

OCCASIONAL PAPERS
OF
BERNICE P. BISHOP MUSEUM
HONOLULU, HAWAII

Volume XXI

July 3, 1953

Number 8

New Species of *Partula* from Southeastern Polynesia*

BY HENRY E. CRAMPTON AND C. MONTAGUE COOKE, JR.

Our kindred and long-sustained interests in the nature, distribution, and relationships of the species belonging to the genus *Partula* have led us to place on record 10 novel forms that have been found on islands of southeastern Oceania. In addition to its novelty, each of the new species is important in its individual way for the larger problem of the biological evolution of terrestrial Mollusca throughout the Pacific region; and each contributes its own items of information for the problem of geological evolution by which the islands and archipelagoes of Oceania have attained their present characteristics.

Nine of the forms now to be described were discovered by the Bishop Museum's Mangarevan Expedition of 1934,¹ conducted by the second author together with E. C. Zimmerman, Yoshio Kondo, and Donald Anderson as zoologists; one was collected by the first author in an earlier year. Six of these species were found in the Society Islands, where more than half of the known members of the genus *Partula* exist. Raivavae in the Austral, or Tubuai, Group, where *Partula hyalina* has been recorded from four islands, yielded three closely inter-related forms that are here treated as full species, although they might well be regarded as subspecies; however, their intrinsic characters and their distinctions are more important than the question of their taxonomic status. The tenth form of the list is a well-distinguished species inhabiting the outlying and solitary island of Rapa, south and east of Raivavae; this locality now marks the extreme limit in a southeasterly direction of the whole oceanic region whose islands are inhabited by *Partulae*.

* Funds for the printing of this paper were contributed by the Charles M. and Anna C. Cooke Trust.

¹ Mangarevan Expedition, publication 41.

***Partula margaritae*, new species (fig. 3, a, b).**

Shell dextral, elongate-conic, unusually solid, openly and flatly perforate. Whorls 5 to 5½, suture slightly impressed on the post-embryonic whorls, indistinctly margined. Whorls moderately convex, the last relatively tumid. Surface lustreless and roughened by lines of growth. Incised spiral lines closely crowded on the younger whorls, becoming coarser and less evident on the body-whorl excepting in the neighborhood of the umbilicus. Epidermis evanescent.

Aperture elongate, with more or less oblique axis. Lip well developed, inclined outward, evenly incrassated in general but narrowed toward the outer insertion; it is exceedingly smooth and polished. Columella straight and simple. Parietal callus thin, but with a definite upraised outer border. Parietal tooth invariably absent.

The prevalent color of adult shells is light cinnamon-brown; variants are dark cinnamon-brown or chestnut color, while a rarer type is purplish-brown. Occasional specimens are more or less distinctly bi-colored, dark on the lower half of the whorl and light above, the demarcation being more evident toward the aperture. All adult shells lack epidermis and are plainly streaked with lighter tints; their apical whorls are paler than the larger coils and they may even become pure matt-white. Young adolescent shells are invariably medium cinnamon-brown, and they are always streaked with lighter transverse lines; the diversities of adult shells are acquired during later growth. The lip is light to deep purple-brown, pale along the extreme margin. The foot of the animal is greyish-fawn, while the mantle is partly or completely dull purplish-brown in color. Egg capsule thickly impregnated with lime; its dimensions are 5.3 mm. by 4.2 mm.

Direct dimensions of the type and co-types. *a*, Bishop Mus. type no. 9982, large form (Area): length 24.5 mm., width 14.0 mm., length of aperture 14.0 mm., width of aperture 9.4 mm.; *b*, co-type Bishop Mus. no. 9981, small form (Tanga): length 19.5 mm., width 10.2 mm., length of aperture 10.1 mm., width of aperture 6.6 mm.; *c*, co-type Crampton collection, large form (Area): length 25.3 mm., width 13.5 mm., length of aperture 13.5 mm., width of aperture 9.1 mm.; *d*, co-type Crampton collection, small form (Tanga): length 19.9 mm., width 11.3 mm., length of aperture 10.6 mm., width of aperture 7.3 mm.

Habitat: Rapa (Oparo) Island, type locality Area, in the northern part of the island. The first specimens were discovered in 1921 by the late Margaret Stokes, for whom the species is named; more ample collections were obtained in 1934 by the Mangarevan Expedition of the Bishop Museum.

The unique characters and the geographical location of *Partula margaritae* give it a prominent place within its genus. Its island home lies at the extreme southeastern limit of the entire Pacific area where *Partulae* are known to exist. The large size of the shells, their solidity, and their distinctions of color and form are exceptional and noteworthy on their merits. Yet *P. margaritae* sufficiently resembles the majority of Society Island species to be regarded as an affiliate of the latter and not as a sole relic of a quasi-independent stock.

The geographical center of Rapa, or Oparo, is at $144^{\circ} 19' 30''$ west longitude and $27^{\circ} 35' 48''$ south latitude (fig. 1). Its north-south axis is about 6 miles and its east-west width is about 4 miles. It is roughly circular in outline and volcanic in nature, although greatly eroded. The walls of the ancient crater persist as an irregular series of mountains, the highest of which—Mount Perahu—rises to 2,077 feet. The circle is incomplete on the east, where a bay extends inward to the center of the island. Conditions of forestation and moisture at the higher levels are favorable for *Partulae*, which were collected from 500 to 1,800 feet of altitude. Ninety-five per cent of the animals were found on *Celtis*—a tree allied to the elms.

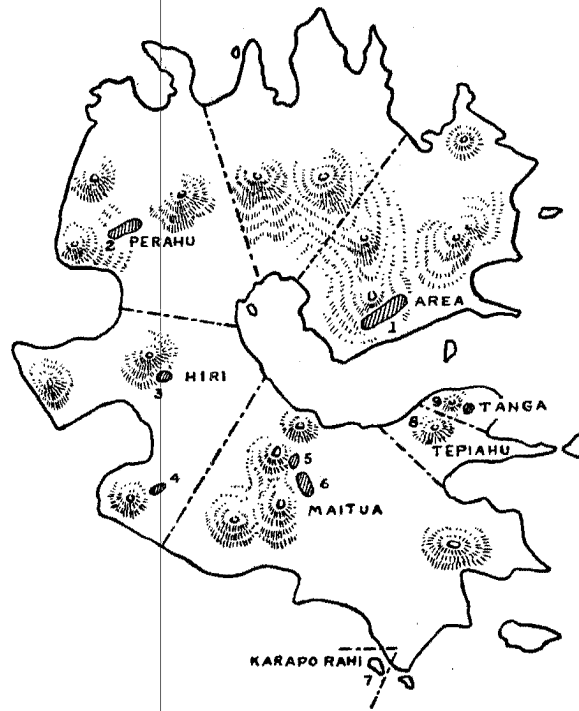


FIGURE 1.—Island of Rapa.

The first collection made by Mrs. Margaret Stokes in 1921 comprised three living and twenty-nine "dead" shells; these are disregarded in the subsequent discussion. The members of the Mangarevan Expedition of 1934 procured more than 300 individuals of all

ages from nine localities at varying distances apart, as shown in figure 1. Some "colonies" are represented by few specimens, while others yielded larger numbers; on the whole, the material is adequate for a detailed study of local diversification about the island.

As regards coloration, the statements of the formal diagnosis may suffice. The kinds and their proportionate numbers differ from colony to colony in expected ways, but a full census is unnecessary. The salient point is that the color-patterns are consistent throughout the whole island, within the limits of variation in pigmentation as recorded. Furthermore, there is no observable correlation between variations in color and structural diversities.

