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New Species of Land Snails of the Genus *Partula* from Raiatea, Society Islands

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In the course of field work during the calendar summers of 1908 and 1909, the species here described and figured for the first time were collected by the present writer in their several areas of habitation in Raiatea. For cogent reasons, they are now established in the record in advance of the publication of the full volume on the entire *Partula* fauna of the island. In all cases the figured holotypes and other shells are in the Crampton collection, now in the American Museum of Natural History.

Nine of the species are new discoveries. The case of the tenth is otherwise. Garrett collected its first representatives many decades ago, and he gave them a manuscript name without a description or a figure. He also allied them to another species from which they are unquestionably distinct. Under these circumstances, his early provisional name cannot be used; it is now superseded by an equally appropriate designation, with a description and a figure which serve to establish this form as an authentic species.

Raiatea is the second largest of the 15 members of the Society Islands, located in southeastern Polynesia. It is irregularly sagittate in form (fig. 1). Its area is about 60 square miles, which is approximately one-sixth of that of the largest and better known island of Tahiti, 112 miles to the southeast. As are Tahiti and the smaller islands of Moorea, Huahine, Tahaa, and Borabora, Raiatea is composed of ancient volcanic material which has undergone more or less erosion and degradation. The nine remaining lesser islands of the archipelago are not inhabited by species of *Partula,* because they are either low atolls or small volcanic islands the ecological conditions of which are prohibitive.

The *Partula* fauna of Raiatea is outstanding in importance on account of the large number of species that inhabit this one island. Garrett's classical monograph on the land snails of the Society Islands (1884) deals with 20 species and three "varieties," or subspecies. Pilsbry's standard volume (1910) describes and figures 18 species and five subspecies. In the present writer's opinion, the Partulae known by 1910 number at least 23 forms entitled to full status. Recently three additional new species have been added (Crampton and Cooke, 1953). The nine entirely novel species described in the present communication bring the total to 35. This figure is approximately equal to the total number of species of *Partula* that are known to exist on the other "high" islands of the Society group—Tahiti, Moorea, Huahine, Tahaa, and Borabora. According to present records, the species of *Partula* the island homes of which are distributed throughout all of the rest of Oceania for a distance of more than 4000 miles are nearly equal in numbers to the total of the Society Island population. Hence it follows that the single island of Raiatea is the home of about one-quarter of the known species of the entire genus.

Partula cedista, new species

Figure 2A

Shell dextral, fusiform-conic, and solid. Whorls five. Spire elongate-conic, with relatively flat whorls which become slightly convex as they enlarge. Suture margined with a white line; the subsutural area is distinctly impressed on the last half of the body whorl. Umbilicus small, rimate, and reduced by a reflexed fold of the columella. Columella vertical, with a weak tubercle. Aperture vertical, incompletely divided into a larger lower part and a smaller upper part by a well-developed parietal tooth and a large, broad, labial tooth. Peristome thick and outwardly expanded, strongly incrassated within the larger division of the aperture, narrowed towards the outer insertion. The lip bears a distinct carina along its entire length, except on the inner terminal segment. The outer insertion of the lip is thick and straight at its contact with the body whorl; the inner insertion is broad and flaring. Parietal callus smooth and shining, with a flatly arched outer border. Color dull gray-white, earlier whorls tinged with light fawn. Under the lens, irregular relics of a pale fawn epidermis are visible. No revolving sculpture and no incremental striations.

MEASUREMENTS OF HOLOTYPE: Shell length, 20.8 mm.; shell width, 12.5 mm.; shell proportions, 60.5 per cent; aperture length, 12.0 mm.;

