

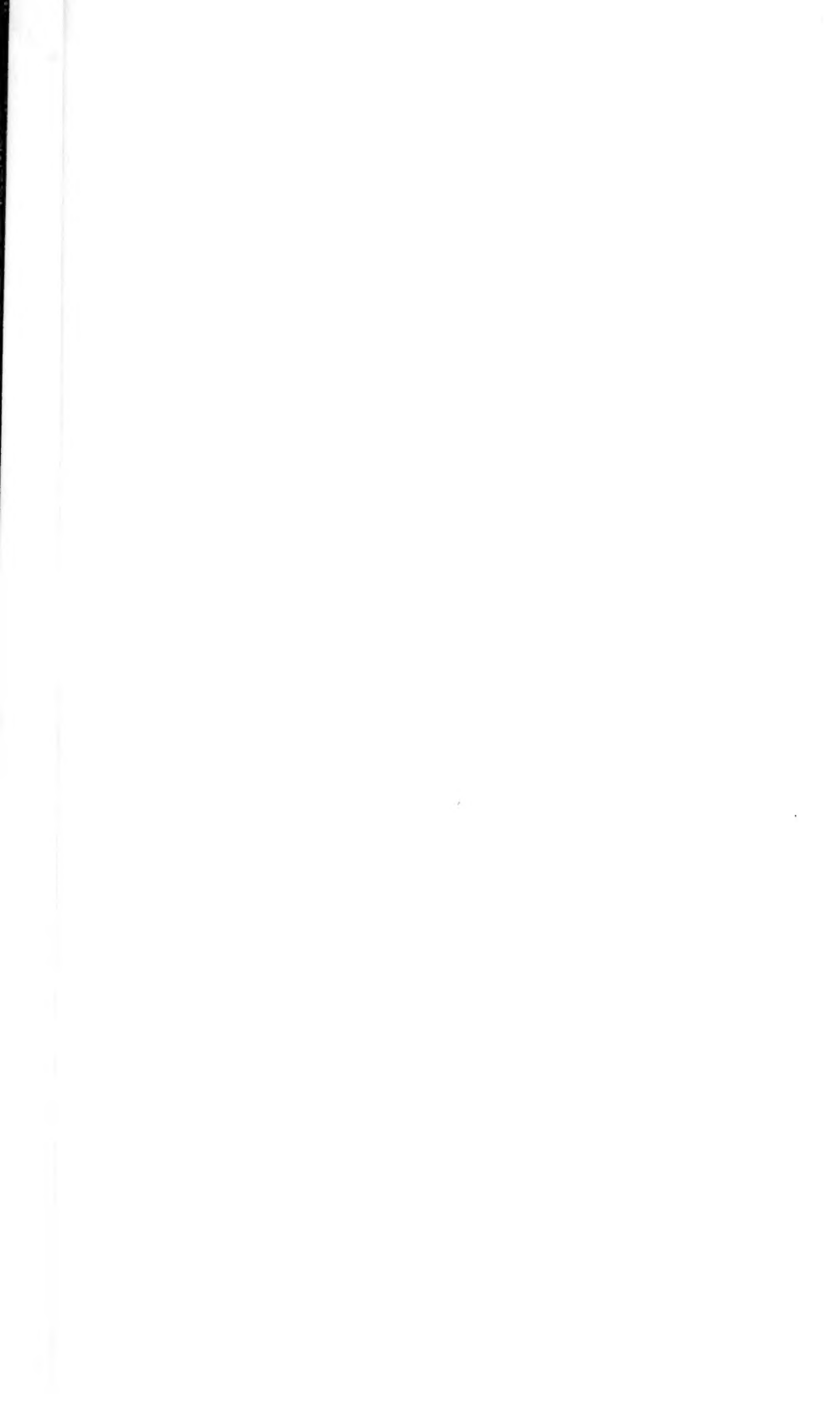


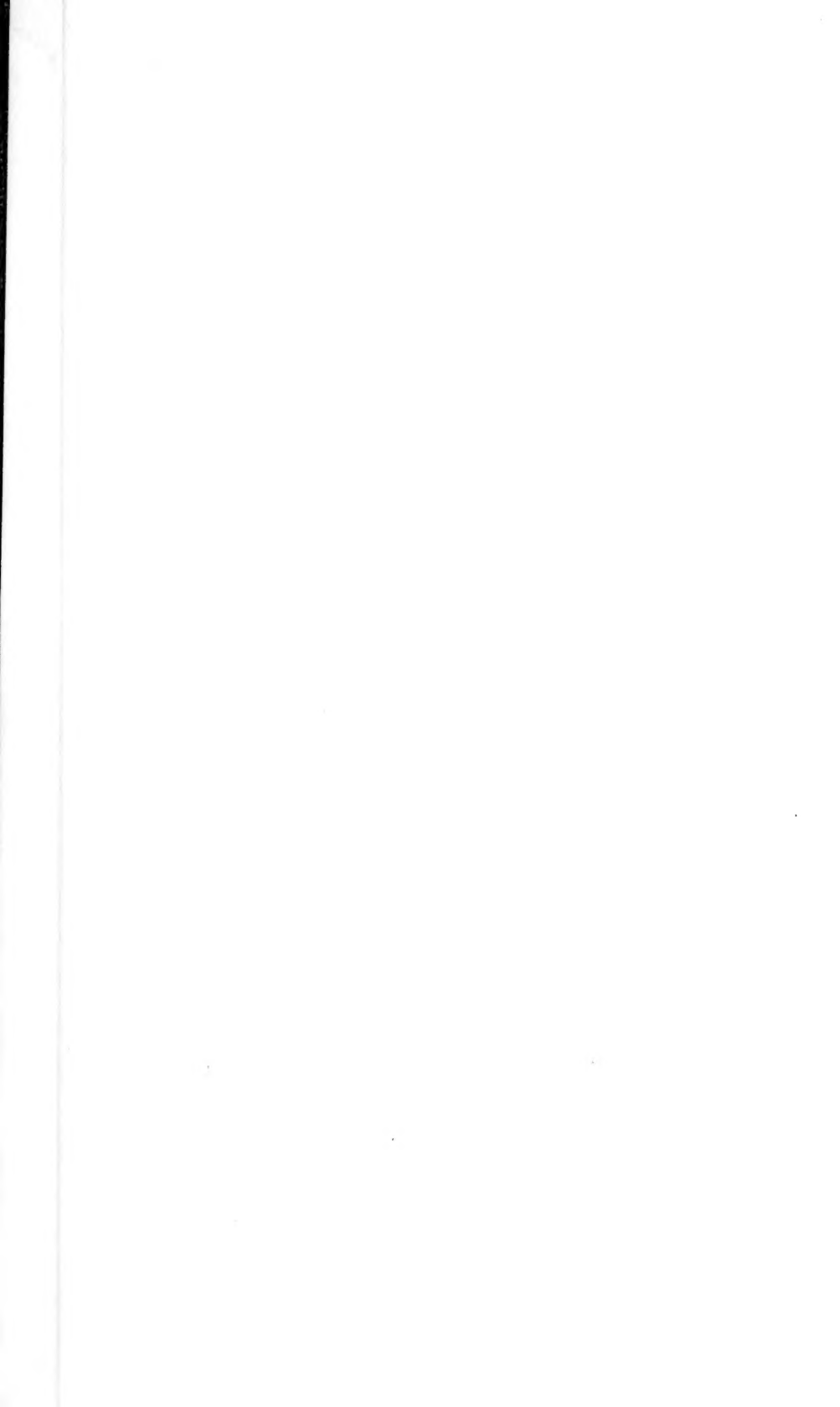


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NEW CALEDONIAN
LAND AND FRESH-WATER SNAILS
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ALAN SOLEM

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APRIL 21, 1961

NATURAE
HISTORY SURVEY



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ALAN SOLEM

Curator, Division of Lower Invertebrates

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New Caledonian Land and Fresh-Water Snails

INTRODUCTION

Pioneer studies on New Caledonian non-marine shells were made by Gassies (1863, 1871, 1880), Crosse (1894), and Dautzenberg (1923), and were recently summarized by Franc (1957) in an illustrated handbook designed to facilitate identifications. Only museum specimens from old collections were available to Franc and he did not attempt to make any innovations in classification.

A detailed study on New Hebridean non-marine mollusks and a survey of Pacific land snail geography (Solem, 1959) necessitated critical examination of many New Caledonian species. The material available in American museums is insufficient to allow any attempt at solving synonymies on the specific level, but did suggest a number of conclusions about the generic and family relationships of the New Caledonian species.

Franc's study dealt entirely with the taxonomy of the New Caledonian snails on the specific level and my own efforts are thus supplementary to his handbook. Study of material collected by T. D. A. Cockerell in 1928 (Solem, 1960) and re-examination of museum material resulted in my compiling this check list. This paper primarily attempts to relate the New Caledonian snails to those found in other regions.

