).

(5) *Pupa lyonsiana* Ancey.

Pupa lyonsiana Ancey, Mem. Soc. Zool. France, v. (1892), p. 713.

HAB. Oahu, Punahou (Ancey).

(6) *Pupa lyrata* Gould.

Pupa lyrata Gould, P. Boston Soc. 1. (1843), p. 139; Boettger, Conch. Mittheil. 1. p. 61, pl. XII. fig. 17.

Pupa striatula Pease, P. Zool. Soc. London, 1871, p. 461.

Pupa magdalenae Ancey, Mem. Soc. Zool. France, v. (1892), p. 716.

I follow Dr Boettger in placing *P. striatula* with *P. lyrata*, and have added *P. magdalenae*, since the character of two parietal teeth, on which Mons. Ancey lays special stress, is found in some undoubted specimens of *P. lyrata*.

HAB. Hawaii (Pease).—Oahu (Baldwin); Palaina (Ancey).

(7) *Pupa mirabilis* Ancey.

Pupa mirabilis Ancey, Bull. Soc. Malac. France, VII. (1890), p. 339.

HAB. Oahu (Ancey).

(8) *Pupa newcombi* Pfeiffer.

Pupa newcombi Pfeiffer, P. Zool. Soc. London, 1852 [1854], p. 69; Kuster, Conch.-Cab. *Pupa*, pl. XX. figs. 23, 24.

Pupa costulosa Pease, P. Zool. Soc. London, 1871, p. 462.

HAB. Hawaii (Pease, Baldwin).—Oahu and Kauai (Baldwin) [sed quaere, E.R.S.].

var. *seminulum* Boettger.

Pupa newcombi var. *seminulum* Boettger, Conch. Mittheil. I. p. 58, pl. XII. fig. 14.

HAB. Probably Hawaii (Boettger).

(9) *Pupa pediculus* Shuttl. var. *nacca* Gould.

Vertigo nacca Gould, P. Boston Soc. VIII. (1862), p. 280.

Dr Boettger has pointed out that this is only a form of *P. pediculus*, Shuttleworth (Bern. Mittheil. 1852, p. 296), and barely of varietal rank. The typical form appears not to be found in the Hawaiian Islands.

HAB. Hawaii (Gould).

(10) *Pupa perlonga* Pease.

Pupa perlonga Pease, P. Zool. Soc. London, 1871, p. 462; Boettger, Conch. Mittheil. I. p. 60, pl. XII. fig. 16.

Only two specimens, which I refer here with some hesitation, since the teeth are rather obscure.

HAB. Oahu (Pease).—Kauai, Makaweli (Perkins).

Fam. ACHATINELLIDAE.

The various species of this family form probably one of the most puzzling groups of land-shells known: numerous 'species' have been described, founded almost entirely on shell colouration or banding, and this, bearing in mind such protean forms as *Tachea nemoralis* or *Polymita picta*, is a course which often leads to endless trouble. At present, such genera as *Achatinella* s. s. and *Achatinellastrum* are in utter confusion, and any attempt at a list of species simply reflects the general view of the writer and cannot be regarded as authoritative.

Of recent years some species have been described, based on shell-colouration combined with that of the mantle, but it should be remembered that some malacological characteristics are frequently as liable to variation as are conchological ones. The severance of species by consideration of habitat is, again, not a necessarily certain guide, since one species of mollusc may range widely, while at different points of its range, local variations may occur.

The history of the Achatinellidae in literature commences with Dixon's description of *Turbo apexfulva*; subsequently stray species were described by various authors, but no serious attempts were made at their study until about 1850-60, when Newcomb and Pfeiffer added greatly to our knowledge. To Mr Gulick, in 1858, we owe large additions to the catalogue—so far as names go—but his views of species were somewhat too narrow, and he described many trifling variations as species, mainly on the ground of geographical range. Later, Pease did useful work and gave a catalogue of the family. Dr Hartman, in 1888, listed the known forms in a similar way. Of recent years Mr Baldwin has done the chief work on the group, and his very valuable catalogue has been of great assistance.

Numerous genera and sections have been described, almost all on purely conchological grounds, and so variable are the forms that linking species are easily found. Still they prove useful in the arrangement of species and therefore have been admitted in this work.

A list of them arranged in chronological order may be of use.

- 1828. *Achatinella* Swainson, Q. J. Sci. Lit. and Arts, p. 81.
- 1847. *Leptachatina* Gould, P. Boston Soc. II. p. 201.
- 1854. *Partulina* Pfeiffer, Malak. Blatt. I. p. 114.
- 1854. *Newcombia* Pfeiffer, t. c. p. 117.
- 1854. *Bulinella* Pfeiffer, t. c. p. 119.
- 1854. *Laminella* Pfeiffer, t. c. p. 126.
- 1854. *Achatinellastrum* Pfeiffer, t. c. p. 133.
- 1854. *Labiella* Pfeiffer, t. c. p. 142.

1855. *Cavelia* H. & A. Adams, Gen. Rec. Moll. II. p. 132.
 1855. *Amastra* H. & A. Adams, *t. c.* p. 137.
 1855. *Auriculella* Pfeiffer, Malak. Blatt. II. p. 3.
 1855. *Frickella* Pfeiffer, *t. c.* p. 3.
 1860. *Apex* Martens, Die Heliceen, p. 248.
 1870. *Eburnella* Pease, P. Zool. Soc. London, 1869, p. 647.
 1870. *Perdicella* Pease, *t. c.* p. 649.
 1875. *Carinella* Pfeiffer, Novit. Conch. IV. p. 116.
 1899. *Thaanumia* Ancey, P. Malac. Soc. London, III. p. 269.
 1899. *Baldwinia* Ancey, *t. c.* p. 270.

Mr Pilsbry's remark, that the use of Férussac's term *Helicteres* "would open the door to an endless series of vagaries in nomenclature," appears to me to be thoroughly justified; for the converse view see Pease, P. Zool. Soc. London, 1862, p. 3. The *Achatinella* of Schlüter (1838) appears to be a mixture of *Ferussacia* and allied groups.

Our knowledge of the anatomy is due primarily to Bland and Binney, who pointed out that the Achatinellidae may be divided into two main groups based on the characters of the radula and jaw; also that *Cavelia*, while it agrees in the radula with the *Leptachatina* and *Amastra* group, differs in the characters of the jaw. Heynemann has also written on the subject, and recently notes have been published by Messrs Gwatkin, Pilsbry and Suter. Mr Pilsbry has recently¹ stated with reference to *Partula* and *Achatinella* that "these forms have no relations with the Bulimulidae and Achatinidae, with which conchologists associate them, but lie at the base of the terrestrial pulmonate tree."

The classification here adopted is:

Genus *Achatinella*. Subgen. *Achatinella* s. s. (Syn. *Apex*.) *Bulimella*. *Partulina*. (Syn. *Baldwinia*.) *Achatinellastrum*. (Syn. *Eburnella*.)

Genus *Perdicella*.

Genus *Newcombia*.

Genus *Amastra*. Subgen. *Amastra* s. s. *Laminella*. *Amastrella*, n. subgen. *Kauaia*, n. n. [*Carinella*, Pfr., nec Sby.]

Genus *Leptachatina*.

Genus *Thaanumia*.

Genus *Carclia*.

Genus *Auriculella*.

Genus *Frickella*.

¹ Ann. nat. Hist. IV. (1899), p. 156.

ACHATINELLA s. str.

Synonym. *Apex* von Martens.

Well has Dr Hartman remarked, that the species of this group "are involved in almost inextricable confusion." Our ignorance of the animal in most forms, combined with the fact that authors have described frequently from single specimens, or from series of two or three, entirely at present prevents one ascertaining the true specific limits.

In the one or two instances where I have attempted 'lumping,' the results are due to a long series of specimens in which I have been unable to arrive at a definite break between the one 'species' and the other.

The conclusions I have drawn are founded on Newcomb's and Pfeiffer's type specimens; specimens compared with Gulick's types; further a few of the types described by Mr Smith; and, finally, the specimens collected by Mr Perkins and a collection formed by Mr Hutchison.

All the species of this group are confined to the Island of Oahu.

(1) *Achatinella albospira* Smith.

Apex albospira Smith, P. Zool. Soc. London, 1873, p. 77, pl. x. fig. 8.

Unknown to me; it has been united by Dr Hartman with *A. turgida* Newc. [= *A. cestus* Newc.].

HAB. Oahu, Ewa.

(2) *Achatinella apexfulva* Dixon.

Turbo apex fulva Dixon, Voyage round the world, 1789, p. 344, figd. on an unnumbered plate.

Turbo lugubris Chemnitz, Conch.-Cab. xl. 1795, p. 278, pl. ccix. figs. 2059, 2060.

Cochlogena (Helicteres) lugubris Chemnitz, Férussac, Prodrôme, p. 60, no. 431.

Monodonta seminigra Lamarck, Hist. Nat. Anim. sans Vert. vii. (1822), p. 37.

Achatinella pica Swainson, Zool. Ill. Moll. ser. II. pl. xcix. fig. 1.

HAB. Oahu, Kawaiiloa (Baldwin).

Dixon was thoroughly binomial, as a reference to his work will show: his figures are good, and the only point that can be made against the utilization of his name is that it appeared in three words. This, probably, was a printer's error, or a slip, as other names in the same work are proper, and suitable descriptions are given.

(3) *Achatinella apicata* (Newcomb MS.) Pfeiffer.

Achatinella apicata Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 210.

HAB. Oahu, Halemano (Perkins).

var. *polymorpha*, Gulick.

Apex polymorpha Gulick, P. Zool. Soc. London, 1873, p. 81, pl. x. fig. 5.

HAB. Oahu, Wahiawa, Kalaikoa, Ahonui (Gulick); Kawailoa Gulch, and above Ewa (Perkins).

var. *vespertina* Baldwin.

Achatinella (Apex) vespertina Baldwin, P. Ac. Philad. 1895, p. 219 [shell and animal], pl. x. fig. 14.

HAB. Oahu, Kawailoa (Baldwin); from a ridge between Waala and Kawailoa Gulches (Perkins).

var. *alba*, var. *n.*

Shell snow-white, save for the peristome being margined with lilac, similar tinting appearing on the columella plait, and inside the outer lip at its junction with the body-whorl of the shell.

HAB. Oahu, near head of Kawailoa Gulch (Perkins).

A fine series of this species. It appears to be distinct from *A swiftii* Newc. [= *A. cestus* Newc. var.], to which Newcomb subsequently referred it, and the type of which I have examined. The shell is larger, different in form, and more polished, the ground colouring darker, and the banding not so conspicuous in the typical form: the protoconch is in general brown, and but rarely white. The prevailing tint is brown, sometimes becoming black with a white area below the suture, rarely altogether snow-white. A few, from near Kawailoa, are tinted with lilac on an ashy ground, occasionally having a chestnut sutural line; these form a passage to *A. vespertina* Baldwin, in which the lilac tint has changed to cream-colour. This latter is the only form in which the animal appears to have been noticed.

(4) *Achatinella bicolor* (Gulick) Pfeiffer.

Achatinella bicolor Pfeiffer, Mon. Hel. Viv. iv. 1859, p. 529.

Near, apparently, to *A. cookei* Baldwin.

HAB. Oahu, Lehui (Pfeiffer).

(5) *Achatinella cestus* Newcomb.

Achatinella cestus Newcomb, P. Zool. Soc. London, 1853 [1854], p. 132, pl. xxii. fig. 8.

Achatinella turgida Newcomb, *tom. cit.* p. 134, pl. xxii. figs. 10, 10 a.

HAB. Oahu, Palolo and Ewa (Newcomb); Ewa and Halemano (Perkins).

var. *swiftii* Newcomb.

Achatinella swiftii Newcomb, P. Zool. Soc. London, 1853 [1854], p. 133, pl. xxii. fig. 9; Ann. Lyc. New York, vi. p. 325 [animal].

Achatinella (Achatinellastrum) valida Pfeiffer, P. Zool. Soc. London, 1855, p. 6, pl. xxx. fig. 24.

Apex flavidus Gulick, *op. cit.* 1873, p. 80, pl. x. fig. 1.

Apex tuberosus Gulick, *tom. cit.* p. 81, pl. x. fig. 3.

Apex liliaceus Gulick, *tom. cit.* p. 79, pl. x. fig. 4.

Apex turbiniformis Gulick, *tom. cit.* p. 81, pl. x. fig. 7.

HAB. Oahu, Ewa (Newcomb); as *A. flavidus*, Kalaikoa and Ahonui (Gulick); as *A. tuberosus*, Kalaikoa, Ahonui, Wahiwawa and Halemano (Gulick); as *A. turbiniformis*, Kalaikoa and Lehui (Gulick).

var. *forbesiana* Pfeiffer.

Bulimella forbesiana Pfeiffer, P. Zool. Soc. London, 1855, p. 5, pl. xxx. fig. 16.

Apex gulickii Smith, *loc. cit.* 1873, p. 78, pl. ix. fig. 19 [non 17].

HAB. Oahu as *A. gulickii*, Kalaikoa, Ahonui and Waialei (Smith).

The type form has the bands interrupted; in the variety *swiftii* they are continuous and almost confluent, recalling a dwarf *A. lugubris*. From the variety *swiftii*, given a fair number of specimens, we may pass by slight variations up to a nearly white shell with hardly a trace of banding. One specimen is light yellow and almost unmarked except the latter half of the last whorl, which is strongly banded with dark brown (Plate XI. figs. 6, 7). The general brown colouring is more persistent in the variety than in the typical form. The variety *forbesiana* is somewhat more elongate and slightly differently banded and coloured.

(6) *Achatinella cookei* Baldwin.

Achatinella (Apex) cookei Baldwin, P. Ac. Philad. 1895, p. 220, pl. x. fig. 15 [shell and animal]; Suter, *t. c.* p. 239 [radula].

HAB. Oahu, Waiau (Baldwin).

(7) *Achatinella decora* Férussac.

Cochlogena (Helicteres) decora Férussac, Prodrôme, 1822, p. 60, no. 430.

Turbo lugubris sinistrorsus Chemnitz, Conch.-Cab. xi. 1795, p. 307, pl. cccxiii. figs. 3014, 3015.

Achatinella perversa Swainson, Quart. Journ. Sci. &c. i. 1828, p. 84; Zool. Ill. 1833, ser. II, pl. xcix. fig. 2; Newcomb, Ann. Lyc. New York, vi. 1858, p. 309 [animal].

Achatinella concidens Gulick, Ann. Lyc. New York vi. 1858, p. 234, pl. viii. fig. 54.

HAB. Oahu, Halemano, Waimea.

var. *leucophaea* Gulick.

Apex leucophaeus Gulick, P. Zool. Soc. London, 1873, p. 82, pl. ix. fig. 16.

HAB. Oahu, Waialei.

var. *neglecta* Smith.

Apex neglectus Smith, P. Zool. Soc. London, 1873, p. 78, pl. ix. fig. 22.

Apex coniformis Gulick, *tom. cit.* p. 81, pl. ix. fig. 17.

HAB. Oahu, Wahiawa, Kalaikoa, Ahonui, Halemano (Smith, Gulick).

var. *versicolor* Gulick.

Apex versicolor Gulick, P. Zool. Soc. London, 1873, p. 80, pl. ix. fig. 18.

HAB. Oahu, Ahonui, Kalaikoa.

var. *innotabilis* Smith.

Apex innotabilis Smith, P. Zool. Soc. London, 1873, p. 78, pl. ix. fig. 23.

HAB. Oahu.

subspecies *mustelina* Mighels.

Achatinella mustelina Mighels, P. Boston Soc. II. 1845, p. 21; Reeve, Conch. Icon.

Achatinella, pl. iii. fig. 21; Newcomb, Ann. Lyc. New York, vi. p. 313 [animal].

HAB. Oahu, Waianae, Kaala.

var. *leucorraphe* Gulick.

Apex leucorraphe Gulick, P. Zool. Soc. London, 1873, p. 79, pl. x. fig. 2.

HAB. Oahu, Kalaikoa.

var. *cinerosa* Pfeiffer.

Achatinella (Bulimella) cinerosa Pfeiffer, P. Zool. Soc. London, 1855, p. 2, pl. xxx. fig. 5.

HAB. Oahu.

It is with much diffidence that the above 'lumping' has been attempted. While not very difficult as a general rule to identify single specimens, I have been unable to divide the long series of specimens which, partly collected by Mr Perkins and partly by Mr Hutchison, have passed through my hands. Shape, colour, and form, seem to be as nothing, and one passes by infinitesimal graduations from one so-called species to another. True it is that the animals are said to differ in colour, but this alone is not, in my opinion, sufficient for a specific character; even if it be so, it can, in general, only avail the field naturalist, and not the Museum student.

The variety *neglecta* Smith is not really so greenish as represented in the original figure; fig. 23 on the same plate gives a better idea of the real colour.

Férussac appears to have confounded more than one distinct form under his *decora*; the name has therefore been here used for the species he first referred to.

(8) *Achatinella dolium* Pfeiffer.

Achatinella (Bulimella) dolium Pfeiffer, P. Zool. Soc. London, 1855, p. 5, pl. xxx. fig. 15.

HAB. Molokai (Baldwin).

I fancy this habitat must be wrong and that the species really belongs to Oahu; the shell is very close to *A. hanleyana* Pf., and may prove to be only a colour variety.

(9) *Achatinella hanleyana* Pfeiffer.

Achatinella (Bulimella) hanleyana Pfeiffer, P. Zool. Soc. London, 1855, p. 202.

Related to the form of *A. lorata* described as *A. nobilis*, and may prove to be an extreme variety.

HAB. Oahu.

(10) *Achatinella lorata* Férussac.

Helix (*Cochlogena*) *lorata* Férussac, Prodrôme, 1822, p. 60.

Achatina lorata Férussac, Deshayes, Hist. Moll. II. p. 193, pl. clv. figs. 9—11.

Achatinella lorata Férussac, Newcomb, Ann. Lyc. New York, IV. p. 310 [animal];

Semper, Reis. im Philippinen, Landmollusken, pl. xvi. fig. 23 [anatomy].

Achatinella alba Nuttall, Jay, Cat. Shells, Ed. II. 1839, p. 58 [*nomen solum*].

Achatinella pallida Nuttall, Jay, *loc. cit.*; Reeve, Conch. Icon. *Achatinella*, sp. 2.

Achatinella (*Bulimella*) *nobilis* Pfeiffer, P. Zool. Soc. London, 1855, p. 202.

Achatinella ventrosa Pfeiffer, *op. cit.* 1855, p. 6, pl. xxx. fig. 20.

Non *A. lorata* Férussac, Reeve, Conch. Icon. *Achatinella*, sp. 6.

A very variable shell, with or without colour bands, and, occasionally, pure white.

HAB. Oahu (various authors); Manoa to Halawa (Baldwin); Nuuanu, Head of Panoa Valley, Mount Tantalus (Perkins).

(11) *Achatinella multilineata* Newcomb.

Achatinella multilineata Newcomb, P. Zool. Soc. London, 1853 [1854], p. 138, pl. xxii. fig. 23.

Achatinella (*Bulimella*) *monacha* Pfeiffer, *op. cit.* 1855, p. 3, pl. xxx. fig. 9.

HAB. Oahu, Waianae Mountains (Baldwin); Koolau poko (Newcomb). Dr Hartman referred this species, apparently by error, to Maui.

(12) *Achatinella napus* Pfeiffer.

Achatinella (*Achatinellastrum*) *napus* Pfeiffer, P. Zool. Soc. London, 1855, p. 5, pl. xxx. fig. 19.

Achatinella (*Bulimella*) *concavospira* Pfeiffer, *op. cit.* 1859, p. 30.

Apex leucozonus Gulick, *op. cit.* 1873, p. 83, pl. x. fig. 6.

HAB. Oahu.

I regret to be unable to agree with Newcomb that *A. napus* is the same as *A. pulcherrima* Swainson. *A. concavospira* seems to be only an elongate variety; the types of both species are in the British Museum (Natural History).

(13) *Achatinella ovum* Pfeiffer.

Achatinella (*Achatinellastrum*) *ovum* Pfeiffer, P. Zool. Soc. London, 1856, p. 334.

HAB. Oahu.

(14) *Achatinella pulchella* Pfeiffer.

Achatinella (Achatinellastrum) pulchella Pfeiffer, P. Zool. Soc. London, 1855, p. 6, pl. xxx, fig. 2.

A small species, very variable in colour, with a blunt apex, and somewhat depressed in form.

HAB. Oahu, mountains behind Ewa (Perkins).

(15) *Achatinella sordida* Newcomb.

Achatinella sordida Newcomb, P. Zool. Soc. London, 1853 [1854], p. 139, pl. xxiii, fig. 27.

Some specimens run very close to *A. decora* Fér.

HAB. Oahu, Lihue (Newcomb).

(16) *Achatinella swainsoni* Pfeiffer.

Achatinella (Bulinella) swainsoni Pfeiffer, P. Zool. Soc. London, 1855, p. 4, pl. xxx, fig. 13.

Newcomb suggested that this might be only a form of *A. sordida*; it appears, however, to be distinct, being broader, brown in general coloration, and having a brown, in place of a white lip. It is a little doubtful, from its form, if it be correctly placed in this group, but the sections are very artificial.

HAB. Oahu.

(17) *Achatinella vittata* Reeve.

Achatinella vittata Reeve, Conch. Icon. *Achatinella*, 1850, sp. 9.

Achatinella simulans Reeve, loc. cit. sp. 15.

Achatinella (Achatinellastrum) globosa Pfeiffer, P. Zool. Soc. London, 1855, p. 7, pl. xxx, fig. 25.

Apex albofasciatus Smith, op. cit. 1873, p. 78, pl. ix, fig. 21.

Apex tumefactus Gulick, tom. cit. p. 82, pl. ix, fig. 20.

Helix decora Férussac, Quoy and Gaimard, Voy. Uranie et Phys. 1824, Zool. p. 478 [nec *H. decora* Fér. 1822 = *A. perversa* Swainson].

Achatina decora Férussac, Deshayes, Hist. Moll. II. pt. 2, p. 191, pl. clv, figs. 5, 7.

Achatinella decora Férussac, Newcomb, Ann. Lyc. New York, vi, p. 307 [animal].

? ? *Achatinella vestita* Mighels, P. Boston Soc. II. 1845, p. 20.

HAB. Oahu, Waheawa, Halemano, Nuuanu Valley, &c.

var. *cinerea*, n. var.

Banding almost black on the last whorl, ash coloured on the whorl above, the upper whorls tinted with pale brown banding above the suture, replaced by an almost black line at the apex.

HAB. Oahu, Nuuanu (Perkins).

Having examined the types of the first five species mentioned in the above synonymy, I am unable to separate them specifically; with a fair series of specimens the forms shade one into another. The variety is noteworthy for its banding being ashy and almost black, while in the typical form it is red-brown in various patterns. If *A. vestita* be really this species it takes precedence in date: I have never seen a specimen.

subgen. *BULIMELLA* Pfeiffer.

Bulimella Pfeiffer, Malak. Blätt. 1 (1854), p. 119 (as section of *Achatinella*, first species *A. rosea* Swainson).

(18) *Achatinella (Bulimella) abbreviata* Reeve.

Achatinella abbreviata Reeve, Conch. Icon. *Achatinella*, sp. 19; Newcomb, Ann. Lyc. New York, vi. p. 317 [animal].

Achatinella bacca Reeve, loc. cit. sp. 45; Newcomb, loc. cit. p. 318 [animal].

Achatinella nivosa Newcomb, P. Zool. Soc. London, 1853 [1854], p. 132, pl. XXII. fig. 6.

Achatinella (Achatinellastrum) clementina Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856], p. 205.

HAB. Oahu, Palolo and Konahuanui (Baldwin); Niu (Newcomb); Head of Kawailoa Gulch (Perkins).

The specimens found are of a puzzling form, shewing links between *clementina* and *colorata*.

The animal, as described by Newcomb, seems to vary a good deal in colour.

(19) *Achatinella (Bulimella) ampla* Newcomb.

Achatinella ampla Newcomb, P. Zool. Soc. London, 1853 [1854], p. 137, pl. XXII. fig. 19.

Mr Baldwin considered this a synonym of *A. colorata* Rve.; the only specimen I have seen is the type, which is somewhat injured, and I incline to place it near *A. abbreviata* Rve.

HAB. Oahu, Koolau (Newcomb).

(20) *Achatinella (Bulimella) bulimoides* Swainson.

Achatinella bulimoides Swainson, Brand's Journ. 1828, p. 85; Zool. Illustr. ser. 2, II. pl. CVIII. fig. 1; Reeve, Conch. Icon. *Achatinella*, sp. 8; Heynemann, Malak. Blätt. XIV. (1867), p. 146, pl. 1. fig. 2 [anatomy].

Achatinella obliqua Gulick, Ann. Lyc. New York, VI. p. 245, pl. VIII. fig. 63.

Achatinella oomorpha Gulick, *l. c.*, p. 246, pl. VIII. fig. 64.

A. obliqua was united with this species by Newcomb; Mr Baldwin, however, gives it as distinct. This latter view may be correct, but the two forms are very closely related.

HAB. Oahu, Kahana (Gulick); Kawailoa (Baldwin).

(21) *Achatinella (Bulimella) byronii* Wood.

Helix byronii Wood, Index Test. Suppl. p. 22, pl. VII. fig. 30.

Achatinella melanostoma Newcomb, P. Zool. Soc. London, 1853 [1854], p. 132, pl. XXII. fig. 7.

Achatinella limbata Gulick, Ann. Lyc. New York, VI. p. 252, pl. VIII. fig. 70.

Achatinella mahogani Gulick, *l. c.*, p. 254, pl. VIII. fig. 72.

Achatinella pulcherrima Swainson, Zool. Ill. pl. CXXXIII. fig. 2; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

HAB. Oahu, Ewa (Newcomb); Ahonui, Kalaikoa (Gulick); Panoa Valley, Halemano, and ridges between Opaepala and Kawailoa Gulches (Perkins).

var. *recta* Newcomb.

Achatinella recta Newcomb, P. Zool. Soc. London, 1853 [1854], p. 143, pl. XXIII. fig. 45.

Bulimella multicolor Pfeiffer, *op. cit.* 1855, p. 4, pl. XXX. fig. 11 [*pars, non* fig. 11 a].

HAB. Oahu, Waialua (Newcomb); Halemano and Nuuanu Valley (Perkins).

var. *nympha* Gulick.

Achatinella nympha Gulick, Ann. Lyc. New York, VI. p. 251, pl. VIII. fig. 69.

HAB. Oahu, Ahonui, Wahiawa, Halemano, Kawailoa, Waimea (Gulick); Halemano (Perkins).

The variation is, as usual in the group, very great. A long series collected by Mr Hutchison, added to those of Mr Perkins, has led me to be unable to form any definite break between the various described species which are here placed as varieties. *A. pulcherrima* appears to be a large race in which the colouring has been broken into bands. *A. multicolor* and *A. recta* are, I think, only dwarf varieties. The sinistral shell figured by Pfeiffer (*loc. cit.* pl. xxx. fig. 11a) as a variety of *A. multicolor* belongs really to *A. oviformis*. *A. nympa* seems a small, elongate, almost colourless variety, with a white lip.

(22) *Achatinella (Bulimella) decipiens* Newcomb.

Achatinella decipiens Newcomb, P. Zool. Soc. London, 1853 [1854], p. 153, pl. xxiv. fig. 68; Ann. Lyc. New York, vi. p. 332 [animal].

Achatinella viridans Pfeiffer, Mal. Blätt. 1854, p. 121 [nec Mighels, fide Newcomb].

Achatinella planospira Pfeiffer, P. Zool. Soc. London, 1855, p. 3, pl. xxx. fig. 8.

Achatinella herbacea Gulick, Ann. Lyc. New York, vi. p. 233, pl. viii. fig. 52.

Achatinella scitula Gulick, *t. c.* p. 241, pl. viii. fig. 61.

HAB. Oahu, Kahana (Newcomb, Baldwin); Koolauloa (Hartman); Waimea, Kawailoa, Hakipu (Gulick).

(23) *Achatinella (Bulimella) faba* Pfeiffer.

Achatinella (Bulimella) faba Pfeiffer, P. Zool. Soc. London, 1859, p. 30.

HAB. Hawaiian Islands.

I cannot trace this species in the Brit. Mus.; it seems not to have been recognized by any recent author.

(24) *Achatinella (Bulimella) glabra* Newcomb.

Achatinella glabra Newcomb, P. Zool. Soc. London, 1853 [1854], p. 139, pl. xxii. fig. 25.