The major task is to survey and to compare the several colonial series on the basis of the structural characters of the shells, and also to describe the population in its entirety in precise biometric terms. For these purposes the island is arbitrarily divided into seven subordinate regions, as shown in figure 1; the exact localities where representative series of animals were collected are designated by numerals. The sections of Area (1), Perahu (2), Hiri (3 and 4), and Maitua (5 and 6) are large in extent, but only in the first-named are the numbers of specimens satisfactorily ample. Karapo Rahi (7) is a small islet off the southern coast, but it is important because of its isolation. The adjacent sections of Tepiahu (8) and Tanga (9) are not extensive, but the former is far enough from the Maitua localities of collection to require separate treatment, while the equally small Tanga section must be considered independently because the majority of its shells are markedly dwarfed in stature and otherwise aberrant in many details of structure. Fortunately, the series from Tanga is large enough to provide reliable statistics for its comparison with all others.

The comprehensive statistical description of the measurable shells is given in table 1. The data for the entire population possess certain statistical values, mainly for the comparison of *Partula margaritae* with other species of the genus existing elsewhere. The extent to which each and every character varies is evident from the figures for the ranges and the mean values, which also demonstrate that all of the colonies are substantially alike excepting the series from Tanga; the latter is far different from all others, even from the colony of nearby Tepiahu—only one-fifth of a mile away. In view of the small numbers

Table 1. *Partula margaritae*, statistical description

RANGE (CLASS VALUES)								
Region	No.	Shell			Aperture			Length aperture ÷ length
		Length	Width	Proportions	Length	Width	Proportions	
		mm.	mm.	per cent	mm.	mm.	per cent	
Area (1).....	95	21.65 - 25.85	12.3 - 14.5	52.5 - 60.5	11.5 - 14.1	7.9 - 9.9	66.5 - 78.5	48.5 - 58.5
Perahu (2).....	11	21.95 - 24.65	12.5 - 13.9	54.5 - 60.5	11.7 - 13.3	8.1 - 9.1	67.5 - 71.5	52.5 - 56.5
Hiri (3,4).....	4	21.35 - 23.15	11.9 - 12.7	53.5 - 57.5	11.1 - 11.9	8.1 - 8.3	68.5 - 73.5	51.5 - 53.5
Maitua (5,6).....	19	21.35 - 24.35	12.3 - 13.9	55.5 - 61.5	11.5 - 12.9	7.9 - 9.1	65.5 - 75.5	49.5 - 55.5
Karapo Rahi (7).....	10	21.05 - 23.15	11.3 - 12.9	53.5 - 57.5	10.5 - 12.1	7.5 - 8.5	68.5 - 73.5	50.5 - 53.5
Tepiahu (8).....	9	21.95 - 24.95	12.3 - 13.7	53.5 - 57.5	11.3 - 12.3	7.9 - 8.7	68.5 - 72.5	48.5 - 53.5
Tanga (9).....	97	18.95 - 24.35	10.3 - 14.3	51.5 - 59.5	9.7 - 12.5	6.5 - 8.9	62.5 - 73.5	48.5 - 55.5
All.....	245	18.95 - 25.85	10.3 - 14.5	51.5 - 61.5	9.7 - 14.1	6.5 - 9.9	62.5 - 78.5	48.5 - 58.5

MEAN VALUE								
Area (1).....	95	23.257 ± 0.058	13.460 ± 0.035	56.658 ± 0.117	12.574 ± 0.034	8.906 ± 0.025	70.858 ± 0.151	53.121 ± 0.111
Perahu (2).....	11	23.341 ± 0.159	13.173 ± 0.095	56.318 ± 0.356	12.609 ± 0.089	8.773 ± 0.058	69.409 ± 0.280	53.954 ± 0.235
Hiri (3,4).....	4	22.175 ± 0.219	12.300 ± 0.095	55.500 ± 0.476	11.650 ± 0.110	8.250 ± 0.029	70.500 ± 0.631	52.500 ± 0.238
Maitua (5,6).....	19	22.787 ± 0.138	13.068 ± 0.079	57.131 ± 0.267	12.247 ± 0.067	8.626 ± 0.045	71.079 ± 0.359	53.500 ± 0.227
Karapo Rahi (7).....	10	22.380 ± 0.138	12.160 ± 0.089	54.900 ± 0.256	11.520 ± 0.084	8.100 ± 0.060	70.300 ± 0.327	52.000 ± 0.257
Tepiahu (8).....	9	23.316 ± 0.215	13.011 ± 0.102	55.611 ± 0.269	11.789 ± 0.060	8.233 ± 0.056	69.833 ± 0.300	50.500 ± 0.300
Tanga (9).....	97	20.768 ± 0.028	11.673 ± 0.051	55.964 ± 0.100	10.856 ± 0.039	7.472 ± 0.033	68.170 ± 0.142	52.304 ± 0.091
All.....	245	22.315 ± 0.076	12.612 ± 0.044	56.275 ± 0.071	11.784 ± 0.041	8.225 ± 0.034	69.680 ± 0.102	52.712 ± 0.069

from most of the regions, the progressive colonial differences, in a geographical order, need not be recorded in full; it will suffice to contrast the two larger series from Area and Tanga, which are located at opposite extremes of an insular arc. The second column of table 2 gives the actual numerical differences of all characters and their probable errors; the sign is uniformly minus. The third column indicates the relations of these differences to their probable errors. As a value of three times the error means virtual certainty of significance, the higher figures for all characters prove beyond question that the Tanga colony is individually unique.

Table 2

CHARACTER	TANGA COMPARED WITH AREA	DIFFERENCE	ERROR
Shell, length, mm.	-2.489 ± 0.064	> 38	times
width, mm.	-1.787 ± 0.068	> 26	"
proportions, per cent.	-0.694 ± 0.154	> 4	"
Aperture, length, mm.	-1.716 ± 0.052	> 33	"
width, mm.	-1.434 ± 0.041	> 34	"
proportions, per cent.	-2.688 ± 0.208	> 12	"
Aperture length ÷ shell length, proportions, per cent.	-0.817 ± 0.144	> 5	"

The Tanga shells prove to differ distinctly from those of Area in characters other than size and proportions. While three specimens of the former resemble the prevalent larger type, in the majority of the shells the aperture is openly pyriform, the lip is more tenuous and less expanded, and the columella is excavated. Were it not for its agreement in coloration, which is generally consistent throughout the island, varying within narrow limits, the Tanga type might be regarded as a true subspecies. But it will be sufficient to record and to emphasize its distinctive nature.

In conclusion, the available data on the fecundity of the larger series from Area and Tanga may be briefly noted. Among 100 animals of the former, 65 per cent contained eggs or embryos or both, while 49 per cent of the 98 specimens from Tanga were similarly gravid. Examination of more than 40 adolescents proved that reproduction begins only after full size is attained and the lip is formed. The characters of the egg-capsule have been recorded earlier.

***Partula dryas*, new species (fig. 3, c).**

Shell dextral, ovate-conic, moderately opaque, thin, fragile, and slightly translucent; umbilicus small and rounded. Whorls $4\frac{1}{2}$ to $4\frac{3}{4}$; the body whorl is narrowed toward its base and is parabolic in profile. Penultimate whorls moderately convex. Suture of the body-whorl narrowly impressed with a distinct narrow white line above. Surface with broad and irregularly spaced lines of incremental growth. The spiral decussating lines of the younger whorls become less evident on the last whorl, and they may vanish excepting on the base. Very fine internal sculpture on the paries within the aperture.