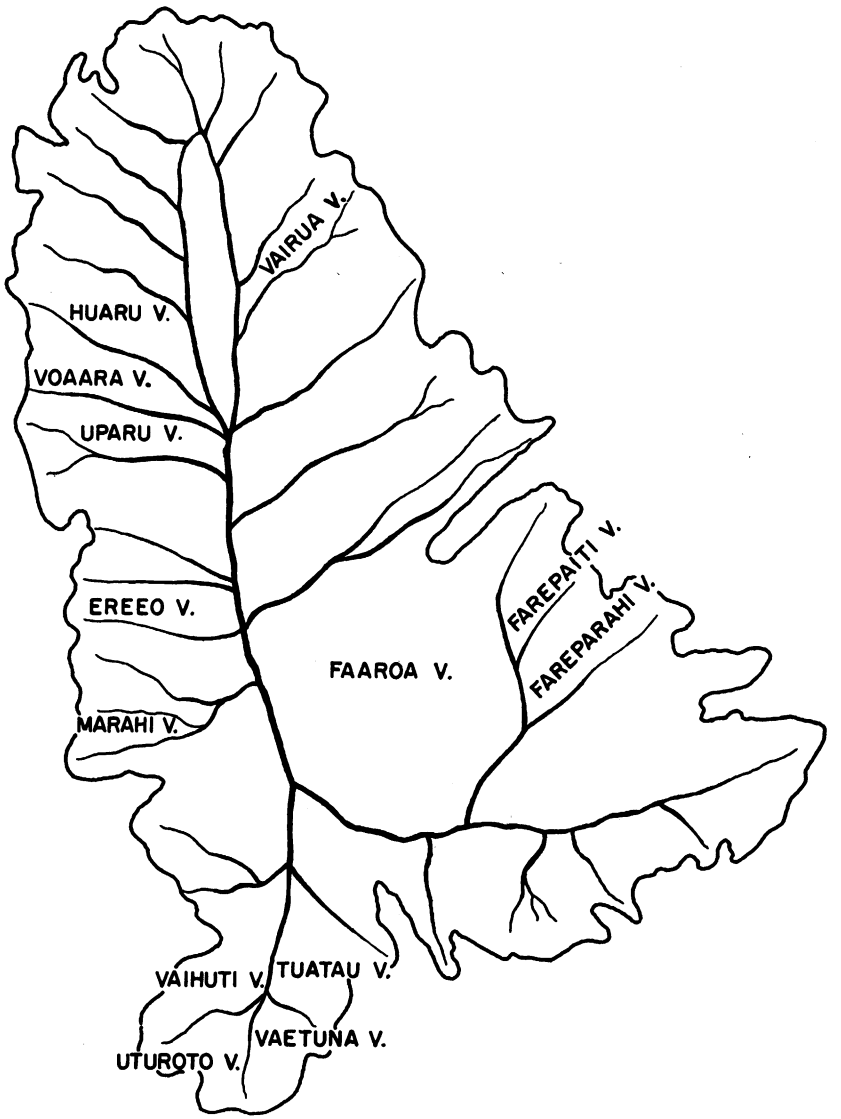

FIG. 1. Map of Raiatea, Society Islands, showing the locations of valleys mentioned in text.

aperture width, 9.0 mm.; aperture proportions, 75.5 per cent; proportion of aperture length to shell length, 57.5 per cent.

HABITAT: Vairua Valley, Raiatea, Society Islands; altitude 450 feet. Arboreal.

The structural characters of the solitary shell of *P. cedista* clearly

demonstrate its affiliation with a number of other species of Raiatea of undoubted common ancestry which are combined to form the "*dentifera* group." It is equally certain that this shell cannot be regarded as a variant of any other species. It was found in the narrow and rugged valley of Vairua which is far north on the eastern side of Raiatea. Immediately south is the larger valley of Hamoa, which is the sole habitat of an allied species, *P. callifera.* The titular species of the group, *P. dentifera,* exists in the Vairahi and Averarahi valleys, immediately to the south of the territory of *P. callifera.*

The shell of *P. cedista,* as compared with that of its southern neighbor, *P. callifera,* is larger and more slender, and its umbilicus is rimate instead of open. The dull gray-white color is markedly different from the purer white of the shells of *P. callifera.* In contrast with the more remote *P. dentifera, P. cedista* is larger and stouter, its columella is not contorted, and the details of its spire and upper whorls are distinctive. Finally, the drab color of *P. cedista* is sharply contrasted with the straw-yellow pigmentation of the more prevalent southern species, *P. dentifera.*

Partula candida, new species

Figure 2B

Shell dextral, oblong-conic, and imperforate. Spire elongate-conic. Whorls five, slightly but definitely convex; last whorl moderately inflated towards the base and not at its middle. Suture not impressed, or vaguely impressed at the terminus of the body whorl, and margined with a very thin white line. Columella vertical, expanded within, and folding outwardly over the umbilicus.

Aperture vertical, narrowly oblong and auriculate. Peristome thickened, somewhat flaring outwardly, and with a prominent tubercle that renders the aperture markedly auriform; the axis of the lesser element of the aperture is more inclined than in *P. dentifera.* The lip bears a well-developed carina that begins at the inner border of the outer insertion and continues to the outer edge of the broadened columellar insertion. A thin and shining callus spreads between the two insertions, with a distinct and very narrow marginal accentuation; the outer border is arcuate.

Shell completely devoid of epidermis, white, and somewhat shining. Apex white, or faintly tinged with pale fawn color. Lines of incremental growth and spiral sulci very weak.

Average Measurements (73 Shells): Shell length, 19.78 mm.; shell width, 11.87 mm.; shell proportions, 59.76 per cent; aperture length, 11.35 mm.; aperture width, 7.98 mm.; aperture proportions, 70.30 per cent; proportions of aperture length to shell length, 57.31 per cent.

HABITAT: Farepaiti, Fareparahi, and Maufenua areas, in the southeastern part of Raiatea, Society Islands. Arboreal.

The compact headquarters of *P. candida* comprises the two small valleys of Farepaiti and Fareparahi, which lie immediately to the east of the extensive ancient crater valley of Faaroa (fig. 1). Fewer numbers of the animals were also found just across the inner bounding ridge of these valleys, in what is actually Faaroa Valley itself, but none were found at lower levels in the last-named valley. The total number of adult shells available for description is 89, of which 73 are perfect and measurable.