Achatinella fricki Pfeiffer, *op. cit.* 1855, p. 3, pl. xxx. fig. 7.

Achatinella platystyla Gulick, Ann. Lyc. New York, vi. p. 196, pl. vi. fig. 25.

Achatinella wheatleyi Newcomb, MS.

HAB. Oahu, Kawailoa to Hauula (Baldwin); Koolau poko (Newcomb); Kawaiawa (Hartman); Kawailoa (Gulick and Perkins).

Only two dead specimens. I think *A. fricki*, which Newcomb placed with *A. ovata*, really belongs here; fig. 7 a, however, belongs to *A. ovata*. The determination of *A. wheatleyi* is from specimens so named in the Brit. Mus.

(25) *Achatinella (Bulimella) elegans* Newcomb.

Achatinella elegans Newcomb, P. Zool. Soc. London, 1853 [1854], p. 149, pl. xxiv. fig. 57.

HAB. Oahu, Hauula (Newcomb); Hauula and Kaipapau (Baldwin).

(26) *Achatinella (Bulimella) luteostoma* Baldwin.

Achatinella (Bulimella) luteostoma Baldwin, P. Ac. Philad. 1895, p. 217, pl. x. figs. 7, 8 [with a note on the animal].

HAB. Oahu, Palolo to Niu (Baldwin).

(27) *Achatinella (Bulimella) lymaniana* Baldwin.

Achatinella (Bulimella) lymaniana Baldwin, P. Ac. Philad. 1895, p. 219, pl. x. figs. 12, 13.

HAB. Oahu, Waianae mountains (Baldwin).

(28) *Achatinella (Bulimella) lyonsiana* Baldwin.

Achatinella (Bulimella) lyonsiana Baldwin, P. Ac. Philad. 1895, p. 218, pl. x. figs. 9—11 [with note on animal]; Suter, *t. c.* p. 239, pl. xi. fig. 52 [radula].

HAB. Oahu, Konahuanui mountain (Baldwin).

(29) *Achatinella (Bulimella) ovata* Newcomb.

Achatinella ovata Newcomb, Ann. Lyc. New York, vi. p. 22 [May, 1853]; *T. c.* p. 324 [animal]; P. Zool. Soc. London, 1853, p. 130, pl. xxii. fig. 2.

Bulimella candida Pfeiffer, P. Zool. Soc. London, 1855, p. 2, pl. xxx. fig. 4.

Achatinella phaeozona Gulick, Ann. Lyc. New York, vi. p. 215, pl. vii. fig. 40.

Achatinella spadicea Gulick, *t. c.* p. 247, pl. viii. fig. 65.

Achatinella lorata Reeve, Conch. Icon. *Achatinella*, sp. 6 [nec Férussac].

HAB. Oahu, Kahana, Waianae (Newcomb); Kawailoa (Baldwin); as *A. phaeozona*, Keawaawa, Kailua, Olomana (Gulick); as *A. spadicea*, Kahana (Gulick); Hauula to Kahana (Baldwin).

Gulick's two species are unknown to me. I follow Newcomb in placing them here; Mr Baldwin has, however, given them rank as species.

(30) *Achatinella (Bulimella) oviformis* (Newcomb) Pfeiffer.

Achatinella oviformis Pfeiffer, P. Zool. Soc. London, 1855, p. 208.

Achatinella multicolor Pfeiffer, *t. c.* p. 4, pl. xxx. fig. 11 a [nec fig. 11, which equals *A. byronii*, var.].

HAB. Oahu (various authors).

(31) *Achatinella (Bulimella) rosea* Swainson.

Achatinella bulimoides var. *rosea* Swainson, Brand's Journ. 1828, p. 85.

Achatinella rosea Swainson, Zool. Illustr. ser. 2, pl. cxxiii. fig. 1; Reeve, Conch. Icon. *Achatinella*, sp. 28; Newcomb, Ann. Lyc. New York, vi. p. 309 [animal].

Bulimella rosea Swainson, Hartman, P. Ac. Philad. 1888, p. 30, pl. 1. fig. 4.

A good series, including some varieties approaching *A. ovata*.

HAB. Oahu, Wahiawa to Kawailoa (Baldwin); Waialua (Hartman); Halemano (Perkins).

(32) *Achatinella (Bulimella) rotunda* Gulick.

Achatinella rotunda Gulick, Ann. Lyc. New York, vi. p. 249, pl. viii. fig. 67.

This form has, with much doubt, been allowed specific rank. In this I have followed Mr Baldwin; Newcomb considered it a variety of *A. ovata*.

HAB. Oahu, Kaawa and Kahana (Gulick); Head of Kawailoa (Perkins).

(33) *Achatinella (Bulimella) rugosa* Newcomb.

Achatinella rugosa Newcomb, P. Zool. Soc. London, 1853 [1854], p. 138, pl. xxii. fig. 22.

Achatinella corrugata Gulick, Ann. Lyc. New York, vi. p. 248, pl. viii. fig. 66.

Achatinella torrida Gulick, *t. c.* p. 250, pl. viii. fig. 68.

I strongly suspect that this will prove to be only a roughened form of *A. byronii* Wood.

HAB. Oahu, Ewa (Newcomb): as *A. corrugata*, Hakipu (Gulick); Kahana (Baldwin): as *A. torrida*, Kahana, Kaawa, Waikane, Waiolu (Gulick).

(34) *Achatinella* (*Bulimella*) *sowerbyana* Pfeiffer.

Bulimella sowerbyana Pfeiffer, P. Zool. Soc. London, 1855, p. 4, pl. xxx. fig. 14.

var. *fuscobasis* Smith.

Bulimella fuscobasis Smith, P. Zool. Soc. London, 1873, p. 77, pl. ix. fig. 15.

I think Mr Smith's species is only a colour variety.

HAB. Oahu (type form, authors); Mount Kaala (variety, Smith).

(35) *Achatinella* (*Bulimella*) *taeniolata* Pfeiffer.

Achatinella taeniolata Pfeiffer, P. Zool. Soc. London, 1846, p. 38; Reeve, Conch. Icon. *Achatinella*, sp. 7.

Achatinella rubiginosa Newcomb, P. Zool. Soc. London, 1854 [1855], p. 154, pl. xxiv. fig. 69.

Bulimella macrostoma Pfeiffer, P. Zool. Soc. London, 1855, p. 2, pl. xxx. fig. 6.

Newcomb was of opinion that *A. macrostoma* was identical with *A. rutila*, but, after examining the type, I prefer to place it here.

HAB. Oahu, Palolo (Newcomb); Niu to Palolo (Baldwin).

(36) *Achatinella* (*Bulimella*) *vidua* Pfeiffer.

Bulimella vidua Pfeiffer, P. Zool. Soc. London, 1855, p. 3, pl. xxx. fig. 10.

Newcomb placed this as a synonym of *A. ovata*; Mr Baldwin regarded it as a distinct species. The columellar plait is very small in the specimens in the Brit. Mus.

HAB. Oahu (Baldwin, &c.).

(37) *Achatinella* (*Bulimella*) *viridans* Mighels.

Achatinella viridans Mighels, P. Boston Soc. II. (1845), p. 20; Newcomb, P. Zool. Soc. London, 1854, p. 310 [animal].

Achatinella radiata Pfeiffer, P. Zool. Soc. London, 1845 [1846], p. 89; Reeve, Conch. Icon. *Achatinella*, sp. 35.

Achatinella subvirens Newcomb, P. Zool. Soc. London, 1853 [1854], p. 136, pl. xxii. fig. 18.

Achatinella rutila Newcomb, t. c. p. 138, pl. xxii. fig. 21; Op. cit. 1854, p. 310 [animal]; Ann. Lyc. New York, vi. p. 326 [animal].

HAB. Oahu, Niu (Newcomb); Palolo, Niu, Konahuanui (Hartman); Nuuanu to Waialae (Baldwin); Nuuanu, Waialae (Perkins).

subgen. PARTULINA Pfeiffer.

Partulina Pfeiffer, Malak. Blätt. 1. 1854, p. 114.

Pfeiffer had no fixed type for his section, but the species all belong to one group, and I would suggest that his first-named, *A. virgulata* Migh., be treated as the type.

Pease, in his review of the genus in 1869, did not alter the grouping, so far as regards *Partulina*.

Mons. Ancey has recently (P. Malac. Soc. London, III. 1899, p. 270) proposed to place *P. physa* Newc., and its allies, in a new subgenus *Baldwinia*.

(38) *Achatinella (Partulina) anceyana* Baldwin.

Achatinella (Partulina) anceyana Baldwin, P. Ac. Philad. 1895, p. 223, pl. x. fig. 16; Gwatkin, t. c. p. 238 [radula].

HAB. Maui, Makawao (Baldwin).

(39) *Achatinella (Partulina) aptycha* Pfeiffer.

Achatinella (Newcombia) aptycha Pfeiffer, P. Zool. Soc. London, 1855 [March], p. 1, pl. xxx. fig. 1.

HAB. Hawaiian Islands. Probably from Maui.

(40) *Achatinella (Partulina) compta* Pease.

Partulina compta Pease, J. Conchyl. xvii. 1869, p. 175.

Curiously enough some specimens collected on Maui, and sent to me by Mr Baldwin, exactly agree with a specimen from Molokai presented by Pease to the British Museum under this name.

HAB. Molokai (Pease); Kawela (Baldwin)—Maui (Baldwin).

(41) *Achatinella (Partulina) confusa* nom. nov.

Achatinella physa Newcomb, P. Boston Soc. v. 1855, p. 218; Amer. J. Conch. 11. 1866, p. 214, pl. XLII. fig. 10.

Achatinella (Partulina) physa Newcomb, Baldwin, P. Ac. Philad. 1895, p. 225 [animal].

Nec *A. physa* Newcomb, 1854, q. v. (p. 316).

An inspection of the figures and descriptions given by Newcomb (P. Zool. Soc. London, 1853, p. 152, pl. XXIV. fig. 64, and as given above) will, I think, show that he was confusing two species, under the belief that the first description related only to a young specimen. It therefore becomes necessary to restrict his name to the species he first referred to, which unfortunately appears to be the same as *A. hawaiiensis* Baldwin, and to rename the other form, which, it is to be regretted, is the species universally known as *A. physa*. It may be noted that the habitat originally given by Newcomb agrees with that of Hamakua given by Mr Baldwin for his *A. hawaiiensis*, whilst Kohala is a different, but adjoining, district.

HAB. Hawaii, Kohala (Newcomb).

(42) *Achatinella (Partulina) crassa* Newcomb.

Achatinella crassa Newcomb, P. Zool. Soc. London, 1853 [1854], p. 155, pl. XXIV. fig. 71.

HAB. Lanai (Newcomb); near Koele (Perkins).

(43) *Achatinella (Partulina) dolei* Baldwin.

Achatinella (Partulina) dolei Baldwin, P. Ac. Philad. 1895, p. 221, pl. x. figs. 17, 18; Suter, t. c. p. 238, pl. XI. fig. 55 [radula].

Belongs to the group of *A. tappaniana* C. B. Ad.; specimens, precisely similar to some kindly sent me by Mr Baldwin, were identified by Mr Gulick as a variety of his *A. fasciata* (= *tappaniana*).

HAB. Maui, Honomanu (Baldwin).

(44) *Achatinella (Partulina) dubia* Newcomb.

Achatinella dubia Newcomb, Ann. Lyc. New York, vi. p. 23 (May, 1853); P. Zool. Soc. London, 1853 [1854], p. 152, pl. XXIV. fig. 65.

HAB. Oahu, among stones, and Waianae on bushes (Newcomb); Makaha Valley, Waianae Mts (Perkins).

(45) *Achatinella (Partulina) dwightii* Newcomb.

Achatinella dwightii Newcomb, Ann. Lyc. New York, vi. p. 145 (Oct. 1855); Amer. J. Conch. II. p. 213, pl. XIII. fig. 9; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Closely related, apparently, to some of the varieties of *A. redfieldi* Newc.

HAB. Molokai, Kamalo (Baldwin); Mountains (Perkins).

(46) *Achatinella (Partulina) fusioidea* Newcomb.

Achatinella fusioidea Newcomb, Ann. Lyc. New York, vi. p. 144 (Oct. 1855); Amer. J. Conch. II. 1866, p. 213, pl. XIII. fig. 8.

HAB. Maui, Haleakala (Newcomb).

(47) *Achatinella (Partulina) gouldi* Newcomb.

Achatinella gouldi Newcomb, Ann. Lyc. New York, vi. p. 21 (May 1853); P. Zool. Soc. London, 1853 [1854], p. 129, pl. XXII. fig. 1.

Achatinella talpina Gulick, Ann. Lyc. New York, vi. p. 212, pl. VII. fig. 38 (Dec. 1856).

Achatinella myrrhea Gulick, Pfeiffer, Mon. Helic. Viv. IV. p. 517.

HAB. Maui, on Tutui trees, Wailuku Valley (Newcomb); Wailuku (Gulick).

(48) *Achatinella (Partulina) grisea* Newcomb.

Achatinella grisea Newcomb, P. Zool. Soc. London, 1853 [1854], p. 153, pl. XXIV. fig. 66.

HAB. Maui, Makawao (Newcomb, &c.).

(49) *Achatinella (Partulina) hayseldeni* Baldwin.

Partulina hayseldeni Baldwin, Nautilus, x. p. 31, July 1896.

Plate XI. fig. 2.

Belongs to the group of *A. variabilis* Newc.

HAB. Lanai (Baldwin); Lanaihale, near highest point of Mountains (Perkins).

(50) *Achatinella (Partulina) horneri* Baldwin.

Achatinella (Partulina) horneri Baldwin, P. Ac. Philad. 1895, p. 224, pl. x. figs. 20, 21, 22; Gwatkin, t. c. p. 238 [radula].

HAB. Hawaii, Hamakua (Baldwin).

(51) *Achatinella (Partulina) lignaria* Gulick.

Achatinella lignaria Gulick, Ann. Lyc. New York, vi. p. 209, pl. vii. fig. 35 (Dec. 1856).

HAB. Maui, Wailuku (Gulick).

var. *crocea* Gulick.

Achatinella crocea Gulick, t. c. p. 211, pl. vii. fig. 36 (Dec. 1856).

I think *A. crocea* is only a variety; both were placed by Newcomb as synonyms of his *A. terebra*.

HAB. Maui, Waihee (Gulick).

(52) *Achatinella (Partulina) marmorata* Gould.

Achatinella marmorata Gould, P. Boston Soc. II. p. 200 (1847); U. S. Explor. Exped. Moll. fig. 94; Newcomb, Ann. Lyc. New York, vi. p. 311 [animal]; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Achatinella adamsi Newcomb, Ann. Lyc. New York, vi. p. 19 (May, 1853); P. Zool. Soc. London, 1853 [1854], p. 137, pl. xxii. fig. 20 (as *A. adamsii*).

Achatinella induta Gulick, Ann. Lyc. New York, vi. p. 207, pl. vii. fig. 34 (Dec. 1856).

The synonymy of this species is difficult; Newcomb united two other forms described by Gulick from a different district of Maui; Mr Baldwin on the other hand regards them as species. For the present I have left them, with some hesitation, specific rank; they are *A. ustulata* and *A. plumbea*.

HAB. Maui, Haleakala (Gould); Makawao (Newcomb, Baldwin); Wailuku (Gulick).

(53) *Achatinella (Partulina) mighelsiana* Pfeiffer.

Achatinella mighelsiana Pfeiffer, Mon. Hel. Viv. II. p. 238; Newcomb, Ann. Lyc. New York, vi. p. 319 [animal]; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula]; Reeve, Conch. Icon. *Achatinella*, sp. 40.

The typical form is a whitish shell with a single black band at the periphery; this single band is occasionally split into two smaller ones. Some lovely varieties were collected by Mr Perkins, which may be tabulated as follows:

(a) White and bandless.

(β) Bandless, of a rich orange hue with strigations of a slightly darker shade, tubercle white.

(7) One-banded, the whitish shell tinted with yellow, ashy, or slaty strigations. A few are white above the band, yellowish below, and show traces of a second band in the umbilical area.

(8) Two- and even three-banded, ground-colouring white, tinted faintly with ashy strigations, shell not quite so attenuate.

HAB. Molokai, Kalae (Baldwin); the Mountains (Perkins).

(54) *Achatinella (Partulina) morbida* Pfeiffer.

Achatinella (Bulinella) morbida Pfeiffer, P. Zool. Soc. London, 1859, p. 30.

HAB. ? Oahu.

The only authority I am aware of for the exact habitat is Mr Baldwin, who gives Oahu, but he marks it as one of the species he has not seen.

(55) *Achatinella (Partulina) mucida* Baldwin.

Achatinella (Partulina) mucida Baldwin, P. Ac. Philad. 1895, p. 222, pl. x. fig. 23.

A series of about 60 specimens. It is generally of an ashy colour with a dark zone at the periphery; smaller colour lines are also present in most specimens. The brown stain at the base of the columellar plait is also noteworthy.

HAB. Molokai, Makakupaia (Baldwin); Makakupaia, and Mountains of Molokai (Perkins).

(56) *Achatinella (Partulina) nivea* Baldwin.

Achatinella (Partulina) nivea Baldwin, P. Ac. Philad. 1895, p. 222, pl. x. fig. 19.

HAB. Maui, Makawao to Huelo (Baldwin).

(57) *Achatinella (Partulina) perdix* Reeve.

Achatinella perdix Reeve, Conch. Icon. *Achatinella*, sp. 43 (1850); Newcomb, Ann. Lyc. New York, vi. p. 317 [animal]; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Achatinella undosa Gulick, Ann. Lyc. New York, vi. p. 205, pl. vii. fig. 33 (Dec. 1856).

A. undosa was wrongly placed by Clessin (Nom. Helic. Viv. p. 305) as a synonym of *A. radiata* Gould.

HAB. Maui, Lahaina (Baldwin); Olinda at 4000 ft. (Perkins).

(58) *Achatinella (Partulina) physa* Newcomb.

Achatinella physa Newcomb, P. Zool. Soc. London, 1853 [1854], p. 152, pl. xxiv. fig. 64.

Achatinella (Partulina) hawaiiensis Baldwin, P. Ac. Philad. 1895, p. 225, pl. x. figs. 24—26; Gwatkin, t. c. p. 238 [radula].

Nec *A. physa* Newc. subsequently.

See for notes on the synonymy under *A. confusa* Sykes.

HAB. Hawaii, Mauna Kea (Newcomb); Hamakua (Baldwin).

(59) *Achatinella (Partulina) plumbea* Gulick.

Achatinella plumbea Gulick, Ann. Lyc. New York, vi. p. 213, pl. vii. fig. 39.

HAB. Maui, Kula (Gulick).

(60) *Achatinella (Partulina) porcellana* Newcomb.

Achatinella porcellana Newcomb, P. Zool. Soc. London, 1853 [1854], p. 146, pl. xxiii. fig. 47.

In appearance recalling a dwarf specimen of *A. terebra* Newc. of W. Maui; only known to me from the type.

HAB. E. Maui (Newcomb).

(61) *Achatinella (Partulina) proxima* Pease.

Helicter proximus Pease, P. Zool. Soc. London, 1862, p. 6.

Partulina proxima Pease, Hartman, P. Ac. Philad. 1888, p. 27, pl. i. figs. 1, 2.

Achatinella proxima Pease, Gwatkin, l. c. 1895, p. 238 [radula].

A fine series. A variety is interesting as showing a link towards *A. theodorei* Baldwin; it is much more slender and smaller than the typical form, generally lighter in colour, and the colour-markings are much finer in pattern. It was found with the typical form.

HAB. Molokai, Waikolu (Baldwin); Kahanui, and mountains of Molokai (Perkins).

(62) *Achatinella (Partulina) pyramidalis* Gulick.

Achatinella pyramidalis Gulick, Ann. Lyc. New York, vi. p. 204, pl. vii. fig. 32 (Dec. 1856).

Newcomb regarded this as a variety of *A. perdix* Reeve; not having seen specimens which unite them I have left it as a species. Clessin (Nom. Helic. Viv. p. 306) placed it—erroneously—under *A. marmorata* Gould.

HAB. Maui, Lahaina (Gulick); Huelo (Baldwin); Waihee (Perkins).

(63) *Achatinella (Partulina) radiata* Gould.

Achatinella radiata Gould, P. Boston Soc. II. 1845, p. 27.

Bulinus gouldi Pfeiffer, Zeitsch. für Malak. 1846, p. 116.

Partula densilincata Reeve, Conch. Icon. *Partula*, sp. 9.

HAB. ? Maui (Baldwin).

The specimens in the British Museum are labelled "Oahu", but probably this is erroneous and Maui is the correct habitat.

(64) *Achatinella (Partulina) redfieldi* Newcomb.

Achatinella redfieldi Newcomb, Ann. Lyc. New York, vi. (May 1853), p. 22; t. c.

p. 325 [animal]; P. Zool. Soc. London, 1853 [1854], p. 131, pl. xxii. fig. 5;

Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

The long series collected by Mr Perkins has given me considerable difficulty. Newcomb originally gave both Maui and Molokai, Clessin (Nom. Helic. Viv. p. 306) gave Molokai and Kauai (the latter being obviously wrong), and Mr Baldwin gives Mapulehu, Molokai. I think Maui was a slip, due to confusion with the very closely allied *A. splendida*, and that *A. redfieldi* is really a Molokai shell. Next arises the question of what the typical form may be; Newcomb states that the shell is either plain or banded on the third whorl *only*, while he gives six as the number of whorls, the shell figured being banded (as *A. splendida*) on all the whorls. The forms I refer to this species are:

a. Typical (Plate XI. fig. 15). Varies from nearly white to chestnut, sometimes being particoloured.

HAB. Makakupaia, Molokai (Perkins).

β. Light to dark fawn colour, banded with brown, the lip being sometimes white. This is the form figured by Newcomb.

HAB. Molokai, towards or above Kamalo (Perkins).

γ. Lip white, shell chestnut, a white band at the periphery and often a smaller one above it, upper whorls finely tessellated. (Plate XI. fig. 16.)

HAB. Molokai, Makakupaia and Kamalo (Perkins).

(65) *Achatinella (Partulina) rufa* Newcomb.

Achatinella rufa Newcomb, Ann. Lyc. New York, vi. p. 21 (May 1853); t. c. p. 324 [animal]; P. Zool. Soc. London, 1853 [1854], p. 130, pl. xxii. fig. 3.

HAB. Molokai, Kalae (Baldwin); mountains (Perkins).

Dr Hartman gave, erroneously, Maui for this shell. The figure is not good, being too elongate and too highly coloured: a pale variety exists.

(66) *Achatinella (Partulina) splendida* Newcomb.

Achatinella splendida Newcomb, Ann. Lyc. New York, vi. p. 20 (May, 1853); P. Zool. Soc. London, 1853 [1854], p. 131, pl. xxii. fig. 4.

Achatinella baileyana Gulick, Ann. Lyc. New York, vi. p. 202, pl. vii. fig. 31 (1856).

Achatinella solida Gulick, Pfeiffer, Mon. Helic. Viv. iv. p. 516.

HAB. Maui, Wailuku (Newcomb, &c.); Lahaina and Wailuku (Baldwin).

(67) *Achatinella (Partulina) tappaniana* C. B. Adams.

Achatinella tappaniana C. B. Adams, Contrib. to Conch. p. 126 (1850) [with var. *dubiosa*].

Achatinella eburnea Gulick, Ann. Lyc. New York, vi. p. 199, pl. vi. fig. 28; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Achatinella ampulla Gulick, t. c. p. 200, pl. vii. fig. 29.

Achatinella fasciata Gulick, t. c. p. 201, pl. vii. fig. 30.

Achatinella tuba Gulick, Pfeiffer, Mon. Helic. Viv. iv. p. 523.

HAB. Maui, (as *A. tappaniana*) Lahaina (Baldwin); (as *A. eburnea*) Honouaia (Gulick); (as *A. ampulla* and *A. fasciata*) Honukawai (Gulick).

(68) *Achatinella (Partulina) terebra* Newcomb.

Achatinella terebra Newcomb, P. Zool. Soc. London, 1853 [1854], p. 144, pl. xxiii. fig. 40.

Bulimella attenuata Pfeiffer, P. Zool. Soc. London, 1855 [March], p. 4, pl. xxx. fig. 12.

Achatinella corusca Gulick, Pfeiffer, Mon. Helic. Viv. iv. p. 525.

Achatinella perforata Gulick, Pfeiffer, pag. cit.

HAB. Maui; W. Maui (Newcomb); Wailuku (Hartman); Honokowai (Baldwin).

(69) *Achatinella (Partulina) tessellata* Newcomb.

Achatinella tessellata Newcomb, Ann. Lyc. New York, vi. (May, 1853), p. 19; t. c. p. 327 [animal]; P. Zool. Soc. London, 1853 [1854], p. 139, pl. xxiii. fig. 26; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

A very fine series. The forms found at Pelekunu are generally dextral and of large size; recalling in shape and colouring *A. virgulata*, but as they possess the mottled colouring of the earlier whorls, so characteristic of the present species, I have placed them here.

HAB. Molokai, Kalae to Waikolu (Baldwin); Pelekunu, Makakupaia, Kahanui, &c. (Perkins).

(70) *Achatinella (Partulina) ustulata* Gulick.

Achatinella ustulata Gulick, Ann. Lyc. New York, vi. p. 211, pl. vii. fig. 37.

Nec *A. ustulata* Newcomb MS.; fide Pfeiffer, Malak. Blätt. i. p. 136 (= *A. colorata* Reeve).

HAB. Maui, Beautiful Valley (Gulick); Lahaina (Baldwin).

(71) *Achatinella (Partulina) variabilis* Newc.

Achatinella variabilis Newcomb, P. Zool. Soc. London, 1853 [1854], p. 154, pl. xxiv. fig. 70.

Achatinella fulva (Newcomb) Pfeiffer, loc. cit. 1855 [1856], p. 208.

Achatinella lactea Gulick, Ann. Lyc. New York, vi. 1858, p. 198, pl. vi. fig. 27 [bad].

HAB. Lanai (Newcomb, &c.); windward side on ridges facing Maui, above Waiapaa, behind Koele, and Lanaihale (Perkins).

var. *semicarinata* Newc.

Achatinella semicarinata Newcomb, P. Zool. Soc. London, 1853 [1854], p. 156, pl. xxiv. fig. 76.

From an examination of the very fine series collected by Mr Perkins, I think Newcomb was quite right in placing *A. fulva* and *A. lactea* in the synonymy. The former is a straw-coloured form without banding and the latter a white form with a reddish-brown stain in the interior of the aperture. Mr Baldwin remarks that *A. variabilis* is 'invariably dextral,' but sinistral specimens, typical in every other respect, were found by Mr Perkins. In placing *A. semicarinata* as a variety I have been guided by the great difficulty I found in endeavouring to separate this form from *A. fulva*, the type specimens of which shew traces of the carina.

Mr Perkins remarks that 'the broader form with ridge more raised' is 'from higher elevations': it appears to be gradually replaced by the form *fulva* at lower altitudes and this latter shades into *A. variabilis* (typical).

HAB. Lanai (Newcomb, &c.); mountains (Perkins).

(72) *Achatinella (Partulina) virgulata* Mighels.

Partula virgulata Mighels, P. Boston Soc. II. 1845, p. 20.

Achatinella virgulata Mighels, Reeve, Conch. Icon. *Achatinella*, sp. 3; Newcomb, Ann. Lyc. New York, vi. p. 312 [animal]; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Bulinus rohri Pfeiffer, Zeitsch. f. Malak. 1846, p. 115.

Bulinus insignis Mighels, Reeve, Conch. Icon. *Achatinella*, sp. 3.

HAB. Molokai, Kaluaaha to Halawa (Baldwin); Mapulehu and mountains (Perkins).

It is a very variable species and the following, which I take to be a variety, is perhaps worthy of note.

var. *a*. Either entirely white or slightly tinted with brown on the last whorl; mouth varying from dusky to white; the spiral black line on the upper whorls either present or absent.

HAB. Molokai, Pelekunu (Perkins).

subgen. ACHATINELLASTRUM Pfeiffer.

Achatinellastrum Pfr., Malak. Blätt. I. (1854), p. 133 (first species *A. venulata* Newc.).

(73) *Achatinella* (*Achatinellastrum*) *augusta* Smith.

Achatinella augusta Smith, P. Zool. Soc. London, 1873, p. 74, pl. ix, fig. 7.

Dr Hartman referred this shell, as *A. augusta*, to *A. fulgens* Newc.

HAB. Oahu, Waialae, Waialupe, Palolo (Smith).

(74) *Achatinella* (*Achatinellastrum*) *bella* Reeve.