Aperture ovate, small, narrow and straight. Lip very thin, slightly and uniformly expanded but narrowed as it reaches the outer insertion, where it curves inward. Columella slenderly triangular, with a simple contact channel at 45° . Parietal callus exceedingly thin and shining, without an outer border. Parietal tooth absent.

The color is invariably dull "warm buff" (Ridgeway's nomenclature), somewhat darker on the apical whorls. The epidermis is thin and irregularly evanescent in the course of growth. The animals may produce young before the lip is formed. The egg-capsule is conventionally impregnated with calcareous substance; it is broadly elliptical and measures approximately 3.2 mm. by 2.7 mm.

Direct measures. *a*, Bishop Mus. type no. 9980: length 14.9 mm., width 9.5 mm., length of aperture 9.1 mm., width of aperture 6.3 mm.; *b*, co-type Crampton collection: length 15.3 mm., width 9.5 mm., length of aperture 9.0 mm., width of aperture 6.5 mm.

Habitat: Raivavae Island, a member of the Austral, or Tubuai, Group, on the southern slopes of Mount Muanui (951 feet), at 500 to 700 feet altitude. Collected by Y. Kondo and D. Anderson, 1934.

This is the first of three distinguishable forms living in Raivavae that are given the status of full species. These forms agree in many basic characters which distinguish them collectively from all other members of the genus, and which clearly demonstrate their close affinities and proximate common ancestry. But they differ, one from another, in definite and consistent ways, both in the qualities of coloration and in the dimensional and proportional characters of the shells. Without the biometric analysis of the latter features, their distinctions would readily escape recognition. Alternatively, these three forms might be treated as varieties of a single species—a course that might be preferred by other students of *Partulae*. However, the question of their taxonomic standing is secondary to the record of their characters and their relationship.

The island of Raivavae (fig. 2) is the easternmost member of the Austral, or Tubuai, Group; it is sometimes charted under the name of Raivavae or Vavitao or Vavitu. Its center is located at approximately $147^\circ 39' 40''$ west longitude and $23^\circ 53' 15''$ south latitude. The great-

est length of the island proper is 5.75 miles, on an axis trending from west-southwest to east-northeast, and its greatest width is about 2 miles. Its volcanic origin is remote in point of time and the original single crater-wall has undergone extensive erosion and degradation. The mountain peaks lie along a somewhat oblique S-shaped axis, and the highest of them is Mount Hiro with an altitude of 1,434 feet. Forests are abundant and thick, especially at the higher levels, where all conditions are favorable for the existence of *Partulae*.

The only other species of *Partula* known to exist in Raivavae is *P. hyalina*, which is the most widely distributed member of its genus, occurring as it does in Rimatara, Rurutu, and Tubuai in the Austral

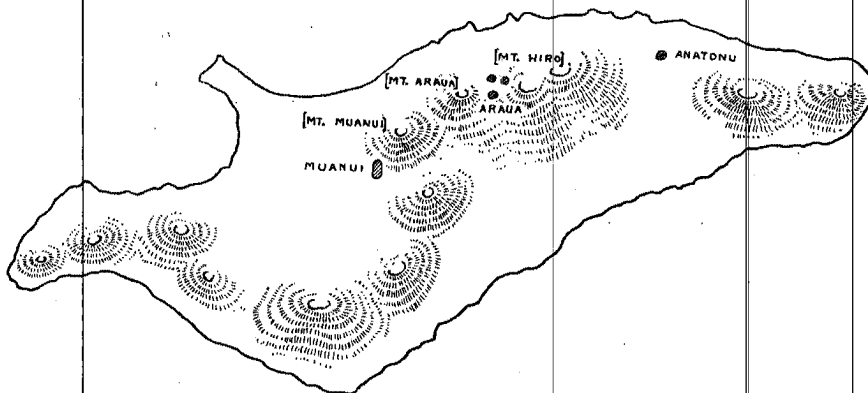


FIGURE 2.—Island of Raivavae.

Islands, in several of the Cook Islands, and in Tahiti only within the Society Islands. But there is no close genetic relationship between *P. dryas* and *P. hyalina*. The shell of *dryas* is much thinner, the lip is far less thickened, the whorls are more convex, and the suture is deeper. The animal itself is uniform buff in color and never white, while the mantle is devoid of the bold maculations that *hyalina* possesses.

Save for the absence of body-markings, *Partula dryas* more closely resembles the members of a widely distributed group that includes *P. attenuata* of Raiatea, Tahiti, and Borabora, as well as *P. annectens* of Huahine, *P. clara* of Tahiti, and *P. fragilis* of the far-distant island of Guam, in the Marianas. All of these species possess thin and translucent shells and greatly attenuated lips, and they are all precociously

fertile. Their real affinities and their wide diffusion constitute significant proof of the prior existence of land connections between what are now the separate islands where the several species dwell.

The record of the diagnostic distinctions of *Partula dryas* in form and color requires no elaboration other than the biometric data. The available material comprises 19 perfect adults, 10 of which contained embryonic items of various ages; in addition, 27 adolescents of diverse sizes were procured that provide evidence of the consistency of the general characters of the species. The statistics are presented in table 3.

Table 3. *Partula dryas*, statistical description

CHARACTER	RANGE (CLASS VALUES)	MEAN VALUE
Shell, length, mm.	14.15 - 15.65	14.829 ± 0.072
width, mm.	8.5 - 10.1	9.226 ± 0.052
proportions, per cent.	58.5 - 65.5	62.342 ± 0.314
Aperture, length, mm.	8.5 - 9.3	8.795 ± 0.039
width, mm.	5.5 - 7.5	6.184 ± 0.067
proportions, per cent.	65.5 - 79.5	69.921 ± 0.492
Aperture length ÷ shell length, proportions, per cent.	56.5 - 61.5	59.447 ± 0.203

The distinctive buff color of the adult shells of this species develops during free post-embryonic life. Ananeanic individuals 5 mm. long are pale corneous while metaneanic shells 9 mm. to 10 mm. show the beginnings of the final color, which gains its full intensity during the paranecanic period. Three animals whose shells were devoid of the lip and adolescent in other features as well contained embryonic items; the lengths of their shells were 13.6 mm., 13.7 mm., and 14.2 mm., respectively.

This and the two following species are similar in so many respects that their differentiation, one from another, must have come about since the isolation of Raivavae by subsidence. Any products of their common ancestors which undoubtedly existed in the adjacent islands of the Austral Group have left no descendants, so far as known.

***Partula oreas*, new species (fig. 3, d).**

Shell dextral, ovate-conic, thin, fragile, and semi-translucent; umbilicus open, slit-like and elongated. Whorls $4\frac{1}{2}$ to $4\frac{3}{4}$. Body whorl somewhat inflated outwardly, slightly parabolic in profile; penultimate whorl regularly convex. Suture not impressed, and devoid of a white line above, but with a definite

smooth, narrow zone on the penultimate whorl above the last half of the body-whorl. Surface with narrow lines of growth, evenly spaced. The incised revolving lines are virtually straight. The parietal wall within the aperture is spirally sculptured with closely crowded lines.

Aperture ovate and large, with straight axis. Lip thin and little expanded, narrowed toward the outer insertion where it meets the body wall at an approximate right angle. Columella broadly elongate-triangular, with its line of contact at about 60°. Parietal callus thin and lustrous, with a weak but definite outer border. No pillar tooth.

