The Land Mollusca of Nissan Island, Solomon Islands

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IN THE COURSE OF WAR SERVICE in the Solomon Islands the writer spent several months in 1944 on Nissan Island (Green, or Sir Charles Hardy, Island) in the northern Solomons. A large collection of Mollusca was made and the present work is based on the land Mollusca obtained. The geographical position of Nissan on the island arc between the Solomons and New Ireland makes the fauna of some interest in a consideration of the origin of the Solomon Island fauna.

LIST OF THE SPECIES

Leptopoma vitreum (Draparnaud, 1801).
Pupina keraudreni Vignard, 1829.
Sturanya modesta (Pfeiffer, 1853).
Pseudocyclotus levis levis (Pfeiffer, 1853).
Omphalotropis nebulosa Pease, 1872.
Paludinella solomonensis n. sp.
Syncera nitida guamensis Abbott, 1945.
Orpiella (*Owaraha*) *nissani* n. sp.
Eustomopsis eustoma (Pfeiffer, 1856).
Papuina (*Pinnadena*) *periwonensis* n. sp.
Gyropena nissani n. sp.
Partula c.f. carteriensis (Q. and G., 1832).
Opeas gracile (Hutton, 1834).

Leptopoma vitreum (Draparnaud, 1801)

Jutting (1948: 566) cites *vitreum* as of Draparnaud, 1801, (*Tabl. Moll. France*). Iredale (1941) cites *vitreum* as of Lesson, 1830, and considers that Lesson's name was preoccupied by that of Draparnaud. He therefore uses *nitidum* of Sowerby for this series. Jutting has apparently considered that the two names apply to the same species and that there is therefore no need to alter the name. The writer has been unable to see Draparnaud's work, therefore, Jutting's usage will be followed.

The group of forms around *vitreum* and *nitidum* are widely distributed in the Austro-Malayan area. Bartsch (1918) differentiated sixteen subspecies from the Philippines and Iredale (1941) indicates two subspecies from New Guinea. Populations from various localities in New Britain and the Solomons do show proportional differences but insufficient material is available to determine whether these apparent geographical differences are constant.

This species occurred rather commonly on Nissan Island, living on the leaves of low shrubs. The shell dimensions of three specimens are:

Height (mm.)	Diameter (mm.)
12.3	12.1
10.6	10.0
10.0	10.4

Pupina keraudreni Vignard, 1829

A series from rotten logs near the shore at Tangalan Plantation, Nissan Island, agrees very well with *P. keraudreni* Vignard, the type species of the genus. This species occurs also in New Guinea (type locality), New Britain, and throughout the Solomons to Santa Anna in the southeast. Clench (1949: 33) notes that *P. solomonensis* Smith is very close to *P. keraudreni*. The differences given by Clench, larger size and dark coloration, do not appear very valid differences and probably only one form is represented.

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TABLE 1
SHELL DATA OF *Paludinella solomonensis* n. sp.
(Measurements in Millimeters)

	HOLOTYPE	PARATYPE
Height	2.36	2.77
Diameter	1.36	1.91
Height of Body Whorl	1.91	2.08
Height of Aperture	1.36	1.41

Sturanya modesta (Pfeiffer, 1853)

This was the only member of the Helicinidae collected on Nissan. It was common throughout the island on low vegetation. Rensch and Rensch (1936: 683) record it from Shortland Island, New Georgia, Guadalcanal in the Solomons, the New Hebrides (type locality), and Samoa.

Pseudocyclotus levis levis (Pfeiffer, 1855)

This species occurred not uncommonly on Nissan on leaves of living vegetation. It occurs through the Solomons from the north to Santa Anna in the southeast. Rensch (1937: 616) also records it from New Ireland.