Achatinella bella Reeve, Conch. Icon. *Achatinella*, sp. 17; Newcomb, Ann. Lyc. New York, vi, p. 316 [animal]; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Pease (P. Zool. Soc. 1869, p. 652) united the species, I think erroneously, with *A. polita* Newc.

HAB. Molokai (various authors and Perkins); Kalae to Waikolu (Baldwin).

(75) *Achatinella* (*Achatinellastrum*) *bilineata* Reeve.

Achatinella bilineata Reeve, Conch. Icon. *Achatinella*, sp. 22.

Achatinella johnsoni Newcomb, P. Zool. Soc. London, 1854, p. 147, pl. xxiii, fig. 50.

Achatinella aplustre Newcomb, t. c. p. 147, pl. xxiii, fig. 51.

HAB. Oahu, Koolau (Newcomb); Manoa to Nuuanu (Baldwin).

(76) *Achatinella* (*Achatinellastrum*) *buddii* Newcomb.

Achatinella buddii Newcomb, P. Zool. Soc. London, 1853 [1854], p. 155, pl. xxiv, fig. 73.

Achatinella pexa Gulick, Ann. Lyc. New York, vi, p. 197, pl. vi, fig. 26.

Achatinella plumata Gulick, t. c. p. 217, pl. vii, fig. 41.

Achatinella caesia Gulick, t. c. p. 234, pl. viii, fig. 53.

Achatinella fuscozona Smith, P. Zool. Soc. London, 1873, p. 76, pl. ix, fig. 9.

I follow Mr Baldwin in uniting Mr Smith's species, with which I am unacquainted. Dr Hartman (P. Ac. Philad. 1888) places it (on p. 32) amongst the synonyms of *A. buddii*; possibly this may be a slip as further on (p. 33) he leaves it specific rank, remarking 'this may be a good species, though it approaches very near to *A. fuscolineata*, Smith,' a comparison which appears to me inaccurate.

HAB. Oahu, Palolo (Newcomb); Niu, Wailupe, Waialae, Palolo, Kailua, and Waimea (Gulick); Makiki, Palolo (Smith).

(77) *Achatinella* (*Achatinellastrum*) *casta* Newcomb.

Achatinella casta Newcomb, P. Zool. Soc. London, 1853, p. 134, pl. xxii. fig. 12.

Achatinella juncea Gulick, Ann. Lyc. New York, vi. p. 230, pl. vii. fig. 49.

Achatinella cognata Gulick, t. c. p. 240, pl. viii. fig. 60.

A. cognata is only known to me from the description: I incline to think Newcomb was right in suppressing it as a species; Mr Baldwin, however, considers it distinct.

HAB. Oahu, Ewa (Newcomb, Baldwin); Kalaikoa, Wahiawa, Halemano, Haiki-puu, and Waikane (Gulick); above Ewa (Perkins).

(78) *Achatinella* (*Achatinellastrum*) *cervina* Gulick.

Achatinella cervina Gulick, Ann. Lyc. New York, vi. p. 241, pl. viii. fig. 62.

Newcomb placed it as a variety of *A. ovata*; Mr Baldwin, on the other hand, gives it rank as a species and places it in *Achatinellastrum*. If the specimens in the Brit. Mus. are correctly identified, it is very close to *A. buddii* Newc.

HAB. Oahu, Kahana (Gulick).

(79) *Achatinella* (*Achatinellastrum*) *colorata* Rve.

Achatinella colorata Reeve, Conch. Icon. *Achatinella*, sp. 18; Newcomb, Ann. Lyc. New York, vi. p. 316 [animal].

HAB. Oahu, Ahuimanu (Hartman); Kalihi (Baldwin).

(80) *Achatinella* (*Achatinellastrum*) *concolor* Smith.

Achatinella concolor Smith, P. Zool. Soc. London, 1873, p. 75, pl. ix. fig. 1.

Dr Hartman considered it to be a form of *A. colorata* Rve.

HAB. Oahu, Ewa (Smith).

(81) *Achatinella* (*Achatinellastrum*) *cucumis* Gulick.

Achatinella cucumis Gulick, Ann. Lyc. New York, vi. p. 225, pl. vii. fig. 45.

HAB. Oahu, Kalihi (Gulick); Kalihi to Moanalua (Baldwin); Kaliua (sic) (Hartman).

(82) *Achatinella (Achatinellastrum) cuneus* Pfeiffer.

Achatinella (Achatinellastrum) cuneus Pfeiffer, P. Zool. Soc. London, 1855, p. 205.

Newcomb considered this a form of *A. decipiens*; Dr Hartman appears to have been in some confusion, as he placed it (P. Ac. Philad. 1888) at p. 29 under *A. decipiens*, and at p. 30 under *A. viridans*. I have seen a long and characteristic series found on the Island of Oahu by Mr Hutchison.

HAB. Oahu (authors); Halawa (Baldwin); mountains behind Ewa (Perkins).

(83) *Achatinella (Achatinellastrum) curta* Newc.

Achatinella curta Newcomb, P. Zool. Soc. London, 1853, p. 144, pl. XXIII. fig. 43.

Achatinella undulata Newcomb, P. Boston Soc. v. (1855), p. 219; Amer. J.

Conch. II. (1866), p. 216, pl. XIII. fig. 15; Pfeiffer, P. Zool. Soc. London, 1855, p. 208.

Achatinella dimorpha Gulick, Ann. Lyc. New York, VI. p. 236, pl. VIII. fig. 56.

Achatinella albescens Gulick, t. c. p. 237, pl. VIII. fig. 57.

Achatinella contracta Gulick, t. c. p. 239, pl. VIII. fig. 59.

Achatinella rhodoraphe Smith, P. Zool. Soc. London, 1873, p. 75, pl. IX. fig. 10;

Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Achatinella pygmaea Smith, P. Zool. Soc. London, 1873, p. 75, pl. IX. fig. 11.

HAB. Oahu, Waiialua (Newcomb); various localities (Gulick); Halemano, Waipio, &c. (Smith); between Kawailoa and Waala gulches, generally between Kawailoa and Halemano, Waimea (Perkins).

(84) *Achatinella (Achatinellastrum) delta* Gulick.

Achatinella delta Gulick, Ann. Lyc. New York, VI. p. 231, pl. VIII. fig. 50.

Newcomb considered *A. delta* to be a more banded variety of *A. curta* Newc.; from the material I have seen I incline, with doubt, to leave them distinct.

HAB. Oahu, Kalaikoa, Halemano, &c. (Gulick).

(85) *Achatinella (Achatinellastrum) diluta* Smith.

Achatinella diluta Smith, P. Zool. Soc. London, 1873, p. 75, pl. IX. fig. 14.

It is near to, but seems distinct from, *A. ligata* Smith, with which Dr Hartman placed it.

HAB. Oahu, probably (Smith).

(86) *Achatinella (Achatinellastrum) ernstina* Baldwin.

Achatinella (Achatinellastrum) ernstina Baldwin, P. Ac. Philad. 1895, p. 217,
pl. x. figs. 5, 6 [animal described].

HAB. Oahu, Nuuanu Valley (Baldwin).

(87) *Achatinella (Achatinellastrum) formosa* Gulick.

Achatinella formosa Gulick, Ann. Lyc. New York, vi. p. 235, pl. viii. fig. 55.

HAB. Oahu, Waimea (Gulick).

(88) *Achatinella (Achatinellastrum) fulgens* Newc.

Achatinella fulgens Newcomb, P. Zool. Soc. London, 1853 [1854], p. 131, pl. xxii.
fig. 24.

HAB. Oahu, Niu (Newcomb); Waialua, south-east end (Hartman).

(89) *Achatinella (Achatinellastrum) germana* Newcomb.

Achatinella germana Newcomb, P. Zool. Soc. London, 1853 [1854], p. 151, pl.
xxiv. fig. 61.

HAB. Maui, Makawao (Newcomb).

(90) *Achatinella (Achatinellastrum) juddii* Baldwin.

Achatinella (Achatinellastrum) juddii Baldwin, P. Ac. Philad. 1895, p. 216, pl. x.
figs. 3, 4.

HAB. Oahu, Halawa (Baldwin).

(91) *Achatinella (Achatinellastrum) lehuiensis* Smith.

Achatinella lehuiensis Smith, P. Zool. Soc. London, 1873, p. 76, pl. ix. fig. 4.

I have not seen the species, but it appears from the figure to be near *A. zonata* Gulick; Dr Hartman has suggested that it is a form of *A. multicolor* Pfr. (= *oviformis* Pfr.).

HAB. Oahu, Lehui (Smith).

(92) *Achatinella (Achatinellastrum) ligata* Smith.

Achatinella ligata Smith, P. Zool. Soc. London, 1873, p. 76, pl. IX. fig. 13.

Achatinella bellula Smith, t. c. p. 77, pl. IX. fig. 8.

I fancy these two forms are only varieties of one species; they approach *A. nympha* Gulick.

HAB. Oahu, Waimolu (Smith); Panoa and Nuuanu (Baldwin); ridges round Nuuanu, Waimea, and beyond head of Panoa Valley (Perkins).

(93) *Achatinella (Achatinellastrum) livida* Swainson.

Achatinella livida Swainson, Zool. Ill. pl. CVIII. fig. 2.

Achatinella emmersonii Newcomb, P. Zool. Soc. London, 1853 [1854], p. 156, pl. XXIV. fig. 74.

Achatinella viridans Reeve, Conch. Icon. *Achatinella*, sp. 25 [nec Mighels].

Achatinella reevei C. B. Adams, Contrib. to Conch. 1850, p. 128.

Achatinella consanguinea Smith, P. Zool. Soc. London, 1873, p. 73, pl. IX. fig. 3.

Nec *A. livida* Pfeiffer, P. Zool. Soc. London, 1845, p. 89 [= *A. vulpina* Fér.].

According to Dr Hartman, Mr Smith's species is probably a variety of *A. colorata*; from the specimens I have seen, I think it rather belongs here.

HAB. Oahu, Waialua (Newcomb, Baldwin); Ahuimanu (Smith).

(94) *Achatinella (Achatinellastrum) longispira* Smith.

Achatinella longispira Smith, P. Zool. Soc. London, 1873, p. 73, pl. IX. fig. 5.

Placed by Dr Hartman as a synonym of *A. vulpina*, but the present species is much more slender in form; I should be inclined rather to refer it to the group of *A. olivacea*.

HAB. Oahu, Halawa, Ahuimanu (?) (Smith).

(95) *Achatinella (Achatinellastrum) multizonata* Baldwin.

Achatinella (Achatinellastrum) multizonata Baldwin, P. Ac. Philad. 1895, p. 215, pl. x. figs. 1, 2 [animal described].

The shells collected by Mr Perkins from 'round Nuuanu' are in no sense typical of this species, they appear to be forms shewing links between it and *A. bellula* Smith (= *ligata* Smith); indeed the two may prove to be forms of one variable species.

HAB. Oahu, Nuuanu Valley (Baldwin); ridges round Nuuanu and Waimea (Perkins).

(96) *Achatinella* (*Achatinellastrum*) *nattii* Baldwin and Hartman.

Achatinella nattii Baldwin and Hartman in Hartman, P. Ac. Philad. 1888, p. 34, pl. I. fig. 3 [as *nealii* in explanation of plate]; Gwatkin, l. c. 1895, p. 238. [radula].

HAB. Maui, Makawao to Honomu (Baldwin).

(97) *Achatinella* (*Achatinellastrum*) *olivacea* Reeve.

Achatinella olivacea Reeve, Conch. Icon. *Achatinella*, sp. 20.

Achatinella prasina Reeve, l. c. sp. 27.

HAB. Oahu, Manoa to Nuuanu (Baldwin); Nuuanu and Mt. Tantalus (Perkins).

(98) *Achatinella* (*Achatinellastrum*) *papyracea* Gulick.

Achatinella papyracea Gulick, Ann. Lyc. New York, vi. p. 229, pl. VII. fig. 48.

HAB. Oahu, Kalaikoa, Ahonui, Wahiaua (Gulick).

(99) *Achatinella* (*Achatinellastrum*) *polita* Newcomb.

Achatinella polita Newcomb, Ann. Lyc. New York, vi. p. 24 (1853, May); t. c. p. 328 [animal].

Pease considered this to be identical with *A. bella*.

HAB. Molokai (Newcomb); Kaluaaha to Halawa (Baldwin).

(100) *Achatinella* (*Achatinellastrum*) *producta* Reeve.

Achatinella producta Reeve, Conch. Icon. *Achatinella*, sp. 13; Newcomb, Ann. Lyc. New York, vi. p. 315 [animal]; Bland and Binney, Ann. Lyc. New York, x. p. 336, pl. xv. figs. 2, 4 [radula and anatomy].

Achatinella venulata Newcomb, P. Zool. Soc. London, 1854, p. 146, pl. XXIII. fig. 48.

Achatinella hybrida Newcomb, t. c. p. 147, pl. XXIII. fig. 52.

Achatinella dunkeri (Cuming MS.) Pfeiffer, op. cit. 1855, p. 208.

HAB. Oahu, Koolau (Newcomb, Hartman); Manoa to Nuuanu (Baldwin).

(101) *Achatinella* (*Achatinellastrum*) *saccata* Pfeiffer.

Achatinella (*Achatinellastrum*) *saccata* Pfeiffer, P. Zool. Soc. London, 1859, p. 30.
Unknown to me.

HAB. Hawaiian Isles (Pfeiffer); Oahu (?) (Baldwin).

(102) *Achatinella* (*Achatinellastrum*) *solitaria* Newcomb.

Achatinella solitaria Newcomb, P. Zool. Soc. London, 1853 [1854], p. 150,
pl. XXIV. fig. 60.

HAB. Oahu, Palolo (Newcomb).

(103) *Achatinella* (*Achatinellastrum*) *trilineata* Gulick.

Achatinella trilineata Gulick, Ann. Lyc. New York, VI. p. 226, pl. VII. fig. 46.

HAB. Oahu, Palolo, Waialae, Wailupe, and Niu (Gulick).

(104) *Achatinella* (*Achatinellastrum*) *versipellis* Gulick.

Achatinella versipellis Gulick, Ann. Lyc. New York, VI. p. 224, pl. VII. fig. 44.

HAB. Oahu, Kailua (Gulick).

(105) *Achatinella* (*Achatinellastrum*) *vulpina* Férussac.

Helix vulpina Férussac, Voy. Freycinet, Zool. p. 447, pl. LXVIII. figs. 13, 14;
Souleyet, Voy. Bonite, Zool. II. p. 508, pl. XXIX. figs. 3, 4 [animal].

Achatina vulpina Férussac, Deshayes, Hist. Moll. II. pt. 2, p. 193, pl. CLV. fig. 1.

Achatinella vulpina Reeve, Conch. Icon. *Achatinella*, sp. 29.

Achatinella castanea Reeve, I. c. sp. 24.

Achatinella adusta Reeve, I. c. sp. 30.

Achatinella virens Gulick, Ann. Lyc. New York, VI. p. 254, pl. VIII. fig. 73 (1858).

Achatinella fuscolineata Smith, P. Zool. Soc. London, 1873, p. 75, pl. IX. fig. 2.

Achatinella livida Pfeiffer, P. Zool. Soc. London, 1845, p. 89 [nec Swainson].

HAB. Oahu, Palolo (Baldwin); Kailua, Palolo, Halawa (Smith); Manoa to Nuuanu (Baldwin); Nuuanu Valley and Mt. Tantalus (Perkins).

var. *stewarti* Green.

Achatina stewarti Green, Contrib. Macl. Lyc. Philad. i. (1827, July), p. 47, pl. iv. figs. 1—4.

Achatinella stewarti Green, Reeve, Conch. Icon. *Achatinella*, sp. 26.

Achatinella pulcherrima Reeve, l. c. sp. 23, fig. *a* [nec Swainson].

Achatinella tricolor Smith, P. Zool. Soc. London, 1873, p. 70, pl. ix. fig. 6.

HAB. Oahu (various authors); Heia (Smith); Nuuanu and Mt. Tantalus (Perkins).

var. *crassidentata* Pfeiffer.

Achatinella (Achatinellastrum) crassidentata Pfeiffer, P. Zool. Soc. London, 1855, p. 6, pl. xxx. fig. 23.

Achatinella diversa Gulick, Ann. Lyc. New York, vi. p. 220, pl. vii. fig. 42 (1856, Dec.).

Achatinella varia Gulick, t. c. p. 222, pl. vii. fig. 43.

Achatinella analoga Gulick, t. c. p. 227, pl. vii. fig. 47.

HAB. Oahu, Halawa (Baldwin); Halawa, Palolo, Waialae and Wailupe (Gulick); Waialae and Nuuanu (Perkins).

var. *liliacea* Pfeiffer.

Achatinella (Achatinellastrum) liliacea Pfeiffer, P. Zool. Soc. London, 1859, p. 31.

HAB. Oahu (Baldwin).

The difficulty of arriving at a satisfactory dividing line between *A. vulpina* and *A. producta* is very great. As at present arranged, *A. vulpina* is the brown shell, var. *stewarti* the greenish coloured form, var. *crassidentata* the parti-coloured, and var. *liliacea* the bandless variety; all the above being sinistral. *A. producta* on the other hand is reserved for the larger and, usually, dextral form.

(106) *Achatinella (Achatinellastrum) wailuaensis*, sp. nov.

Testa dextrorsa, subperforata, nitida, turrita, solidula, levissime striata, alba, lineis castaneis picta, apud peripheriam zona alba, in sutura linea nigro-castanea notata; anfr. 5—5½, regulariter crescentes, convexi; apertura auriformis; margine columellari plica fusca mediocri munita, margine dextro acuto, callo parietali tenuissimo. Long. 15.5, alt. 8.4 mill. Plate XI. fig. 19.

A pretty little shell of the group of *A. bella* Reeve, of Molokai. A variety also occurred (Plate XI. fig. 20) in which the banding is almost obsolete, save in the suture of the earliest whorls and in one strong dark band below the periphery.

HAB. Maui, Wailua (Perkins).

(107) *Achatinella (Achatinellastrum) zonata* Gulick.

Achatinella zonata Gulick, Ann. Lyc. New York, VI. p. 237, pl. VIII. fig. 58.

Achatinella glauca Gulick, t. c. p. 232, pl. VIII. fig. 51.

United by Newcomb with *A. trilineata* Gulick; it appears however to have much flatter whorls, and I follow Mr Baldwin, with some little doubt, in restoring it to specific rank. According to Newcomb, *A. glauca* is a synonym of *A. livida* Swain., but specimens in the Brit. Mus. "named from Gulick's type" as a variety, lead me to place it here.

HAB. Oahu, Waimea, Pupukea, Waialei, Kahuku, Hauula, and Kaawa (Gulick); above Ewa (Perkins).

The following appears to be only a manuscript name:

Achatinellastrum olesonii Baldwin, Cat. Shells Hawaiian Islands, 1893, p. 5.

HAB. Oahu, Nuuanu.

PERDICELLA Pease.

Perdicella Pease, P. Zool. Soc. London, 1869, p. 649.

Pease, unfortunately, having named no type, it becomes necessary to select one and I propose to take *A. helena* Newc. The species come from Maui and Molokai.

(1) *Perdicella fulgurans*, sp. nov.

Testa subperforata, dextrorsa, ovato-turrita, nitida, sub lente lineis spiralibus confertim sculpta, albida, strigis fulgurantibus castaneis elegantissime picta, sutura modice impressa, apice obtusulo; anfr. $5\frac{1}{2}$, plano-convexi, ultimis $\frac{2}{3}$ longitudinis testae aequans; apertura ovato-pyriformis, intus lilacina; peristoma margine dextro simplici, columellari subreflexo; plica columellaris torta, subprominens, mediocris, rapide ascendens. Long. 16; lat. 8; long. apert. 8.1; lat. apert. 4.9 mill. (Plate XI. fig. 5.)

This very pretty shell is akin to *P. zebrina* Pfr., but may be readily separated from it by its greater size, by being much broader in proportion to the length, and by the colour-pattern being finer in design and more zigzag. The protoconch is brown, then becoming paler with a dark shade near the sutural line. It is the *Partulina zebrina* Pfr. of Mr Baldwin's valuable catalogue.

HAB. E. Maui, Makawao to Huelo (Baldwin); Maui (Hutchison).

(2) *Perdicella helena* Newcomb.

Achatinella helena Newcomb, Ann. Lyc. New York, vi. (May, 1853), p. 27; P. Zool. Soc. London, 1853 [1854], p. 151, pl. xxiv. fig. 63.

HAB. Molokai, on Ti-tree (Newcomb); Kamalo to Kalae (Baldwin); Kalae and Makakupaia (Perkins).

(3) *Perdicella mauiensis* (Newcomb) Pfeiffer.

Achatinella mauiensis (sic, err. typ.) (Newcomb) Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 207; Newcomb, Amer. J. Conch. II. p. 217, pl. xiii. fig. 16.

HAB. Maui, Makawao to Huelo (Baldwin).

(4) *Perdicella minuscula* Pfeiffer.

Achatinella (*Newcombia*) *minuscula* Pfeiffer, P. Zool. Soc. London, 1858, p. 22.

HAB. Maui, Lahaina (Baldwin).—Molokai Mts. at 4000 feet (Perkins).

Both these habitats can hardly be correct; I suspect the former may be an error of identification.

(5) *Perdicella ornata* Newcomb.

Achatinella ornata Newcomb, P. Zool. Soc. London, 1853 [1854], p. 149, pl. xxiv. fig. 55.

HAB. Maui; E. Maui (Newcomb); Lahaina (Baldwin).

(6) *Perdicella theodorei* Baldwin.

Achatinella (*Partulina*) *theodorei* Baldwin, P. Ac. Philad. 1895, p. 226, pl. x. fig. 27.

HAB. Molokai, Kawela (Baldwin); Makakupaia and the mountains (Perkins).

(7) *Perdicella zebra* Newcomb.

Achatinella zebra Newcomb, Ann. Lyc. New York, vi. p. 142 [Oct. 1855].

Placed by Dr Hartman, in his list, both in *Achatinellastrum* and *Laminella*!

HAB. E. Maui (Newcomb).

(8) *Perdicella zebrina* Pfeiffer.

Newcombia zebrina Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 202.

HAB. E. Maui (Baldwin as *P. zebra* Newc.).

NEWCOMBIA Pfeiffer.

Newcombia Pfeiffer, Malak. Blätt. i. 1854, p. 117; Pease, P. Zool. Soc. London, 1869, p. 649.

Pfeiffer's list of species was very heterogeneous and included shells of diverse groups, his first species being *A. helena* Newcomb; fortunately Pease in 1869 properly confined the group to the shells it is now used for.

Two sections may be formed: I. Spirally lirated; *N. lirata*, etc. II. Nearly smooth, usually more elongate; *N. cumingi*, etc.

(1) *Newcombia canaliculata* Baldwin.

Achatinella (*Newcombia*) *canaliculata* Baldwin, P. Ac. Philad. 1895, p. 226, pl. x. figs. 28, 29; Gwatkin, t. c. p. 238 [radula].

HAB. Molokai, Halawa (Baldwin).

(2) *Newcombia cinnamomea* Pfeiffer.

Achatinella cinnamomea Pfeiffer, Malak. Blätt. iv. 1857, p. 230.

Achatinella (*Newcombia*) *cinnamomea* Pfeiffer, P. Zool. Soc. London, 1858, p. 22.

Newcombia cinnamomea Pfeiffer, Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Conchologically this is very close to *N. cumingi* Newc.

HAB. Molokai, Mapulehu (Baldwin); Makakupaia and the mountains (Perkins).

(3) *Newcombia cumingi* Newcomb.

Achatinella cumingi Newcomb, Ann. Lyc. New York, vi. 1853, p. 25; P. Zool. Soc. London, 1853 [1854], pl. xxiv. fig. 59.

HAB. Maui, Haleakala (Newcomb); Lahaina and Makawao (Baldwin).

(4) *Newcombia gemma* Pfeiffer.

Achatinella gemma Pfeiffer, Malak. Blätt. iv. 1857, p. 323.

Achatinella (*Newcombia*) *gemma* Pfeiffer, P. Zool. Soc. London, 1858, p. 22.

Akin to *N. lirata* Pfr., but the sculpture is almost obsolete.

HAB. Molokai Mts. (Perkins).

(5) *Newcombia plicata* (Mighels MS.) Pfeiffer.

Achatinella plicata Pfeiffer, Mon. Helic. Viv. II. 1848, p. 235; Newcomb, Ann. Lyc. New York, VI. 1858, p. 312 [animal]; Reeve, Conch. Icon. *Achatinella*, sp. 44.

Bulimus liratus Pfeiffer, P. Zool. Soc. London, 1851 [1853], p. 261.

I cannot trace the supposed description by Mighels in P. Boston Soc. as *Bulimus plicatus*.

HAB. Molokai, Kalae (Baldwin); Mountains (Perkins).

(6) *Newcombia perkinsi* Sykes.

Newcombia perkinsi Sykes, P. Malac. Soc. London, II. 1896, p. 130. (Plate XI. fig. 36.)

HAB. Molokai Mts. (Perkins). A fine series of this handsome shell.

(7) *Newcombia pfeifferi* Newcomb.

Achatinella pfeifferi Newcomb, Ann. Lyc. New York, VI. p. 25 (May, 1853); P. Zool. Soc. London, 1853 [1854], p. 150, pl. XXIV. fig. 58.

Bulimus newcombianus Pfeiffer, P. Zool. Soc. London, 1851, p. 261 [Dec. 1853].

HAB. Molokai, Kaluaaha (Baldwin).

(8) *Newcombia philippiana* Pfeiffer.

Achatinella philippiana Pfeiffer, Malak. Blätt. IV. 1857, p. 89.

HAB. Molokai, Makakupaia (Baldwin).

(9) *Newcombia sulcata* Pfeiffer.

Achatinella sulcata Pfeiffer, Malak. Blätt. IV. 1857, p. 231.

Achatinella (*Newcombia*) *sulcata* Pfeiffer, P. Zool. Soc. London, 1858, p. 22.

Newcombia sulcata Pfeiffer, Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

HAB. Molokai, Pohakupili (Baldwin).

AMASTRA H. and A. Adams.

Amastra H. and A. Adams, Genera of Recent Mollusca, II. p. 137.

Type: the group of *A. magna* Ad.

This large genus may for convenience be subdivided into groups somewhat in the following manner; perhaps the large first section might be more broken up, though I think no sectional name will prove necessary.

subgen. AMASTRA (s. str.).

(1) *Amastra affinis* Newcomb.

Achatinella affinis Newcomb, P. Zool. Soc. London, 1853 [1854], p. 142, pl. XXIII. fig. 35.

Achatinella (Laminella) goniostoma Pfeiffer, P. Zool. Soc. London, 1855, p. 203.

Amastra rustica Gulick, P. Zool. Soc. London, 1873, p. 84, pl. x. fig. 17.

Dr Hartman has suggested that *A. rustica* may equal *A. variegata* Pfr., an Oahu species.

HAB. E. Maui, Kula (Newcomb, Gulick).

(2) *Amastra albolabris* Newcomb.

Achatinella albolabris Newcomb, P. Zool. Soc. London, 1853 [1854], p. 149, pl. XXIV. fig. 56.

Achatinella nucleola Reeve, Conch. Icon. *Achatinella*, sp. 39 [non Gould].

One young specimen I refer to this species. See a note under *A. subrostrata* Pfr.

HAB. Oahu, Waianae Mts. (Newcomb, Perkins); Kapalama and Kalihi (Baldwin).

(3) *Amastra amicta* Smith.

Amastra amicta Smith, P. Zool. Soc. London, 1873, p. 86, pl. x. fig. 20.

Dr Hartman notes that this species "may equal *petricola*"; it appears to me quite distinct.

HAB. Hawaiian Islands (Smith).

(4) *Amastra assimilis* Newcomb.

Achatinella assimilis Newcomb, P. Zool. Soc. London, 1853 [1854], p. 148, pl. XXIII. fig. 53.

Amastra assimilis Newcomb, Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Achatinella deshayesii Morelet, Bull. Soc. Hist. Nat. Moselle, 1857, p. 27 [pars].

It has been suggested that this is a variety of *A. nubilosa* Mighels, but the present species is a more slender shell with much flatter whorls.

HAB. W. Maui (Newcomb).

(5) *Amastra aurostoma* Baldwin.

Amastra aurostoma Baldwin, Nautilus, x. (July, 1896), p. 31.

HAB. Lanai (Baldwin).

(6) *Amastra badia* Baldwin.

Amastra badia Baldwin, P. Ac. Philad. 1895, p. 230, pl. XI. fig. 40.