The color is paper-white to whitish corneous. Reproduction may take place before the shell attains its final growth. Egg capsule white and calcareous, more elongate than in *Partula dryas*; it measures 3.8 mm. by 2.5 mm.

Direct measures of the two co-types. *a*, Bishop Mus. type no. 9979: length 16.0 mm., width 10.3 mm., length of aperture 9.8 mm., width of aperture 7.2 mm.; *b*, co-type Crampton collection: length 15.8 mm., width 10.2 mm., length of aperture 9.7 mm., width of aperture 6.9 mm.

Habitat: Raivavae Island, Austral, or Tubuai, Group, between Mount Araua (1,253 feet) and Mount Hiro (1,434 feet), nearer to the former, at an altitude of 1,000 feet. Collected by E. C. Zimmerman and D. Anderson, 1934.

This is the second of the three closely allied forms of Raivavae which are given primary status for two main reasons. The shells of *Partula oreas* are plainly distinguished from those of the two other forms by definite and consistent characters even though some of the differences in question may be small in degree. In the second place, there is nothing to indicate that any one of the three affiliates is original and that the others are derived varieties; for these reasons and for clarity they are described as full species.

The living material of *Partula oreas* consists of 56 adult individuals of perfect form, and two abnormal specimens; in addition, 44 adolescents of varying size were collected. The snails were gathered at an altitude of 1,000 feet in a forested area between the mountains of Araua and Hiro, which area is recorded under the name of Mount Hiro, although it is slightly nearer the former peak (fig. 2).

On close examination, *Partula oreas* is found to differ from *P. dryas* both in qualitative and quantitative characters. The universal chalk-white color of the shell presents a marked contrast with the buff tints of all of the *dryas* specimens; there are no variants of either species which approach the other.

The shell of the present form is definitely more opaque, even in the ananeanic and metaneanic stages. The body-whorl is parabolic in profile instead of convex, the whorls of the spire are regularly convex,

and the protoconch is flatter. The aperture, lip, columella, parietal callus, and umbilicus are distinctive in *Partula oreas*. The point to be strongly stressed is that all of these differences, slight or marked, are consistent throughout the entire series of shells.

Even more significant are the distinctions in the dimensions and proportions of the shells of *Partula oreas*, when biometrically contrasted with those of *P. dryas*. The fundamental descriptive figures for the former are given in table 4.

Table 4. *Partula oreas*, statistical description

CHARACTER	RANGE (CLASS VALUES)	MEAN VALUE
Shell, length, mm.	13.25 - 16.55	14.916 ± 0.065
width, mm.	8.9 - 10.7	9.743 ± 0.037
proportions, per cent.	61.5 - 68.5	64.946 ± 0.141
Aperture, length, mm.	8.3 - 10.1	9.150 ± 0.037
width, mm.	6.1 - 7.5	6.721 ± 0.020
proportions, per cent.	67.5 - 79.5	73.303 ± 0.207
Aperture length ÷ shell length, proportions, per cent.	58.5 - 64.5	61.036 ± 0.128

When the figures for the mean values of the characters of this species are compared with those relating to *Partula dryas*, it appears that the former exceed the latter in every quality of form. In view of their importance, the numerical differences with their probable errors are recorded, together with the data indicating their real significance, in table 5.

Table 5

CHARACTER	P. OREAS COMPARED WITH P. DRYAS	DIFFERENCE : ERROR
Shell, length, mm.	+ 0.087 ± 0.097	< 1 times
width, mm.	+ 0.516 ± 0.064	> 8 "
proportions, per cent.	+ 2.604 ± 0.434	> 5 "
Aperture, length, mm.	+ 0.355 ± 0.054	> 6 "
width, mm.	+ 0.548 ± 0.069	> 7 "
proportions, per cent.	+ 3.382 ± 0.534	> 6 "
Aperture length ÷ shell length, proportions, per cent.	+ 1.588 ± 0.240	> 6 "

Only in the case of the first character is the difference devoid of significance. In all of the other seven characters the higher figures in

the second column prove beyond question that *Partula oreas* is unlike *P. dryas* in its structure.

All of the 58 adults were found to be gravid, which makes this the first case on record where so substantial a number of adult individuals were productive at the same time. Ten of the paraneanic snails ranging from 12.7 mm. to 14.1 mm. in length were precociously fertile.

The colors of the pre-adult stages require further comment. Embryonic shells are very thin in texture and light corneous in tint. Subsequent calcareous deposits begin in the apical half of the whorls, wherefore the aneaneic shells are bi-colored, white above and clear corneous below. When half-grown, however, the lower half whitens to some extent, although some degree of contrast still persists. But in all older shells the deposits of calcareous substance have become uniform. The half-colored condition of early young in this case is noteworthy because the shells of the next form to be described display that character in the final adult stage.

***Partula hamadryas*, new species (fig. 3, e).**

Shell dextral; ovate-conic, thin, fragile, translucent, and rimately umbilicate. Whorls $4\frac{3}{4}$ to 5. Body-whorl not inflated, and regularly convex in profile; whorls of the spire convex, parabolic in contour. Suture not impressed; a narrow zone, edged with a white line, occurs on the penultimate whorl above the entire length of the body-whorl. Surface relatively smooth, with irregular and weak lines of incremental growth. The revolving incised lines are delicate and broadly undulating over the entire shell. The paries within the aperture is sculptured with very fine spiral lines.

Aperture elongate-ovate, large and narrow; its axis is slightly oblique. Lip thin and narrowly expanded; its outer portion becomes progressively thinner toward the slightly incurved insertion. Columella narrow and prolonged, with a contact angle of approximately 30° . Parietal callus very thin, shining, and indistinctly bordered.

The shell is bi-colored. The upper half of each whorl is dull white by virtue of its calcareous nature, and only semi-translucent, while the lower half is dull corneous and hyaline. Small and opaque spots or larger spiral areas of opacity occur in the clearer half of the body-whorl. Precocious fertility occurs in this species. The egg-capsule is white-walled; it is more broadly elliptical than usual, measuring 3.2 mm. by 2.8 mm.

Direct measures of the two co-types. *a*, Bishop Mus. type no. 9978: length 16.5 mm., width 9.5 mm., length of aperture 10.2 mm., width of aperture 6.9 mm.; *b*, co-type Crampton collection: length 16.3 mm., width 9.3 mm., length of aperture 10.0 mm., width of aperture 6.9 mm.

Habitat: Raivavae Island, Austral, or Tubuai, Group; 0.15 of a mile south of Anatonu, altitude 650-700 feet. Collected by Y. Kondo and D. Anderson, 1934.

The third and last of the novel forms of *Raivavae* is represented by only three adult individuals and two paraneanic specimens. They were found on the wooded lower portion of a cliff less than a quarter of a mile from the coastal village of Anatonu, in the northeastern part of the island (fig. 2). This material is scanty, it is true, but the extraordinary likeness of the shells and their collective contrasts with those distinguished as *Partula oreas* justify their separation, even though the localities of these two species are only five-eighths of a mile apart.

The contrast of *Partula hamadryas* with *P. oreas* and with the more remote *P. dryas* is most evident in the bi-colored nature of the adult shells. A similar pattern is shown by the youngest shells of *P. oreas*, as noted in the discussion of that species, a fact that attests the close relationship of the two although it is not held to prove their specific identity.