Omphalotropis nebulosa Pease, 1872

Smith (1855: 597) has shown that *nebulosa* Pease should be used for the Solomon Island shells instead of *bulimoides* H. & J., which refers to a species from the Caroline Islands. Rensch and Rensch (1931: 684) have followed this usage. This species was commonly distributed under logs and leaves on the forest floor on Nissan. It appears to be distributed throughout most of the Solomon Islands. It has also been recorded from the Bismarck Archipelago by Rensch (1937: 620).

Paludinella solomonensis n. sp.
Fig. 1*d*

Shell small, 2.3 to 2.7 mm. long, globose, light brown in colour, smooth and semi-translucent. Protoconch of one and a half smooth shining whorls. Post nuclear whorls with very fine microscopic spirals on early whorls, becoming obsolete over adult whorl surfaces. Number of whorls five and a half. Outline of whorls rather broadly rounded. Body whorl slightly subangled below the middle. Sculpture consisting of irregular axial growth lines with traces of fine spirals on the base. Suture slightly impressed. Aperture obliquely ovate, constricted above. Outer lip thin, sharp. Parietal wall gently concave. Columella short, rounded. There is a well-marked constriction of the aperture edge at junction of parietal wall and columella. Umbilicus completely obscured by thickened columella. Shell measurements are given in Table 1.

Locality: Near lagoon shore, Tangalan Plantation, Nissan Island. R. K. Dell, 1944.

Holotype (M. F. 2509) and paratype (M. F. 2510) in Dominion Museum, Wellington, New Zealand.

This appears to be the first record of the genus from the Solomons. The outline characterizes the species.

Syncera nitida guamensis Abbott, 1949
Fig. 1*b*

A series of shells from near the lagoon shore, Tangalan Plantation, Nissan Island, cannot be separated from the above subspecies from the Marianas. The umbilicus is totally closed in all the specimens seen. Half-grown specimens have a low spiral carina on the base. Abbott's figure (1949, fig. 8) of

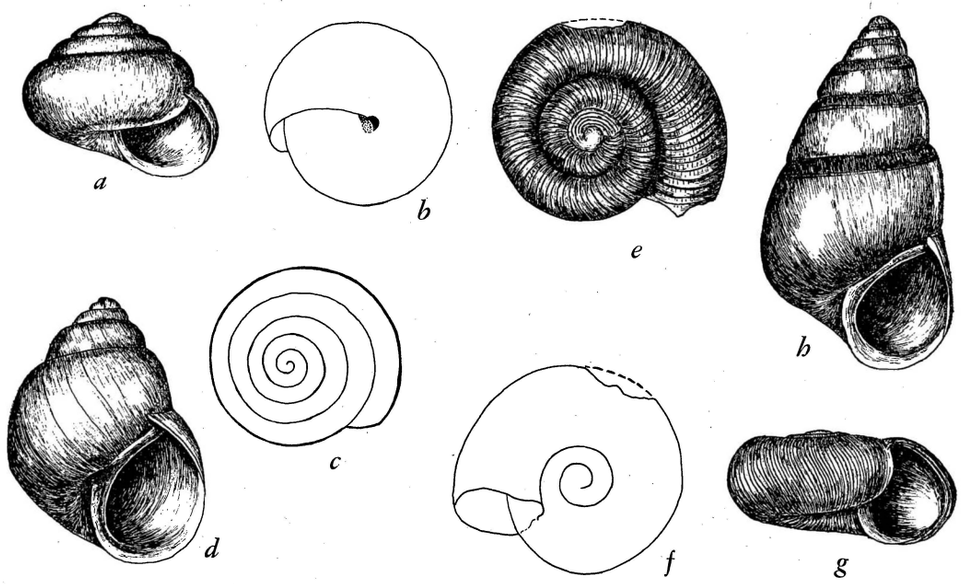

FIG. 1. *a–c*, Frontal, basal, and apical aspects of the shell of *Orpiella* (*Owaraha*) *nissani* n. sp. (holotype, 3.04 × 2.32 mm.). *d*, The shell of *Paludinella solomonensis* n. sp. (holotype, 2.36 × 1.36 mm.). *e–g*, Apical, basal, and frontal aspects of the shell of *Gyropena nissani* n. sp. (holotype, 2.04 × 0.92 mm.). *h*, The shell of *Syncera nitida guamensis* Abbott (Nissan Island, 3.18 × 1.86 mm.).

guamensis shows a wider shell than the Nissan specimens but his measurements indicate that both forms have almost identical proportions. Since later work may show that the Solomon Island form is separable, a specimen from Nissan is figured and the dimensions of five specimens are given below.