HAB. Oahu, Ewa (Baldwin).

(7) *Amastra biplicata* Newcomb.

Achatinella biplicata Newcomb, P. Zool. Soc. London, 1853 [1854], p. 156, pl. XXIV. fig. 75.

Achatinella deshayesii Morelet, Bull. Soc. Hist. Nat. Moselle, 1857, p. 27 [pars]; Pease, P. Zool. Soc. London, 1869, p. 652.

Morelet's original series, now in the British Museum, consists of three specimens, one belonging to this species, and two to *A. assimilis* Newc.; his diagnosis however refers to a form with only one columellar plait. From Mr Perkins' long series, it appears that the upper plait is variable and sometimes becomes obsolete; in one specimen, which has received an injury, both plaits are dwarfed so as to show only as a slight thickening of the columella.

HAB. Lanai (Newcomb); Waiapaa and Koele (Perkins).

(8) *Amastra breviata* Baldwin.

Amastra breviata Baldwin, P. Ac. Philad. 1895, p. 231, pl. XI. figs. 45, 46.

HAB. Oahu, Palolo and Halawa (Baldwin).

(9) *Amastra citrea* Sykes.

Amastra citrea Sykes, P. Malac. Soc. London, II. (1896), p. 129.

Plate XI. fig. 4.

HAB. Molokai (Hutchison).

(10) *Amastra conicospira* Smith.

Amastra conicospira Smith, P. Zool. Soc. London, 1873, p. 86, pl. x. fig. 10.

Dr Hartman places this in the synonymy of *A. assimilis* Newc.; I have never seen the present species, but from the figure it appears distinct.

HAB. Hawaiian Islands (Smith).

(11) *Amastra conifera* Smith.

Amastra conifera Smith, P. Zool. Soc. London, 1873, p. 85, pl. x. fig. 11.

HAB. E. Maui, Kula (Smith).

(12) *Amastra cornea* Newcomb.

Achatinella cornea Newcomb, P. Zool. Soc. London, 1853 [1854], p. 141, pl. xxiii. fig. 32.

HAB. Oahu, below Kaala (Perkins).

Newcomb appears not to have noted the exact habitat; the type-tablet in the British Museum is, however, labelled 'Oahu.'

(13) *Amastra crassilabrum* Newcomb.

Achatinella crassilabrum Newcomb, P. Zool. Soc. London, 1853 [1854], p. 141, pl. xxiii. fig. 31.

HAB. Oahu, Waianae (Newcomb, &c.).

(14) *Amastra cylindrica* Newcomb.

Achatinella cylindrica Newcomb, P. Zool. Soc. London, 1853 [1854], p. 134, pl. xxii. fig. 11; Ann. Lyc. New York, vi. p. 325 [animal].

HAB. Oahu, Waianae (Newcomb).

(15) *Amastra decorticata* Gulick.

Amastra decorticata Gulick, P. Zool. Soc. London, 1873, p. 84, pl. x. fig. 14.

Dr Hartman has united this with *A. ellipsoidea* of Gould, from Maui, but a glance at Gould's figures would have shewn him their distinctness.

HAB. Oahu, Kawailoa, Halemano, and various localities (Gulick); ridges of Nuuanu (Perkins).

(16) *Amastra durandi* Ancey.

Amastra durandi Ancey, Naturaliste, 1897, p. 178.

HAB. Oahu (Ancey).

(17) *Amastra ellipsoidea* Gould.

Achatinella ellipsoidea Gould, P. Boston Soc. II. (1847), p. 200; U. S. Explor. Exped. Moll. pl. VII. fig. 96.

A species unknown to me: Newcomb united it with his *A. pupoidea*, but it appears not to be so produced in form.

HAB. Maui (Gould).

(18) *Amastra elliptica* Gulick.

Amastra elliptica Gulick, P. Zool. Soc. London, 1873, p. 83, pl. x. fig. 15.

HAB. Oahu, Waialei, Kahuku, Hauula, Kawailoa (Gulick); Waianae (Hartman).

Two specimens, collected by Mr Perkins on "Waianae Mts. Oahu," may belong to a large, incrassate variety.

(19) *Amastra extincta* Pfeiffer.

Achatinella (Laminella) extincta Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 204.

? ? *Leptachatina hartmani* (Newc. MS.) Hartman, P. Ac. Philad. 1888, p. 54.

I fancy that the new name given by Dr Hartman, on the ground that recent examples had been found, was due to an error of identification. Specimens submitted to me under the name of *A. extincta* by Mr Baldwin appear to be only a form of *A. similaris* Pease.

HAB. Oahu, subfossil (Pfeiffer).

(20) *Amastra flavescens* Newc.

Achatinella flavescens Newcomb, P. Zool. Soc. London, 1853 [1854], p. 151, pl. XXIV, fig. 62.

HAB. Hawaii (Newcomb).

Dr Hartman gives also "Wanoa, Oahu (Newcomb)," but this must be an error.

(21) *Amastra frosti* Ancey.

Amastra frosti Ancey, Mem. Soc. Zool. France, v. (1892), p. 719; Sykes, P. Malac. Soc. London, III. pl. XIII, fig. 12.

Mons. Ancy has also described (P. Malac. Soc. London, III. p. 269, pl. XII, fig. 11) a variety *unicolor*.

HAB. Oahu, Waianae (Ancy).

(22) *Amastra grayana* Pfeiffer.

Achatinella (Laminella) grayana Pfeiffer, P. Zool. Soc. London, 1855 [1856, Feb.], p. 204.

A single specimen. Dr Hartman has suggested that this is a form of *A. magna*, but I have not seen linking specimens. It is marked with spiral bands, due probably to the periostracum.

HAB. Oahu (Clessin, Nomencl. Helic. Viv. 1881); ? Oahu (Baldwin).—Lanai, Lanaihale, a ground shell (Perkins).

(23) *Amastra humilis* Newcomb.

Achatinella humilis Newcomb, Ann. Lyc. New York, VI. (Oct. 1855), p. 143; Amer. J. Conch. II. (1866), p. 211, pl. XIII, fig. 4.

HAB. Molokai, Kalae (Newcomb); Makakupaia and the mountains (Perkins).

(24) *Amastra inflata* Pfeiffer.

Achatinella (Laminella) inflata Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856], p. 203.

HAB. Oahu (Clessin, Nomencl. Helic. Viv.); Koolauloa (Baldwin).

(25) *Amastra intermedia* Newcomb.

Achatinella intermedia Newcomb, P. Zool. Soc. London, 1853 [1854], p. 135.
pl. XXII. fig. 13.

HAB. Oahu, Waianae (Newcomb); ridges of Nuuanu, and Waianae Mts. below Kaala (Perkins).

A long series.

(26) *Amastra irregularis* Pfeiffer.

Achatinella irregularis Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856], p. 205.

HAB. Hawaiian Islands (Pfeiffer).

(27) *Amastra lineolata* Newcomb.

Achatinella lineolata Newcomb, Ann. Lyc. New York, VI. (1853), p. 29; P. Zool. Soc. London, 1853 [1854], p. 140, pl. XXIII. fig. 29.

HAB. Hawaii (Newcomb).

The habitat 'Maui,' originally given, seems to have been a slip.

(28) *Amastra longa* Sykes.

Amastra longa Sykes, P. Malac. Soc. London, II. (Oct. 1896), p. 129.
Plate XI. fig. 35.

HAB. Lanai (Newcomb); windward side, apparently extinct (Perkins).

(29) *Amastra luctuosa* Pfeiffer.

Achatinella (Laminella) luctuosa Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856],
p. 204.

Laminella luctuosa Pfeiffer, Bland and Binney, Ann. Lyc. New York, x. pp.
335—6 [jaw and radula].

HAB. Oahu, Waialea (Baldwin).

(30) *Amastra magna* C. B. Adams.

Achatinella magna C. B. Adams, Contrib. to Conch. p. 125, 1850; Newcomb, Ann. Lyc. New York, vi. (1858), p. 319 [animal].
Achatinella baldwinii Newcomb, P. Zool. Soc. London, 1853 [1854], p. 155, pl. xxiv. fig. 72.

I have seen a good series of this handsome shell.

HAB. Lanai (Newcomb); behind Koele (Perkins).

(31) *Amastra malleata* Smith.

Amastra malleata Smith, P. Zool. Soc. London, 1873, p. 85, pl. x. fig. 18.

Mr Baldwin has united this with *A. affinis* Newcomb; I have not seen a specimen, but, from the figure and description, they appear distinct.

HAB. E. Maui, Kula (Smith).

(32) *Amastra mastersi* Newcomb.

Achatinella mastersi Newcomb, P. Zool. Soc. London, 1853 [1854], p. 153, pl. xxiv. fig. 67; Ann. Lyc. New York, vi. p. 332 [animal].
Laminella mastersi Newcomb, Bland and Binney, Ann. Lyc. New York, x. p. 335, pl. xv. figs. 7, 9—11 [jaw and radula].

Amastra mastersi Newcomb, Gwatkin, P. Ac. Philad. 1895, p. 239 [radula].

Achatinella rubens Pfeiffer, Malak. Blätt. 1854, p. 129 [nec Gould, fide Newcomb].

HAB. Maui (Newcomb); ? Haleakala at 5000 feet (Perkins).

Two, apparently immature, specimens, which I refer here with some hesitation.

Four specimens from "Molokai Mts." appear to me to be very close to this species.

(33) *Amastra melanosia* Newcomb.

Achatinella melanosia Newcomb, P. Zool. Soc. London, 1853 [1854], p. 144, pl. xxiii. fig. 41.

HAB. Hawaii (Newcomb).

(34) *Amastra modesta* C. B. Adams.

Achatinella modesta C. B. Adams, Contrib. to Conch. 1850, p. 128.

Achatinella punila Gulick, Clessin, Nom. Helic. Viv. 1881, p. 313.

HAB. Hawaiian Islands (Adams).—Molokai (Hartman, Baldwin).

(35) *Amastra moesta* Newcomb.

Achatinella moesta Newcomb, P. Zool. Soc. London, 1853 [1854], p. 157, pl. xxiv. fig. 77.

Achatinella obscura Newcomb, t. c. p. 157, pl. xxiv. fig. 78.

According to Pease (P. Zool. Soc. London, 1869, p. 651), and he is followed by Dr Hartman (P. Ac. Philad. 1888, p. 47), these two forms are one species. Probably this is correct.

HAB. Lanai (Newcomb).

(36) *Amastra mucronata* Newcomb.

Achatinella mucronata Newcomb, Ann. Lyc. New York, vi. (May 1853), p. 28; P. Zool. Soc. London, 1853 [1854], p. 146, pl. xxiii. fig. 49.

Achatinella (Laminella) fusiformis Pfeiffer, P. Zool. Soc. London, 1855, p. 5, pl. xxx. fig. 18.

HAB. Molokai (Newcomb, Baldwin).

Newcomb, in his later paper, gave the locality of 'Maui,' but probably this is a slip due to the fact that he was, as he subsequently stated, unable to see the proofs. Two specimens, collected on Molokai by Mr Perkins, appear to belong to a dwarf race.

(37) *Amastra nana* Baldwin.

Amastra nana Baldwin, P. Ac. Philad. 1895, p. 232, pl. xi. figs. 48, 49 [with animal]; Gwatkin, t. c. p. 239 [radula].

HAB. Maui, Makawao at 4000 feet (Baldwin).

(38) *Amastra nigra* Newcomb.

Achatinella nigra Newcomb, P. Boston Soc. v. (Sept. 1855), p. 219; Amer. J. Conch. II. (1866), p. 210, pl. xiii. fig. 3.

According to Clessin (Nomencl. Helic. Viv. 1881, p. 311) *A. globosa*, Gulick nec Pfeiffer, is a synonym.

HAB. E. Maui (Newcomb).

(39) *Amastra nubilosa* Mighels.

Achatinella nubilosa Mighels, P. Boston Soc. II. (1845), p. 20; Reeve, Conch. Icon. *Achatinella*, sp. 1; Newcomb, Ann. Lyc. New York, VI. p. 312 [animal].

Achatinella nubilosa Gould, U.S. Explor. Exped. Moll. pl. VII. fig. 95.

HAB. Molokai (Newcomb); Kalae (Baldwin).

It has been suggested, but I think erroneously, that this species comes, in reality, from Oahu.

(40) *Amastra nucula* Smith.

Amastra nucula Smith, P. Zool. Soc. London, 1873, p. 85, pl. x. fig. 19.

HAB. Lanai ? (Smith).

(41) *Amastra peasei* Smith.

Amastra peasei Smith, P. Zool. Soc. London, 1873, p. 86, pl. x. fig. 13.

HAB. Hawaiian Islands (Smith).—Oahu ? (Baldwin).

(42) *Amastra pellucida* Baldwin.

Amastra pellucida Baldwin, P. Ac. Philad. 1895, p. 231, pl. XI. figs. 41, 42 [with animal].

HAB. Oahu, Waianae Valley (Baldwin).

(43) *Amastra petricola* Newcomb.

Achatinella petricola Newcomb, Ann. Lyc. New York, VI. (Oct. 1855), p. 143; Amer. J. Conch. II. (1866), p. 211, pl. XIII. fig. 6.

Achatinella (Laminella) umbilicata Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856], p. 205.

Amastra umbilicata Pfr., Hartman, P. Ac. Philad. 1888, p. 50, pl. I. fig. 11.

HAB. Molokai (Newcomb); Mapulehu (Baldwin).

(44) *Amastra porphyria* Newcomb.

Achatinella porphyria Newcomb, P. Zool. Soc. London, 1853 [1854], p. 136, pl. XXII. fig. 16.

Achatinella (Laminella) grossa Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856], p. 204.

HAB. Oahu, Waianae (Newcomb).

(45) *Amastra porphyrostoma* Pease.

Amastra porphyrostoma Pease, J. Conchyl. xvii. (1869), p. 172; Hartman, P. Ac. Philad. 1888, p. 48, pl. 1. fig. 6.

HAB. Oahu (Pease).

(46) *Amastra pullata* Baldwin.

Amastra pullata Baldwin, P. Ac. Philad. 1895, p. 228, pl. xi. figs. 31, 32; Gwatkin, t. c. p. 239 [radula].

Amastra umbrosa Baldwin, t. c. p. 229, pl. xi. figs. 36, 37; Gwatkin, t. c. p. 239 [radula].

After an examination of the long series collected by Mr Perkins I have been unable to sever these two species. The animals are said to differ in colour, and they are said to inhabit different districts; conchologically they seem to shade into one another, and the radula appears to be identical. Probably they will prove to be local races.

HAB. Molokai, Kamalo (Baldwin, as *A. umbrosa*); Waikolu (Baldwin, as *A. pullata*); Kamalo and Makakupaia Mts. (Perkins).

(47) *Amastra pupoidea* Newcomb.

Achatinella pupoidea Newcomb, P. Zool. Soc. London, 1853 [1854], p. 144, pl. xxiii. fig. 42.

The colouring is somewhat exaggerated in the figure. See also a note under *A. ellipsoidea* Gould.

HAB. E. Maui (Newcomb).

(48) *Amastra pusilla* Newcomb.

Achatinella pusilla Newcomb, Ann. Lyc. New York, vi. (Oct. 1855), p. 144; Amer. J. Conch. ii. (1866), p. 211, pl. xiii. fig. 5.

Achatinella pulla (Newcomb) Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856], p. 209.

HAB. Lanai (Newcomb).

(49) *Amastra reticulata* Newcomb.

Achatinella reticulata Newcomb, P. Zool. Soc. London, 1853 [1854], p. 148,
pl. XXIV, fig. 54.

Achatinellastrum conspersa Pfeiffer, P. Zool. Soc. London, 1855 [March], p. 7,
pl. XXX, fig. 26.

HAB. Oahu, Waianae (Newcomb).

(50) *Amastra rubens* Gould.

Achatinella rubens Gould, P. Boston Soc. II. (1845), p. 27; Newcomb, Ann. Lyc.
New York, VI. p. 314 [animal]; Reeve, Conch. Icon. *Achatinella*, sp. 42,
pars b [fide Newcomb].

HAB. Oahu, W. Mts. (Newcomb); Kaala (Baldwin).

(51) *Amastra rubicunda* Baldwin.

Amastra rubicunda Baldwin, P. Ac. Philad. 1895, p. 229, pl. XI, fig. 38 [with
animal]; Suter, t. c. p. 240, pl. XI, figs. 54 [jaw], 56 [radula].

HAB. Oahu, Konahuanui Mt. (Baldwin).

(52) *Amastra rubida* Gulick.

Amastra rubida Gulick, P. Zool. Soc. London, 1873, p. 84, pl. x, fig. 12.

HAB. Oahu, Kahuku (Gulick).

(53) *Amastra sericea* Pfeiffer.

Achatinella (Laminella) sericea Pfeiffer, P. Zool. Soc. London, 1859, p. 31.

HAB. Hawaiian Isles (Pfeiffer).—? Oahu, Waialua (Baldwin). Unknown to me.

(54) *Amastra simularis* Hartman.

Amastra simularis Hartman, P. Ac. Philad. 1888, p. 252, pl. XIII, fig. 7.

Amastra simularis Hartman, Gwatkin, op. cit. 1895, p. 239 [radula].

HAB. Molokai (Hartman, Perkins); Mapulehu (Baldwin).

var. *roseotincta* Sykes.

A. similaris Hartman, var. *roseotincta* Sykes, P. Malac. Soc. London, II. p. 130.

Plate XI. fig. 3.

HAB. Molokai mountains (Perkins).

Varieties under the names of *maura* and *semicarnea* have recently been described by Mons. Ancey (P. Malac. Soc. London, III. p. 270, pl. XIII. figs. 8, 16).

(55) *Amastra solida* Pease.

Amastra solida Pease, J. Conchyl. XVII. (1869), p. 173.

HAB. Oahu (Pease).

(56) *Amastra spirizona* Férussac.

Helix (*Cochlogena*) *spirizona* Férussac, Prodrome, no. 433.

Achatina spirizona Fér., Hist. Moll. II. pt. 2, p. 196, pl. CLV. figs. 14, 15.

Achatinella spirizona Fér., Newcomb, Ann. Lyc. New York, VI. p. 307 [animal].

Achatinella acuta Swainson, Quart. J. Sci. Lit. Arts, I. (1828), p. 84; Zool.

Illustr., ser. 2, pl. XCIX. fig. 3.

Achatinella batica Mighels, MS.

HAB. Oahu, Waianae Mts. (Baldwin); Waianae Mts. below Kaala on lee side, and Halemano (Perkins).

var. *nigrolabris* Smith.

Amastra nigrolabris Smith, P. Zool. Soc. London, 1873, p. 85, pl. x. fig. 9.

HAB. Oahu, Wahiawa, Kalaikoa, Waimea (Smith); Halemano (Perkins).

var. *rudis* Pfeiffer.

Achatinella rudis Pfeiffer, P. Zool. Soc. London, 1855, p. 5 (pars).

Laminella albida Pfeiffer, t. c. p. 203.

Newcombia chlorotica Pfeiffer, t. c. p. 203.

HAB. Oahu.

A. nigrolabris Smith, is, in my opinion, only a broader variety, in which the light band below the suture is wider: in a box of specimens from Halemano forms are found showing a graduation from it to the typical form. It is possible that *A. rudis* may be a distinct species, but I fancy it is only a paler colour variety. Mr Perkins notes that he found the species "mostly on dead branches of trees, covering itself with mucus to which débris of bark and wood stick, and therefore very well concealed."

(57) *Amastra subrostrata* Pfeiffer.

Achatinella (Laminella) subrostrata Pfeiffer, P. Zool. Soc. London, 1859, p. 31.

HAB. Hawaiian Islands (Pfeiffer).—? Oahu (Baldwin).

Dr Hartman suggests that this is the same as *A. albolabris* Newc. ; it may possibly be an elongate variety, but I doubt it.

(58) *Amastra tenuilabris* Gulick.

Amastra tenuilabris Gulick, P. Zool. Soc. London, 1873, p. 83, pl. x. fig. 16.

HAB. Oahu (Gulick, with some doubt).

Dr Hartman remarks that from "a comparison of types" this is a synonym of *A. flavescens* Newc. I have, equally, examined the types, and this species differs in being stumpier, with a larger mouth, and more shouldered whorls.

(59) *Amastra tenuispira* Baldwin.

Amastra tenuispira Baldwin, P. Ac. Philad. 1895, p. 232, pl. xi. fig. 51.

HAB. Oahu, Kaala Mt. (Baldwin).

(60) *Amastra textilis* Férussac.

Helix (Heliciteres) textilis Férussac, Voy. Freycinet, Zool., p. 482.

Achatinella textilis Férussac, Binney, Ann. Lyc. New York, xi. p. 190, pl. xiv. fig. G [radula].

Amastra textilis Férussac, Hartman, P. Ac. Philad. 1888, p. 50, pl. i. fig. 8.

Achatinella microstoma Gould, P. Boston Soc. II. (1845), p. 28.

Achatinella ventulus Férussac, Reeve, Conch. Icon. *Achatinella*, sp. 31; Pfeiffer in Conch.-Cab. *Achatinella*, p. 287, pl. LXVII. figs. 12, 13 [nec Férussac].

HAB. Oahu (Baldwin, Hutchison, &c.).

A single specimen from Nuuanu, Oahu, appears to be a varietal form.

(61) *Amastra transversalis* Pfeiffer.

Achatinella (Laminella) transversalis Pfeiffer, P. Zool. Soc. London, 1855 [Feb. 1856], p. 204.

United by Newcomb with *A. reticulata*, but appears distinct.

HAB. Oahu, Keawaawa (Baldwin).

(62) *Amastra tristis* Férussac.

Helix (Heliceres) tristis Férussac, Voy. Freycinet, Zool. p. 482, pl. LXVIII. figs. 6, 7.

Achatinella tristis Férussac, Reeve, Conch. Icon. *Achatinella*, sp. 37; Pfeiffer in Conch.-Cab. *Achatinella*, pl. LXVII. figs. 10—11 [not good].

Achatinella fuliginosa Gould, P. Boston Soc. II. (1845), p. 28.

HAB. Oahu, Palolo (Hartman); Nuuanu to Palolo (Baldwin).

(63) *Amastra turritella* Férussac.

Helix (Cochlogena) turritella Férussac, Prodrôme, No. 434; Voy. Freycinet, Zool. p. 481.

Achatina turritella Fér., Hist. Moll. II. pt. 2, p. 196, pl. CLV. fig. 13; Souleyet, Voy. Bonite, Zool. II. p. 509, pl. XXXIX. figs. 7—8 [animal].

Achatinella turritella Fér., Newcomb, Ann. Lyc. New York, VI. p. 307 [animal].

? *Helix (Cochlogena) luteola* Férussac, Voy. Freycinet, Zool. p. 480.

? *Achatina luteola* Fér., Hist. Moll. II. pt. 2, p. 196, pl. CLV. fig. 12.

? *Laminella luteola* Fér. (sic), Hartman, P. Ac. Philad. 1888, p. 42.

Achatina oahuensis Green, Contrib. Macl. Lyc. Phil. I. (1827), p. 49, pl. IV. fig. 5.

Achatinella inornata Mighels, P. Boston Soc. II. (1845), p. 21.

Newcomb states that he was unable to trace the type of *A. luteola*, and apparently it is lost: Pease (P. Zool. Soc. London, 1869, p. 652) united it with *A. turritella*, and probably this will prove to be correct.

HAB. Oahu (authors); Kalihi to Palolo (Baldwin); ridges of Nuuanu Valley (Perkins).

(64) *Amastra undata* Baldwin.

Amastra undata Baldwin, P. Ac. Philad. 1895, p. 230, pl. XI. fig. 39.

HAB. Oahu, Nuuanu (Baldwin).

(65) *Amastra uniplicata* Hartman.

Amastra uniplicata Hartman, P. Ac. Philad. 1888, p. 50, pl. I. fig. 7.

HAB. Molokai (Hartman).

(66) *Amastra variegata* Pfeiffer.

Achatinella variegata Pfeiffer, Zeitschr. für Malak. 1849, p. 90; Conch.-Cab.

Achatinella, p. 282, pl. LXVII. figs. 14, 15.

Amastra rubens, Reeve, pars, Conch. Icon. *Achatinella*, fig. 42 a [fide Newcomb].

Achatinella decepta C. B. Adams, Contrib. to Conch. 1850, p. 127.

HAB. Oahu, head of Boothes Valley (Hartman); Waianae (Baldwin).

(67) *Amastra ventulus* Férussac.

Helix (Helicteres) ventulus Férussac, Voy. Freycinet, Zool. p. 481.

Achatinella ventulus Férussac, Newcomb, Ann. Lyc. New York, vi. p. 306
[animal].

Achatinella melampoides Pfeiffer, P. Zool. Soc. London, 1851 [Dec. 1853], p. 262;
Pfeiffer in Conch.-Cab. *Achatinella*, p. 288, pl. LXVII. figs. 8, 9.

Achatinella (Amastra) manoaensis Newc., Clessin, Nom. Helic. Viv. 1881, p. 311.
May prove to be a *Leptachatina*.

HAB. Oahu, Nuuanu to Palolo (Baldwin); Panoa Valley and ridges of Nuuanu
(Perkins).

(68) *Amastra violacea* Newcomb.

Achatinella violacea Newcomb, Ann. Lyc. New York, vi. (1853, May), p. 18;

P. Zool. Soc. London, 1853 [1854], p. 135, pl. XXII. fig. 14.

Achatinella gigantea Newcomb, P. Zool. Soc. London, 1853 [1854], p. 136, pl.
XXII. fig. 17.

These two species have been united by Pease and Dr Hartman, the latter remarking "The only example of *gigantea* ever found is in the British Museum. It probably equals a large example of *A. violacea*, Newc." Probably the locality of Maui, given by Newcomb, was an error, as his specimen appears to be only an elongate form of the Molokai shell. This varies very much in size and shape, as may be seen from the following:

Alt. 34; diam. 16; alt. ap. 15; lat. ap. 9.5 mill.

" 31; " 12; " " 11.5; " " 7 "

" 31; " 15; " " 13; " " 9 "

Mr Baldwin has left *A. gigantea* in his list as a Maui shell, but the fact that this diligent collector has marked it as a shell unknown to him, lends confirmation to the view that it does not really come from that island.

HAB. Molokai, Haleakala (Newcomb); Mapulehu to Halawa (Baldwin); Halawa and Pelekunu (Perkins).—? Maui as *A. gigantea*, Haleakala (Newcomb).

subgenus LAMINELLA Pfeiffer.

Laminella Pfr., Malak. Blätt. I. 1854, p. 126.

Pfeiffer's original group was very heterogeneous, as was that of Pease under this name (P. Zool. Soc. London, 1869, p. 648); the latter author also proposing *Perdicella* for a portion of the group. I would propose to select *A. gravida* Fér., the old and well-known species, as the type.

(69) *Amastra (Laminella) alexandri* Newcomb.

Achatinella alexandri Newcomb, P. Calif. Ac. III. (1865), p. 182; Amer. J. Conch., II. (1866), p. 216, pl. XIII. fig. 14.

HAB. West Maui, at 7500 feet (Newcomb); top of West Maui (Baldwin).

(70) *Amastra (Laminella) citrina* (Mighels MS.) Pfeiffer.

Achatinella citrina Mighels, Pfeiffer, Mon. Helic. Viv. II. (1848), p. 234; Reeve, Conch. Icon. *Achatinella*, sp. 33; Newcomb, Ann. Lyc. New York, VI. p. 312 [animal].

Pease united (P. Zool. Soc. London, 1869, p. 652) this species with *A. venusta*. Conchologically, they differ in the periostracum, shape of whorls, &c., while, from the descriptions given by Newcomb, the animals are distinct in colouration.

HAB. Molokai, Kalae to Waikolu (Baldwin); Molokai (Perkins).

(71) *Amastra (Laminella) concinna* Newcomb.

Achatinella concinna Newcomb, P. Zool. Soc. London, 1853 [1854], p. 157, pl. XXIV. fig. 79.

Newcomb's type was a bandless dextral shell. In the very fine series collected, both dextral and sinistral forms occur; black bands are either absent or present, and, in the latter event, vary from one to even four in number.

HAB. Lanai (Newcomb, &c.); Koele side of highest point, side of highest point furthest from Koele, near Koele at 3000 feet (Perkins).

(72) *Amastra (Laminella) depicta* Baldwin.

Laminella depicta Baldwin, P. Ac. Philad. 1895, p. 228, pl. XI. figs. 33—5 [animal described].

A very fine series, shewing a range of colour from pale yellow to rich orange, tinged with crimson; it is sometimes dextral, but sinistral forms predominate.