Like *P. cedista* in the north, this species is obviously closely affiliated with *P. dentifera,* which it resembles in such major features as the general form of the shell, the carinated peristome, and the keyhole aperture. In other qualities, however, the shells are consistently different. They are pure white owing to the absence of pigmented cuticle such as *P. dentifera* possesses. They are also longer, wider, and stouter, with biometric differences that are conclusively large. The columella is vertical, not folded within, and it is devoid of a notch. The whorls are five in number, while *P. dentifera* possesses five and a half whorls.

It is apparent that Garrett did not explore the Farepa region where *P. candida* exists, as he could not have failed to find this species had he done so. Garrett (1884) specifically states that *P. dentifera* does not occur outside the Vairahi-Averarahi territory to the north, and hence there is no possibility that he did discover some animals of this species which he supposed to be *P. dentifera.* Furthermore, no representatives of *P. candida* have been found in collections attributed by Garrett to Raiatea, and there is no entry in Garrett's chart, published by Hartman (1881), which could possibly apply to *P. candida.*

Partula remota, new species

Figure 2C, D

Shell dextral, globose-ovate, solid, and umbilicate. Whorls five. Spire stoutly conical, with convex whorls and obtuse apex; last whorl tumose. Suture impressed, margined with a narrow white line excepting on the apex. Columella vertical, broad, and simple. Surface generally smooth, with only weak lines of incremental growth, and with fine spiral incised lines that are more or less obsolete on the middle of the last whorl.

Aperture vertical. Peristome wide and thick, inwardly heavily incrassated, and somewhat beveled, with a well-developed carina that traverses the entire curvature. The parietal callus is thin and shining, with a weakly accentuated border. The parietal tooth is invariably present.

Color uniformly corneous fawn throughout, or with pale rose-brown suffusion on the whorls of the spire. The apex is never deeply colored,

and spiral bands are absent. Peristome pure white and shining.

AVERAGE MEASUREMENTS (93 Shells): Shell length, 17.49 mm.; shell width, 12.35 mm.; shell proportions, 70.64 per cent; aperture length, 10.01 mm.; aperture width, 8.60 mm.; aperture proportions, 86.08 per cent; proportions of aperture length to shell length, 57.14 per cent.

HABITAT: Tuatau, Vaetuna, Uturoto, and Vaihuti valleys, in the extreme southwestern portion of Raiatea, Society Islands. Arboreal.

This well-distinguished arboreal *Partula* is one of the most notable discoveries of the present research. The shells are consistently alike in their distinctive qualities which combine to render this form unique within its genus. The compact area of habitation comprises four small valleys at the extreme southern limit of Raiatea (fig. 1). Of the total number of 93 adults, 76 were collected in Vaihuti Valley; fewer numbers were found in the other valleys which are not favorable for the animals, owing to their smaller size and drier nature.

The general constitution of *P. remota* is strikingly similar to that of *P. hebe* from which, however, it is clearly distinguished by its much larger size. The most obvious likenesses are the rounded form of the entire shell and the breadth and thickness of the carinated peristome. The two species are markedly different in coloration. Whereas the typical *hebe* is decorticated, *P. remota* possesses a colored cuticle throughout the whole shell, with rare exceptions where small areas are denuded or where revolving erosion of the epidermis has come about, as in the shell shown in figure 2D.

All the comments in the last paragraph on *P. candida* are equally pertinent in the case of *P. remota*. The only valid conclusion is that Garrett failed to survey the sequestered southern peninsula of Raiatea where *P. remota* exists.

Partula levilineata, new species

Figure 2E

Shell dextral, ovate-conic, and medium in texture. Umbilicus narrowly rimate. Whorls four and one-half. Suture moderately impressed, margined with a thin white line. Spire conic, apex somewhat obtuse; whorls of the spire flatly convex. Surface rough owing to the numerous lines of incremental growth. Lines of spiral sculpture not deeply incised, close on the whorls of the spire and more coarse on the larger whorls where they become evanescent.

Aperture narrowly elliptical, with vertical axis. Lip moderately developed, narrowing towards the outer insertion, incrassated within, and beveled. A weak labial ridge is present near the outer margin of the peristome. The columella is narrowly triangular; the columellar peristome

is only slightly thickened inwardly. Parietal callus present, with an accentuated border which is very little arched. Parietal tooth very small or only a trace.

Color pale yellowish corneous, with numerous transverse strigations that are variable in width and spacing. Protoconch uniformly dark brown. Peristome white.

MEASUREMENTS: Of the type: shell length, 18.8 mm.; shell width, 11.1 mm.; shell proportions, 59.0 per cent; aperture length, 9.9 mm.; aperture width, 7.2 mm.; aperture proportions, 72.7 per cent; proportions of aperture length to shell length, 52.7 per cent. Of the cotype: shell length, 17.8 mm.; shell width, 11.1 mm.; shell proportions, 62.3 per cent; aperture length, 9.7 mm.; aperture width, 7.1 mm.; aperture proportions, 73.2 per cent; proportions of aperture length to shell length, 54.5 per cent.

HABITAT: Marahi Valley, Raiatea, Society Islands. Arboreal.

Marahi Valley is situated far to the south on the western side of Raiatea (fig. 1). It is small and arid, and its *Partula* inhabitants are sparse in numbers, in contrast with the adjacent valley of Vaiaau, which is extensive and densely populated by five species of *Partula*.