HEIGHT (mm.)	DIAMETER (mm.)	HEIGHT OF BODY WHORL (mm.)	HEIGHT OF APERTURE (mm.)
3.18	1.86	2.0	1.27
2.73	1.59	1.77	1.13
2.59	1.73	1.73	1.13
2.95	1.68	1.77	1.13
2.95	1.73	1.86	1.13

Genus ORPIELLA Gray, 1855

1855 *Orpiella* Gray, *Pulm. Brit. Mus.*, p. 147.
Haplotype: *Helix scorpio* Gould.

Baker (1941: 239) gives a full synonymy for this genus. He also proposes (p. 240) a new section, *Owaraha* for *Helix solidiuscula* Smith from the Solomon Islands, and this name probably is available for all the Solomon Island species, previously assigned to *Fretum*, *Kalendyma*, and *Nanina*. Rensch and Rensch (1936) has used *Orpiella* for *compluviata* (Cox), *concava* (Clapp), *malaitaensis* (Clapp), *treasuryensis* (Tryon), *pamuaensis* (Clapp), *keppelli* (Pfeiffer) and *solidiuscula* (Smith).

A small species was obtained on Nissan which does not agree with any other species recorded from the Solomons. It is here described as new. In the absence of the animal it may be tentatively assigned to *Orpiella* (*Owaraha*).

Orpiella (Owaraha) nissani n. sp.

Fig. 1*a–c*

Shell small globose-turbinate, perforate, translucent, shiny brown. Whorls five and a half, narrowly increasing, periphery evenly rounded. Embryonic whorls sculptured with microscopic spirals crossed by axials of

weaker strength. This sculpture persists across the spire whorls, with irregular axial growth wrinkles becoming more apparent. On the base the fine spirals become somewhat irregular but are stronger, and the microscopic axials become obsolete. Spire somewhat elevated. Suture rather impressed. Aperture sublunate, slightly oblique. Outer lip simple. Columella obliquely descending, slightly thickened and reflexed, almost covering the umbilicus. Umbilicus very narrow, deep, almost covered by the reflected columella.

Maximum diameter, 3.04 mm.; height, 2.32 mm.; height of spire 1.0 mm. (Holotype). Dimensions of three paratypes, maximum diameter 2.64, 3.0, 2.64 mm.; height, 1.91, 2.36, 1.86 mm.; height of spire 0.73, 1.19, 0.82 mm., respectively.

Holotype (M. F. 2511) and two paratypes (M. F. 2512) in Dominion Museum, Wellington, New Zealand. Another paratype in Bernice P. Bishop Museum, Honolulu.

Locality: Tangalan Plantation, Nissan Island, Solomon Islands, under logs. R. K. Dell, –6–1944.

Eustomopsis eustoma Pfeiffer 1856

A single shell was obtained from Nissan. It has the raised spire of *erinaceus* Pfr. but the whole question of the subspecific status of the Solomon Island forms needs review. Present indications are that *Eustomopsis eustoma erinaceus* Pfr. may be a northern form extending to New Ireland with *Eustomopsis eustoma eustoma* Pfr. replacing it in the southern Solomons. Only extensive series from numerous localities can decide the matter. It may well be a case of variability with no geographical basis.

Papuina (Pinnadena) periwonensis n. sp.