HAB. Molokai, Kamalo (Baldwin); mountains, and above Pelekunu (Perkins).

(73) *Amastra (Laminella) elongata* Newcomb.

Achatinella elongata Newcomb, Ann. Lyc. New York, vi. (May, 1853), p. 26.

Achatinella acuta Newcomb, P. Zool. Soc. London, 1853 [1854], p. 142 [nec Swainson].

The figure given in P. Zool. Soc. London (l. c.) under this name does not (fide Newcomb) represent the present species, but *A. soror*. Dr Hartman gives 'Makawao, Maui' as the habitat, but this must be an error; further he unites the species, erroneously in my opinion, with *A. hutchinsonii* Pease.

HAB. Oahu, Lehue (Newcomb); Waianae Mts (Baldwin).

(74) *Amastra (Laminella) erecta* Pease.

Laminella erecta Pease, J. Conchyl., xvii. (1869), p. 174.

Close to *A. micans* Pfeiffer.

HAB. Maui (Pease).

(75) *Amastra (Laminella) farcimen* Pfeiffer.

Achatinella (Laminella) farcimen Pfeiffer, P. Zool. Soc. London, 1856, p. 334. nec *Amastra farcimen*, Pfeiffer, Hartman, P. Ac. Philad. 1888, p. 46, pl. 1. fig. 5.

Dr Hartman states that his figure is "typical"; this is obviously incorrect as the type is a sinistral specimen, of considerable size, while the figure represents a smaller, dextral, shell of another group. What species his shell may belong to, I am unable to determine, but it appears to possess no columellar plait.

HAB. Maui (Newcomb, fide Pfeiffer).

(76) *Amastra (Laminella) fraterna* Sykes.

Amastra fraterna, Sykes, P. Malac. Soc. London, II. (Oct. 1896), p. 129.

Plate XI. fig. 23.

HAB. Lanai, mountains behind Koele (Perkins).

(77) *Amastra (Laminella) gravaida* Férussac.

Helix gravaida Férussac, Voy. Freycinet, Zool. p. 478, pl. LXVIII. figs. 4, 5.

Achatina gravaida Férussac, Deshayes, Hist. Moll. II. p. 192, pl. CLV. figs. 3, 4.

Achatinella gravaida Fér., Newcomb, Ann. Lyc. New York, VI. p. 307 [animal].

Achatinella suffusa Reeve, Conch. Icon. *Achatinella*, sp. 11.

Achatinella dimondi C. B. Adams, Contrib. to Conch. 1850, p. 126 (with var. *lata*).

The specimen described by Reeve does not now appear to exist in the Brit. Mus. collection.

HAB. Oahu, Kalihi to Niu (Baldwin); Nuuanu (Perkins).

(78) *Amastra (Laminella) helvina* Baldwin.

Achatinella (Laminella) helvina Baldwin, P. Ac. Philad. 1895, p. 227, pl. XI. fig. 30 [shell, animal, and anatomy]; Gwatkin, t. c. p. 239 [radula].

Some specimens, given to Mr Perkins by Mr O. Meyer, are broader and have more periostracum, forming a link towards *A. picta*.

HAB. Molokai, Ohia Valley, near Kaluaaha (Baldwin); Molokai (Perkins).

(79) *Amastra (Laminella) hutchinsonii* Pease.

Helicter hutchinsonii Pease, P. Zool. Soc. London, 1862, p. 7.

Amastra hutchinsonii Pease, Hartman, P. Ac. Philad. 1888, p. 45, pl. I. fig. 9.

Dr Hartman suggests, I think erroneously, that this is a synonym of *A. elongata* Newc.

HAB. Maui (Pease).

(80) *Amastra (Laminella) micans* Pfeiffer.

Achatinella (Laminella) micans Pfeiffer, P. Zool. Soc. London, 1859, p. 31.

Amastra micans Pfeiffer, Hartman, P. Ac. Philad. 1888, pl. I. fig. 10.

Dr Hartman's figure is not very good.

HAB. Oahu (Baldwin, Hutchison).

(81) *Amastra (Laminella) picta* Mighels.

Achatinella picta Mighels, P. Boston Soc. II. (1845). p. 21; Newcomb, Ann. Lyc. New York, VI. p. 311 [animal]; Reeve, Conch. Icon. *Achatinella*, sp. 36; Pfeiffer, Conch.-Cab. *Achatinella*, p. 284, pl. LXVIII. figs. 28, 29 [not very good]; Bland and Binney, Ann. Lyc. New York, X. p. 335, pl. XV. fig. 6 [jaw].

Achatinella picta Pfeiffer, P. Zool. Soc. London, 1845 [1846], p. 90.

HAB. Maui, Lahaina and Makawao (Baldwin); Haleakala, at 4000 feet, and Iao Valley (young shells) (Perkins).

var. *bulbosa* Gulick.

Achatinella bulbosa Gulick, Ann. Lyc. New York, vi. (1858), p. 253, pl. VIII, fig. 71.

Newcomb placed *A. bulbosa* as a synonym; it appears to me to be of varietal rank, and to differ in being larger and in the whorls being more flattened. I fancy the species will prove to be variable, as Mr Perkins' shells are more slender than the series in the Museum. Specimens sent by Mr Hutchison as from 'Maui' are still more slender, and may possibly prove to be distinct. Mighels gave, by error probably, 'Oahu.'

HAB. E. Maui, Honuaua and Kula (Gulick).

(82) *Amastra (Laminella) remyi* Newcomb.

Achatinella remyi Newcomb, Ann. Lyc. New York, vi. (Oct. 1855), p. 146; Amer. J. Conch. II. (1866), p. 215, pl. XIII, fig. 13.

HAB. Lanai (Newcomb).

Only known to me from the original series in the Brit. Mus.; Pfeiffer (P. Zool. Soc. London, 1855, p. 207) gave Hawaii as the habitat, but probably this was an error.

(83) *Amastra (Laminella) sanguinea* Newcomb.

Achatinella sanguinea Newcomb, P. Zool. Soc. London, 1853 [1854], p. 135, pl. XXII, fig. 15; Ann. Lyc. New York, vi. p. 326 [animal].

Laminella ferussaci Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 203.

HAB. Oahu, Lehui (Newcomb); Waianae and Halemano (Baldwin); Halemano, Kawaihoa, and Makaha Valley (dead) (Perkins).

(84) *Amastra (Laminella) soror* Newcomb.

Achatinella soror Newcomb, P. Zool. Soc. London, 1853 [1854], p. 143, pl. XXIII, fig. 38 [also fig. 36, sub nom. *A. acuta*].

HAB. Maui (Newcomb).

The additional locality of Lanai given, subsequently, by Newcomb, really, I think, refers to my *A. fraterna*.

(85) *Amastra (Laminella) straminea* Reeve.

Achatinella straminea Reeve, Conch. Icon. *Achatinella*, sp. 38; Newcomb, Ann. Lyc. New York, vi. p. 318 [animal].

HAB. Oahu, Panoa to Palolo (Baldwin); Nuuanu (Perkins).

(86) *Amastra (Laminella) tetrao* Newcomb.

Achatinella tetrao Newcomb, P. Boston Soc. v. (1855), p. 219; Ann. Lyc. New York, vi. p. 334 [animal]; Amer. J. Conch. II. (1866), p. 214, pl. XIII. figs. 11, 12.

From the fine series collected it appears that the ground-colouring, under the zigzag periostracum, varies considerably. Shades of crimson or rich orange predominate, but occasionally the colour is confined to a band below the suture, the rest of the shell being whitish.

HAB. Lanai (Newcomb); mountains and behind Koele (Perkins).

(87) *Amastra (Laminella) venusta* Mighels.

Achatinella venusta Mighels, P. Boston Soc. II. (1845), p. 21; Newcomb, Ann. Lyc. New York, vi. p. 311 [animal]; Reeve, Conch. Icon. *Achatinella*, sp. 32; Binney, Ann. Lyc. New York, XI. p. 191, pl. XIV. fig. D.

HAB. Molokai, Mapulehu (Baldwin); mountains (Perkins).
Mighels gave, but erroneously, 'Oahu' as the locality.

(88) *Amastra (Laminella) villosa* Sykes.

Amastra villosa Sykes, P. Malac. Soc. London, II. (1896), p. 129.
Plate XI. fig. 24.

The specimen here figured is not the one whose measurements were given in the original diagnosis, but a slightly smaller shell whose periostracum is better preserved.

HAB. Molokai (Perkins).

subgenus AMASTRELLA, n. subgen.

This name is proposed for a group of rotund, generally incrassated, small forms, which have been usually placed in *Amastra*. I take as the type *A. rugulosa* Pease. They are nearly all natives of Kauai, but a few species are found on other islands.

(89) *Amastra (Amastrella) anthonii* Newcomb.

Achatinella anthonii Newcomb, P. Calif. Ac. II. (1861), p. 93; Amer. J. Conch. II. (1866), p. 210, pl. XIII. fig. 2.

HAB. Kauai (Newcomb).

(90) *Amastra (Amastrella) antiqua* Baldwin.

Amastra antiqua Baldwin, P. Ac. Philad. 1895, p. 233, pl. XI. fig. 47.

HAB. Oahu, Ewa (Baldwin, as fossil).

(91) *Amastra (Amastrella) carinata* Gulick.

Amastra carinata Gulick, P. Zool. Soc. London. 1873, p. 83.

Achatinella obesa var. *agglutinans* Newcomb, P. Zool. Soc. London, 1853 [1854], p. 143, pl. XXIII. fig. 39 a.

This appears to be specifically distinct from *A. obesa* Newc.

HAB. W. Maui, Wailuku (Gulick).

(92) *Amastra (Amastrella) cyclostoma* Baldwin.

Amastra cyclostoma Baldwin, P. Ac. Philad. 1895, p. 234, pl. XI. fig. 53 [animal and shell].

HAB. Kauai, Makaweli (Baldwin).

(93) *Amastra (Amastrella) nucleola* Gould.

Achatinella nucleola Gould, P. Boston Soc. II. (1845), p. 28.

Achatinella brevis Pfeiffer, P. Zool. Soc. London, 1845 [1846], p. 90.

HAB. Kauai (Newcomb); Hanalei (Baldwin).—? Oahu, Manoa Valley (Clessin, Nomenc. Helic. Viv.).

I feel doubtful as to this last locality: the *A. nucleola* Gould, of Reeve, is *A. albolabris* Newc. (cf. p. 333).

(94) *Amastra (Amastrella) obesa* Newcomb.

Achatinella obesa Newcomb, Ann. Lyc. New York, vi. (May, 1853), p. 24; t. c. p. 329 [animal]; P. Zool. Soc. London, 1853 [1854], p. 143, pl. xxiii. fig. 39; Binney, Ann. Lyc. New York, xi. p. 191, pl. xiv. fig. H [radula and jaw].

HAB. Maui, Makawao and Kula (Baldwin); Haleakala (Newcomb).

(95) *Amastra (Amastrella) rugulosa* Pease.

Amastra rugulosa Pease, P. Zool. Soc. London, 1869, p. 649 (nom. sol.); J. Conchyl. xviii. (1870), p. 95; Crosse, l. c. xxiv. (1876), p. 99, pl. i. fig. 4.

var. *similaris* Pease.

Amastra similaris Pease, P. Zool. Soc. London, 1869, p. 649 (nom. sol.).

Amastra rugulosa var. *similaris* Pease, J. Conchyl. xviii. (1870), p. 96.

Mr Perkins' specimens are small but otherwise agree with some presented by Pease to the British Museum. I have seen specimens collected by Mr Hutchison as from Oahu, but think there must be an error as to the locality.

HAB. Kauai (Pease, type and var.); Kapaa (Baldwin); Lihue (Perkins).—E. Maui, Kula (Hartman) [? an error].

(96) *Amastra (Amastrella) sphaerica* Pease.

Amastra sphaerica Pease, P. Zool. Soc. London, 1869, p. 649 (nom. sol.); J. Conchyl. xviii. (1870), p. 94; Crosse, l. c. xxiv. (1876), p. 98, pl. i. figs. 5, 5a.

HAB. Kauai (Pease).

The habitat is given as "Lanai" by both Mr Baldwin and Dr Hartman, but I know not on what authority.

(97) *Amastra (Amastrella) vetusta* Baldwin.

Amastra vetusta Baldwin, Cat. Shells Hawaiian Islands, 1893, p. 10 (nom. sol.); P. Ac. Philad. 1895, p. 233, pl. xi. fig. 50.

HAB. Oahu, near the base of Punchbowl Hill, Honolulu, fossil (Baldwin).

subgen. KAUAIA, nom. nov.

Carinella Pfr. (1875) nec Sowerby (1839).

The type of Pfeiffer's group is *A. kauaiensis* Newc.: the subgeneric name was used first by Sowerby for a different group of Molluscs. Whether *A. alata* and *A. heliciformis* really belong here I am not clear.

(98) *Amastra (Kauaia) alata* Pfeiffer.

Helix alata Pfeiffer, P. Zool. Soc. London, 1856, p. 33.

I have elsewhere (P. Malac. Soc. London, II. p. 127) pointed out that all authors have overlooked the fact that this shell has a columellar plait. It is, in my opinion, not a Helicoid at all, but belongs to an aberrant group of *Amastra*. The columellar plait does not ascend rapidly into the shell, but stands almost horizontally, and has no final 'knob.' The single specimen found by Mr Perkins measures diam. max. 8; alt. 4; alt. apert. 3 mill.

HAB. Lanai (Pfeiffer); Mts. behind Koele (Perkins).

(99) *Amastra (Kauaia) heliciformis* Ancey.

Amastra heliciformis Ancey, Bull. Soc. Malac. France, VII. (1890), p. 340.

HAB. Oahu, Waianae (Ancey).

(100) *Amastra (Kauaia) kauaiensis* Newcomb.

Achatinella kauaiensis Newcomb, Ann. Lyc. New York, VII. (April, 1860), p. 145; Amer. J. Conch. II. (1866), p. 209, pl. XIII. fig. 1.

Achatinella (Carinella) kauaiensis Newc., Pfeiffer, Novit. Conch. IV. p. 115, pl. CXXVI. figs. 8—11.

A good series, principally however dead shells, of this almost extinct species. Mr Perkins notes that one specimen was found "with embryonic shells in mouth."

HAB. Kauai (authors); Halemanu (Baldwin); Makaweli at 2000 ft. and Halemanu at 4000 feet (Perkins).

(101) *Amastra* (*Kauaia*) *knudseni* Baldwin.

Amastra knudseni Baldwin, P. Ac. Philad. 1895, p. 234, pl. XI, figs. 43, 44.

HAB. Kauai, Halemanu (Baldwin, Perkins). A single specimen of this very fine species.

The following appear to be only MS. names: *Amastra ferruginea* Baldwin, Cat. Shells Hawaiian Islands, 1893, p. 9 (nom. sol.). HAB. Oahu, Ewa and Waianae (Baldwin).—*Amastra testudinea* Baldwin, t. c. p. 10. HAB. Oahu, Ewa (Baldwin).

LEPTACHATINA Gould.

Leptachatina Gould, P. Boston Soc. II. p. 201; type *Achatinella acuminata* Gould.

It is frequently difficult to draw the line between this group and *Amastra*, and perhaps such species as *A. melampoides* Pfr. (= *A. ventulus* Fér.) may eventually be transferred to *Leptachatina*.

Pfeiffer proposed *Labiella* (Malak. Blätt. I. 1854, p. 142) for the group with an incassated lip, such as *A. labiata* Newc., and perhaps it may, conchologically, form a convenient section.

The species are principally from Oahu, but an elongate and generally striate group characterizes the older Islands, such as Kauai.

(1) *Leptachatina accincta* Mighels.

Achatina accincta (err. typ.) Mighels, P. Boston Soc. II. (1845), p. 20; Reeve, Conch. Icon. *Achatina*, sp. 101.

nec *Achatinella accincta* Gould, U.S. Explor. Exped. Mollusca, pl. VII, fig. 97.

Achatinella granifera Gulick, Ann. Lyc. New York, VI. (1856), p. 185, pl. VI, fig. 13; Sykes, P. Malac. Soc. London, III. pl. XIV, fig. 5.

Achatinella (*Leptachatina*) *margarita* Pfeiffer, P. Zool. Soc. London, 1855, p. 206.

Gulick admitted (P. Zool. Soc. London, 1873, p. 91) the identity of his species with Pfeiffer's. If Mighels' dimensions and description are accurate, I think the above identification will prove correct. The shell figured by Gould does not appear to be Mighels' species. See also a note under *L. grana* Newc.

HAB. Oahu (Mighels, Pfeiffer); Keawaawa (Gulick).

(2) *Leptachatina acuminata* Gould.

Achatinella acuminata Gould, P. Boston Soc. II. (1847), p. 200; U. S. Explor. Exped. Mollusca, pl. VII. fig. 100.

Plate XII. figs. 13, 13 a.

The type of the genus; the radula is figured from a dissection by Lt.-Col. H. H. Godwin-Austen, F.R.S.

HAB. Kauai (Gould); Hanalei (Baldwin); Kaholuamano (Perkins).

(3) *Leptachatina antiqua* Pease.

Leptachatina antiqua Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.);

J. Conchyl. XVIII. (1870), p. 94; Crosse, J. Conchyl. XXIV. p. 98, pl. III. fig. 6.

Leptachatina antiquata Pease, J. Conchyl. XVIII. (1870), p. 87 [err. typ.].

HAB. Kauai (Pease); Mana (Baldwin).

(4) *Leptachatina approximans* Ancey.

Leptachatina approximans Ancey, Naturaliste, 1897, p. 222.

HAB. Waianae, Oahu (Ancey).

(5) *Leptachatina arborea*, n. sp.

Testa ovato-oblonga, turrata, tenuis vel tenuiuscula, dextrorsa, cornea, longitudinaliter levissime striatula; anfr. 6—7, plano-convexi, ultimus $\frac{3}{8}$ altitudinis testae aequans; sutura bene impressa; apertura quadrato-ovata, margine dextro subincrassatulo, columellari verticali, incrassato, reflexo, plica parva vix conspicua munito. Alt. 8; diam. 3.6 mill. Plate XI. fig. 21.

The plica is very inconspicuous; the colour becomes lighter in adult specimens, and then the polished, transparent gloss disappears and the shell becomes of a straw colour. Over thirty specimens were collected by Mr Perkins; they vary slightly in shape, a few being broader in proportion to the length, and having more inflated whorls. Mr Baldwin sends me the following note: "It is found on the Candle-nut tree (*Aleurites moluccana*), among the leaves of the Bird-nest fern (*Asplenium nidus*), sometimes at a height of 30 or 40 feet. All the other known species of *Leptachatina* are terrestrial—under rocks or on dead leaves and decaying wood."

HAB. Hawaii, Kona at 4000 feet (Perkins); Olaa, Hilo (Baldwin).

(6) *Leptachatina balteata* Pease.

Leptachatina balteata Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.); J. Conchyl. xviii. (1870), p. 91; Crosse, l. c. xxiv. (1876), p. 96, pl. iv. fig. 4.

Four, apparently immature, specimens; they approach this species very closely save that they do not possess the colour band, and the last whorl measures just over, rather than under, half the length of the shell. As the species is only known to me from description and figure, I think it safer to refer them here with a query than to describe them.

HAB. Kauai (Pease); Wahiawa (Baldwin); at 4000 feet (Perkins).

(7) *Leptachatina brevicula* Pease.

Leptachatina brevicula Pease, J. Conchyl. xvii. (1869), p. 169.

Only known to me from the description. The specimens, while slightly larger than the dimensions stated by Pease, agree well with the proportions given. The plait, which he states is "*valida, fere transversa*," seems to vary much in size and prominence.

HAB. Kauai (Pease); Kaholuamano, and at 4000 feet (Perkins).

(8) *Leptachatina (Labiella) callosa* Pfeiffer.

Achatinella (Labiella) callosa Pfeiffer, P. Zool. Soc. London, 1856 [1857], p. 334.

Only known to me from the unique type in the British Museum.

HAB. Oahu (Pfeiffer).

(9) *Leptachatina cerealis* Gould

Achatinella cerealis Gould, P. Boston Soc. II. (1847), p. 201; U. S. Explor.

Exped. Mollusca, pl. vii. fig. 99; Hartman, P. Ac. Philad. 1888, pl. i. fig. 13.

Two specimens only, which, if not this species, are probably undescribed.

HAB. Oahu, Waianae (Gould); Waianae Mts. below Kaala (Perkins).

(10) *Leptachatina chrysallis* Pfeiffer.

Achatina chrysallis Pfeiffer, P. Zool. Soc. London, 1855, p. 99.

This species has been united with *L. obtusa* Newc., by Mr Baldwin, but appears to me to be quite distinct; the habitat he gives of 'Wahiawa to Kawailoa, Oahu' probably really refers to *L. obtusa*.

HAB. Hawaiian Islands (Pfeiffer).

(11) *Leptachatina cingula* Mighels.

Achatinella cingula Mighels, P. Boston Soc. II. (1845), p. 21.

Leptachatina cingula Mighels, Hartman, P. Ac. Philad. 1888, pl. 1. fig. 14.

Achatinella (Leptachatina) dimidiata Pfeiffer, P. Zool. Soc. London, 1855, p. 205.

The *L. cingula* Mighels is unknown to me; I quote the following from Mr Hartman, "*Achatinella dimidiata* Pfeiffer, equals *cingula* Migh. in coll. Newcomb *ex Auct.* The figure of this shell in Chemnitz [i.e. Conch.-Cab. *Bulimacea*, pl. LXVII. figs. 5—7] does not represent the species, but equals an *Amastra*."

HAB. Oahu (Mighels, Pfeiffer); Halemano, Kawaihoa Gulch (Perkins).

(12) *Leptachatina clausina* Mighels.

Bulimus clausinus Mighels, P. Boston Soc. II. (1845), p. 20.

Leptachatina clausiana (sic) Mighels, Hartman, P. Ac. Philad. 1888, p. 52.

Unknown to me.

HAB. Hawaii (Mighels).

(13) *Leptachatina columna* Ancey.

Leptachatina columna Ancey, Naturaliste, 1889, p. 266; Sykes, P. Malac. Soc. London, III. pl. XIII. fig. 18.

Near *L. chrysalis* Pfr.

HAB. Oahu (Ancey).

(14) *Leptachatina compacta* Pease.

Labiella compacta Pease, J. Conchyl. XVII. (1869), p. 172.

The specimens appear to agree with Pease's description; the species has not been figured.

HAB. Maui (Pease); E. Maui (Baldwin); Haleakala, at 5000 feet (Perkins).

(15) *Leptachatina conicoides*, sp. nov.

Testa conico-ovata, imperforata, dextrorsa, tenuiuscula, cornea, apud suturas crenulata; anfr. 6, ultimus $\frac{2}{3}$ altitudinis testae aequans; sutura subimpressa; apertura subverticilis, sinuato-oblonga, margine dextro sub-incrassatulo, columellari reflexo,

adnato, plica obliqua, parva, compressa munito, marginibus callo tenui junctis. Alt. 7.5; diam. 3.5 mill.

Plate XI. fig. 26.

A somewhat conic shell, in which, when adult, the columella plait becomes inconspicuous. One adult and three young specimens.

HAB. Molokai (Perkins).

(16) *Leptachatina convexiuscula*, sp. nov.

Testa turrata, elongata, gracilis, tenuiuscula, dextrorsa, brunneo-cornea, laevis, polita, nitida, apice obtusulo; anfr. $6\frac{1}{2}$, convexi, turgiduli, ultimus $\frac{9}{16}$ altitudinis testae aequans; sutura bene impressa; apertura pyriformis, margine columellari sinuato, plica minima munito, marginibus callo tenuissimo junctis. Alt. 8; diam. 2.8 mill.

Plate XI. fig. 11.

A shell of the group of *L. exilis* Gulick, but with more inflated whorls, slightly more tapering towards the apex, and the mouth not so drawn out to the right. Three specimens.

HAB. Oahu, Waiolani (Perkins).

(17) *Leptachatina corneola* Pfeiffer.

Achatinella corneola Pfeiffer, P. Zool. Soc. London, 1845 [1846], p. 90.

Achatinella corneola Pfeiffer, Reeve, Conch. Icon. *Achatinella*, sp. 4.

HAB. Oahu? (Baldwin); Oahu, one young specimen (Hutchison).

(18) *Leptachatina coruscans* Hartman.

Leptachatina coruscans Hartman, P. Ac. Philad. 1888, p. 52, pl. 1. fig. 16.

A variable shell in thickness and colouration.

HAB. Molokai (Hartman); Kamalo (Baldwin); Kapanui, Kolamaula, and at 4000 ft. (Perkins).

(19) *Leptachatina costulata* Gulick.

Achatinella costulata Gulick, Ann. Lyc. New York, VI. (1856), p. 177, pl. VI. fig. 5; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 4.

Newcomb united this shell with *L. semicostata* Pfeiffer, but Gulick's type is much more slender than that species, the mouth is of a different shape, and other minor differences exist, all leading me to regard it as a good species.

HAB. Oahu, Pupukea, Waimea, and Kawailoa (Gulick).

(20) *Leptachatina costulosa* Pease.

Leptachatina costulosa Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.);

J. Conchyl. XVIII. (1870), p. 90; Crosse, l. c. XXIV. p. 96, pl. III. fig. 4.

HAB. Kauai (Pease); Waimea and Kealia (Baldwin).

(21) *Leptachatina crystallina* Gulick.

Achatinella crystallina Gulick, Ann. Lyc. New York, VI. (1856), p. 186, pl. VI. fig. 14.

Newcomb united this species with his *L. nitida*.

HAB. Oahu, Mokuleia, Kamoo, Waialua (Gulick).

(22) *Leptachatina emerita*, sp. nov.

Testa elongata, subcylindrica, imperforata, dextrorsa, cornea vel hyalina vel flava, tenuiuscula, sub lente longitudinaliter tenuiter striata, apice obtusulo; anfr. $6\frac{1}{2}$, plano-convexi, ultimus $\frac{2}{3}$ altitudinis testae fere aequans; sutura impressa, marginata; apertura ovata, margine dextro sub-incrassatulo, columellari sub-reflexo, plica parva inconspicua ascendente munito. Alt. 8; diam. 3.5 mill.

Plate XI. fig. 10.

Variable in colour, shading from brown to a hyaline tint; adult specimens lose their gloss and become of a straw-yellow. The columellar plait is small and inconspicuous.

HAB. Molokai, Kalamaula, and at 4000 feet (Perkins).

(23) *Leptachatina exilis* Gulick.

Achatinella exilis Gulick, Ann. Lyc. New York, VI. (1856), p. 188, pl. VI. fig. 16 [bad]; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 18.

Leptachatina cylindrata Pease, J. Conchyl. XVII. (1869), p. 168; P. Zool. Soc. London, 1869, p. 650 (nom. sol.).

Remarkable though the distribution may be, I am unable, after a comparison of Gulick's type with specimens of *L. cylindrata* presented by Pease to the British Museum, to sever these two species.

HAB. Oahu, Keawaawa (Gulick).—Kauai (Pease); at 4000 feet (Perkins).

(24) *Leptachatina extensa* Pease.

Leptachatina extensa Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.);
J. Conchyl. xviii. (1870), p. 92.

Four specimens, agreeing fairly well with Pease's diagnosis, are referred to this species.

HAB. Kauai (Pease); Kaholuamano (Perkins).

(25) *Leptachatina fumida* Gulick.

Achatinella fumida Gulick, Ann. Lyc. New York, vi. (1856), p. 181, pl. vi. fig. 9;
Sykes, P. Malac. Soc. London, III. pl. xiv. fig. 15.

Newcomb united this with his *L. vitrea*, but they appear to me to be quite distinct.

HAB. Oahu, Waialei, Pupukea, Waimea, Kawailoa, Halemano (Gulick).

(26) *Leptachatina fumosa* Newcomb.

Achatinella fumosa Newcomb, P. Zool. Soc. London, 1853 [1854, Nov.], p. 140,
pl. xxiii. fig. 28.

HAB. Oahu, Manoa (Newcomb); Kawailoa Gulch (Perkins). Only a single specimen.

(27) *Leptachatina fusca* Newcomb.

Achatinella fusca Newcomb, Ann. Lyc. New York, vi. (1853), p. 28; P. Zool.
Soc. London, 1853 [1854, Nov.], p. 145, pl. xxiii. fig. 44.

HAB. Oahu, Manoa (Newcomb).

(28) *Leptachatina fuscula* Gulick.

Achatinella fuscula Gulick, Ann. Lyc. New York, vi. (1856), p. 180, pl. vi. fig. 8.