Only two animals of *P. levilineata* were discovered. They differ in many respects from their more numerous arboreal associates, *P. imperforata* and *P. faba,* and their contrasts with the accompanying terrestrial species, *P. crassilabris,* are equally marked. The two shells are not exactly alike in some of their dimensional details, but they are sufficiently similar to be regarded as members of one and the same species. Their affinity is most clearly demonstrated by their similar qualities of coloration and pattern which are not duplicated in any other species of Raiatea excepting the one next to be described. The possibility that they are adolescent individuals of *P. imperforata,* which is abundant in their valley, is excluded by the fact that each of the animals contained two embryos and a single egg.

The problem of the relationships of *P. levilineata* to other species of its island is somewhat involved owing to its individual peculiarities of structure and coloration. For the present, this form is regarded as a member of the *"garretti* group," which comprises five long-known species inhabiting a series of valleys to the north, on the western side of Raiatea. This assignment is made principally on account of the similar features of the aperture, peristome, columella, and weakly developed labial carina.

Partula levistriata, new species

Figure 2F

Shell dextral, broadly ovate-conic, and moderately solid. Umbilicate. Whorls four and three-quarters. Suture slightly impressed, margined

with a white line. Spire stoutly conic, with an obtuse apex; whorls of the spire convex. Surface rough, with well-marked lines of incremental growth. Spiral sculpture fine and continuous throughout.

Aperture roundly oval, with vertical axis. Peristome well developed, not distinctly beveled, moderately incrassated, and curved inwardly towards its upper insertion. Labial carina low and continuous. Columellar peristome with a slight but definite inward thickening. Parietal callus very thin, with an arched border which is reduced mesially. Parietal tooth indicated by a very weak trace.

Color pale yellowish corneous, with numerous transverse strigations of warm brown that vary in width and spacing. Protoconch dull dark brown. Peristome white and shining.

MEASUREMENTS OF HOLOTYPE: Shell length, 17.2 mm.; shell width, 12.1 mm.; shell proportions, 70.3 per cent; aperture length, 9.9 mm.; aperture width, 8.2 mm.; aperture proportions, 82.8 per cent; aperture length divided by shell length, 57.5 per cent.

HABITAT: Ereeo Valley, Raiatea, Society Islands. Arboreal.

The smaller valley of Tehurui and the larger valley of Utuara lie between the habitat of the foregoing species and Ereeo Valley, in which the sole representative of *P. levistriata* was discovered among more than 600 animals of other species. The coloration of the shell is so much like that of *P. levilineata* as to leave no doubt that the two are closely related, but the numerous differences in structural qualities justify its separation as a valid species. The fact that the localities of these two forms are not immediately adjacent is incidental but not necessarily significant.

Like its preceding affiliate, *P. levistriata* is assigned to the *"garretti* group" of the *Partula* fauna of Raiatea and for the same specified reasons. The details of immediate concern are the structural differences between the two species in question. The shell of *P. levistriata* is shorter and broader, the last whorl is more tumose, and the umbilicus is more open. The aperture is oval, relatively broader, and only vaguely subauriculate. The lip curves inward at its outer insertion, and the labial ridge is continuous. The columellar peristome is uniform in width and not triangular at its terminus.

Partula cuneata, new species

Figure 3A

Shell dextral, elongate ovate-conic, moderately solid. Umbilicus openly rimate. Whorls five. Suture impressed, not margined with a white line. Spire conic, with somewhat pointed apex; smallest whorls convex, penultimate whorl less rounded. Surface smooth and shining, with weak

and intermittent lines of growth. Spiral sculpture absent on the apex, weak on the apical whorls, weak on the upper third of the penultimate and last whorls, evanescent elsewhere.

Aperture unusually small, roundly elliptical, with vertical axis. Lip well developed, calloused within, and uniform in width to the outer terminus; hence the aperture is not subauriculate. The labial carina is present as an uninterrupted ridge, within which the peristome is definitely beveled. The columella is only slightly widened. The columellar peristome is not thickened, and it bears a shallow notch close to the inner insertion. Parietal callus exceedingly thin, with a very weak and slightly arched border. Parietal tooth little more than a trace.

The general color of the shell is pale cream-corneous, devoid of transverse strigations of dark color. The first two whorls are uniform purple-brown, while the third whorl is bicolored owing to the disappearance of the deep color below the suture and the continuation of the deep color on the lower half of the whorl. The deeply colored spiral diminishes in width as it continues onto the fourth whorl, until it vanishes at the beginning of the last whorl. The lip is white and shining.

MEASUREMENTS OF HOLOTYPE: Shell length, 17.3 mm.; shell width, 10.2 mm.; shell proportions, 58.5 per cent; aperture length, 8.7 mm.; aperture width, 6.8 mm.; aperture proportions, 78.2 per cent; aperture length divided by shell length, 50.3 per cent.

HABITAT: Ereeo Valley, Raiatea, Society Islands. Arboreal.