The qualitative distinctions of this form are adequately listed in the formal description; the quantitative data, however, provide the surest proof of its independence. Usually when the number of specimens is only three, the probable errors are large, although they possess real statistical values; but in this case the shells are so similar that the probable errors are remarkably small. The relevant data are given in table 6.

Table 6. *Partula hamadryas*, statistical description

CHARACTER	RANGE (CLASS VALUES)	MEAN VALUE
Shell, length, mm.....	16.25 - 16.55	16.350 ± 0.067
width, mm.....	9.3 - 9.5	9.433 ± 0.036
proportions, per cent.....	57.5 - 58.5	57.833 ± 0.184
Aperture, length, mm.....	10.1 - 10.3	10.167 ± 0.036
width, mm.....	6.9	6.900 ± 0.0
proportions, per cent.....	67.5 - 69.5	68.500 ± 0.318
Aperture length ÷ shell length, proportions, per cent.....	61.5	61.500 ± 0.0

The direct comparison of *Partula hamadryas* with its nearer neighbor, *P. oreas*, discloses evidence that the former is so different in quantitative characters as to merit its recognition as an independent species. The figures for the mean values of the seven standard characters differ in sign, in degree, and in statistical probability as recorded in table 7.

Table 7

CHARACTER	P. HAMADRYAS AS COMPARED WITH P. OREAS	DIFFERENCE	ERROR
Shell, length, mm.....	+ 1.434 ± 0.094	> 15	times
width, mm.....	— 0.309 ± 0.052	> 5	“
proportions, per cent.....	— 7.113 ± 0.232	> 30	“
Aperture, length, mm.....	+ 1.017 ± 0.052	> 19	“
width, mm.....	— 0.188 ± 0.014	> 13	“
proportions, per cent.....	— 4.803 ± 0.379	> 12	“
Aperture length ÷ shell length, proportions, per cent.....	+ 0.464 ± 0.128	> 3	“

Stated in words, the *hamadryas* shells are longer, narrower, and much more slender in form; the aperture also is longer, actually narrower, and far narrower in proportions. The proportions of the aperture to the whole shell, as regards length, is definitely greater. As the numerical differences in the majority of cases greatly exceed their probable errors, the conclusion seems justified that *Partula hamadryas* is entitled to full status.

Each of the three adult animals was gravid. One of the two paraneanic individuals, measuring 14.2 mm. in length, also contained embryonic items; therefore this species agrees with *Partula dryas* and *P. oreas* in its capacity to reproduce precociously.

***Partula diaphana*, new species (fig. 3, f).**

Shell dextral, moderately ovate-conic, minutely perforate, extremely thin and fragile, nearly transparent. Whorls 4½; suture weakly impressed, with a scarcely visible narrow margin on the mid-dorsal region only. Spire slightly convex in outline; whorls flatly convex. Surface somewhat shining, the incremental lines of growth faintly visible under the lens, and without raised crests. Spiral sculpture extremely delicate and crowded, continuous over the whole outer surface of the shell, and also present on the paries within the aperture. Aperture ovately-pyriform. The attenuated lip narrows progressively toward the outer insertion. Columella slightly twisted, triangular above and narrow below, and somewhat compressed over the umbilicus. Parietal callus very thin and scarcely visible, even under the lens. No parietal tooth.

Uniformly pale brownish corneous in color. The lip is paler but not white. The animal is boldly and irregularly maculated with whitish and deep slate pigmentation, zigzag in pattern. The egg capsule is impregnated with lime and measures 3.1 mm. by 2.5 mm.

The dimensions of the sole adult example (Bishop Mus. type no. 9973) are as follows: length 15.6 mm., width 9.7 mm., length of aperture 9.6 mm., width of aperture 6.6 mm.; proportions of shell 62 per cent, proportions of aperture 68 per cent, proportions of aperture length to shell length 61 per cent.

Habitat: Moorea, Society Islands, at 2,000 feet altitude on the slopes of Mount Teaharoa—a peak that dominates the wide valley of Maharepa in the northeastern part of the island. Collected by D. Anderson and C. Gessler, 1934.

By good fortune, the sole adult representative of this remarkable and significant species was gravid and contained two elliptical egg-capsules about 3.25 mm. in length, which definitely prove the maturity of the animal. In addition, two immature specimens were found whose respective lengths were 13.0 mm. ($4\frac{1}{2}$ whorls) and 5.6 mm. ($3\frac{1}{4}$ whorls). Scanty though it is, this material fully justifies the establishment of the species. The high location of its habitat, in a part of Moorea that is difficult of access, partly explains the failure of earlier collectors to find it.

The outstanding distinctions of *P. diaphana* are its thin, fragile texture and its tenuous peristome. Other notable features are the form of the columella, the dome-like contour of the apex, and the close, delicate and complete spiral sculpture of the whole shell. In all of these characters, *P. diaphana* is widely different from all of its associates in Maharepa Valley, and from all of the other known species of Moorea.

But all of these characters are shared with *P. turgida* of Raiatea, 92 miles distant, and with *P. arguta* of Huahine, 70 miles from Moorea. Hence this species presumably belongs to the distinct section of *Leptopartula*, established by Pilsbry to include *P. turgida* and *P. arguta*. Furthermore, there is no doubt that *P. magdalinæ* is an affiliated species also, even though its habitat is in the Marquesas Islands, more than 350 miles distant. None of these species could arise by mutation from another of its own island, and no one of them could be directly derived from parents living on a remote island. The mutual resemblances among the species in question attest their descent from a common ancestral stock which was widely distributed over a larger land mass in far earlier time. This stock must have already diverged greatly from the progenitors of the more numerous and more conventional species of to-day which are grouped by Pilsbry in the section *Partula sensu strictu*. Doubtless additional members of the section *Leptopartula* will be found in the future in such islands as Tahiti and Tahaa or elsewhere, but as yet they have not come to light.

***Partula tristis*, new species (fig. 4, *a, b*).**

Shell dextral, ovate-conic, thin in texture and compressly perforate. Whorls 5, suture scarcely impressed and not margined. Spire stoutly conic, with slightly convex outlines. Whorls flatly convex. Surface with little lustre. The transverse incremental lines are weak and irregular, while the spiral sculpture is well incised. Aperture elliptical and vertical. Lip roundly reflexed, very slightly produced outwardly, and with little or no internal thickening; the inner terminus is appressed over the umbilicus. The columella is tortuous and wide above, contracted below, and presents a slightly notched appearance. Parietal callus thin and dull, but thickened along its arcuate outer margin, more markedly in older examples. No parietal tooth.

The general color is dull brown grading to chestnut-brown, or light corneous brown with darker transverse streaks. The color of the apex is brown, or purple-brown extended along the lower portion of the second and third whorls in a helix. In some shells a narrow median light zone occurs on the body whorl. The lip is whitish, faintly tinged with brown.

Direct measures of the two co-types, in Bishop Mus., nos. 9977 *a* and 9977 *b*. *a* (fig. 4, *a*): length 16.9 mm., width 10.7 mm., length of aperture 9.1 mm., width of aperture 7.2 mm.; *b* (fig. 4, *b*): length 16.5 mm., width 10.7 mm., length of aperture 8.8 mm., width of aperture 6.4 mm.

Habitat: Tooroa (Paoio) Valley, western side of Raiatea, Society Islands. Collected by Y. Kondo, D. Anderson, and C. Gessler, 1934.