HAB. Oahu, mountain forests of Mokuleia (Gulick).

(29) *Leptachatina glutinosa* Pfeiffer.

Achatinella (*Laminella*) *glutinosa* Pfeiffer, P. Zool. Soc. London, 1855 [1856, Feb.], p. 204.

Achatinella lacrima Gulick, Ann. Lyc. New York, vi. (1856, Dec.), p. 176, pl. vi. fig. 4; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 10.

HAB. Oahu, Lihue, Kalaikoa, Wahiawa, Halemano, Peula (Gulick); Waianae Mts., below Kaala (Perkins). Only a single specimen.

(30) *Leptachatina gracilis* Pfeiffer.

Achatinella (*Achatinellastrum*) *gracilis* Pfeiffer, P. Zool. Soc. London, 1855, p. 6, pl. XXX. fig. 22.

Achatinella elevata (Newcomb) Pfeiffer, t. c. [1856, Feb.], p. 209.

Achatinella subula Gulick, Ann. Lyc. New York, vi. [1856, Dec.] p. 191, pl. vi. fig. 19; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 16.

Gulick's species appears to be a bandless and slightly more attenuate variety.

HAB. Oahu (various authors); Palolo Valley (Gulick); Kaala (Baldwin); Waianae Mts., below Kaala, lee side (Perkins).

(31) *Leptachatina grana* Newcomb.

Achatinella grana Newcomb, Ann. Lyc. New York, vi. (1853), p. 29; P. Zool. Soc. London, 1853 [1854], p. 146, pl. XXIII. fig. 46.

Leptachatina grana Newcomb, Bland and Binney, Ann. Lyc. New York, x, p. 336 [radula].

The types of this species have met with an accident and are entirely broken. Newcomb believed that *L. granifera* Gulick [= *L. accincta* Mighels] was a synonym, but I feel doubtful of this.

HAB. Maui, Makawao (Newcomb); Haleakala, at 5000 feet (Perkins).

(32) *Leptachatina guttula* Gould.

Achatinella guttula Gould, P. Boston Soc. II. (1847), p. 201; U. S. Explor. Exped. Mollusca, pl. VII. fig. 98.

Achatinella gunnea Gulick, Ann. Lyc. New York, vi. (1856), p. 182, pl. vi. fig. 10; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 1.

Achatinella fragilis Gulick, t. c. p. 183, pl. vi. fig. 11; Sykes, t. c. pl. XIV. fig. 2.

Newcomb united—I think correctly—the two Gulickian species with Gould's; Mr Baldwin has, however, in his 'Catalogue' allowed them specific rank.

HAB. Oahu, Mokuleia, Lihue, Punaluu, Hauula, Halemano (Gulick).—Maui (Gould).

(33) *Leptachatina imitatrix*, sp. nov.

Testa elongata, turrata, imperforata, dextrorsa, tenuiuscula, flavido-cornea, sub lente longitudinaliter minute striata; anfr. $6\frac{1}{2}$, plano-convexi, ultimus $\frac{4}{5}$ altitudinis testae aequans; sutura impressa; apertura elongato-ovalis, margine dextro arcuato, acuto, columellari incrassatulo, reflexo, plica minima, inconspicua munito, marginibus callo tenui junctis. Alt. 7; diam. 2.6 mill.

Plate XI. fig. 9.

Only a single specimen. It recalls *L. exilis* of Gulick, but is more conic—i.e. the upper whorls are narrower in proportion—and is of a light straw-yellow. The columellar plait is deeply-seated and inconspicuous.

HAB. Hawaii, Mauna Loa at 4000 feet (Perkins).

(34) *Leptachatina impressa* Sykes.

Leptachatina impressa Sykes, P. Malac. Soc. London, II. (1896), p. 127.

Plate XI. fig. 8.

HAB. Lanai, Mountains behind Koele (Perkins).

(35) *Leptachatina isthmica* Ancey.

Leptachatina isthmica Ancey, P. Malac. Soc. London, III. (1899), p. 270; Sykes, t. c. pl. XIII. fig. 20.

HAB. Maui, Sand Hills between East and West Maui, subfossil (Ancey).

(36) *Leptachatina konaensis*, sp. nov.

Testa elongato-ovata, imperforata, dextrorsa, tenuiuscula, cornea vel pallide cornea, longitudinaliter tenuiter striata, apice obtusulo; anfr. 6, planati, ultimus $\frac{5}{8}$ altitudinis testae aequans; sutura impressa, marginata; apertura sinuato-ovata, columella arcuata, margine dextro intus subcalloso, columellari subreflexo, plica mediocri ascendente munito. Alt. 8; diam. 4 mill.

Plate XI. fig. 13.

Akin to *L. simplex* Pease, but is much more swollen and inflated. Six specimens.

HAB. Hawaii, Kona at 4000 feet (Perkins).

(37) *Leptachatina (Labiella) labiata* Newcomb.

Achatinella labiata Newcomb, Ann. Lyc. New York, vi. (1853), p. 27; P. Zool. Soc. London, 1853 [1854], p. 141, pl. xxiii. fig. 33; Gwatkin, P. Ac. Philad. 1895, p. 239 [radula].

Achatinella lagena Gulick, Ann. Lyc. New York, vi. (1856), p. 175, pl. vi. fig. 3; Sykes, P. Malac. Soc. London, III. pl. xiv. fig. 9.

Achatinella dentata Pfeiffer, P. Zool. Soc. London, 1855, p. 7, pl. xxx. fig. 27.

I follow Newcomb in including Gulick's species, but the latter's type does not fully shew the thickening on the columellar wall, nor the denticle on the outer lip.

HAB. Oahu, Lehui (Newcomb); Halemano, Wahiawa, Kalaikoa (Gulick); Mount Kaala (Perkins).

(38) *Leptachatina laevis* Pease.

Leptachatina laevis Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.); J. Conchyl. xviii. (1870), p. 91; Crosse, l. c. xxiv. (1876), p. 96, pl. iv. fig. 6.

HAB. Kauai (Pease); Waimea (Baldwin).

(39) *Leptachatina leucochila* Gulick.

Achatinella leucochila Gulick, Ann. Lyc. New York, vi. (1856), p. 173, pl. vi. fig. 1; Sykes, P. Malac. Soc. London, III. pl. xiv. fig. 12.

Newcomb united this with *L. pyramis* Pfr.; I think it is quite distinct specifically.

HAB. Kauai (Gulick).

(40) *Leptachatina lineolata* Newcomb.

Achatinella lineolata Newcomb, Ann. Lyc. New York, vi. (1853), p. 29; P. Zool. Soc. London, 1853 [1854], p. 140, pl. xxiii. fig. 29.

The real habitat seems somewhat uncertain; Newcomb originally gave Maui, subsequently Hawaii, which is more probably correct.

HAB. Maui (Newcomb and Hartman).—Hawaii (Newcomb and Baldwin).

(41) *Leptachatina lucida* Pease.

Leptachatina lucida Pease, J. Conchyl. xviii. (1870), p. 93.

HAB. Kauai (Pease); Kealia (Baldwin).

(42) *Leptachatina marginata* Gulick.

Achatinella marginata Gulick, Ann. Lyc. New York, vi. (1856), p. 179, pl. vi. fig. 7.

United by Newcomb with *L. succincta* Newc., but the present species is smaller and more slender.

HAB. Oahu, Kalaikoa (Gulick).

(43) *Leptachatina nitida* Newcomb.

Achatinella nitida Newcomb, Ann. Lyc. New York, vi. (1853, May), p. 29; P. Zool. Soc. London, 1853 [1854], p. 140.

Leptachatina nitida Newcomb, Bland and Binney, Ann. Lyc. New York, x. p. 336, pl. xv. fig. 8 [radula].

The figure given by Newcomb (P. Zool. Soc. London, 1853, pl. xxiii. fig. 30) apparently has been taken by error from some other shell, and does not represent this species. The form found by Mr Perkins appears to be a variety.

HAB. E. Maui (Newcomb).—Maui and Oahu (Hartman).—Oahu, Mt Kaala (Perkins).

(44) *Leptachatina obsoleta* Pfeiffer.

Spiraxis obsoleta Pfeiffer, P. Zool. Soc. London, 1856, p. 335.

A species of the group of *L. sandwicensis*. Mr Perkins found a single young shell on 'Haleakala at 5000 feet,' Maui, which may be the young of this species.

HAB. ? Oahu (Baldwin).

(45) *Leptachatina obtusa* (Newcomb) Pfeiffer.

Achatinella obtusa Newcomb, Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 209.

Mr Baldwin has suggested that this species is identical with *L. chrysallis* Pfeiffer, but I cannot agree with him.

HAB. Hawaiian Islands.—? Oahu (Baldwin).

(46) *Leptachatina octogyrata* Gulick.

Achatinella octogyrata Gulick, Ann. Lyc. New York, vi. (1856), p. 190, pl. vi. fig. 18; Sykes, P. Malac. Soc. London, III. pl. xiv. fig. 7.

Newcomb placed it as a synonym of *L. obclavata*, Pfr. [= *L. sandwicensis* Pfr.].

HAB. Oahu, Palolo Valley (Gulick).

(47) *Leptachatina oryza* Pfeiffer.

Achatinella (*Leptachatina*) *oryza* Pfeiffer, P. Zool. Soc. London, 1855 [1856, Feb.], p. 206.

Achatinella triticea Gulick, Ann. Lyc. New York, vi. (1856, Dec.), p. 184, pl. vi. fig. 12; Sykes, P. Malac. Soc. London, III. pl. xiv. fig. 8.

HAB. Oahu, subfossil (Pfeiffer); Keawaawa (Gulick).

(48) *Leptachatina* (*Labiella*) *pachystoma* Pease.

Labiella pachystoma Pease, J. Conchyl. xvii. (1869), p. 171.

I am not sure if this be a true *Labiella*.

HAB. Kauai (Pease).

(49) *Leptachatina perkinsi* Sykes.

Leptachatina perkinsi Sykes, P. Malac. Soc. London, II. (1896), p. 128.

Plate XI. fig. 30.

HAB. Lanai, Mts. behind Koele (Perkins).

(50) *Leptachatina petila* Gulick.

Achatinella petila Gulick, Ann. Lyc. New York, vi. (1856), p. 189, pl. vi. fig. 17;

Sykes, P. Malac. Soc. London, III. pl. xiv. fig. 14.

United by Newcomb with *L. fusca* Newc., but appears to me to be quite distinct.

HAB. E. Oahu, Koko (Gulick).

(51) *Leptachatina pyramis* Pfeiffer.

Achatinella pyramis Pfeiffer, P. Zool. Soc. London, 1845 [1846], p. 90; Reeve, Conch. Icon. *Achatinella*, sp. 41 [good].

Appears from its form to be an Oahu species, and I am not sure that Pease's localization will prove correct.

HAB. Kauai (Pease).

(52) *Leptachatina resinula* Gulick.

Achatinella resinula Gulick, Ann. Lyc. New York, VI. (1856), p. 174, pl. VI. fig. 2 ;
Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 11.

HAB. Oahu, Kawailoa, Waialei, and other localities (Gulick).

(53) *Leptachatina saccula* Hartman.

Achatinella (Leptachatina) saccula Hartman, P. Ac. Philad. 1888, p. 55, pl. 1.
fig. 15.

HAB. Hawaiian Islands (Hartman).

(54) *Leptachatina sandwicensis* Pfeiffer.

Achatina sandwicensis Pfeiffer, P. Zool. Soc. London, 1846 [May], p. 32.

Achatinella (Leptachatina) obclavata Pfeiffer, Op. cit. 1855 [July], p. 98.

Leptachatina octavula Paetel, Clessin, Nomenc. Helic. Viv. 1881, p. 316.

Pfeiffer placed his *Achatina sandwicensis* in the synonymy of *L. accincta* Mighels ;
the above identification is from an examination of Pfeiffer's types.

HAB. Oahu (Pfeiffer) ; Waianae Mts. (Perkins). One young specimen only.

(55) *Leptachatina saxatilis* Gulick.

Achatinella saxatilis Gulick, Ann. Lyc. New York, VI. (1856), p. 187, pl. VI.
fig. 15 ; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 17.

Leptachatina saxatilis Gulick, Hartman, P. Ac. Philad. 1888, p. 55.

HAB. Oahu, Mokuleia (Gulick).

(56) *Leptachatina sculpta* Pfeiffer.

Achatina sculpta Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 211.

HAB. Oahu (Pfeiffer) ; (Hutchison, one specimen).

(57) *Leptachatina scutilus* Mighels.

Bulinus scutilus Mighels, P. Boston Soc. II. (1845), p. 20.

HAB. Oahu (Mighels).

(58) *Leptachatina semicostata* Pfeiffer.

Achatinella (*Leptachatina*) *semicostata* Pfeiffer, P. Zool. Soc. London, 1855 [1856, Feb.], p. 206.

Dr Hartman remarks (P. Ac. Philad. 1888, p. 55) "Dr Newcomb thinks it questionable if this species be not a synonym of *L. fusca* Newc."; it is quite distinct.

HAB. Hawaiian Islands (Pfeiffer).

(59) *Leptachatina semipicta* Sykes.

Leptachatina semipicta Sykes, P. Malac. Soc. London, II. (1896), p. 128.

Plate XI. fig. 12.

HAB. Lanai, Mts. behind Koele (Perkins).

(60) *Leptachatina simplex* Pease.

Leptachatina simplex Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.); J. Conchyl. XVII. 1869, p. 170.

Dr Hartman notes (P. Ac. Philad. 1888, p. 55) that "Examples *L. nitida* Newc. (coll. Newc.) and *L. simplex* Pse. (coll. Pse.) are similar." There must be some error here, as specimens presented by Pease to the British Museum are quite distinct from *L. nitida* Newc.; further, Newcomb's species does not come from Hawaii.

HAB. Hawaii (Pease); Kona, at 3000—4000 feet (Perkins).

(61) *Leptachatina smithi* Sykes.

Leptachatina smithi Sykes, P. Malac. Soc. London, II. (1896), p. 128.

Plate XI. fig. 29.

HAB. Lanai, Mts. behind Koele (Perkins).

(62) *Leptachatina stiria* Gulick.

Leptachatina stiria Gulick, Ann. Lyc. New York, VI. (1856), p. 194, pl. VI. fig. 2.

HAB. Oahu, Halemano, Peula, Kawailoa (Gulick).

(63) *Leptachatina striata* Newcomb.

Tornatellina striata Newcomb, P. Calif. Ac. II. (1861), p. 93.

From the description this appears to be close to *L. lucida* Pease.

HAB. Kauai (Newcomb).

(64) *Leptachatina striatella* Gulick.

Achatinella striatella Gulick, Ann. Lyc. New York, VI. (1856), p. 178, pl. VI. fig. 6;
Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 19.

United by Newcomb with *L. fusca* Newc., but appears to me to be distinct.

HAB. Oahu, Keawaawa (Gulick).

(65) *Leptachatina striatula* Gould.

Achatinella striatula Gould, P. Boston Soc. II. (1845), p. 28.

Achatinella clara Pfeiffer, P. Zool. Soc. London, 1845 [1846, Jan.], p. 90; Reeve,
Conch. Icon. *Achatinella*, sp. 5.

A nice series, shewing both the form with the sutural band and the unicolorous variety.

HAB. Kauai (various authors); Makaweli, Kaholuamano, Lihue, and at 4000 ft. (Perkins).

(66) *Leptachatina succincta* Newcomb.

Achatinella succincta Newcomb, P. Boston Soc. V. (1855), p. 220; Amer. J. Conch.
II. (1866), p. 213, pl. XIII. fig. 7.

Leptachatina succinata Newcomb, Hartman, P. Ac. Philad. 1888, p. 55 (err. typ.).

HAB. Oahu, Ewa (Newcomb); Halemano (Perkins). One specimen only.

(67) *Leptachatina supracostata*, sp. nov.

Testa elongata, turrita, imperforata, dextrorsa, tenuis, cornea, polita; anfr. 8, ultimus $\frac{1}{2}$ longitudinis testae fere aequans, primi apud suturas subcostulati, reliqui fere laeves; sutura impressa, marginata, linea spirali notata; apertura lunata, columella sub-arcuata; margine dextro sub-incrassatulo, columellari sub-reflexo, plica minima oblique torta munito. Alt. 6.3; diam. 2 mill.

Plate XI. fig. 22.

Only two specimens. It belongs to the group of *L. exilis* Gulick; is inconspicuously costulate below the suture, the sculpture gradually fading out, until the last whorl hardly shews any marking beyond the lines of growth. There is a faint spiral line just below the suture.

HAB. Lanai, Mts. behind Koele (Perkins).

(68) *Leptachatina tenebrosa* Pease.

Labiella tenebrosa Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.).

Leptachatina tenebrosa Pease, J. Conchyl. XVIII. (1870), p. 92; Crosse, l. c. XXIV. (1876), p. 96, pl. III. fig. 5.

HAB. Kauai (Pease); Wahiawa (Baldwin); Kaholuamano, and at 4000 feet (Perkins).

(69) *Leptachatina tenuicostata* Pease.

Leptachatina tenuicostata Pease, J. Conchyl. XVII. (1869), p. 170.

HAB. Hawaii (Pease).—Oahu (Baldwin).

I feel doubts as to the accuracy of the last locality, as Mr Baldwin marks it as a species he has not seen.

(70) *Leptachatina terebralis* Gulick.

Achatinella terebralis Gulick, Ann. Lyc. New York, VI. (1856), p. 193, pl. VI. fig. 21; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 3.

HAB. Oahu, Kawaihoa (Gulick); Waianae Mts., below Kaala (Perkins).

(71) *Leptachatina teres* Pfeiffer.

Achatinella (Leptachatina) teres Pfeiffer, P. Zool. Soc. London, 1855 [1856], p. 206.

Near *L. obtusa* Newcomb.

HAB. Hawaiian Islands.

(72) *Leptachatina turgidula* Pease.

Labiella turgidula Pease, P. Zool. Soc. London, 1869, p. 651 (nom. sol.).

Leptachatina turgidula Pease, J. Conchyl. XVIII. (1870), p. 89; Crosse, l. c. XXIII. (1876), p. 96, pl. IV. fig. 5.

HAB. Kauai (Pease); Halemanu (Baldwin); Makaweli (Perkins). Five specimens.

(73) *Leptachatina turrata* Gulick.

Achatinella turrata Gulick, Ann. Lyc. New York, VI. (1856), p. 192, pl. VI. fig. 20;
Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 6.

United by Newcomb with *L. obclavata* Pfr. [= *L. sandwicensis* Pfr.], but *L. turrata* is a broader and stouter shell, of a darker colour.

HAB. Oahu, Lihue (Gulick).

(74) *Leptachatina vana* sp. nov.

Testa pyramidato-conica, dextrorsa, imperforata, tenuiuscula, brunneo-cornea, nitida, sub lente obsolete longitudinaliter striata, sutura marginata; anfr. 8, lente accrescentes, ultimus $\frac{5}{8}$ altitudinis testae aequans; apertura pyriformis, margine dextro acuto, columellari sub-reflexo, sinuato, plica mediocri munito, marginibus callo tenuissimo junctis. Alt. 7.8; diam. 3.9 mill. Plate XI. fig. 27.

Four specimens of a brownish-horny, pyramidal shell, which has no striking characteristics.

HAB. Oahu, Mt. Kaala (Perkins).

(75) *Leptachatina vitrea* Newcomb.

Achatinella vitrea Newcomb, P. Zool. Soc. London, 1853 [1854] p. 142, pl. XXIII. fig. 34.

HAB. Oahu, Manoa (Newcomb).

(76) *Leptachatina vitreola* Gulick.

Achatinella vitreola Gulick, Ann. Lyc. New York, VI. (1856), p. 194, pl. VI. fig. 23.

Achatinella parvula Gulick, t. c. p. 195, pl. VI. fig. 24; Sykes, P. Malac. Soc. London, III. pl. XIV. fig. 13.

Both were united by Newcomb with his *L. grana*; they appear to me to be quite distinct from that species.

HAB. Hawaiian Islands (Gulick); W. Maui (Baldwin for *L. parvula*).

THAANUMIA Ancey.

Thaanumia omphalodes Ancey.

Thaanumia omphalodes Ancey, P. Malac. Soc. London, III. (1899), p. 269, pl. XII.
fig. 8.

The type, and only, species.

HAB. Oahu, Waianae Mountains (Ancey).

CARELIA H. and A. Adams.

Carelia H. and A. Adams, Genera of Recent Mollusca, II. (Feb. 1855) p. 132.

This interesting genus, confined to Kauai save for one species on the Island of Niihau, was described by Messrs H. and A. Adams, with no named type.

The anatomy has been described by Binney, P. Ac. Philad. 1876, p. 185, who points out that it agrees in general with the *Amastra* group, but differs in having a costate jaw.

(1) *Carelia bicolor* Jay.

Achatina bicolor Jay, Cat. Shells, Ed. III. (1839), p. 119, pl. VI. fig. 3.

Carelia bicolor Jay, Binney, P. Ac. Philad. 1876, p. 185, pl. VI. [anatomy].

Achatina adusta Gould, P. Boston Soc. II. (1845), p. 26.

Carelia adusta Gould, var. *angulata* Pease, J. Conchyl. XVIII. (1870), p. 403.

Achatina fuliginea Pfeiffer, P. Zool. Soc. London, 1852 [1854], p. 66; Conch.

Cab. *Achatina*, p. 267, pl. XLIII. figs. 21, 22.

HAB. Kauai (various authors).

(2) *Carelia cochlea* Reeve.

Achatina cochlea Reeve, Conch. Icon. *Achatina*, sp. 5.

The spiral sculpture is nearly obsolete in some specimens; I have seen one measuring 61 mill. in length.

HAB. Kauai (various collectors).

(3) *Carelia cumingiana* Pfeiffer.

Spiraxis cumingiana Pfeiffer, P. Zool. Soc. London, 1855, p. 106, pl. XXXII. fig. 1.

HAB. Kauai (Pfeiffer, &c.).

(4) *Carelia dolei* Ancey.

Carelia dolei Ancey, Mem. Soc. Zool. France, vi. (1893), p. 328.

HAB. Kauai, Hanalei (Ancey); Haena, subfossil (Baldwin).

(5) *Carelia glutinosa* Ancey.

Carelia glutinosa Ancey, Mem. Soc. Zool. France, vi. (1893), p. 324.

HAB. Probably Kauai. Unknown to me.

(6) *Carelia olivacea* Pease.

Carelia olivacea Pease, Amer. J. Conch. ii. (1866), p. 293.

Carelia variabilis Pease, J. Conchyl. xviii. (1870), p. 402 [with var. *viridis*];

P. Zool. Soc. London, 1871, p. 473.

I do not quite follow why Pease described *C. variabilis*, when, in the same paper, he stated that it and *C. olivacea* were varieties of one species.

HAB. E. Kauai (Pease).

(7) *Carelia paradoxa* Pfeiffer.

Spiraxis paradoxa Pfeiffer, P. Zool. Soc. London, 1853, p. 128.

Differs from all others known to me in its strongly granulated surface.

HAB. Kauai.

(8) *Carelia sinclairi* Ancey.

Carelia sinclairi Ancey, Mem. Soc. Zool. France, v. (1892), p. 720.

HAB. Niihau, subfossil (Ancey).

(9) *Carelia turricula* Mighels.

Achatina turricula Mighels, P. Boston Soc. ii. (1845), p. 20.

Carelia turricula Mighels, Kobelt, J. B. Malak. Ges. ii. (1875), p. 225, pl. vii. fig. 1.

Achatina obeliscus Reeve, Conch. Icon. *Achatina*, sp. 129.

Achatina newcombi Pfeiffer, P. Zool. Soc. London, 1851 [1853], p. 262.

HAB. Kauai, Hanalei (Baldwin, Perkins).

AURICULELLA Pfeiffer.

Auriculella Pfeiffer, P. Zool. Soc. London, 1855, p. 1; Mal. Blätt. II. p. 3.

The type appears to be the *Partula auricula* Fér.

(1) *Auriculella ambusta* Pease.

Auriculella ambusta Pease, J. Conchyl. XVI. (1868), p. 345.

Probably the locality suggested by Mr Baldwin is correct.

HAB. Oahu? (Baldwin).

(2) *Auriculella auricula* Fér.

Partula auricula Férussac, Prodr. p. 66, no. 6; Voy. de Freycinet, Zool. p. 486.

Auricula owaihiensis Chamisso, Nov. Act. Leop. XIV. (1829), p. 639, pl. XXXVI. fig. 1.

Auricula sinistrorsa Chamisso, tom. cit. p. 640, pl. XXXVI, fig. 2 [spec. juv.].

Partula dumartroyi Souleyet, Rev. Zool. V. (1842), p. 102.

Bulinus armatus Mighels, P. Boston Soc. II. (1845), p. 19.

This species varies greatly in size and shape; it is generally unicolorous, varying, from nearly white, through shades of yellow and green, to brownish green; a few specimens have a single brown band.

HAB. Oahu, Mount Tantalus, Mount Kaala, Halemano, Head of Kawaiiloa Gulch (Perkins).

(3) *Auriculella brunnea* Smith.

Auriculella brunnea Smith, P. Zool. Soc. London, 1873, p. 88, pl. X. fig. 23; Gwatkin, P. Ac. Philad. 1895, p. 238 [radula].

Two Lanai specimens have a single darker band at the periphery; others are unicolorous.

HAB. Molokai and Lanai (Smith); Molokai, Kalamaula, also Lanai, behind Koele (Perkins).

(4) *Auriculella cerea* Pfeiffer.

Achatinella cerea Pfeiffer, P. Zool. Soc. London, 1855, p. 2, pl. xxx. fig. 21.

Pease has suggested (J. Conchyl. xvi. p. 343) that this is identical with *A. petitiiana* Pfeiffer; he is not improbably correct, but I have only seen the single type specimen.

HAB. Molokai (Nevill, fide specimens from Newcomb).

(5) *Auriculella chamissoi* Pfeiffer.

Achatinella (Auriculella) chamissoi Pfeiffer, P. Zool. Soc. London, 1855, p. 98.

HAB. Oahu (Baldwin).—Hawaii (fide tablet in Brit. Mus.).

(6) *Auriculella crassula* Smith.

Auriculella crassula Smith, P. Zool. Soc. London, 1873, p. 88, pl. x. fig. 22.

Auriculella ponderosa Ancey, Bull. Soc. Malac. France, vi. (1889), p. 225.

HAB. Maui, Makawao (Baldwin); Iao Valley, Olinda, and Haleakala at 4000 feet (Perkins).

(7) *Auriculella diaphana* Smith.

Auriculella diaphana Smith, P. Zool. Soc. London, 1873, p. 87, pl. x. fig. 25.

Auriculella patula Smith, tom. cit. p. 88, pl. x. fig. 24.

HAB. Oahu, various localities (Smith); Mount Tantalus, and head of Panoa Valley (Perkins).

(8) *Auriculella expansa* Pease.

Auriculella expansa Pease, J. Conchyl. xvi. (1868), p. 343, pl. xiv. fig. 8.

HAB. Hawaiian Islands (Pease).—Probably Maui (Ancey).—Kauai (Baldwin).

(9) *Auriculella lurida* Pfeiffer.

Tornatellina castanea Pfeiffer, Mon. Helic. Viv. III. (1853), p. 524.

Achatinella (Auriculella) lurida Pfeiffer, Mon. Helic. Viv. iv. p. 570.

Pfeiffer re-named the species, apparently to avoid confusion with *Achatinella castanea* Reeve.

HAB. Maui? (Baldwin).—Oahu, Mount Tantalus (Perkins).

(10) *Auriculella newcombi* Pfeiffer.

Balea newcombi Pfeiffer, P. Zool. Soc. 1852 [1854], p. 67.

Achatinella obeliscus Pfeiffer, Malak. Blätt. II. (1855), p. 166.

HAB. Molokai, Kalamaula (Perkins).

(11) *Auriculella obliqua* Ancey.

Auriculella obliqua Ancey, Mem. Soc. Zool. France, v. (1892), p. 721; Sykes, P. Malac. Soc. London, III. p. 275, pl. XIII. fig. 17.

Appears to be very near *A. ambusta* Pease.

HAB. Oahu, Waianae Mts. (Baldwin).

(12) *Auriculella perkinsi* sp. nov.

Testa subperforata, elongato-conica, brunnea aut corneo-brunnea, linea brunnea ad peripheriam saepe notata, nitida; anfr. 6—6½, planiusculi, ultimus ⅔ altitudinis testae aequans; apertura auriformis, intus brunnea, margine parietali lamina obliqua intrante, columellari lamina volvente munitis; peristoma leviter reflexum, incrassatum. Alt. 8; lat. 4 mill.