Fig. 2*b–d*

Shell trochiform, periphery sharply angled, imperforate. Whorls four and a half. Protoconch not clearly marked off from subsequent whorls. Apex domed, smooth at first apart from fine growth wrinkles. Upper whorls with fine irregular incised spirals which are retained on lower whorls on a narrow band below the suture. Penultimate and body whorl above the peripheral keel sculptured with irregular closely spaced oblique wrinkles. Base of body whorl with raised wrinkles, with irregular raised spirals running through them. Body whorl divided about the middle with a strong raised keel. Aperture oblique, expanded, thickened. Outer lip angled slightly by the keel, bearing up to three low broad teeth above the angulation. Outer lip advanced, columella retracted. No sign of perforation. Colour yellowish cream with broad irregular, brown, axially disposed, zigzag markings on the spire whorls, becoming rather oblique on the body whorl. Outer lip, columella and edge of keel white. See Table 2 for shell measurements. Locality: On vegetation near Periwon Village, Nissan Island, northern Solomons, R. K. Dell, May, 1944; generally distributed in the area near Tangalan Plantation.

Holotype (M. F. 2507) and four paratypes (M. F. 2508) in the Dominion Museum.

There is some variation in regard to height-width ratios and the brown colour markings are less obvious in some examples. Pilsbry

TABLE 2
SHELL MEASUREMENTS OF *Papuina* (*Pinnadera*) *periwonensis* N. SP.
(Measurements in Millimeters)

	DIAMETER	HEIGHT	HEIGHT OF SPIRE
Holotype	28.0	19.1	9.5
Paratype	27.8	19.5	10.2
Paratype	26.3	19.5	10.7
Paratype	27.4	18.5	10.1
Paratype	25.2	19.0	9.2

(1891) gave Marten's genus *Papuina* subgeneric rank and used some 15 groups, for each of which he gave a short diagnosis. Later workers have restored *Papuina* to full generic rank. Iredale (1941: 84) has proposed new generic names for 14 of these groups and has

used Pilsbry's group diagnoses as generic diagnoses without any very critical re-examination of specimens. Evaluation of these names must await a complete revision of the species of *Papuina*. In the meantime, they may be used subgenerically. *P. periwonensis* seems best included in *Pinnadena* (Type *Helix lombei* Pfeiffer). From the *lombei* series it may be distinguished by the very sharp keel on the periphery.

Gyropena nissani n. sp.

Fig. 1*e–g*

Shell small, discoidal, umbilicate. Whorls three and a half including a spirally striate protoconch of one and a half whorls. Sculpture on postembryonic whorls consisting of fine raised radial riblets, about 85 on body whorl. Interstices with fine growth lines and fine spirals. Spire very slightly elevated. Periphery rounded. Suture impressed. Aperture rather wide, sub-lunate, unarmed. Umbilicus deep, perspective, about one third the greatest diameter.

Major diameter 2.04 mm.; height .92 mm.; diameter of umbilicus 0.6 mm.

Holotype (M. F. 2513) in Dominion Museum, New Zealand.

Locality: Near Tangalan Plantation, Nissan Island, northern Solomons, in forest litter, R. K. Dell, June, 1944.

The only two members of the family Charopidae hitherto recorded from the Solomons are *Endodonta* (*Charopa*) *solomonensis* Clapp from Ugi, and *Foxidonta stevensoni* Clench from Malaita. *Foxidonta* is a peculiarly turreted shell, large for the family, and doubtfully belonging to it. *Charopa solomonensis* Clapp seems very similar to the New Zealand species around *C. anguiculus* (Reeve). It has a smooth protoconch. Jutting (1951: 28) has described *Charopa* (*Discachoropa*) *microdiscus* from Java and South Celebes, with fine radial riblets on the protoconch. The type of *Discocharopa* (*D. exquisita* Iredale) from the Kermadecs, has a smooth protoconch. It is not unusual for the fine radials on the protoconch to be worn off leaving an apparently smooth protoconch and *solomonensis* and *microdiscus* may both for the present be classed under *Discocharopa*. The former is somewhat larger than the other species ascribed to this genus and close examination of actual specimens may well show other points of difference. *Gyropena nissani* n. sp. has a protoconch with well-marked spirals, a very flattened spire, and an impressed suture. In some respects it recalls the New Zealand charopid genus *Mocella*. However, the general facies and the impressed suture agree with the description and figure of Iredale's *Gyropena* from Lord Howe Island.