The order of families, genera, and species follows that of Franc (1957). Under each species, reference has been given to the original description, the first published illustration, and Franc (1957). Primary references to synonyms are included. It was thought unnecessary to repeat the extensive citations of references given by Crosse (1894) and Franc (1957). Since many species now recognized may be only geographic races of polytypic species, I have cited the type locality for each named form. In cases where several localities were cited in the original description, I have arbitrarily selected the first named as type locality. Where examination of specimens suggested changes in Franc's synonymies or classification, the pertinent data are set forth as remarks under the species or genus concerned.

Material from several museum collections was examined. For convenience the museums are identified in the text by the following abbreviations:

ANSP	Academy of Natural Sciences of Philadelphia
CM	Carnegie Museum
CNHM	Chicago Natural History Museum
UMMZ	University of Michigan Museum of Zoology
USNM	United States National Museum

In three genera, *Pleuropoma*, *Physastra*, and *Placostylus*, the variation found in the New Hebridean species strongly suggested that most of the many New Caledonian named forms are only local races or individual variants of a very small number of species. For *Pleuropoma* and *Physastra* I have simply presented a chronological list of names. For *Placostylus* I have followed the classification set forth by Pilsbry (1900, pp. 28-68) rather than the one used by Franc (1957, pp. 150-161). Only local population studies can untangle the specific synonymy in these genera and no museum has sufficient material to make any attempt at revising the species meaningful.

Species preceded by an asterisk were seen during this study. No attempt at study of the taxonomy on the specific level in *Physastra* and *Placostylus* was made, and thus no names in these two genera are starred.

A major nomenclatural headache concerns the status of varietal names. Under the proposed new rules of zoological nomenclature discussed at the 1958 International Congress of Zoology, infrasubspecific names have no legal status. If subsequently elevated to specific or subspecific rank they must date from that time. Mere use of the term "variety," however, is not considered to be sufficient evidence that a name is infrasubspecific rather than subspecific.

Many of the authors who worked on the New Caledonian land shells had the habit of listing varietal names which have subsequently crept into the literature. Their method of proposing such names was not consistent and it is extremely doubtful that the names could be considered valid. In many cases, a series of varieties followed the Latin description of a species. A typical example (see Gassies, 1871, pp. 72-73) reads as follows:

"Var. β *ponderosa*, *crassiuscula*, *peristoma duplex*, *lutea*, *nitida*.
 Hab. Baie Lebris, Necoue. (M.E. Marie.)
 Var. χ *acutior*, *concolor*, *castanea ad B. alexander similis*.
 Hab. Kanala."

On the following page, a French translation of the description of the species is followed by the same varietal listings, *with the Latin phrases*

translated into colloquial French. In some cases only single words formed the Latin varietal descriptions; in other cases long phrases were used.

I have arbitrarily eliminated all of these varietal names from consideration on the basis that they are not consistently validly proposed and thus can have no nomenclatural standing. Whenever they have been subsequently elevated to specific rank or validly proposed, they are quoted from the later author. This procedure eliminates several hundred varietal names.

The species which Crosse (1894, pp. 170-173) removed from the New Caledonian faunal list are not included below, nor are full nomenclatural details cited for introduced species.

Systematic List

Family HELICINIDAE

The only twentieth century monograph of the Helicinidae (Wagner, 1907-11) is full of errors. Franc (1957, pp. 28-36) utilized Wagner's classification and most of the changes suggested below result from corrections of Wagner's mistakes; for example, Wagner (op. cit., pp. 260, 261) placed the New Caledonian *Helicina primeana* Gassies and the New Hebridean *H. layardi* Hartman in *Palaeohelicina* (*Ceratopoma*), although *Ceratopoma* Moellendorff, 1893, clearly has priority over *Palaeohelicina* Wagner, 1905. The New Hebridean *Helicina sublaevigata* Pfeiffer was put in *Orobophana* in 1905 and *Aphanoconia* (*Sphaeroconia*) in 1909. *Helicina layardi* and *H. sublaevigata* are synonyms (Solem, 1959, p. 174) and belong in *Pleuropoma*.

The record of *Palaeohelicina* from New Caledonia (Franc, 1957, pp. 35-36) is based on Wagner's misclassification of *Helicina primeana*. Species of the genus *Palaeohelicina*, found in the Palau Islands, New Guinea, the Bismarcks, and the Solomons, have a sharply carinate shell with strong spiral sculpture. None of the New Caledonian species are at all similar.