Plate XI. figs. 17, 18.

var. *a.* Magis elongata et tenuior, flavida, peristomate albido.

I cannot identify this species with any of the numerous varieties of *A. auricula*, and therefore describe it. It is very variable in colour, shading from rich brown to light yellow: when brown the band—if present—is yellowish, and conversely. The lip varies in colour from dark brown to white. It is a fairly thin shell and appears to be common.

HAB. Oahu, ridges round Nuuanu, and Mount Tantalus (Perkins).

(13) *Auriculella petitiiana* Pfeiffer.

Tornatellina petitiiana Pfeiffer, Zeitsch. Malak. IV. (1847), p. 149; Kuster, Conch.-Cab. *Tornatellina*, p. 153, pl. XVIII. figs. 24, 25.

HAB. Hawaiian Islands.

See a note under *A. cerea*.

(14) *Auriculella perpusilla* Smith.

Auriculella perpusilla Smith, P. Zool. Soc. London, 1873, p. 87, pl. x. fig. 26.
HAB. Oahu, Kahalu (Smith).

(15) *Auriculella pulchra* Pease.

Auriculella pulchra Pease, J. de Conchyl. xvi. (1868), p. 346, pl. xiv. fig. 6.

Specimens presented by Pease to the British Museum under this name do not quite agree with his diagnosis, and his figure appears to have been drawn from a variety which he notes, and not the type form. I have followed the identified specimens; possibly it is a variable species, or an error may have occurred in translating his paper.

HAB. Oahu (authors); Mount Tantalus and Mount Kaala (Perkins).

(16) *Auriculella tenella* Ancey.

Auriculella tenella Ancey, Bull. Soc. Malac. France, vi. (1889), p. 232.

HAB. Oahu, Waianae (Ancey).

(17) *Auriculella tenuis* Smith.

Auriculella tenuis Smith, P. Zool. Soc. London, 1873, p. 87, pl. x. fig. 27.

Mons. Ancey has described (Bull. Soc. Malac. France, vi. p. 230) a var. *solida*.

HAB. Oahu, various localities (Smith).

(18) *Auriculella triplicata* Pease.

Auriculella triplicata Pease, J. de Conchyl. xvi. (1868), p. 346.

HAB. Maui (Hartman).—Oahu, Tantalus and Panoa (Baldwin).

(19) *Auriculella uniplicata* Pease.

Auriculella uniplicata Pease, J. de Conchyl. xvi. (1868), p. 344, pl. xiv. fig. 7.

HAB. Maui (Pease); West Maui (Baldwin).—Molokai, Kalamaula, and above Pelekunu (Perkins).

(20) *Auriculella westerlundiana* Ancey.

Auriculella westerlundiana Ancey, Bull. Soc. Malac. France, vi. (1889), p. 218; Sykes, P. Malac. Soc. London, III. p. 275, pl. XIII. fig. 21.

HAB. Hawaii, Kona, and Waimea (Ancey); Kona at 3000 feet, and Olaa (Perkins).

INSUFFICIENTLY KNOWN OR ERRONEOUSLY RECORDED SPECIES.

The following appear to be only manuscript names: *jucunda* Smith; *solida* Gulick; *solidissima* Smith (confer Ann. Lyc. New York, x. pp. 331—2).

Bulinus pumicatus Mighels, P. Boston Soc. II. p. 19.

HAB. Oahu.

Probably this is really an *Auriculella*; I am totally unacquainted with it.

Partula pusilla Gould, P. Boston Soc. II. p. 197; U. S. Explor. Exped. Mollusca, pl. VII. fig. 90.

This species has been referred to *Auriculella*, and consequently a Hawaiian habitat has been suggested for it; it is really, however, a *Tornatellina* and was described from Metia [= Mata].

FRICKELLA Pfeiffer.

Frickella Pfeiffer, P. Zool. Soc. London, 1855, p. 2; Mal. Blätt. II. p. 3.

Frickella amoena Pfeiffer.

Achatinella (*Frickella*) *amoena* Pfeiffer, P. Zool. Soc. London, 1855, p. 2, pl. xxx. fig. 3.

This aberrant species appears to be a link between *Achatinella* and *Tornatellina*. The single young shell, found by Mr Perkins, does not quite agree with the type, as the whorls are flatter, but I am unable to sever it specifically.

HAB. Oahu, Konahuanui (Baldwin); Halemano (Perkins).

TORNATELLINIDAE.

TORNATELLINA Beck.

Beck (Index Moll. 1837, p. 80) proposed this name as a subgenus of *Achatina*, and placed in it four species, all of them undiagnosed. Pfeiffer in 1841 (Symb. Hist. Helic. pt. 2, p. 5) diagnosed the genus and gave (p. 130) a list of species. Previously to this Anton had proposed (1839) *Strobilus*, but in considering his claims it should be borne in mind that *Strobila* had twice previously been used in Zoology.

The Hawaiian species appear to be but little understood: the only attempt at figuring them was made by Gould, whose six figures, under one name, represent three different species.

I have endeavoured to avoid the creation of synonyms by a careful study of the descriptions and measurements given by the various authors. The habitat in the case of these very small shells is not always reliable, as they are very liable to be transported with plants, &c.

(1) *Tornatellina baldwini* Ancey.

Tornatellina baldwini Ancey, Bull. Soc. Malac. France, vi. (1889), p. 238.

HAB. Oahu, Tantalus (Ancey); Waianae Mts. (Perkins).—Kauai (Baldwin).

(2) *Tornatellina compacta* sp. nov.

Testa perforata, ovata, brunneo-cornea, nitidula, tenuis; spira curta, apice obtusulo; anfr. 5—5½, lineis incrementi bene notati, convexiusculi, regulariter et lente crescentes, sutura bene impressa; apertura ovato-pyriformis, lamina unica pygmaea volventi, interdum praedita; peristoma simplex, margine columellari reflexo et expanso. Alt. 2·2, diam. 1·2 mm.

Plate XI. fig. 1.

A compressed, compact little form, the aperture measuring about $\frac{2}{3}$ of the length; the whorls are somewhat convex.

HAB. Hawaii, Mauna Loa at 2000 feet, on hilo grass (Perkins).

(3) *Tornatellina confusa* sp. nov.

Pupa peponum Gould, P. Boston Soc. II. (1847), p. 197; U. S. Explor. Exped. Mollusca, pl. VII. figs. 104 a—c.

See for remarks under *Tornatellina peponum* Gould; this is the edentulous form figured by him.

HAB. Kauai, Makaweli (Perkins).

(4) *Tornatellina cylindrica* sp. nov.

Testa elongata, cylindrica, cornea, perforata; anfr. 5—5½, convexiusculi, striatuli, ultimus rotundatus, $\frac{2}{3}$ altitudinis testae aequans, sutura impressa; apertura ovata vel lunaris, lamellam in pariete gerens; columella incrassata, albida, contorta, interdum denticulo mediocri munita. Alt. 2·2, lat. vix 1 mm.

Plate XI. fig. 28.

This species may be distinguished from the true *T. pepoum*, by its smaller size and more slender shape.

HAB. Oahu, Waianae Mts. (Perkins).—Kauai, Makaweli, one specimen (Perkins).

(5) *Tornatellina dentata* Pease.

Tornatellina dentata Pease, P. Zool. Soc. London, 1871, p. 460.

I identify Mr Perkins' specimens with some doubt; if not this species they belong to no other recorded Hawaiian form.

HAB. Hawaii (Pease); Puna (Baldwin); Kona at 3000 feet (Perkins).

(6) *Tornatellina euryomphala* Ancy.

Tornatellina euryomphala Ancy, Bull. Soc. Malac. France, vi. (1889), p. 239.

Not found by Mr Perkins; I have specimens from another source, without indication as to which island they come from.

HAB. W. Maui (Ancy).

(7) *Tornatellina extincta* Ancy.

Tornatellina extincta Ancy, Bull. Soc. Malac. France, vii. (1890), p. 341.

HAB. Central Maui, subfossil (Ancy).

(8) *Tornatellina gracilis* Pease.

Tornatellina gracilis Pease, P. Zool. Soc. London, 1871, p. 460.

A single shell, found by Mr Perkins, agrees well with Pease's description and measurements, save that Pease speaks of the shell being sometimes spirally sulcate, while Mr Perkins' specimen shews traces of a single spiral thread at the periphery.

HAB. Kauai (Pease).—? Hawaii, Kona at 3000 feet (Perkins).

(9) *Tornatellina newcombi* Pfeiffer.

Tornatellina newcombi Pfeiffer, P. Zool. Soc. London, 1856, p. 335.

I am not quite clear if the localities are to be relied on; the figure given by Gould (as *T. peponum*, U. S. Explor. Exped. Moll. pl. vii. fig. 104 *e*) does not, I think, represent this species, as has been suggested.

HAB. Maui and Oahu (Ancey).—Kauai, Oahu, and Maui (Baldwin).

(10) *Tornatellina oblonga* Pease.

Tornatellina oblonga Pease, P. Zool. Soc. London, 1864, p. 673; Binney, Ann. Lyc. New York, xi. p. 190 [radula].

Tornatellina bacillaris Mousson, J. Conchyl. xix. (1871), p. 16, pl. iii. fig. 5.

Tornatellina oblongata Pease, Clessin, Nom. Helic. Viv. 1881, p. 343 (err. typ.).

Unknown to me as Hawaiian; it was described from the Tonga Islands.

HAB. Oahu, Manoa (Ancey).

(11) *Tornatellina peponum* Gould.

Pupa peponum Gould, P. Boston Soc. II. (1847), p. 197; U. S. Explor. Exped. Mollusca, pl. vii. figs. 104, 104 *d*.

Gould has undoubtedly confused three species under this name: which it therefore becomes necessary to restrict to one of his forms. I propose that it should be used for the shells figured by him as fig. 104 and fig. 104 *d*; namely the slender species with a parietal lamina and no columellar tooth: of this I have Hawaiian specimens.

The next form, that figured as figs. 104 *a-c*, has no parietal lamina, and equally no teeth on the columella; this has been found by Mr Perkins on Kauai, and is here named *T. confusa*.

The third form, figured as fig. 104 *e* (enlargement of mouth only) is a shell nearly related to *T. euryomphala*, Ancey; it is not, I think, *T. newcombi*.

HAB. Hawaii, Hilo, also Oahu (Gould).

(12) *Tornatellina perkinsi*, sp. nov.

Testa elongato-pyramidalis, subperforata, cornea, sub lente striatula; anfr. 7, planiusculi, lente accrescentes, sutura subimpressa; apertura ovata, lamellam sat minutam in pariete gerens; columella incrassata, albida, plicis duabus inconspicuis praedita. Alt. 3, lat. 1.2 mm.

Plate XI. fig. 14.

Its most noteworthy features are the very elongately pyramidal shape, flattened whorls, and the two inconspicuous plicae on the columella, the upper one being more deeply seated than the lower.

HAB. Kauai, Kaholuamano at 4000 feet (Perkins).

(13) *Tornatellina trochoides* sp. nov.

Testa profunde perforata, cornea, pyramidalis, pellucida, fere laevis; spira conoidea, apice acutiusculo; anfr. $7-7\frac{1}{2}$, regulariter lenteque accrescentes, planiusculi, ultimus ad peripheriam subcarinatus, sutura impressa; apertura quadrato-ovata, superne angulata, laminam conspicuam validam in pariete gerens; columella brunnea, incrassata, plicis duabus munita. Alt. 4, lat. 2 mm.

Plate XI. fig. 31.

Closely related, apparently, to *T. umblicata* Ancey; but differs from it in the relative proportions of height and breadth.

HAB. Lanai Mountains (Perkins).

(14) *Tornatellina umblicata* Ancey.

Auriculella umblicata Ancey, Bull. Soc. Malac. France, vi. (1889), p. 232.

Tornatellina umblicata Ancey, Mém. Soc. Zool. France, v. p. 721.

HAB. Maui, Lahaina (Ancey).

Fam. STENOgyRIDAE.

OPEAS Albers.

Opeas Albers, Die Heliceen, 1850, p. 175; Martens, Die Heliceen, Ed. 2, 1860, p. 265 (type *Bulinus goodalli* Miller).

(1) *Opeas junceus* Gould.

Bulinus junceus Gould, P. Boston Soc. II. (1847), p. 191; U. S. Explor. Exped. Moll. pl. VII. fig. 87.

HAB. Hawaiian Islands (Gould); all the islands (Baldwin).—Oahu, Waianae Mts. (Perkins).

(2) *Opeas prestoni* Sykes.

Opeas prestoni Sykes, P. Malac. Soc. London, III. (1898), p. 73, pl. v. fig. 4.

A long series, which I am entirely unable to sever from the shell recently described by me from Ceylon. The whole genus, however, is notorious for having been discovered in widely separated localities, and probably this species has been transported with plants.

HAB. Hawaii, Kawailoa, Mauna Loa at 1500 feet (Perkins).

(3) *Opeas pyrgiscus* Pfeiffer.

Bulimus pyrgiscus Pfeiffer, P. Zool. Soc. London, 1861, p. 24; Malak. Blätt. 1861, p. 15; Novit. Conch. III. p. 425, pl. xcvi. figs. 10—12.

This form does not seem to have been found in recent years.

HAB. Hawaiian Islands (Pfeiffer).

Opeas striolata Pease, is recorded as Hawaiian by Nevill (Handlist Ind. Mus. pt. I. 1878, p. 166); it appears to be a manuscript name only.

CAECILIOIDES (Blainville) Herrmannsen.

(1) *Caecilioides baldwini* Ancey.

Caecilianella baldwini Ancey, Mem. Soc. Zool. France, v. (1892), p. 718.

I have followed Mr Smith (J. Conch. vi. pp. 341—342) as to the generic name.

HAB. Oahu, Manoa (Ancey).

Fam. SUCCINEIDAE.

SUCCINEA Draparnaud.

Succinea Draparnaud, Tabl. des Moll. 1801, p. 55 (first species *S. amphibia* Drap.).

The large number of unfigured species described from the Hawaiian Islands renders the identification of specimens belonging to this puzzling group by no means an easy task.

Pease proposed (J. Conchyl. XVIII. 1870, p. 89) the genus *Catinella* for *Succinea rubida*; also the genus *Truella* (P. Zool. Soc. London, 1871, p. 459) for *S. elongata*. I have thought it best to leave all the forms in *Succinea*, and have listed the species in alphabetical order.

Two species collected by Mr Perkins still await identification; they are not improbably new, but so many of the described species are unknown to me that I consider it safer to leave them for the present. One is from Honolulu and Waianae Mts. in Oahu, with a dwarf variety from the mountains of Molokai at 4000 feet; the other from Kau, Hawaii: both belong to the group of *S. canella* Gould.

(1) *Succinea aurulenta* Ancey.

Succinea aurulenta Ancey, Bull. Soc. Malac. France, VI. (1889), p. 242; Sykes, P. Malac. Soc. London, III. p. 275, pl. XIII. fig. 4.

HAB. Hawaii, North Kona (Baldwin); Kona at 3000 feet (Perkins).

(2) *Succinea baldwini* Ancey.

Succinea baldwini Ancey, Bull. Soc. Malac. France, VI. (1889), p. 250.

The specimens are identified from the description alone.

HAB. Maui, Lahaina (Baldwin); Haleakala at 9000 feet (Perkins).

(3) *Succinea bicolorata* Ancey.

Succinea bicolorata Ancey, P. Malac. Soc. London, III. (1899), p. 271, pl. XII. fig. 2.

HAB. Hawaii, Waimea (Ancey).

(4) *Succinea caduca* Mighels.

Succinea caduca Mighels, P. Boston Soc. II. (1845), p. 21; Gould, U. S. Explor. Exped. Mollusca, pl. II. fig. 30.

HAB. Oahu, Waianae Mts. (Baldwin).—Molokai Mts. (Perkins).—Lanai Mts. (Perkins).

(5) *Succinea canella* Gould.

Succinea canella Gould, P. Boston Soc. II. (1847), p. 184; U. S. Explor. Exped. Mollusca, pl. II. fig. 20; Bland and Binney, Ann. Lyc. New York, X. p. 338 [jaw and radula].

Mons. Ancey has named (Bull. Soc. Malac. France, VI. pp. 245—7) varieties *crassa*, *obesula*, *mamillaris*, and *lucida*.

HAB. Maui, Lahaina (Baldwin).—Molokai and Maui (Ancey).—Maui, Haleakala at 5000 feet; Molokai Mountains (Perkins).

(6) *Succinea casta* Ancey.

Succinea casta Ancey, P. Malac. Soc. London, III. (1899), p. 272, pl. XII. fig. 10.
HAB. Hawaii, Olaa (Ancey).

(7) *Succinea cepulla* Gould.

Succinea cepulla Gould, P. Boston Soc. II. (1847), p. 182; U. S. Explor. Exped. Mollusca, pl. II. fig. 15.

Succinea fragilis Souleyet, Voy. Bonite, Zool. II. (1852), p. 501, pl. XXVIII. figs. 18—20 [shell and animal: nec *S. fragilis* King].

Succinea souleyeti Ancey, Bull. Soc. Malac. France, VI. (1889), p. 255.

The synonymy given here and under *S. rotundata* has been arrived at from a careful comparison of the original descriptions and figures, and a study of the identifications made by Pfeiffer amongst the specimens in the British Museum. The shell figured by Reeve (Conch. Icon. *Succinea*, fig. 69), purporting to be Hawaiian, under the name of *S. fragilis* King, is not the present species.

HAB. Hawaii (Gould, &c.).—Oahu, Tantalus, Head of Panoa Valley (Perkins).—Molokai Mountains (Perkins).

(8) *Succinea cinnamomea* Ancey.

Succinea cinnamomea Ancey, Bull. Soc. Malac. France, VI. (1889), p. 247.
Plate XI. fig. 32.

HAB. Oahu, Waianae Mts. (Baldwin); Mount Kaala (Perkins).

(9) *Succinea delicata* Ancey.

Succinea delicata Ancey, Bull. Soc. Malac. France, VI. (1889), p. 243.

HAB. East Maui (Ancey); Kula (Baldwin).

(10) *Succinea elongata* Pease.

Succinea elongata Pease, J. Conchyl. XVIII. (1870), p. 96.

A single specimen was found by Mr Perkins; the species was only known to me by the description. Authors refer to a *S. elongata* Beck, but I have failed to trace the reference.

HAB. Kauai (Pease); Waimea (Baldwin); Kaholuamano (Perkins).

(11) *Succinea explanata* Gould.

Succinea explanata Gould, U. S. Explor. Exped. Mollusca, p. 13, pl. II. fig. 31.

HAB. Kauai (Gould); North side (Baldwin).

(12) *Succinea garrettiana* Ancey.

Succinea garrettiana Ancey, P. Malac. Soc. London, III. (1899), p. 272, pl. XII. fig. 7.

HAB. Hawaii, Rainbow Falls, Hilo (Ancey).

(13) *Succinea inconspicua* Ancey.

Succinea inconspicua Ancey, P. Malac. Soc. London, III. (1899), p. 273, pl. XII. fig. 9.

HAB. Hawaii, Waimea (Ancey).

(14) *Succinea konaensis* Sykes.

Succinea konaensis Sykes, P. Malac. Soc. London, II. (1897), p. 299.

Plate XI. fig. 34.

HAB. Hawaii, Mount Kona at 4000 feet (Perkins).

(15) *Succinea lumbalis* Gould.

Succinea lumbalis Gould, P. Boston Soc. II. (1847), p. 183; U. S. Explor. Exped. Moll. pl. II. fig. 18.

HAB. Hawaii, Mauna Kea (Baldwin).—Kauai (Gould); Makaweli, and above Waimea at 4000 feet (Perkins).

The specimens from 'above Waimea' have a more drawn out spire, but only belong, I think, to a varietal form.

(16) *Succinea lutulenta* Ancey.

Succinea lutulenta Ancey, Bull. Soc. Malac. France, VI. (1889), p. 244.

HAB. Maui (Ancey); Ulupalakua (Baldwin).

(17) *Succinea mauiensis* Ancey.

Succinea mauiensis Ancey, Bull. Soc. Malac. France, vi. (1889), p. 248.

HAB. Maui (Ancey); Makawao (Baldwin); Haleakala at 5000 feet (Perkins).

(18) *Succinea newcombiana* Garrett.

Succinea newcombiana Garrett, P. Calif. Ac. 1. (1857), p. 103.

A species closely related to *S. cepulla* and *S. rotundata*, but, if my identification of the latter is correct, this is smaller, the mouth is rounder, and the last whorl not so much inflated.

HAB. Hawaii, district of Waimea (Garrett); Kohala Mountains (Perkins).

(19) *Succinea protracta* sp. nov.

Testa tenuis, aureo-rufa vel pallide-cornea, lineis incrementi obliquis bene notata; spira producta, apice acutulo, mamillato; anfr. $3\frac{1}{2}$ convexi, sutura bene impressa discreti, rapide accrescentes: apertura ovato-pyriformis, fere recta; peristoma simplex, tenue, margine columellari arcuato, haud plicato. Long. 12.7, diam. maj. 6; alt. ap. 8, lat. ap. 5 mm.

Plate XI, fig. 25.

Belongs to the group of *S. aurentata* Ancey, but is much more elongate and slender, and the suture is more impressed. A single white specimen from Mauna Loa at 3500' feet I also refer to this species.

HAB. Hawaii, Kau (Perkins).

(20) *Succinea punctata* Pfeiffer.

Succinea punctata Pfeiffer, P. Zool. Soc. London, 1854 [May, 1855], p. 297; Reeve, Conch. Icon. *Succinea*, fig. 29.

The specimens from Kohala Mts. are young and have the spire slightly more depressed, but appear to belong to this form. The white spots shewn in Reeve's figure are much exaggerated: most specimens have a few blotches of a paler tint, but I have seen none regularly spotted in the way the artist has represented them.

HAB. Hawaii (Pfeiffer); Kohala Mountains, Olaa Puna, and Kona at 3000 feet (Perkins).

(21) *Succinea rotundata* Gould.

Succinea patula Mighels, P. Boston Soc. II. (1845), p. 21 [nec *S. patula* Brug., nec King].

Succinea rotundata Gould, P. Boston Soc. II. (1847), p. 182; U. S. Explor. Exped. Moll. pl. II. fig. 14 [shell and animal].

Succinea newcombi Pfeiffer, P. Zool. Soc. London, 1854 [May, 1855], p. 297; Novit. Conch. I. pl. IX. figs. 3—5; Reeve, Conch. Icon. *Succinea*, fig. 61.

HAB. Oahu (Gould, &c.).—Molokai (Pfeiffer).—Hawaii, Kohala (Perkins).

See the remarks under *S. cepulla*, which species seems to be, like the present one, widely scattered over the islands.

(22) *Succinea rubella* Pease.

Succinea rubella Pease, P. Zool. Soc. London, 1871, p. 460.

The coloration of this species is very variable, and some specimens are found of a straw-colour; it appears to be close to *S. canella* Gould.

HAB. Lanai (Pease); Mountains (Perkins).

(23) *Succinea rubida* Pease.

Succinea rubida Pease, J. Conchyl. XVIII. (1870), p. 97.

HAB. Kauai (Pease); North side (Baldwin).

(24) *Succinea thaanumi* Ancey.

Succinea thaanumi Ancey, P. Malac. Soc. London, III. (1899), p. 273, pl. XII. fig. 3.

HAB. Hawaii, Olaa (Ancey).

(25) *Succinea venusta* Gould.

Succinea venusta Gould, P. Boston Soc. II. (1847), p. 186; U.S. Explor. Exped. Moll. pl. II. fig. 25.

HAB. Hawaii, Mauna Kea (Baldwin); Kona at 3000 feet, and Olaa Puna (Perkins).

The specimens from Kona are whitish and slightly more shouldered.

(26) *Succinea vesicalis* Gould.

Succinea vesicalis Gould, P. Boston Soc. II. (1847), p. 183; U.S. Explor. Exped. Moll. pl. II. fig. 17.

The figure given by Reeve (Conch. Icon. *Succinea*, fig. 85) does not represent this species.

HAB. Hawaii, Mauna Kea (Gould); Kau, and Mauna Loa at 2000 ft. (Perkins).

(27) *Succinea waianaensis* Ancey.

Succinea waianaensis Ancey, P. Malac. Soc. London, III. (1899), p. 273, pl. XII. fig. 12.

HAB. Oahu, Waianae Mts. (Ancey).

SPECIES INSUFFICIENTLY KNOWN OR ERRONEOUSLY RECORDED.

Succinea aperta Lea. Unknown to me; it has been doubtfully referred to *S. rotundata*.

Succinea approximata Shuttleworth, Reeve, Conch. Icon. *Succinea*, fig. 27. Apparently really refers to the West Indian *S. approximans*.

Succinea pudorina Gould, Reeve, Conch. Icon. *Succinea*, figs. 43, 75.

Two apparently distinct species are figured by Reeve under this name; he records it, I think erroneously, from the 'Sandwich Islands.'

The following appear to be only manuscript names.

S. apicalis Ancey, Makawao, Maui.

S. tenerrima Ancey, Hilo, Hawaii.

Fam. LIMNAEIDAE.

LIMNAEA Lamarck.

Limnaea Lamarck, Mém. Soc. Hist. Nat. Paris, 1799, p. 75 (type *Helix stagnalis* L.).

The name *Limnaea* appears to have been used as early as 1791 by Poli for the animals of *Unio*, *Anodonta* and *Chama*; but his work is so peculiar, that I feel doubts if this can be regarded as preoccupying the name for a genus.

The question whether these forms—when sinistral—belong to *Physa* or *Limnaea*, has for long proved to be a difficult one. Gould, when describing his *Physa reticulata*, remarked "its form is so much that of a reversed *Limnaea* that I am almost tempted to consider it one." Pease, in his review of the Hawaiian species, stated that he was "confident," having examined the animals of several hundred specimens, that there was no species of *Physa* in the Islands. He also remarked that sinistral and dextral specimens of the same species may be found together. Prof. E. von Martens, in 1866, expressed the view, here adopted, that these Hawaiian forms were really sinistral species of *Limnaea*.

As shewing how little the literature has been studied, I may remark that as late as 1889 Mr Cooke (P. Zool. Soc. London, 1889, p. 142), when pointing out the affinities with *Limnaea* of the so-called *Physae* of Australia, notes that "Tryon mentions, but I have failed to trace on what authority, that sinistral *Limnaeas* occur in the Sandwich Islands."

Mighels described (P. Boston Soc. II. p. 21) two species, *producta* and *umbilicata*, as *Physae*: according to Pease the types were destroyed by fire and, as the species are unidentifiable from the diagnoses only, I have omitted them.

(1) *Limnaea aulacospira* Ancey.

Limnaea aulacospira Ancey, Naturaliste, (2) XI. (Dec. 1889), p. 290; Sykes, P. Malac. Soc. London, III. pl. XIII. fig. 19.

HAB. Maui (Ancey); Haleakala at 5000 feet, and Iao Valley (Perkins).

(2) *Limnaea binominis*, nom. nov.

Physa sandwichensis Clessin, Conchylien-Cabinet, *Physa*, p. 342, pl. XLVIII. fig. 7 (1886).

nec *Limnaea sandwichensis* Philippi.

HAB. Hawaiian Islands (Clessin).—Oahu, Mts. near Honolulu (Perkins).

(3) *Limnaea compacta* Pease.

Limnaea compacta Pease, Amer. J. Conch. VI. (1870), p. 6, pl. III. fig. 4.

Limnaea ambigua, Pease, t. c. p. 6, pl. III. fig. 5.

Physa flavida Clessin, Conchylien-Cabinet, *Physa*, p. 364, pl. LI. fig. 9 (1886).

HAB. Oahu (Pease).—(as *L. ambigua*) Kauai, Kapaa (Baldwin).—(as *L. compacta*) all the Islands (Baldwin).

(4) *Limnaea hartmanni* Clessin.

Physa hartmanni Clessin, Conchylien-Cabinet, *Physa*, p. 371, pl. LIV. fig. 9 (1886).

HAB. Hawaii (Clessin).

Some catalogues give a *Limnaea hartmanni* of Studer and of Charpentier, but I cannot trace a described *species* of that name; there appears to be a variety of *L. ovatus* Drap bearing the name.

(5) *Limnaea moreletiana* Clessin.

Physa moreletiana Clessin, Conchylien-Cabinet, *Physa*, p. 341, pl. XLVIII. fig. 3 (1886).