Only four adult and two paraneanic animals of this species were found on trees and shrubs in the central portion of Tooroa Valley—a locality that is sometimes called Paoio from its river and bay. Apparently the species exists in scanty numbers and in a restricted area, for it was not found during the earlier surveys of Garrett and of the first author. The paucity of numbers in this case is emphasized by the great abundance of six other species that occur in the same valley.

The four full-grown shells present various combinations of the general and special features of coloration. The first (fig. 4, *a*) is brown, with a brown apex, uniform upper spire, and a faint median lighter band. The second (fig. 4, *b*) is deeper brown, with a purple-brown apex and a helical extension of the same color, and it is clearly banded. The third shell is like the second excepting that the band is lacking. The fourth specimen is similar to the third in minor characters, but it is strigated. These diverse combinations indicate that the qualities in question are uncorrelated and independent in their inheritance.

The problem of the affinities of *Partula tristis* is somewhat involved. The one assured fact is that this form cannot be a localized variant of an associated species of Tooroa Valley. Its differences from

P. attenuata, *P. turgida*, *P. faba*, *P. vittata*, and *P. imperforata* are numerous and wide; the sixth species, *P. rustica*, is smaller in size and otherwise separated by many features, and it is terrestrial instead of arboreal. On first inspection, the thinner texture of the shell and tenuous lip seem to ally *P. tristis* to *P. lugubris*, a terrestrial species, occurring in valleys to the southward of Tooroa, and distinguished by the straight and thin structure of the lip at its inner insertion. However, the tortuous columella, the appressed columellar insertion of the lip, and the more compressed umbilicus mark its relationship to the arboreal forms *P. thalia* and *P. garretti*, living in valleys to the north, and also to *P. rustica* of its own valley, terrestrial in its habits. Unless more ample future collections prove the contrary, this affiliation may be accepted.

The dimensions of the two co-types, as recorded, define their major characters. Even though the number of specimens is only four, their biometric treatment has been made for the sake of inter-specific comparisons. (See table 8.) While the figures have only a qualified value, this can be estimated on the basis of the probable errors of the averages. The data are as follows:

Table 8. *Partula tristis*, statistical description

CHARACTER	RANGE (CLASS VALUES)	MEAN VALUE
Shell, length, mm.	16.55 - 16.95	16.625 ± 0.041
width, mm.	10.5 - 11.1	10.750 ± 0.073
proportions, per cent.	63.5 - 66.5	64.500 ± 0.413
Aperture, length, mm.	8.9 - 9.5	9.350 ± 0.087
width, mm.	7.1 - 7.7	7.300 ± 0.083
proportions, per cent.	75.5 - 80.5	79.000 ± 0.695
Aperture length ÷ shell length, proportions, per cent.	53.5 - 57.5	55.250 ± 0.602

Two of the four adults were gravid; one advanced paraneanic animal was infertile. Therefore it is certain that the thinness of the shell and the weak development of the lip are final qualities, and that they are not the marks of immaturity.

***Partula labrusca*, new species (fig. 4, c).**

Shell dextral, stoutly ovate-conic, openly perforate, and of medium solidity. Whorls 5 to 5½; suture moderately impressed and not margined. Spire stoutly

conical, with definitely convex contour. Whorls convex. Surface exceptionally glossy and apparently smooth despite the close and weak lines of incremental growth. Spiral sculpture of the younger whorls close and distinct, but evanescent on the body-whorl, even on the base. Aperture sub-vertical, with a slightly reversed inclination. Lip simple in contour, thin, sloping inwardly, evenly reflexed, and with a slight shelf-like inward thickening that somewhat contracts the aperture. Columella stoutly triangular. Parietal callus very thin and dull in sharp contrast with the shining outer surface. No parietal tooth.

The general color is warm brown or deep brown with a vinaceous cast of distinctive nature. The lip is wine-colored or purplish brown. All of the known shells possess a narrow, vaguely defined median zone of lighter color, 1.5 mm. in width.

Direct dimensions of the two co-types. *a*, Bishop Mus. type no. 9976: length 20.9 mm., width 13.0 mm., length of aperture 11.2 mm., width of aperture 8.5 mm.; *b*, Crampton collection: length 20.4 mm., width 12.8 mm., length of aperture 11.2 mm., width of aperture 8.3 mm.

Habitat: Temehani Plateau, northern part of Raiatea, Society Islands, between 1,400 and 2,000 feet altitude. Collected by D. Anderson and C. Gessler, 1934.

Three adult and two living immature animals of this species were taken on the peculiar flattened heights called Temehani in the northern part of Raiatea; one dead shell was also found that was perfect in all respects. The collector's notes record that the plateau was reached by way of Tepua Valley, and that no snails were collected until the higher ground was reached; hence the locality is satisfactorily verified.

Its colors and structure make it certain that *Partula labrusca* is not a variant of another species existing on Temehani Plateau or below in Tepua Valley, where *P. protea*, *P. auriculata*, and *P. faba* are found in abundance. The dull wine color of the shells, which has suggested the name of the new form, is not duplicated in any other species of Raiatea. All adult shells possess the revolving narrow zone of lighter tint, about 1.5 mm. wide, which appears only on the body-whorl in three specimens, while in the fourth example the zone is so broadened as to appear above the suture on the larger whorls of the spire. A para-metaneanic shell is medium brown, with a narrow lighter band. In a metaneanic specimen the greater depth of the brown pigment renders the light zone more evident by contrast. The single known embryonic shell is uniform brown, without a band.

The significant structural qualities of *Partula labrusca* are its distinctive general form, the medium texture of the shell, the open umbilicus, the forms of the aperture and lip, and the absence of a

parietal tooth. In sharp contrast with the associated species of the region, the inner terminus of the lip is thin, flat, and straight, and it is not appressed over the umbilicus. These last-noted features are of critical importance because they are displayed by the members of a group of affiliated species typified by *P. lugubris*, all of which occur in valleys on the western side of Raiatea; this new form can be added to that group with confidence.

For purposes of comparison with other species, the statistical description of the small series of shells is given, for the sake of such value as it possesses. (See table 9.)

Table 9. *Partula labrusca*, statistical description

CHARACTER	RANGE (CLASS VALUES)	MEAN VALUE
Shell, length, mm.	20.45 - 22.35	21.200 ± 0.220
width, mm.	12.7 - 14.3	13.250 ± 0.210
proportions, per cent.	60.5 - 63.5	62.250 ± 0.366
Aperture, length, mm.	11.1 - 12.3	11.500 ± 0.158
width, mm.	8.1 - 9.1	8.500 ± 0.126
proportions, per cent.	73.5 - 75.5	74.500 ± 0.238
Aperture length ÷ shell length, proportions, per cent.	52.5 - 54.5	53.750 ± 0.198

***Partula dolorosa*, new species (fig. 4, d).**

Shell dextral, narrowly ovate-conic, very thin in texture, with elongate and rimate perforation. Whorls 4¾ to 5. Suture narrow and deeply impressed, devoid of margination. Spire acutely conic, slightly convex in outline. Whorls convex and roundly shouldered below the suture. Surface dull. Incremental lines weak and widely spaced; spiral incised lines, wavy and relatively strong, are continued over the whole surface of the shell, more closely on the base.

Aperture elliptical and vertical. Lip very thin and only slightly reflexed, with very weak inward thickening of uniform degree; the outline is simple and continuous. The columellar margin of the aperture is less beveled than the rest, and its outer border is straight or only slightly curved. Columella nearly triangular. Parietal callus exceedingly thin and scarcely perceptible, even under the lens. Parietal tooth absent.

