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NOTES ON HAWAIIAN LAND SHELLS.

BY

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AND

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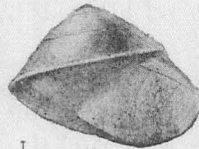
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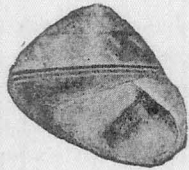
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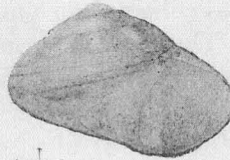
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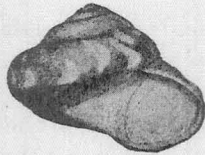
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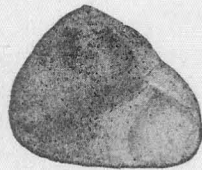
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# Hawaiian Species of *Helicina*.

BY HENRY A. PILSBRY AND C. MONTAGUE COOKE, JR.

HELICINA, in company with other genera of the smaller Hawaiian land shells, has so far received very little attention from the local collectors. The present paper is based mainly on a series collected for the Bishop Museum by the junior author.

The Hawaiian species are very seldom found alive in open or partly open country. They are usually collected in rather damp and heavily wooded sections of the islands. The only exception is *H. baldwini*, which occurs in a rather open belt of hala (*Pandanus odoratissimus*), on the fallen leaves.

The representatives of this genus, from the Hawaiian Islands, seem to belong to three groups. The characters upon which these groups are based, at present, are only those of the shell.

I. Group of *H. laciniosa*. In this group the spire is conic or depressed-conic, the periphery is more or less angular and the last whorl is flat or nearly flat above the periphery. This group contains: *laciniosa* and its numerous varieties, *oahuensis*, *sulculosa*, *nuuanuensis* and *baldwini*.

II. Group of *H. rotelloidea*. This group is characterized by the shells having a somewhat rounded periphery, the whorls are distinctly convex. The species belonging to this group are as follows: *rotelloidea*, *hawaiiensis*, *knudseni* and *kauaiensis*.

III. Group of *H. uberta*. In this group the periphery is rounded, the whorls are nearly flat, the spire rather high with distinctly convex outlines and the aperture is sometimes slightly contracted. The species belonging to this group are: *uberta* and its var. *magdalenæ*, *berniceia*, *lymaniana* and *juddii*.

## *Helicina oahuensis*, n. sp.

Fig. 1.

The shell is lenticular, with the periphery acutely carinate, slightly sinuous and minutely crenulated by the growth-striæ, thin, slightly diaphanous, striate with lines of growth, with two or three faint impressed spiral lines on the upper portion of the whorls

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(3)

and strongly impressed just above and below the peripheral keel. Color reddish alternating with somewhat zigzag light flammules, which are almost white at the periphery, base brownish, except around the callus where there are traces of reddish flammules. Spire low conical, apex acute. Suture lightly impressed, margined above. Whorls nearly 4, almost flat, the last two slightly projecting at the periphery; the embryonic nearly smooth; the last flat above the carinate periphery, slightly convex below, not descending in front. Aperture nearly triangular; outer lip thin, forming a straight line above the periphery, arcuate below. Callus whitish about the axis, the rest very thin, transparent and minutely punctate. Operculum wanting. Maj. diam. 5.0, total length 2.7 mm.

Oahu: Waianae Mountains and Mt. Tantalus (Cooke). The locality of the type specimen is, back of the Leilehua Ranch-house, Waianae Mts.

Type No. 14,911, Bishop Museum.

This shell has been referred to *H. sandwichiensis*, Soul., by various authors and collectors. Its nearest relative is *H. laciniosa*, Migh., var. *delta*, P. & C., from which it is easily distinguished by its much more depressed contour.

### ***Helicina laciniosa* Migh.**

*Helicina laciniosa* Mighels, P. Bost. Soc., ii, 1845, p. 19. *Helicina laciniosa* Gould, U. S. Exp. Exp., Moll., pl. vii, fig. 108. *Helicina sandwichiensis* Souleyet, Voy. Bonite, Zool., ii, 1852, p. 529, pl. xxx, figs. 1-5.

Unfortunately we do not have before us a typical shell of this species, though some of its numerous varieties are the most abundant of the *Helicinae* found on the Hawaiian Islands. Specimens which would be hard to separate from this species, except as varieties, occur on Kauai, Oahu, Molokai, Maui and Hawaii.