The unique and distinctive nature of the sole example of *P. cuneata* is emphasized by its contrasts with the five other species of *Partula* which inhabit the same valley of Ereeo. The revolving bicolored pattern of the middle whorls of the spire is not duplicated in any other shell of another species dwelling in this valley or elsewhere in Raiatea, and by itself this character is sufficient to justify the primary and independent status accorded to *P. cuneata.* Structural features of equal significance are the general form of the whole shell, the small size of the aperture, and the brevity of the main axis of the aperture in relation to the length of the entire shell. The exiguous parietal callus and the abrupt inward bend of the outer terminus of the lip are also noteworthy.

The animal was gravid and contained two embryos together with one egg of conventional nature. The embryonic shells were very light in tint, and they exhibited no indication of the future dark color of an adult protoconch or of a contrasting spiral helix.

Like the preceding species of very different character, *P. cuneata* is regarded as a member of the "*garretti* group" which from an earlier common ancestor has proceeded along different lines from those of its fellows in Ereeo Valley and in other areas of Raiatea.

Partula leptochila, new species

Figure 3B

Shell dextral, ovate-conic, moderately thick in texture. Whorls five to five and one-half. Spire stoutly conic, with moderately convex whorls. The surface is rough owing to the coarse and irregularly spaced lines of growth. Spiral sculpture fine and clear on the upper whorls, becoming more or less obsolete on the body whorl excepting on the subsutural and basal areas.

Aperture usually oblong-ovate, but variable. Peristome reflexed, somewhat flaring, calloused within, beveled more or less, and narrowed towards the outer insertion. The outer border of the inner portion of the peristome is straight and inclined from the vertical to some degree. The columella widens towards its junction with the body whorl; the sulcus at the line of contact is horizontal or only slightly inclined. Parietal callus very thin and shining; the median portion of the callus itself and its slightly arched border are usually more tenuous. There is no parietal tooth.

There are three distinguishable types of coloration: (1) buff ground color with numerous variously spaced brown strigations, and an apex of the same color; (2) dull brown, varying from nutria to dark seal brown, with purple apex; and (3) general color brown with a median revolving zone of lighter color, which is vaguely bordered and variable in width, and with brown or purple-brown apical whorls.

AVERAGE MEASUREMENTS: Shell length, 19.47 mm.; shell width, 12.38 mm.; shell proportions, 64.10 per cent; aperture length, 10.45 mm.; aperture width, 7.97 mm.; aperture proportions, 75.35 per cent; proportions of aperture length to shell length, 54.20 per cent.

HABITAT: Upper portion of Huaru and Voaara valleys, Raiatea, Society Islands. Mainly terrestrial.

The headquarters of *P. leptochila,* Huaru Valley (fig. 1), lies well to the north on the western side of Raiatea. Forty-one adults and three adolescents were personally collected at levels from 200 feet to 400 feet of altitude. One "dead" shell of this species was found in the highest portion of Voaara Valley, which adjoins Huara Valley on the south.

It is strange that no shells of *P. leptochila* are to be found in the collections of *Partula* throughout the world. Garrett, during his many years of residence in the Society Islands, certainly explored Huaru Valley in which he correctly locates *P. faba* and *P. thalia,* both in the text of his monograph (1884) and in his chart published by Hartman (1881). Presumably he was content with his collections from the lower and middle

part of this region and failed to reach the higher inner slopes where *P. leptochila* exists.

The critical characters are those which demonstrate the relationship of this species to other forms that collectively constitute the *"lugubris* group" of the *Partula* fauna of the island. The characters in question are the general form of the shell, the shape of the aperture, the relatively thin texture of the flaring and beveled peristome, the breadth of the columellar base, and the complete absence of the parietal tooth. The titular species of the group, and its close relative, *P. ovalis,* inhabitat valleys to the south. The central plateau of Temehani, which is not far to the north of Huara Valley, is the habitat of the two remaining species of the group, *P. dolorosa* and *P. labrusca;* these have been described only recently (Crampton and Cooke, 1953).

More than 90 per cent of the adult animals were gravid; altogether they contained 70 embryos and 68 eggs. Although the embryonic shells were only lightly tinged with color, they were readily assorted into light brown and medium brown classes. The pigmentation of the shells was uniform; hence it is obvious that the deep colors and the patterns of the adult shells develop only during the later stages of growth.

Partula dolichostoma, new species

Figure 3C

Shell dextral, ovate-conic, and solid in texture. Whorls five. Spire stoutly conic, with flatly convex whorls; suture slightly impressed. Surface dull and somewhat rough, with narrow and irregularly spaced lines of growth. Foveae absent on the protoconch; weak incised spiral sculpture present only on the last whorl where the lines are interrupted and variously spaced. Columella virtually uniform in breadth and devoid of a notch.

Aperture narrow and almost perfectly elliptical, with the axis slightly inclined from the vertical. Peristome moderately reflexed, incrassated inwardly, and with simple insertions. A narrow and low carina traverses the entire curvature of the peristome, and it continues without interruption over the paries between the insertions of the lip, just within the border of the parietal callus. The callus itself is thin and shining, with a nearly straight border that is thickened only near the termini. No parietal tooth.