The ground color is dull tawny brown or corneous brown, either uniform or overlaid with tawny-brown transverse strigations, vague and irregular. A constant feature is a narrow median or sub-median revolving corneous band; this is pale and only slightly contrasted with the ground color, but its margins are rendered clearer by a parallel deepening of the ground color on either side. A variant of deep mahogany-brown color with a sharply contrasted light band is represented by a single immature specimen. Apical whorls deeper brown or more frequently purple-brown. Lip slightly tinged with pale brown, more intense within the margin.

Direct dimensions of the two co-types. *a*, Bishop Mus. type no. 9975: length 17.2 mm., width 10.3 mm., length of aperture 9.5 mm., width of aperture 6.5 mm.; *b*, Crampton collection: length 18.0 mm., width 11.0 mm., length of aperture 9.5 mm., width of aperture 6.9 mm.

Habitat: Temehani Plateau, northern part of Raiatea, Society Islands, between 1,400 and 2,000 feet altitude. Collected by D. Anderson and C. Gessler, 1934.

Five living adult and five immature animals of this distinctive species were collected on the same plateau of Temehani where *Partula labrusca* was discovered; three of the mature individuals were gravid. The foot is dark slate-grey in color, and the body is completely mottled. The shells of these animals are in close agreement in the characters of color and structure, and they collectively differ markedly from all other species of their territory. Their full specific status is unquestionable. The pattern of their coloration is exhibited by some other species of the island, it is true, but the ground colors are peculiar to this species only and the deeper borders on either side of the vague light band are unique.

The general form of the shell, its thin texture, the weakly developed lip, together with the straight columellar border of the aperture, ally *Partula dolorosa* to *P. lugubris* and its associates. However, this species is much smaller and its younger whorls are more convex. The general dull corneous-brown of the shell is distinctive, excepting in the case of the single paraneanic shell noted in the description, which closely resembles the prevalent type of *P. lugubris* in the depth of its color. The occurrence of both *P. dolorosa* and *P. labrusca* in one and the same area is remarkable, in view of their widely different characters of color and structure and their presumable derivation from the same proximate ancestral stock. However these circumstances are not unprecedented, for their parallel exists in the independent but affiliated species of Vaiare Valley, Moorea, where *P. suturalis* and *P. aurantia* are found in association.

As in the case of other species, the biometric description of the adult shells is recorded (table 10), even though the number of adult shells is small. The contrasts with *Partula labrusca* in structural characters are so evident that the figures for the exact differences and the calculation of their probable errors are unnecessary. The data are as follows:

Table 10. *Partula dolorosa*, statistical description

CHARACTER	RANGE (CLASS VALUES)	MEAN VALUE
Shell, length, mm.	16.55 - 18.05	17.330 ± 0.147
width, mm.	9.5 - 11.1	10.260 ± 0.163
proportions, per cent.	56.5 - 61.5	58.900 ± 0.526
Aperture, length, mm.	9.1 - 9.5	9.380 ± 0.048
width, mm.	6.1 - 6.9	6.540 ± 0.092
proportions, per cent.	65.5 - 72.5	69.300 ± 0.840
Aperture length ÷ shell length, proportions, per cent.	52.5 - 55.5	54.100 ± 0.409

***Partula sagitta*, new species (fig. 4, *e*).**

Shell dextral, lanceolate-conic, moderately solid, spire with straight sides, umbilicus compressed. Whorls 5 to 5½, suture not impressed, margined with increasing distinctness from the middle of the penultimate whorl to the lip. Spire prolonged. Whorls flatly convex.

Surface generally smooth with weak lines of incremental growth. The decussating spiral lines are nearly straight, and they become progressively weaker from the second whorl onward, excepting in the basal region. Epidermis weakly developed.

Aperture small and nearly circular. Lip wide, thickened inwardly, rounded, and shelf-like at its outer edge. The outer insertion of the lip is drawn upward on the body-whorl, while the inner insertion is slightly and roundly notched. The columella is simple and nearly straight. Parietal callus thin, transparent, and shining. A definite parietal tooth is invariably present.

The general color is "baryta brown" to "Martin's yellow" (Ridgeway's nomenclature), deepened to ochreous buff on the apical whorls. Egg capsule opaque white, heavily impregnated, and elongated (4.2 mm. by 2.1 mm.).

Direct measurements of the two co-types. *a*, Bishop Mus. type no. 9974: length 18.2 mm., width 10.1 mm., length of aperture 8.9 mm., width of aperture 7.3 mm.; *b*, Crampton collection: length 18.0 mm., width 10.1 mm., length of aperture 8.7 mm., width of aperture 7.1 mm.

Habitat: Hamene Valley, Tahaa, Society Islands. Collected at 750 feet altitude on the slopes of Mount Purauti by Y. Kondo and D. Anderson, 1934.

This species is one of the most notable discoveries of the Mangarevan Expedition. Its area of habitation is apparently very small, as in the parallel cases of *P. olympia* and *P. tohiviana* of Moorea, and it dwells on the upper branches of trees at a relatively high altitude. For these reasons it had escaped the notice of Garrett in his time, and of the first author during a comprehensive but brief survey of Tahaa in 1908.

The living material available for description comprises 19 adult and 17 adolescent animals. All but two of the full-grown snails were gravid, while even the most advanced paraneanic animals were sterile, so that precocious fertility does not occur in this species as it does in some others.

The distinctive pale lemon-yellow colors of *Partula sagitta* develop only after the embryonic young are liberated from the brood-chamber, when they are white even on the apex. The yellowish tints appear when the animals are half-grown, but the darkening of the apex is deferred until the paraneanic stage.

No proximate relative of this species has been found elsewhere in Tahaa or in any other member of the Society Islands. Its outstanding structural features are its arrow-like general form, the slenderness of the narrow protracted spire, the small and rounded form of the aperture, and the brevity of the latter in comparison with the length of the whole shell. The statistical description of the measurable adults is given in table 11.

Table 11. *Partula sagitta*, statistical description

CHARACTER	RANGE (CLASS VALUES)	MEAN VALUE
Shell, length, mm.....	16.2 - 19.8	17.766 ± 0.117
width, mm.....	9.7 - 10.9	10.026 ± 0.051
proportions, per cent.....	54.5 - 60.5	56.237 ± 0.265
Aperture, length, mm.....	8.1 - 9.3	8.595 ± 0.051
width, mm.....	6.7 - 7.9	7.163 ± 0.050
proportions, per cent.....	80.5 - 86.5	83.341 ± 0.237
Aperture length ÷ shell length, .		
proportions, per cent.....	46.5 - 51.5	48.237 ± 0.206

The affinities of *Partula sagitta* are extremely important. Again it is emphasized that it is unique in its island and in its archipelago; its relatives must be sought elsewhere. When the whole field is surveyed, we find that some of the species of the Fiji Islands, such as *P. lirata* and *P. lanceolata*, possess the same critical qualities that separate *P. sagitta* from all of its immediate insular associates. Proceeding from the axiom that fundamental likenesses demonstrate a common ancestry, *P. sagitta* may be regarded as the sole survivor in its own region of an anciently differentiated stock that formerly ranged over a wide series of connected land masses, since separated by subsidence. The

Fijian species are, similarly, derivatives of the same stock in their area. No other conclusion explains the facts, despite the distance of approximately 1,200 miles that extends between the habitations of the species in question.

Partula eremita, new species (fig. 4, f).