From Souleyet's description it would be hard to separate his species from *laciniosa* even as a variety. *H. bronniiana*, Phil., and *H. dissotropis*, Ancey, have been retained as varieties. Both of these differ but slightly from Mighel's description. Probably the form described by Mighels is one of the extremely local forms and it does not seem to have been rediscovered by any of the later collectors. Gould's description (U. S. Exp. Exp., Moll., p. 99, pl. vii, fig. 108) agrees closely with that of Mighels. Unfortunately

the figure does not agree very closely with the description. Mighels gives the diameter as 3.8 mm; Gould's measurements are: axis 2.5, base 3.8 mm.

var. **bronniana** (Philipi).

*Helicina bronniana* Philipi, Zeitsch. Malak., iv, 1847, p. 124. *Helicina rotelloidea* Pfeiffer, Conch. Cab., *Helicina*, p. 23, pl. iii, figs. 40-43.

This variety is decidedly larger than the typical *laciniosa*. Philipi does not mention any spiral lines. The flat whorls and the rotundate-angulate periphery bring his species very close to the typical *laciniosa*. This is probably one of the very local forms.

Philipi's measurements are: alt. 4.2, diam. 5.25 mm.

var. **dissotropis** (Ancey).

*Helicina dissotropis* Ancey, P. Malac. Soc. London, vi, 1904, p. 127, pl. vii, figs. 22, 23.

M. Ancey, in a note, says, "Surely not a variety of *H. sandwichiensis*, Souleyet, of which I have typical specimens from the Waianae Mountains, Oahu (D. D. Baldwin)." The shells distributed by Mr. Baldwin as *H. sandwichiensis* Souleyet are not this species—which equals *H. laciniosa* Migh.—but *H. oahuensis*.

In the variety *dissotropis* the shell is more compressed and flattened and the periphery is more angulated than in the typical form of *laciniosa*.

M. Ancey's measurements are: diam. 4.2, alt. 2.25, alt. apert. (oblique) almost 2 mm.

The habitat is: Oahu, Nuuanu (Thaanum).

var. **delta**, n. var.

Fig. 2.

The shell is somewhat lenticular, carinate at the periphery, striate with lines of growth, with 4-6 low and not very conspicuous spiral ridges grouped above and below the peripheral keel. Bright red, distinctly and closely marked with numerous zigzag yellowish white flammules. Spire depressed conic, apex subacute. Suture lightly impressed, margined above. Whorls  $4\frac{1}{2}$ , nearly flat, the embryonic smooth, the penultimate slightly projecting, the last flat above the carinate periphery, slightly convex below,

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not descending in front. Aperture oblique, semicircular-triangular, not contracted; outer lip with a thin edge. Callus thin, whitish about the axis, the rest transparent, minutely punctate. Operculum corneous, thin, minutely punctate.

Maj. diam. 4.4, total length 2.9 mm.

Kauai: Ekaula, below Puukapele.

Type No. 14,901, Bishop Museum.

This variety somewhat approaches *H. oahuensis*. It is, however, quite closely related to *H. laciniosa*. This is the nearest relative to *laciniosa* so far reported from the island of Kauai.

var. **gamma**, n. var.

Fig. 3.

The shell is biconic, acutely carinate at the periphery, nearly smooth, finely striate with lines of growth, without spiral lines, but distinctly impressed just above and below the peripheral keel. Color light cinnamon, nearly uniform, overlaid with a thin yellowish cuticle. Spire depressed-conic, apex subacute. Suture simple. Whorls 4, nearly flat, the embryonic nearly smooth, the second and third slightly convex, the last flat above the carinate periphery, convex below, descending slightly in front. Aperture oblique, subtriangular, not contracted; outer lip with a thin edge. Callus thick and whitish about the axis, the rest very thin and transparent, minutely punctate. Maj. diam. 5.0, total length 3.5 mm.

Oahu: Ewa (Cooke), Wahiawa (Lyman, Cooke).

Type No. 14,902, Bishop Museum.

This is one of the most distinct of the varietal forms of *laciniosa*. The relatively high spire and pronounced carination easily distinguish it from the other varieties.

var. **beta**, n. var.

Fig. 4.

The shell is globose-conic, with the periphery rotundate-angulate, nearly smooth, faintly striate with lines of growth, encircled at and immediately below the periphery with three raised, rounded keels. Color a uniform dull claret, spire slightly eroded. Spire conic, with slightly convex outlines, apex slightly obtuse. Suture

faintly impressed, simple, indistinctly margined above on the third whorl. Whorls  $4\frac{1}{2}$ , slightly convex, the embryonic slightly eroded, the last rotundate-angulate, slightly descending in front. Aperture oblique, nearly semicircular, not contracted; outer lip with a thin edge. Callus thick, minutely punctate. Operculum dull claret, minutely punctate. Maj. diam. 4.5, total length 4.0 mm.