The importance of these scattered charopids from the Solomons and the Greater Sunda Islands is that they probably represent relics on the migration route through which the charopid faunas of southern Australia, New Caledonia, Lord Howe, Norfolk, the Kermadecs, and New Zealand were derived.

TABLE 3

SHELL MEASUREMENTS OF *Partula* (*Melanesica*) *carteriensis* (Q. AND G.)
(Measurements in Millimeters)

SPECIMEN	NUMBER OF WHORLS	HEIGHT	DIAMETER	HEIGHT OF APERTURE	WIDTH OF APERTURE
Nissan	4½	17.8	9.8	9.0	5.6
Nissan	4½	17.5	8.9	9.0	6.2
Nissan	4½	17.3	9.3	9.2	6.2
P. carteriensis (*fide Pilsbry*)	5	17.5	8.5	9.0	6.0
P. carteriensis (*fide Pilsbry*)	4½	16.0	8.7	8.7	6.0

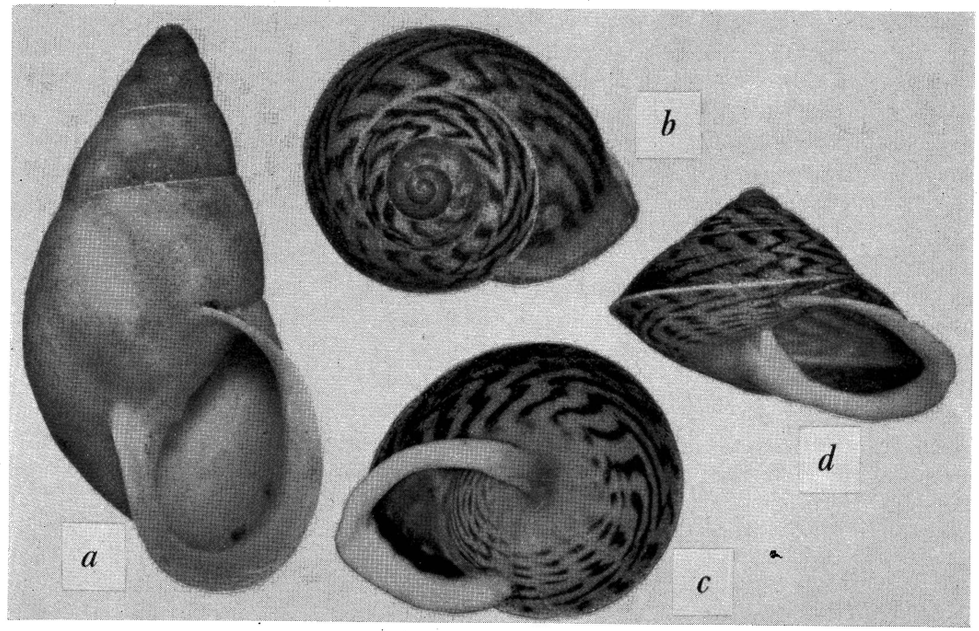

FIG. 2. *a*, Shell of *Partula* (*Melanesica*) cf. *carteriensis* (Q. and G.) (Nissan Island, 17.8 × 9.8 mm.). *b–d*, Apical basal, and frontal aspects of the shell of *Papuina* (*Pinnadena*) *periwonensis* n. sp. (holotype, 28.0 × 19.1 mm.).