Unknown to me, but from the figure I think it may be a form of *L. turgidula* Pease. It appears not to be the *Limnaea moreletiana* Gassies, of Adams (Gen. Rec. Moll. II. p. 253).

HAB. Hawaiian Islands (Clessin).

(6) *Limnaea naticoides* Clessin.

Physa naticoides Clessin, Conchylien-Cabinet, *Physa*, p. 341, pl. XLVIII. fig. 5 (1886).

HAB. Hawaiian Islands (Clessin).

(7) *Limnaea oahuensis* Souleyet.

Limnaea oahuensis Souleyet, Voy. Bonite, Zool. II. (1852), p. 527, pl. XXIX. figs. 38—41 [with animal]; Reeve, Conch. Icon. *Limnaea*, sp. 90.

Limnaea affinis Souleyet, Voy. Bonite, Zool. II. p. 528, pl. XXIX. figs. 42—44.

Limnaeus sandwichensis Philippi, Arch. Naturg. II. (1845), p. 63; Kuster, Conchylien-Cabinet, *Limnaea*, p. 26, pl. IV. figs. 25, 26.

Limnaea volutata, Gould, P. Boston Soc. II. (1847), p. 211; U. S. Explor. Exped. Moll. pl. IX. fig. 142.

I defer to Pease's experience and unite Souleyet's two species; though, from the figures, I should have regarded them as distinct. It is not the *Limnaea affinis* of Beck.

HAB. Oahu (Souleyet, Pease, &c.).—Oahu and Maui (Baldwin).

(8) *Linnaea peasei* Clessin.

Physa peasei Clessin, Conchylien-Cabinet, *Physa*, p. 339, pl. XLVII. fig. 8 (1886).

Judging from specimens received by the British Museum from the Morelet collection, the figure is by no means good.

HAB. Hawaiian Islands (Clessin).

(9) *Linnaea reticulata* Gould.

Physa reticulata Gould, P. Boston Soc. II. (1847), p. 214; U. S. Explor. Exped. Moll. pl. IX. fig. 140; Sowerby, Conch. Icon. *Physa*, fig. 56; Clessin, Conch.-Cab. *Physa*, p. 330, pl. XLVI. fig. 4.

Linnaea reticulata Gould, Pease, Amer. J. Conch. VI. p. 5.

Neither Sowerby nor Clessin appears to have been aware of Gould's published description of this species.

HAB. Kauai (Pease).

(10) *Linnaea rubella* Lea.

Lymnaeus rubellus Lea, Tr. Amer. Phil. Soc. IX. (1843), p. 12.

Linnaea rubella Lea, Pease, Amer. J. Conch. VI. p. 5, pl. III. figs. 1—3.

Pease was of opinion that this might prove to be a variety of *L. oahuensis* Soul.

HAB. Oahu (Lea).—Kauai (Pease); Mts. between Lihue and the sea, also Wailua river (Perkins).

(11) *Linnaea turgidula* Pease.

Linnaea turgidula Pease, Amer. J. Conch. VI. (July, 1870), p. 5, pl. III. fig. 3.

HAB. Oahu (Pease).

ERINNA A. Adams.

Erinna newcombi A. Adams.

Erinna newcombi A. Adams, P. Zool. Soc. London, 1855, p. 120; H. and A. Adams, Gen. Rec. Moll. II. p. 644, pl. CXXXVIII. fig. 9; Bland and Binney, Ann. Lyc. New York, X. p. 349 [jaw and radula]; Binney, P. Ac. Philad. 1874, p. 54, pl. V. figs. 7—10 [jaw and radula].

HAB. Kauai, Hanalei River (Baldwin, &c.). H. and A. Adams give as locality "Henata River, Kami."

See also a note on the genus by Dr Jousseume, Rev. Mag. Zool. (3) II. (1874), p. 25.

ANCYLUS, Geoffroy.

Ancylus Geoffroy, Traité sommaire des coquilles,.....aux environs de Paris, 1767, p. 122 [type apparently *A. lacustris*].

Ancylus sharpi sp. nov.

Testa pygmaea, convexiuscula, hyalino-flavida; apertura elongato-elliptica, apice obtusulo. Long. 2; lat. 1.1; alt. .8 mill.

Plate XII. figs. 14, 14 a.

An insignificant little form with no striking characters; there being no other species recorded from the Islands, I venture to give these shells a name; they are probably not adult.

HAB. Oahu, on pali, head of Nuuanu Valley (Coll. Dr B. Sharp, commisit H. A. Pilsbry).

Fam. MELANIIDAE.

MELANIA Lamarck.

The genus appears to have been first put forward by Lamarck in 1799 (Mém. Soc. Hist. Nat. Paris, p. 75) and to have been also characterised by him in 1801 (Syst. An. sans Vert. p. 91). In both cases the species named by him was *Melania amarula* Lam., which is therefore the type.

(1) *Melania baldwini* Ancey.

Melania baldwini Ancey, P. Malac. Soc. London, III. (July, 1899), p. 273, pl. XII. fig. 6.

HAB. Maui, Lahaina (Ancey).

(2) *Melania indefnita* Lea.

Melania indefnita Lea, P. Zool. Soc. London, 1850, p. 187; Reeve, Conch. Icon. *Melania*, fig. 56; Brot, Conch.-Cab. *Melania*, pl. XXIII. fig. 7.

Melania newcombii Lea, Pease, Amer. J. Conch. VI. p. 6 [nec Lea, fide Brot].

HAB. Oahu (Pease).

The Philippine specimens in coll. Cuming seem identical with some from Oahu, named *M. newcombii* by Pease.

(3) *Melania kauaiensis* Pease.

Melania kauaiensis Pease, Amer. J. Conch. vi. (July 1870), p. 7, pl. III. fig. 6.

HAB. Kauai (Pease).—Molokai, Pelekunu (Perkins).

Probably the species of *Melania* are scattered over the various islands and not confined to any single locality; *M. mauiensis*, for example, has been found on Maui, Molokai, Kauai, and Oahu.

(4) *Melania mauiensis* Lea.

Melania mauiensis Lea, P. Ac. Philad. VIII. (1857), p. 145; Brot, Conch.-Cab.

Melania, p. 322, pl. XXXIII. figs. 7, 8, 8 a.

HAB. Maui (Lea).—Maui, Oahu, Kauai (Pease).—Maui, Molokai (Brot).—Molokai, in taro patches, Pelekunu (Perkins).

Large specimens were found on Molokai by Mr Perkins, exact spot not recorded, and a small race, kindly identified for me by the late Dr Brot, on Pelekunu. *Melania tahitensis* Pease MS. is stated by Brot to be a synonym. Schepman (Notes Leyden Mus. XIV. p. 158) has recorded the present species from the Island of Soemba.

(5) *Melania newcombii* Lea.

Melania newcombii Lea, P. Ac. Philad. VIII. (1857), p. 145; Brot, Conch.-Cab.

Melania, p. 213, pl. XXIV. figs. 2, 2 a.

Melania contigua Pease, Amer. J. Conch. vi. (July 1870), p. 7.

I follow Brot in uniting *M. contigua* Pease; he also places *M. oahuensis* Pease MS. and *M. paulla* Dunker MS. in the synonymy.

HAB. Oahu (Lea); In stream in mountain gulch near Honolulu (Perkins).—Kauai (Pease).

(6) *Melania verreauxiana* Lea.

Melania verreauxiana (sic) Lea, P. Ac. Philad. VIII. (1857), p. 144.

Melania verreauxiana Lea, J. Ac. Philad. n. s. VI. pl. XXII. fig. 27; Brot, Conch.-Cab. *Melania*, p. 32, pl. IV. fig. 2.

Unknown to me and may not really be Hawaiian. Dr Brot considered it might be a form of *M. largillierti* Phil.

HAB. Hawaiian Islands (Lea).

Fam. PALUDESTRINIDAE.

PALUDESTRINA D'Orbigny.

Paludestrina porrecta Mighels.

Paludina porrecta Mighels, P. Boston Soc. II. (1845), p. 22.

HAB. Oahu (Mighels).

Fam. HELICINIDAE.

HELICINA Lamarck.

In 1799 (Mém. Soc. Hist. Nat. Paris, p. 77) the genus was described but no type or species named; in 1801 (Syst. An. sans Vert. p. 94) the only species named was *Helicina neritella* Lam., which may be taken as the type. Lamarck refers for a figure to Lister (Hist. Conch. fig. 59), and this illustration appears to represent a *Helicina*, though it is hard to be certain whether it be *H. neritella* or not.

(1) *Helicina laciniosa* Mighels.

Helicina laciniosa Mighels, P. Boston Soc. II. (1845), p. 19; Gould, U. S. Explor. Exped. Moll. pl. VII. fig. 108.

A very variable shell in size and coloration; it appears to be always more compact and elevated than *H. sandwichiensis*.

HAB. Oahu (Mighels).—Kauai (Baldwin).—Lanai, behind Koele; also Kalamaula, Molokai; Kaala, Oahu; and between Lihue and the sea, Kauai (Perkins).

(2) *Helicina magdalenae* Ancey.

Helicina magdalenae Ancey, Bull. Soc. Malac. France, VII. (1890), p. 342.

Helicina constricta Pfeiffer, P. Zool. Soc. London, 1848, p. 120; Conch.-Cab.

Helicina, p. 22, pl. VII. fig. 37—9 [both relate to his variety only].

Pfeiffer's typical form came from 'Otaheite' and appears to belong to a different species to his variety, which seems to be identical with this. Possibly forms may be found linking *H. magdalenae* to *H. uberta*.

HAB. Oahu, Tantalus (Ancey).

(3) *Helicina rotelloidea* Mighels.

Helicina rotelloidea Mighels, P. Boston Soc. II. (1845), p. 19; Pfeiffer, Conch.-Cab. *Helicina*, p. 23, pl. III. fig. 40—3.

Helicina bronniiana Philippi, Zeitsch. Malak. IV. (1847), p. 124.

HAB. Oahu (Mighels, &c.).

(4) *Helicina sandwichiensis* Souleyet.

Helicina sandwichiensis Souleyet, Voy. Bonite, Zool. II. (1852), p. 529, pl. xxx. figs. 1—5.

nec ? *H. sandwichiensis* Sowerby, Thes. Conch. III. pl. cclxx. figs. 173—4.

A variety "β" has been recorded by Pfeiffer as from the Loyalty Islands; probably this is an error. See Crosse, J. Conchyl. XLII. p. 405.

HAB. Oahu, Waiañae Mts. (Baldwin); at and below Kaala (Perkins).

(5) *Helicina uberta* Gould.

Helicina uberta Gould, P. Boston Soc. II. (1847), p. 202; U. S. Explor. Exped. Moll. pl. VII. fig. 114.

HAB. Maui and Oahu (Gould).—Oahu, below Kaala (Perkins).

SPECIES DOUBTFUL OR ERRONEOUSLY RECORDED.

Helicina antoni Pfeiffer. Originally recorded without locality; subsequently Pfeiffer gave the Hawaiian Islands and the Gambiers. It really appears to come from Honduras, and the Hawaiian habitat is probably erroneous, these supposed Hawaiian specimens belonging, as undoubtedly the Gambier Island shells do, to *H. pazi* Crosse (J. Conchyl. XIII. p. 221, pl. VI. fig. 8).

Helicina crassilabris, Philippi. It has been suggested by Pfeiffer that this is Hawaiian, but it really comes from Venezuela or the Caribbean Region.

Helicina fulgora Gould, originally described from Manua, Samoa Islands; it has also been noted, but, I think, erroneously, from the Hawaiian Islands.

Helicina pisum Philippi. I think "Sandwich Is." must have been a mistake and possibly refers to Vate or Sandwich I.: it may be a slip for Savage I., from which specimens, inseparable from this, undoubtedly do come. This appears not to be the *H. pisum* Hombr. and Jacq., which equals *H. tahitensis* Pease.

Fam. NERITIDAE.

NERITINA Lamarck.

I have not seen the first Edition of the 'Philosophie Zoologique' (1809) in which this genus is said to occur, but in the second edition (1830) the name appears in French only, with no diagnosis or named species (Vol. I. p. 321). However in his 'Hist. An. sans Vert.' it is duly given in Latin with named species (Vol. VI. pt. 2, p. 182). The first is *N. perversa* Gmel., which is the type of Montfort's *Velates* (1810) under the more correct name of *V. conoidea*, but the others belong to *Neritina* as we understand it to-day.

(1) *Neritina cariosa* Gray.

Nerita cariosa Gray, Wood, Index Test. Suppl. *Nerita* fig. 9 (1828).

Neritina sandwichensis Deshayes, An. sans Vert. Ed. 2, VIII. (1838), p. 579.

Neritina convexa Nuttall, Jay, Cat. Shells, Ed. 3, 1839, p. 66 (nom. sol.).

Neritina nuttalli Recluz, Rev. Zool. 1841, p. 276; Souleyet, Voy. Bonite, Zool. II. pl. XXXIV. figs. 43—46.

Neritina solidissima Sowerby, Thes. Conch. II. p. 541, pl. CXVI. fig. 573.

I have not sufficient material to determine whether the large synonymy given by Tryon (Man. Conch. x.) is fully justified. Prof. von Martens (Conch.-Cab. *Neritina*) expressed the opinion (p. 276) that *Neritina cariosa* Gray does not really belong here, but is a form of *N. mauritii*: this has been dealt with by Mr Smith (P. Zool. Soc. London, 1884, p. 275).

HAB. Hawaiian Islands (various authors).—Maui and Oahu (Baldwin).—Hawaii, Hilo (Smith).

(2) *Neritina granosa* Sowerby.

Neritina granosa Sowerby, Tank. Cat. App. p. XI. (1825); Conch. III. *Neritina* fig. 6.

Neritina papillosa Jay, Cat. Shells, Ed. 2, 1839, pl. IV. fig. 11.

Neripteron gigas Lesson, Rev. Zool. 1842, p. 187.

HAB. All the Islands (Baldwin).—Molokai, Pelekunu (Perkins).

(3) *Neritina lugubris* Philippi.

Neritina lugubris Philippi, Abbild. Conchylien, I. pt. 2, p. 20, pl. I. fig. 9 (1845).

This has been placed as a synonym of *N. cariosa*, but from the description and figure it seems to be distinct.

HAB. Hawaiian Islands (Philippi).

(4) *Neritina neglecta* Pease.

Neritina neglecta Pease, P. Zool. Soc. London, 1860, p. 435.

HAB. Hawaiian Islands (Pease).

(5) *Neritina vespertina* Nuttall.

Neritina vespertina Nuttall, Jay, Cat. Shells, Ed. 3, 1839, p. 66 (nom. sol.);

Reeve, Conch. Icon. *Neritina*, sp. 61.

? *Neritina sandwichensis* Desh., Reeve, Conch. Icon. sp. 82 [nec Deshayes].

HAB. All the Islands (Baldwin).

In conclusion I may call attention to three species, attributed to the Islands, which do not really belong to their fauna.

Partula terrestris Pease. Apparently a manuscript name; it has appeared in Paetel's 'Catalog' and in the Mon. Helic. Viv. (Vol. VIII. p. 209) with the habitat of 'I. Sandwich.' According to Dr Hartman, it is a synonym of *P. approximans* Pease, from Raiatea.

Spiraxis sandwichensis was described by Pfeiffer (P. Zool. Soc. London, 1856, p. 335) as from the Hawaiian Islands. It appears to me to be a form of the *Bulinus lactifluus* of Pfeiffer, described from Chili, and I feel no doubt the Hawaiian habitat is erroneous.

Bulinus kauaiensis was described by Pfeiffer in the same volume (p. 332). It is probably also Chilian and very close to *Bulinus albicans* Brod.; but I am not quite sure of the identity, as the shell is slightly more succineiform.

Finally, it may be noted that a specimen of *Viviparus chinensis* Gray, doubtless imported for food, was collected by Mr Perkins at "Wailuku," Maui.

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§ 4. List of named forms which are placed in this work as varieties or synonyms.

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<i>sandwichensis</i> Philippi (<i>Limnaca</i>) = <i>oahuensis</i> Souleyet (<i>Limnaca</i>)	392
<i>sandwichensis</i> Deshayes (<i>Neritina</i>) = <i>cariosa</i> Gray (<i>Neritina</i>)	398
<i>scitula</i> Gulick (<i>Ach.</i>) = <i>decipiens</i> Newcomb (<i>Ach.</i>)	307
<i>semicarinata</i> Newcomb (<i>Ach.</i>) = <i>variabilis</i> Newcomb, var. (<i>Ach.</i>)	320
<i>seminigra</i> Lamarck (<i>Monodonta</i>) = <i>apexfulva</i> Dixon (<i>Ach.</i>)	298
<i>setigera</i> Gould (<i>Helix</i>) = <i>hystrix</i> Pfeiffer (<i>Endodonta</i>)	290
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<i>sinistrorsa</i> Chamisso (<i>Auric.</i>) = <i>auricula</i> Fér. (<i>Auric.</i>)	375
<i>solida</i> Gulick (<i>Ach.</i>) = <i>splendida</i> Newcomb (<i>Ach.</i>)	318
<i>solidissima</i> Sby. (<i>Neritina</i>) = <i>cariosa</i> Gray (<i>Neritina</i>)	398
<i>souleyeti</i> Ancy (<i>Succinea</i>) = <i>cepulla</i> Gould (<i>Succinea</i>)	386
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<i>stewarti</i> Green (<i>Achatina</i>) = <i>vulpina</i> Fér., var. (<i>Ach.</i>)	328
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<i>talpina</i> Gulick (<i>Ach.</i>) = <i>gouldi</i> Newcomb (<i>Ach.</i>)	313
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<i>tuberosus</i> Gulick (<i>Apex</i>) = <i>cestus</i> Newcomb (<i>Ach.</i>)	300
<i>tumefactus</i> Gulick (<i>Apex</i>) = <i>vittata</i> Reeve (<i>Ach.</i>)	304
<i>turbiniiformis</i> Gulick (<i>Apex</i>) = <i>cestus</i> Newcomb (<i>Ach.</i>)	300
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<i>umbilicata</i> Pfeiffer (<i>Ach.</i>) = <i>petricola</i> Newcomb (<i>Amastra</i>)	341
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<i>undulata</i> Newcomb (<i>Ach.</i>) = <i>curta</i> Newcomb (<i>Ach.</i>)	323
<i>valida</i> Pfeiffer (<i>Ach.</i>) = <i>cestus</i> Newcomb, var. (<i>Ach.</i>)	300
<i>varia</i> Gulick (<i>Ach.</i>) = <i>vulpina</i> Fér., var. (<i>Ach.</i>)	328
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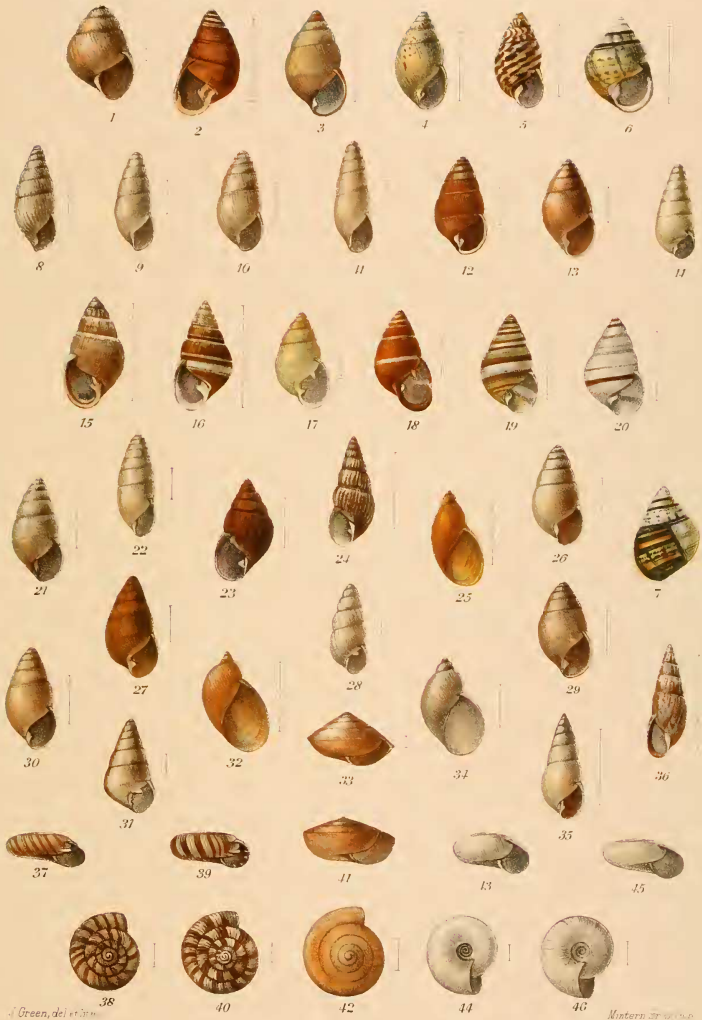
§ 5. List of unidentified, or erroneously recorded, forms.

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DESCRIPTION OF PLATE XI. (VOL. II.)

MOLLUSCA.

- Fig. 1. *Tornatellina compacta*, sp. nov. (p. 380).
 Fig. 2. *Achatinella (Partulina) hayseldeni* Baldwin (p. 313).
 Fig. 3. *Amastra simularis* Hartm., var. *roseotincta* Sykes (p. 344).
 Fig. 4. *Amastra citrea* Sykes (p. 335).
 Fig. 5. *Percidella fulgurans*, sp. nov. (p. 329).
 Figs. 6, 7. *Achatinella cestus* Newcomb (p. 300).
 Fig. 8. *Leptachatina impressa* Sykes (p. 364).
 Fig. 9. *Leptachatina imitatrix*, sp. nov. (p. 364).
 Fig. 10. *Leptachatina emerita*, sp. nov. (p. 361).
 Fig. 11. *Leptachatina convexiuscula*, sp. nov. (p. 360).
 Fig. 12. *Leptachatina semipicta* Sykes (p. 369).
 Fig. 13. *Leptachatina konaensis*, sp. nov. (p. 384).
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 Figs. 15, 16. *Achatinella (Partulina) redfieldi* Newcomb (p. 317).
 Figs. 17, 18. *Auriculella perkinsi*, sp. nov. (p. 377).
 Figs. 19, 20. *Achatinella (Achatinellastrum) waituaensis*, sp. nov. (p. 328).
 Fig. 21. *Leptachatina arborea*, sp. nov. (p. 357).
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 Fig. 23. *Amastra (Laminella) fraterna* Sykes (p. 349).
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 Fig. 25. *Succinea protracta*, sp. nov. (p. 388).
 Fig. 26. *Leptachatina conicoides*, sp. nov. (p. 359).
 Fig. 27. *Leptachatina vana*, sp. nov. (p. 372).
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 Fig. 29. *Leptachatina smithi* Sykes (p. 369).
 Fig. 30. *Leptachatina perkinsi* Sykes (p. 367).
 Fig. 31. *Tornatellina trochoides*, sp. nov. (p. 383).
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 Fig. 33. *Kaliella konaensis* Sykes (p. 286).
 Fig. 34. *Succinea konaensis* Sykes (p. 387).
 Fig. 35. *Amastra longa* Sykes (p. 338).
 Fig. 36. *Newcambia perkinsi* Sykes (p. 332).
 Figs. 37, 38. *Endodonta (Nesophila) lanaiensis* Sykes (p. 291).
 Figs. 39, 40. *Endodonta (Thaumatodon) ringens* Sykes (p. 288).
 Figs. 41, 42. *Philonesia perkinsi* Sykes (p. 284).
 Figs. 43, 44. *Vitrea lanaiensis* Sykes (p. 278).
 Figs. 45, 46. *Vitrea molokaiensis* Sykes (p. 278).



J. Green, del. et sculp.

Matern sculp.

DESCRIPTION OF PLATE XII. (VOL. II.)

MOLLUSCA.

PHILONESIA BALDWINI Ancy (p. 281).

- Fig. 1. Mantle margin, with shell and dorsal lobes. *a*, denotes white spots on integument covering the branchial cavity.
 Fig. 2. Extremity of foot from left side.
 Fig. 2 *a*. Portion of foot showing sole.
 Fig. 3. Genitalia, not quite complete.
 Fig. 3 *a*. Male organs enlarged, to show the retractor muscle and coiled vas deferens.
 Fig. 4. Jaw.
 Fig. 5. Centre and two side teeth of radula.
 Fig. 5 *a*. Median teeth, 7th—11th.
 Fig. 5 *b*. Lateral teeth, 19th—22nd.
 Fig. 5 *c*. Eleven of the outermost, or marginal, teeth.

GODWINIA CAPERATA Gould (p. 277).

- Fig. 6. Animal with shell removed, showing dorsal lobes.
 Fig. 7. Portion of mantle zone, near respiratory orifice.
 Fig. 8. Extremity of foot.
 Fig. 9. Buccal mass, and salivary gland, &c.
 Fig. 10. Sole of foot.
 Fig. 11. Jaw.
 Fig. 12. Central tooth of radula.
 Fig. 12 *a*. Fifth intermediate, and following lateral teeth.
 Fig. 12 *b*. Outermost, or marginal, teeth.

- Fig. 13. *Leptachatina acuminata* Gould. Central teeth of radula (p. 357).
 Fig. 13 *a*. Intermediate and marginal teeth.
 Figs. 14, 14 *a*. *Aneylus sharpi*, sp. nov. (p. 394).

EXPLANATION OF THE LETTERING.

<i>Al. Gd.</i>	albumen gland.	<i>pr.</i>	prostate.
<i>B. m.</i>	muscle of buccal mass.	<i>r. d. l.</i>	right dorsal lobe.
<i>Gen. ap.</i>	generative aperture.	<i>r. m. P.</i>	retractor muscle of penis.
<i>h. d.</i>	hermaphrodite duct.	<i>r. s. l.</i>	right shell lobe.
<i>i.</i>	intestine.	<i>Sal. gland.</i>	salivary gland.
<i>l. d. l.</i>	left dorsal lobe.	<i>st.</i>	stomach.
<i>l. s. l.</i>	left shell lobe.	<i>v. d.</i>	vas deferens.
<i>P.</i>	male organ.		

The numerical digits in smaller type indicate the tooth figured, reckoning from 0, the central tooth.
 All figures (except 14, 14 *a*) are from dissections and drawings made by Lt.-Col. H. H. Godwin-Austen, F.R.S.

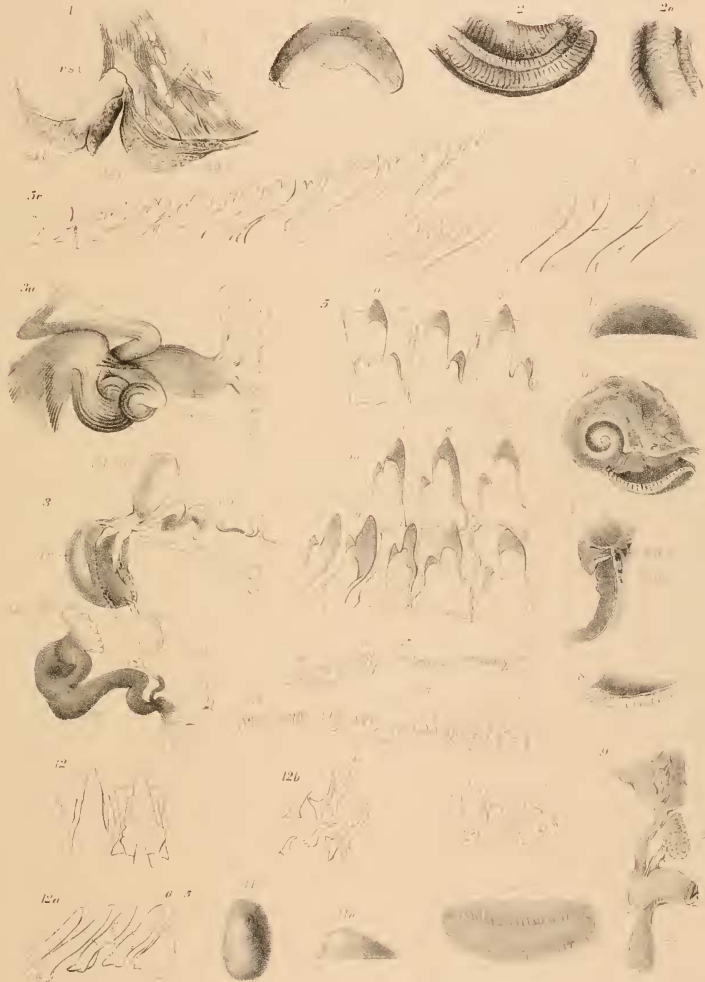


Fig. 1

Fig. 2

Fig. 3