Oahu: Kapalama (Lyman).

Type No. 14,903, Bishop Museum.

This variety differs not only in size and in its relative proportions, but also in its dull claret color which has not been observed in any of the other varieties of this species.

var. **alpha**, n. var.

Fig. 5.

The shell is globose-conic, with the periphery strongly angular, quite smooth, striate with lines of growth and encircled with 5-7 impressed spiral lines, the two most prominent being just above and below the peripheral keel. Color a nearly uniform light cinnamon red with a slight suffusion or spotting from incipient surface decay, sometimes broken by very indistinct lighter flammules. Spire straightly conic, apex rather acute. Suture scarcely impressed, indistinctly margined. Whorls nearly 4, almost flat, the embryonic very minutely transversely striate, the last nearly flat above the strongly angular periphery, very convex below it, slightly descending in front. Aperture oblique, subtriangular, not contracted; outer lip thin. Callus quite thick, whitish about the axis, the rest nearly transparent, minutely punctate. Operculum reddish corneous, thin, very minutely punctate. Maj. diam. 3.2, total length 2.6 mm.

Oahu: Mt. Tantalus (Cooke).

Type No. 14,904, Bishop Museum.

This variety comes nearer the true *H. laciniosa* in form and sculpture than any of the other varieties of this species mentioned herein. It differs in its higher spire and smaller size. It is intermediate between *H. laciniosa* Migh. and *H. sulculosa* Ancey.

***Helicina sulculosa* Ancey.**

*Helicina sulculosa* Ancey, P. Malac. Soc. London, vi, 1904, p. 127, pl. vii, fig. 25.

This species and *H. laciniosa* Migh. var. *alpha* are very closely related. The spire of the former is more depressed, the whorls are slightly more convex and the aperture is more rounded.

This is the only species so far reported from the island of Hawaii. M. Ancey's measurements are: diam. 3.33, alt. 2.5, alt. apert. 1.5 mm.

Hawaii: Olaa (Thaanum).

***Helicina hawaiiensis*, n. sp.**

Fig. 6.

The shell is depressed with a conical spire, periphery rounded, quite thin, nearly smooth, under a strong lens minutely striate with lines of growth and, in type specimen, with five fine raised spiral striæ, two above, one encircling and two below the periphery. Color a dull yellowish green interspersed with a few irregular light reddish flammules above. Apex somewhat acute. Suture simple, well impressed. Whorls  $3\frac{2}{3}$ , convex, the embryonic minutely striate, the last rounded with the base somewhat flattened, slightly descending in front. Aperture elongate-semicircular, not contracted; outer lip thin. Callus small, thin, transparent, minutely granulate. Operculum whitish, thin, granulate. Maj. diameter 5.5, total length 3.7 mm.

Oahu.

Type No. 58,384, Phil. Ac. Nat. Sci.

This species approaches *H. knudseni* in form. Its larger size, the absence of forwardly descending wrinkles and the presence of raised spiral lines enable it to be easily distinguished from the Kauaian species. Its closest relative is *H. rotelloidea* Migh. The two differ considerably in size, color pattern, etc.

***Helicina knudseni*, n. sp.**

Fig. 7.

The shell is depressed with a conic spire, the periphery rounded, quite thin, nearly smooth, minutely striate with lines of growth, under a strong lens these are intersected, almost at right



angles, by very fine, close, forwardly-descending wrinkles. Color light brownish-red, darker on the spire, interspersed with irregular, zigzag yellowish white flammules forming spots on the periphery, and absent on the base except close to the callus. Apex somewhat obtuse. Suture simple, well impressed. Whorls about  $3\frac{3}{4}$ , quite convex, slightly projecting above the suture, the embryonic nearly smooth, the last somewhat flattened above and below the rounded periphery, not descending in front. Aperture nearly semicircular; outer lip thin. Callus whitish about the axis, the rest transparent, thin, granular. Operculum punctate, of a light cinnamon color. Maj. diam. 4.9, total length 3.6 mm.

Kauai: Olokele (type loc.), Waiakoali (Cooke).

Type No. 14,905, Bishop Museum.

This species has nearly the same form as *H. rotelloidea* Migh. It is easily distinguished by its larger size, the absence of spiral striæ, and the peculiar sculpture of the forwardly descending wrinkles over the growth lines.