The color of the protoconch is deep purple-brown, which grades into deep brown on the second whorl and to less intense brown on the third whorl. The penultimate and the fifth whorl are transversely marked with

warm chestnut-brown and lighter fuscous strigations that vary considerably in width and spacing.

MEASUREMENTS OF HOLOTYPE: Shell length, 19.5 mm.; shell width, 12.8 mm.; shell proportions, 65.6 per cent; aperture length, 11.0 mm.; aperture width, 8.1 mm.; aperture proportions, 73.6 per cent; proportions of aperture length to shell, 56.4 per cent.

HABITAT: Upper portion of Huaru Valley, Raiatea, Society Islands. Arboreal.

The outstanding distinctive characters of the shell of this species are those of the aperture and peristome; their counterparts are not found in any other species of *Partula.* The narrow form and regular contour of the lip are peculiar to *P. dolichostoma,* and they are such as to preclude the possibility that this specimen is a mutant derivative of another species of Raiatea. Equally noteworthy is the unbroken continuity of the labial carina over the parietal callus. While this is a seemingly minor item, it derives its importance from the fact that a similar condition has not been found elsewhere, even in species that possess prominent peristomial ridges, such as *P. hebe* and *P. thalia.*

Owing to the unusual structural features of the shell, the problem of the affinities of *P. dolichostoma* with other species of Raiatea is difficult to solve with certainty. Considering the geographical as well as the morphological details, it seems probable that this form is to be placed in the "*robusta* group," the members of which are similar in the general form and size of the whole shell, in the presence of a ridge of lesser prominence on the lip and in the shouldered nature of the columella. *Partula robusta* itself occurs in abundance in valleys of the extreme north of Raiatea, not far from the locality of this species. Two other species of the group are yet to be described; one of these exists in the same valley of Huaru while the other inhabits the next large valley to the south, named Voaara.

Partula protracta, new species

Figure 3D

Shell dextral, moderately elongated, and solid. Whorls five and one-half. Spire prolonged, with flatly convex whorls and somewhat obtuse apex; the last whorl is not tumose. Suture impressed only on the terminal third of the body whorl. Umbilicus compressed. Surface marked with lines of incremental growth that are more prominent towards the outer peristome. The columella is vertical, broad at its base, and shouldered; the lower notch of related forms is represented by a small and shallow indentation. Parietal callus thin and lustrous; its arched border

is thickened at its junctions with the termini of the peristome. Parietal tooth small.

Aperture slightly oblique. Peristome well developed and thickened, somewhat declivous within, and narrowed towards its outer insertion so as to render the aperture subauriculate. A low but definite carina traverses the entire lip near its outer border.

The color is uniform pale whitish buff. The peristome is lightly tinged with pale buff. The apex is devoid of deeper pigmentation.

MEASUREMENTS OF HOLOTYPE: Shell length, 19.8 mm.; shell width, 11.8 mm.; shell proportions, 59.6 per cent; aperture length, 10.3 mm.; aperture width, 8.4 mm.; aperture proportions, 8.1 per cent; proportions of aperture length to shell length, 81.5 per cent.

HABITAT: Huaru Valley, Raiatea, Society Islands. Arboreal.

In 1908 a single half-grown animal was found in Huaru Valley (fig. 1) the shell of which differed markedly from shells of the other species of its valley or elsewhere. Fortunately a full-grown and perfect individual of the same kind was discovered in 1909 when a second search was made in the higher portion of the valley. The general constitution of the adult specimen is sufficiently like that of the unquestionable members of the *"robusta* group" to justify its assignment to that section of the *Partula* fauna of Raiatea.

In contrast with its affiliated forms, the shell of this species is longer and more slender. The aperture is relatively smaller, and the proportion of its main axis to that of the whole shell is distinctly less. In addition, the apex is more obtuse, the umbilicus is more narrowly rimate, and the axis of the columella is vertical and not inclined. The outer terminus of the peristome meets the body whorl at a right angle. Finally, the color is much lighter than in any of the other members of the group. These individual distinctions are sufficient to separate this type from all the related species that exist in areas either to the north or to the south of Huaru Valley.

Partula atilis, new species

Figure 3E, F

Shell dextral, stoutly ovate-conic, and solid. Umbilicus openly pyriform. Whorls five. Spire short and stout, with slightly convex whorls; the last whorl is somewhat tumose, and the apex is obtuse. Surface dull and rough owing to the numerous and coarse lines of incremental growth. The revolving incised lines are straight and well separated; they are more or less obsolete on the last whorl. Suture vaguely impressed on the body whorl and usually margined with a thread-like white line.

Aperture broadly oval and auriculate, with a vertical axis. Peristome wide, beveled, and much thickened inwardly. A carina of lesser or greater prominence extends along the entire peristome. The thick inner terminus is pressed downward over the open umbilicus. The base of the columella is widely triangular, below the innermost portion of the peristome; the latter is indented near its lowermost curvature. Parietal callus white, opaque, and well developed; its thickened and slightly arcuate border is continuous with the labial carina at its opposite ends. Parietal tooth low and broad.