There are no clear-cut conchological differences by which *Orobophana* (not *Orobaphana* as in Franc, 1957) and *Pleuropoma* can be distinguished. Their radulae are quite different, but the conchological variation overlaps. None of the New Caledonian species have been dissected. While species such as *Helicina porphyrostoma* Crosse have the appearance of *Orobophana*, I suspect that they are derived from local *Pleuropoma*. Pending study of the animals, I prefer to retain all the New Caledonian species in *Pleuropoma*.

The record of *Helicina sublaevigata* Pfeiffer (see Franc, 1957, p. 34) from Lifu is based on a misidentification by Melville. Some of the specimens seen by Melville (UMMZ material) appear to be a variety of *Pleuropoma primeana* and I have dropped *sublaevigata* from the New Caledonian faunal list (see Solem, 1959, p. 175). *Helicina galina* Gassies and *H. laeta* Crosse are variants of a species complex which ranges over the entire Pacific (see discussion of *Pleuropoma articulata* in Solem, 1959, pp. 176-178). The remaining species seem to be modifications of one basic stock.

For convenience specific names are listed in chronological order.

Genus **PLEUROPOMA** Moellendorff, 1893

Type species.—*Helicina dichroa* Moellendorff, 1890 (original designation).

***Pleuropoma togatula** (Morelet), 1857

Helicina togatula Morelet, 1857, Bull. Soc. d'Hist. Nat. Moselle, 8: 30; Gassies, 1863, Faune Conchy., 1: 77, pl. 2, fig. 10.

Orobaphana (sic) *togatula* (Morelet), Franc, 1957, Moll. Néo-Caledonien, p. 32, pl. 3, fig. 34.

Type locality.—Ore meridionale, New Caledonia.

***Pleuropoma littoralis** (Montrouzier), 1859

Helicina littoralis Montrouzier, 1859, Jour. de Conchy., 7: 287, pl. 8, fig. 2.

Aphanoconia littoralis (Montrouzier), Franc, 1957, Moll. Néo-Caledonien, p. 30, pl. 3, fig. 33 (holotype of *littoralis*).

Type locality.—Art Island, New Caledonia.

***Pleuropoma littoralis pygmaea** (Gassies), 1880

Helicina littoralis pygmaea Gassies, 1880, Faune Conchy., 3: 68.

Type locality.—Nou Island, New Caledonia.

***Pleuropoma primeana** (Gassies), 1863

Helicina primeana Gassies, 1863, Faune Conchy., 1: 78, pl. 2, fig. 9.

Palaeohelicina primeana (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 35-36, pl. 4, fig. 42.

Type locality.—Mount Mou, New Caledonia.

***Pleuropoma lifouana** (Crosse), 1869

Helicina lifouana Crosse, 1869, Jour. de Conchy., 17: 25-26, pl. 2, fig. 5.

Orobaphana (sic) *sphaeroidea lifouana* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 35, pl. 4, fig. 41.

Type locality.—Lifu, Loyalty Islands.

***Pleuropoma gallina** (Gassies), 1870

Helicina gallina Gassies, 1870, Jour. de Conchy., 18: 145.

Helicina mariei Crosse, 1870, op. cit., 18: 244–245, 418, pl. 13, fig. 9.

Aphanoconia gallina (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 29–30, pl. 3, fig. 32.

Type locality.—Lifu, Loyalty Islands (*gallina*), New Caledonia (*mariei*).

***Pleuropoma mediana** (Gassies), 1870

Helicina mediana Gassies, 1870, Jour. de Conchy., 18: 145–146; Gassies, 1871, Faune Conchy., 2: 128, pl. 5, fig. 8.

Aphanoconia mediana (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 29, pl. 3, fig. 30.

Type locality.—Art Island, New Caledonia (here selected).

Pleuropoma laeta (Crosse), 1870

Helicina laeta Crosse, 1870, Jour. de Conchy., 18: 245–246; Gassies, 1871, Faune Conchy., 2: 132, pl. 8, fig. 8.

Aphanoconia laeta (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 28–29, pl. 3, fig. 29 (holotype of *laeta*).

Type locality.—Mount Mou, New Caledonia.

***Pleuropoma porphyrostoma** (Crosse), 1870

Helicina porphyrostoma Crosse, 1870, Jour. de Conchy., 18: 245; Gassies, 1871, Faune Conchy., 2: 131–132, pl. 8, fig. 10.

Helicina rossiteri Crosse, 1894, Jour. de Conchy., 42: 395–396.

Orobaphana (sic) *porphyrostoma* (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 33–34, pl. 3, fig. 37 (holotype of *porphyrostoma*).