#### ***Helicina kauaiensis*, n. sp.**

Fig. 8.

The shell is subglobose-conic, with the periphery well rounded, quite thin, nearly smooth, under a lens minutely striate with lines of growth, with several (in the type specimen about eight) widely spaced, thin, raised spiral cuticular striæ, three above, one on, and the rest below the periphery, the upper striæ extended on the spire nearly to the embryonic whorls. Color orange-red, with distinct light yellow flammules at and above the periphery. Spire convexly conical, with the apex slightly acute. Suture simple, well impressed. Whorls  $3\frac{3}{4}$ , distinctly convex, under a lens the embryonic whorls are transversely striate, the last rounded, not descending in front. Aperture slightly oblique, semicircular, not contracted; outer lip thin. Callus slightly whitish about the axis, the rest very thin, transparent, very minutely punctate. Maj. diam. 3.2, total length 2.4 mm.

Kauai: The upper part of Milolii (Cooke).

Type No. 14,906, Bishop Museum.

This species recalls *H. rotelloidea* Migh., in form. It is slightly larger, darker colored, with more distinct flammules, higher spire, and is also distinctly marked with spiral cuticular striæ.

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***Helicina rotelloidea* Migh.**

Fig. 9.

*Helicina rotelloidea* Mighels, Proc. Bost. Soc., ii, 1845, p. 19.

The shell is depressed, with a low conoidal spire and a well rounded periphery, thin, nearly smooth, dull, under a lens showing minute lines of growth and two or three faint spiral lines above the periphery. Color a uniform dull cinnamon more reddish on the spire (sometimes of a uniform light greenish yellow). Spire convexly conoidal, apex subacute. Suture simple, well impressed. Whorls  $3\frac{2}{3}$ , distinctly convex, at first slowly and regularly then rapidly increasing, the last wide, well rounded, convex below the periphery, hardly descending in front. Aperture quite oblique, semicircular, not contracted; outer lip thin. Callus thin, becoming thick and whitish about the axis, the outer portion transparent, of the color of the shell, very minutely punctate. Operculum very thin, whitish, minutely punctate. Maj. diam. 3.0, total length 2.0 mm.

Oahu: Nuuanu (Cooke). This species is sometimes terrestrial in habitat. It is usually found on growing plants two or three feet above the ground.

Type of the above description, No. 14,907, Bishop Museum.

Mighels' type is probably lost. Unfortunately the species is insufficiently described and there are no figures of authentic specimens of this species. Pfeiffer's figures (Conch. Cab., *Helicina*, pl. iii, figs. 40-43) undoubtedly refer to *H. bronniiana* Phil. Mighels' measurements (2.5-5.8 mm.) include at least two species, the smaller of which has been chosen to represent the species.

The specimen selected differs from his description in the absence of "obscure light spots." These are, however, found in other specimens from another part of Nuuanu Valley.

*H. rotelloidea* is characterized by its small size, convex whorls and rounded periphery.

***Helicina nuuanuensis*, n. sp.**

Fig. 10.

The shell is subglobose conic, slightly angular at the periphery, thin, nearly smooth, minutely transversely striate and with four or five fine raised spiral striæ, of which two are above, the

rest below, the slightly angular periphery. Color of a uniform greenish yellow or cinnamon brown. Spire conoidal, apex obtuse. Suture simple, well impressed. Whorls  $3\frac{3}{4}$ , flatly convex, slowly and regularly increasing, the last flattened and sloping above the slightly angular periphery and very convex below it, gradually descending in front. Aperture oblique, semicircular, not contracted; outer lip thin. Callus thick and white near the axis, the rest very thin, of the same color as the shell, minutely punctate. Operculum very thin, of the same color as the shell and minutely punctate. Maj. diam. 2.9, total length 2.5 mm.

Oahu: Nuuanu, upper part (Cooke).

Type No. 14,908, Bishop Museum.

*Nuuanuensis* is easily distinguished from the other Hawaiian species. In size it approaches *H. rotelloidea* Migh., but differs by its higher spire, less convex whorls, the last of which is flattened above the inconspicuous peripheral angle. It is apparently most nearly related to *H. laciniosa* Migh.

### ***Helicina berniceia*, n. sp.**

Fig. 11.

The shell is globosely depressed, with a rounded periphery, quite thin, smooth, minutely marked with growth-striae. The spire is rather high, with convex outlines and a slightly conoidal summit. Suture simple, slightly impressed. Whorls 4, very slightly convex, regularly increasing, the last rounded, slightly flattened below, hardly descending in front. Aperture oblique, semicircular, not contracted; outer lip thin. Callus thin, smooth. Operculum wanting. Maj. diam. 3.5, total length 3.1 mm.