The color is uniform dull ochre-brown, excepting in one case where it is deeper brown. The apex is not tinged with brown or purple-brown. No banded shells were found.

AVERAGE MEASUREMENTS (15 MEASURABLE SHELLS): Shell length, 18.27 mm.; shell width, 11.99 mm.; shell proportions, 65.70 per cent; aperture length, 10.11 mm.; aperture width, 8.23 mm.; aperture proportions, 81.30 per cent; proportions of aperture length to shell length, 55.30 per cent.

HABITAT: Uppermost portions of Voaara and Uparu valleys, Raiatea, Society Islands. Terrestrial.

Unlike all the foregoing newly discovered species, representatives of *P. atilis* have been known for some time, but hitherto they have not been described or figured. Garrett collected the first specimens during his earlier years of residence in the Society Islands and gave them the provisional manuscript name of *P. pinguis,* although at a later time he altered his view regarding their specific status. In his monograph (1884, p. 77) he writes as follows: "My *P. pinguis,* of which I have seen only a dozen examples, was found under decaying leaves in the mountain ravines, at the head of Vaioara Valley. It certainly = *rustica.*" Incidentally, the correct name of the locality is Voaara Valley (fig. 1). In his chart that shows the distribution of the species of *Partula* of Raiatea, published by Hartman (1881), Garrett correctly places this form under the name of *perpinguis*—an orthography that occurs nowhere else in his texts or in his correspondence. Hartman includes *P. pinguis* in his catalogue (1881, p. 185) and comments as follows: "The form of the aperture resembles *P. rustica,* but in size it approximates *P. thalia.* It is a terrestrial species and probably = *P. rustica.*"

Owing to the lack of a description by Garrett or anyone else, and also because the shells in question were regarded by Garrett and others as variants of *P. rustica,* it is obvious that the early manuscript name is a *nomen nudum.* The superseding name of *P. atilis* preserves the meaning of Garrett's former designation.

The collections of *P. atilis* belonging to the present writer comprise nine living animals and six dead shells from the inner portion of Garrett's area, Voaara Valley, as well as three living specimens and one dead shell from Uparu Valley that adjoins the former area on the south (fig. 1). The author's shells agree in all essential respects with the original series of Garrett's so-called *P. pinguis,* of which seven have been located and critically examined. Four specimens from Garrett's own collection are now in the Bishop Museum of Honolulu, and their authenticity is assured by the fact that they are labeled *P. pinguis* in Garrett's handwriting. Three more of the original 12 are in the Hartman collection, now deposited in the Carnegie Museum of Pittsburgh.

The shells of *P. atilis* differ so greatly from those of *P. rustica* as to preclude the possibility that the two are one and the same species. The former are larger in size and broader in shape. The spire is more stoutly conical, and the whorls are more convex, in contrast with the flattened contour of their homologues in *P. rustica.* The body whorl is more inflated. The aperture of *P. atilis* is broad instead of narrow, and it is auriculate, with an upper sinus that is disproportionately small. The lip is massive and more incrassated within; its labial carina is more distinct and prominent. Finally, a parietal tooth is present in all shells, whereas it is very small or absent in *P. rustica.*

When the topic of the affiliations of *P. atilis* with other species of Raiatea is finally considered, the judgment of the present writer is that it belongs in the so-called *"robusta* group," of which the titular species exists in abundance in the most northern portion of Raiatea and of which the other members are found in neighboring valleys.

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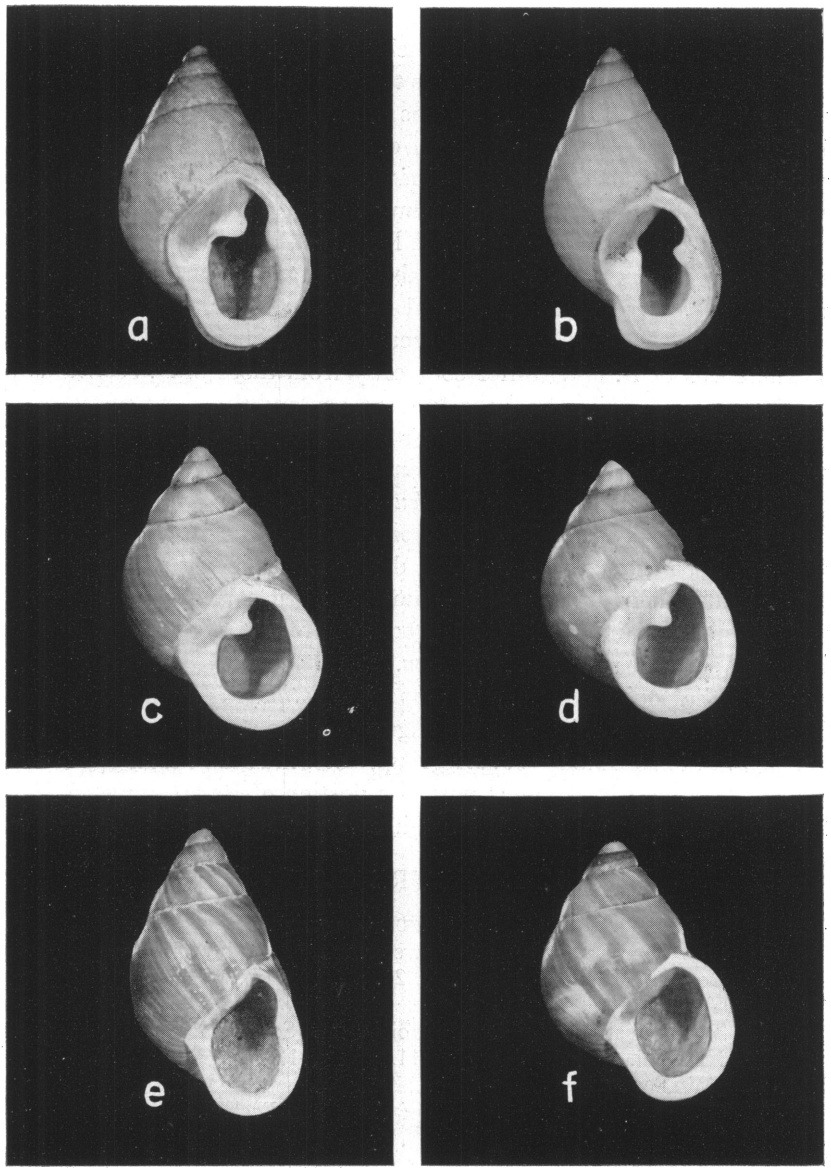