Partula (**Melanesica**) cf. **carteriensis** (Q. and G., 1832)

Fig. 2*a*

A species of *Partula* was comparatively common on the island living on vegetation. The collection contains three specimens. They are close to *P. carteriensis* (Q. and G.) as described and figured by Pilsbry (1909: 298, pl. 36, figs. 15, 16) and the geographical position of Nissan in relation to New Ireland makes it very probable that they are closely related if not identical. The spiral sculpture is very fine as described for *P. carteriensis* (Q. and G.). Table 3 gives shell measurements of Pilsbry's specimens and three from Nissan. The systematics of the group in the Solomon Islands is so uncertain that a figure is given of a Nissan Island specimen. The tooth on the parietal lip is absent in the other specimens.

Opeas gracilis Hutton, 1854

A number of specimens were collected under rotten wood near the lagoon at Tangalan Plantation. This species is a tropical cosmopolite and has been recorded from many of the islands of the Solomon group.

DISCUSSION

Thirteen species of land snails are herein recorded from this small island and it is highly probable that other forms will be collected in the future. It is, however, unlikely that any large species were missed. The relationships of this fauna are, as might be expected, with both the Bismarck Archipelago and with the other Solomon Islands. Four of the species appear to be endemic to the island but for three of these (*Orpiella nissani*, *Gyropena nissani* and *Paludinella solomonensis*) this is probably an apparent, rather than a true endemism. So little is known of the molluscan fauna of the northern Solomons, especially the smaller forms, that little value can as yet come from such comparisons. It is more likely that *Papuina periwonensis* is truly endemic although again it could quite easily

occur also in northern Bougainville or Buka.

Of the nine non-endemic forms, one, *Opeas gracile*, is a cosmopolitan tropical form which has probably attained its present wide distribution through the assistance of man. Five species, *Omphalotropis nebulosa*, *Leptopoma vitreum*, *Pseudocyclotus levis*, *Eustomopsis eustoma*, and *Pupina keraudreni*, occur both in the Bismarck Archipelago and throughout the Solomons. *Partula carteriensis* is known elsewhere only from New Ireland. *Syncera nitida guamensis* occurs in the Carolines and *Sturanya modesta* has a fairly wide distribution throughout the Solomons and New Hebrides and has been recorded from Samoa. The two best represented elements in the fauna therefore are (a) the four endemic forms, and (b) the five species that range from the Bismarck Archipelago to the southern Solomons. The latter group must consist of species that either have been in the area for a long period of time or have efficient methods of dispersal. Since such geographical variation as has been observed in members of the group in this area is very slight or incipient, it seems most unlikely that these forms have been long established on Nissan or the other islands of the Solomons. We have, then, the situation that the two groups of species best represented on Nissan consist of one that has been present for a sufficiently long period to acquire strong differentiating characters and another that has become widely spread in the Solomons and colonized Nissan en route. That this movement has probably been mainly from the northwest to the southeast is shown by the wide distribution of such forms as *Leptopoma*, *Pseudocyclotus* and chloritid mollusks in the Austro-Malayan region.

The waifs and strays of the Nissan fauna are such as one would expect in an oceanic island, and three of these, *Paludinella*, *Syncera* and *Opeas*, are forms that appear to be confined to coastal areas.

Nissan is an elevated and probably tilted coral atoll, some 15 miles in diameter. Most of the surface of the island is covered by dense forest apart from two quite considerable patches of coconut plantations. Situated between Buka in the northern Solomons and New Ireland it is about 30 miles from Buka and 70 miles from New Ireland. However, it is more closely connected with New Ireland by the small island group of Feni, which is about halfway between. Ocean depths between Nissan and New Ireland are at least over 2,000 fathoms, and it is most unlikely that the two areas have been joined in the recent past by a fall in sea level. The land Mollusca of Nissan (apart from the endemic species which may be older in origin) must, therefore, have been derived by transoceanic migration. Very little is known of the methods used for such transoceanic dispersal by land snails although there has been a great deal of conjecture, especially in the literature of the latter part of the nineteenth century. What does seem very apparent is that some land snails do cross ocean barriers. At least it is as logical to assume that they do, as to postulate a land bridge in the face of strong biological and geological evidence to the contrary. In an attempt to derive some elements of the Solomon Island land snail fauna from the Bismarck Archipelago, the strait between New Ireland and Nissan presents the first and probably the widest oceanic barrier. The land snails present on Nissan show that some species have crossed this gap comparatively recently and that presumably they could also spread further south.