Kauai: Limahuli, fossil (Judd, Cooke).

Type No. 14,909, Bishop Museum.

This species is somewhat related to *H. laciniosa* Migh., though it lacks the spiral lines and the angular periphery. Its nearest relative appears to be *H. nuuanuensis*, from Oahu. From this species it differs slightly in size, in the convexity of the spire and whorls, and the lack of spiral lines. At present this species is only known in its fossil state.

This species is dedicated to Bernice Pauahi Bishop, in whose memory the Museum, which bears her name, was founded.

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***Helicina lymaniana*, n. sp.**

Fig. 12.

The shell is semiglobose, with the periphery rounded, quite thin, nearly smooth, not polished, minutely striate with lines of growth and with a few slightly raised longitudinal striæ on the last whorl. Color a pale dull red under a yellowish cuticle. Spire very convex. Suture well impressed, simple. Whorls about 4, slightly convex, regularly increasing, the last slowly but rather deeply descending in front, well rounded. Aperture contracted, very oblique, small, semicircular; outer lip slightly thickened, minutely duplicate above. Callus whitish, reddish towards the outer edge, thick, minutely punctate. Operculum wanting. Maj. diam. 3.0, total length 3.0 mm.

Oahu: Waialua (Lyman).

Type No. 14,910, Bishop Museum.

Another form from Waihiawa, Oahu, though slightly larger, undoubtedly belongs to this species.

*Lymaniana* is somewhat related to *H. uberta* Gld. Its smaller size and more globose form easily separate it from Gould's species.

***Helicina juddii*, n. sp.**

Fig. 13.

The shell is semiglobose, with a flattened base and a rounded periphery, solid, nearly smooth, but under a lens fine growth-lines are seen intersected at right angles by fine, close, forwardly descending wrinkles. Spire elevated, with convex outlines. Suture simple, well impressed. Whorls  $4\frac{3}{4}$ , slightly convex, the last rather abruptly descending in front, rounded at the periphery and above, flattened below. Aperture contracted, semicircular, very oblique; outer lip thickened within, though thin at the edge, duplicate above the periphery. Callus very thick, smooth. Operculum wanting. Maj. diam. 4.8, total length 4.6 mm.

Kauai: Koloa beach, in a fossil state (Judd).

Type No. 14,898, Bishop Museum.

This species is easily recognized by its semiglobose form, flattened base, large size and by the minute corrugation of its sur-

face. It is only known, at present, from bleached specimens found on the Koloa beach.

So far this is the only representative of the group related to *H. uberta* from the island of Kauai.

***Helicina uberta* Gould.**

*Helicina uberta* Gould, Proc. Bost. Soc., ii, 1847, p. 202. *Helicina uberta* Gould, U. S. Exp. Exp., Moll., p. 94, pl. vii, fig. 114.

Gould reported the habitat to be Maui and Oahu. The only locality from which typical forms are collected at present is in the Waianae mountains. Specimens from back of Leilehua, in the Waianae mountains, agree very closely with the type shell (No. 5516, Smithsonian Institution).

var. ***magdalenæ*** (Ancey).

Fig. 14.

*Helicina magdalenæ* Ancey, Bull. Soc. Malac. France, vii, 1890, p. 342.

The variety is only found on the Pauoa side of Mt. Tantalus. No representatives of the typical form or of the variety have been reported, so far, from the region between the Waianæ mountains and Mt. Tantalus.

The variety differs from the typical form in size, and in the former there is usually an impressed spiral line just below the periphery. A shell of the type form measures: maj. diam. 4.5, total length 3.8 mm.

The variety is from 4.9-5.6 mm. in diameter, while the total length is from 3.3-4.0 mm. The variety is usually of a redder color. Both the variety and the typical form are characterized by a thick, pinkish parietal callus.

***Helicina baldwini* Ancey.**

*Helicina baldwini* Ancey, P. Malac. Soc. London, vi, 1904, p. 126, pl. vii, fig. 24.

This is the largest species so far reported from the Hawaiian Islands. It is chiefly characterized by its relative large size, depressed conical form which is angular at the periphery, and

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by several faint impressed spiral lines, above, on and below the periphery. M. Ancey's type measured: maj. diam. 6.0, alt. 4.0 mm. A rather large specimen from the type locality measures: maj. diam. 7.6, total length 4.8 mm.

The species has only been reported from Kipu, Kauai.

*Presented August 23, 1907.*