FIG. 2. New species of *Partula*. A. *P. cedista*. B. *P. candida*. C, D. *P. remota*. E. *P. levilineata*. F. *P. levistriata*. All approximately twice natural size; apertures slightly retouched.

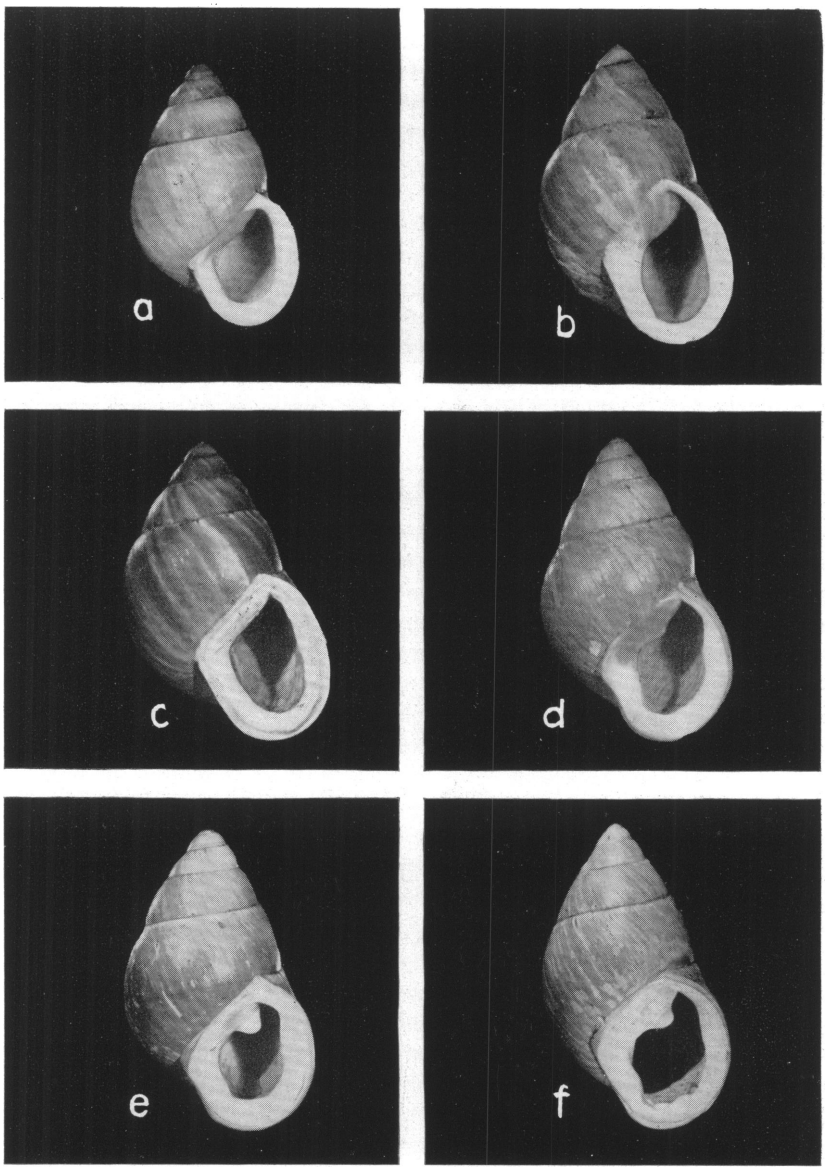

FIG. 3. New species of *Partula*. A. *P. cuneata*. B. *P. leptochila*. C. *P. dolichostoma*. D. *P. protracta*. E, F. *P. atilis*. All approximately twice natural size; apertures slightly retouched.