These remarks would apply to the *Eustomopsis*, *Omphalotropis*, *Leptopoma*, *Pseudocyclotus* and *Pupina*. *Partula carteriensis* has apparently crossed the strait but has not, so far as is known, extended its range further south. Three of these forms, *Leptopoma*, *Pseudocyclotus* and *Partula* are arboreal in habit while the other three are terrestrial, so there is apparently no advantage in motility as regards type of habitat.

When the fauna of Nissan is considered in relationship to the zoogeography of the Solomon group, some very distinctive elements are seen to be missing. No species of *Placostylus* extends as far north, and such characteristic genera as *Trochomorpha* and *Dendrotrochus* are not represented.

REFERENCES

ABBOTT, R. T. 1949. New syncerid mollusks from the Mariana Islands (Gastropoda, Prosobranchiata, Synceridae). *Bernice P. Bishop Mus., Occas. Papers* 19 (15): 261–274.

BAKER, H. B. 1941. Zonitid snails from Pacific Islands. [Parts 3 and 4.] *Bernice P. Bishop Mus., Bul.* 166: 1–370, 23 pls.

BARTSCH, P. 1918. A key to the subspecies of *Leptopoma nitidum* Sowerby of the Philippine Islands. *Wash. Acad. Sci., Jour.* 8: 532–535.

CLENCH, W. J. 1941. The land Mollusca of the Solomon Islands (Succineidae, Bulimulidae and Partulidae). *Amer. Mus. Novitates* 1129: 1–21.

——— 1949. Cyclophoridae and Pupinidae of Caroline, Fijian and Samoan Islands. *Bernice P. Bishop Mus., Bul.* 196: 1–52, 28 figs.

IREDALE, T. 1941. A basic list of the land Mollusca of Papua. *Austral. Zool.* 10: 51–94.

JUTTING, W. G. S. VAN B. 1948. Systematic studies on the non-marine Mollusca of the Indo-Australian Archipelago I. Critical revision of the Javanese operculate landshells of the families Hydrocenidae, Helicinidae, Cyclophoridae, Pupinidae, and Cochlostomatidae. *Treubia* 19: 539–604.

——— 1951. On a new Charopa from Celebes (Charopa (Discocharopa) microdiscus nov. spec.). *Basteria* 15: 28–29.

——— 1952. Systematic studies on the non-marine Mollusca of the Indo-Australian Archipelago III. Critical revision of the Javanese pulmonate land snails of the families Ellobiidae to Limacidae, with an appendix on Helicarionidae. *Treubia* 21: 291–435.

PILSBRY, H. A. 1891. [Tryon, G. W., and H. A. Pilsbry] *Manual of conchology*. Ser. 2, vol. 7, 225 pp., 61 pls. Academy of Natural Sciences of Philadelphia, Philadelphia.

——— 1909–10. [Tryon, G. W., and H. A. Pilsbry] *Manual of conchology*. Ser. 2, vol. 20, v + 336 pp., 43 pls. Academy of Natural Sciences of Philadelphia, Philadelphia.

RENSCH, I. 1937. Systematische und tiergeographische Untersuchungen über die Landschnecken-Fauna des Bismarck Archipelago. II. *Arch. f. Naturgesch.* (N.F.) 6: 525–644.

RENSCH, I., and B. RENSCH. 1936. Systematische und tiergeographische Studien über die Landschnecken der Solomonen II. *Rev. Suisse de Zool.* 43: 653–695.

SMITH, E. A. 1885. On a collection of shells (chiefly land and freshwater) from the Solomon Islands. *Zool. Soc. London, Proc.* 1885: 588–609.