Shell dextral, ovate, moderately thin; umbilicus compressly pyriform. Whorls nearly 5, convex, suture somewhat impressed, margined only on the last whorl; a peripheral line is visible above the suture of the last whorls. The surface is dull, with weak and irregularly spaced incremental lines, but with very distinct wavy spiral sculpture over the whole shell, even to the margin of the lip. Aperture vertical and broadly oval. Lip only slightly thickened, beveled, and rolled outward to a thin edge; the outer insertion ascends over the penultimate whorl, while the columellar insertion is simple and unnotched. Columella narrow, with a low swelling on its inner face. The parietal callus is very thin and irregularly opaque; it is absent between the insertions of the lip, and hence it is devoid of a definite outer margin. A parietal tooth is lacking.

The ground color is faint yellowish-corneous, with irregular and vague transverse streaks of deeper tint. The lip is white within, but tinged with light brownish color outwardly.

Measurements: length 16.9 mm., width 11.0 mm.; length of aperture 9.1 mm., width of aperture 7.7 mm. Proportions of shell 65 per cent; proportions of aperture 84 per cent; proportions of aperture length to shell length 53 per cent.

Habitat: Inner portion of Hurepiti Valley, near the foot of Mount Tete, Tahaa, Society Islands. Collected by H. E. Crampton, 1908.

Only a single example of this species was discovered in the northern portion of Hurepiti Valley, which is located in the southwestern part of Tahaa; the animal was not gravid, but it was unquestionably an adult. Its general form, thin texture, more convex whorls, deeper suture, form of the aperture and of the peristome, lack of a parietal tooth, and especially its complete sculptured surface combine to make it certain that the unique shell belongs to a distinct and independent species. It cannot possibly be an aberrant member of another species living in the same area, such as *Partula virginea* or *P. umbilicata*. The form and spiral sculpture alone would exclude it from the first-named, while these same characters and all of the rest of the distinctions enumerated above distinguish it from *P. umbilicata*. As only a single specimen of *P. eremita* was found among several hundreds of animals belonging to other species, it is possible that this form exists in such scanty numbers as to be in danger of extinction. It is to be hoped that some collector of the future will rediscover *P. eremita*, and will procure enough representatives to provide full information for the determination of its affinities with other species of its genus.

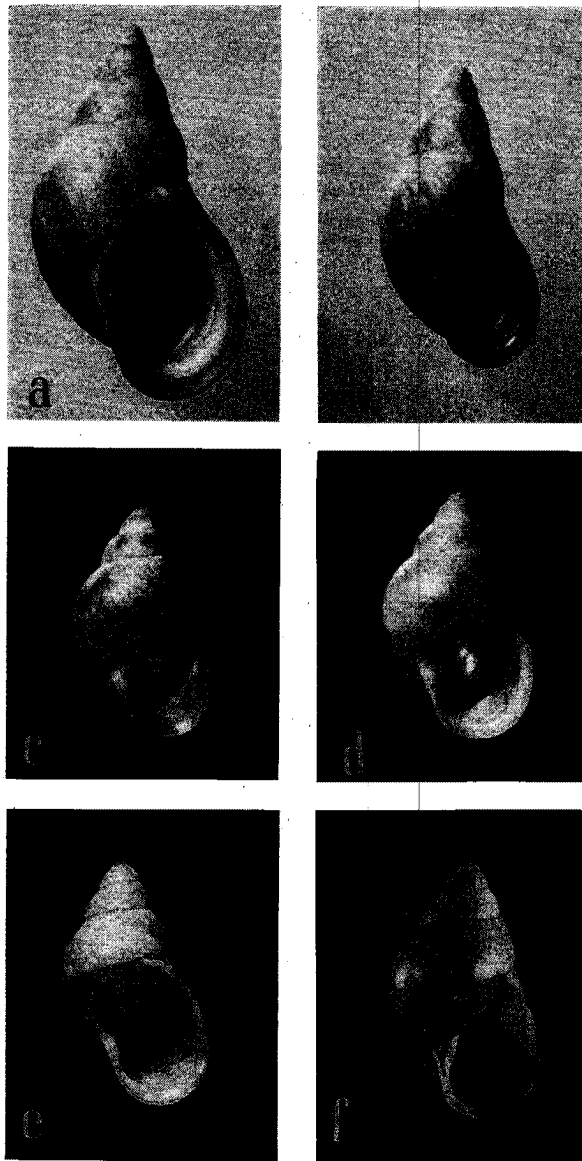


FIGURE 3.—New species of *Partula* (all shells approximately twice natural size): a, *P. margaritae*, large form, Area; b, *P. margaritae*, small form, Tanga; c, *P. dryas*; d, *P. oreas*; e, *P. hamadryas*; f, *P. diaphana*.

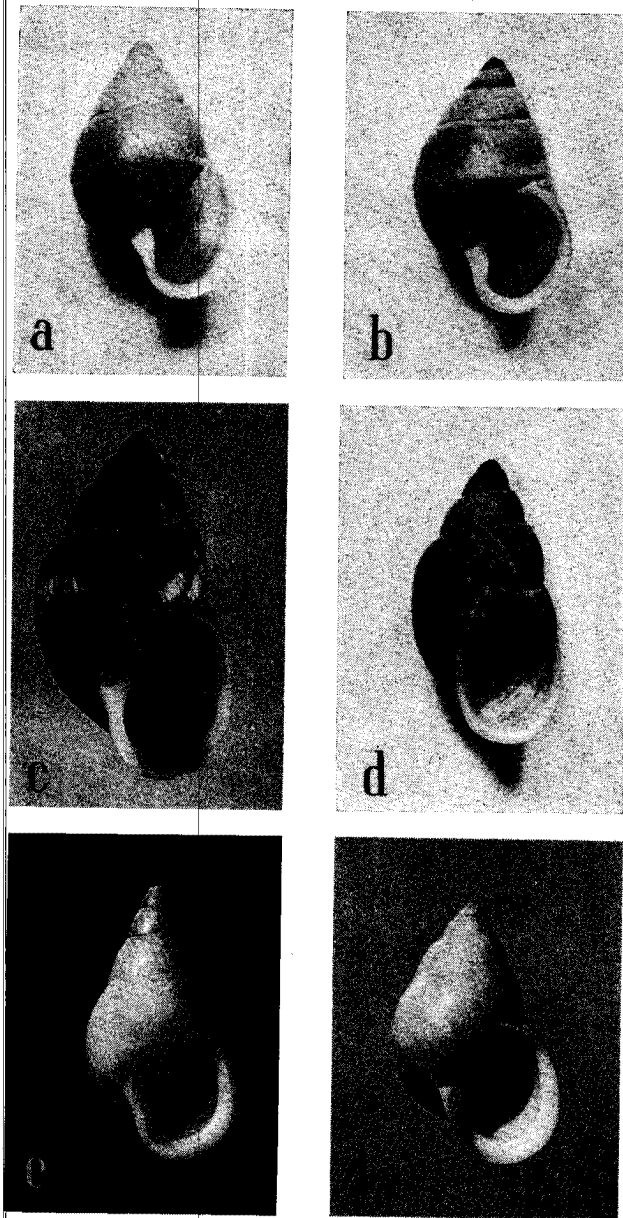


FIGURE 4.—New species of *Partula* (all shells approximately twice natural size): a, b, *P. tristis*; c, *P. labrusca*; d, *P. dolorosa*; e, *P. sagitta*; f, *P. eremita*.