Type locality.—New Caledonia (*porphyrostoma*), Baie du Sud (*rossiteri*).

Pleuropoma mouensis (Crosse), 1870

Helicina mouensis Crosse, 1870, Jour. de Conchy., 18: 246; Gassies, 1871, Faune Conchy., 2: 130, pl. 8, fig. 9.

Orobaphana (sic) *mouensis* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 34, pl. 3, fig. 39 (holotype of *mouensis*).

Type locality.—Mount Mou, New Caledonia.

***Pleuropoma benigna** (Crosse), 1870

Helicina benigna Crosse, 1870, Jour. de Conchy., **18**: 246-247; Gassies, 1871, Faune Conchy., **2**: 130-131, pl. 8, fig. 12.

Orobaphana (sic) *benigna* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 32.

Type locality.—New Caledonia.

Pleuropoma gassiesiana (Crosse), 1874

Helicina gassiesiana Crosse, 1874, Jour. de Conchy., **22**: 111, 184, pl. 4, fig. 6.

Orobaphana (sic) *gassiesiana* (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 32-33, pl. 3, fig. 35 (holotype of *gassiesiana*).

Type locality.—Mare, Loyalty Islands.

***Pleuropoma noumeensis** (Crosse), 1874

Helicina noumeensis Crosse, 1874, Jour. de Conchy., **22**: 111, 186, pl. 4, fig. 7.

Aphanoconia noumeensis (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 29, pl. 3, fig. 31 (holotype of *noumeensis*).

Type locality.—Vicinity of Noumea, New Caledonia.

***Pleuropoma alrici** (Crosse), 1887

Helicina alrici Crosse, 1887, Jour. de Conchy., **35**: 303; Crosse, 1895, op. cit., **42**: 79-80, pl. 5, fig. 7.

Orobaphana (sic) *alrici* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 34, pl. 3, fig. 38 (holotype of *alrici*).

Type locality.—Kanala, New Caledonia.

Pleuropoma mondaini (Crosse), 1887

Helicina mondaini Crosse, 1887, Jour. de Conchy., **35**: 303-304; Crosse, 1894, op. cit., **42**: 397-398, pl. 3, fig. 7.

Orobaphana (sic) *mondaini* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 33, pl. 3, fig. 36 (holotype of *mondaini*).

Type locality.—Baie du Sud, New Caledonia.

***Pleuropoma bourailensis** (Hartman), 1889

Helicina bourailensis Hartman, 1889, Proc. Acad. Nat. Sci. Philadelphia, **1889**: 93, pl. 5, fig. 8.

Helicina nehoueensis Hartman, 1889, op. cit., p. 93, pl. 5, fig. 9.

Helicina saxoniana Hartman, 1889, op. cit., pp. 93-94, pl. 5, fig. 10.

Aphanoconia bourailensis (Hartman), Franc, 1957, Moll. Néo-Caledonien, p. 30.

Aphanoconia nehoueensis (Hartman), Franc, 1957, op. cit., p. 31.

Aphanoconia saxoniana (Hartman), Franc, 1957, loc. cit.

Type locality.—Bourail, New Caledonia (*bourailensis*), Nehoué, New Caledonia (*nehouéensis*), and west coast of New Caledonia (*saxoniana*).

Remarks.—After restudy of their types and paratypes, these three named forms were considered to be individual variations of the same species (see Solem, 1960).

Pleuropoma ouenensis (Cockerell), 1930

Helicina (*Palaeohelicina*) *ouenensis* Cockerell, 1930, *Nautilus*, **43**, (4), pp. 134–135; **44**, (1), pl. 5, fig. 11.

Palaeohelicina ouenensis Cockerell, Franc, 1957, *Moll. Néo-Caledonien*, p. 36.

Type locality.—Dge, Ouen Island, New Caledonia.

Family POTERIIDAE

Clench (1949) divided the poteriids of Samoa, Fijis, New Hebrides, New Caledonia, and the Caroline Islands into several genera based solely on shell features. Solem (1959, p. 182) showed that the Samoan *Ostodes* and Fijian–New Hebridean *Gonatoraphe* are also characterized by anatomical features. The New Caledonian *Gassiesia* has not yet been dissected. The speciation pattern in *Gassiesia* worked out by Franc (1957, pp. 37–40) is changed only by the result of examining paratypes of *Ostodes vitreus* Preston and the suggestion of *Cyclostoma forbesianus* Pfeiffer as a probable synonym of *Gassiesia couderti* Fischer and Bernardi.

Genus GASSIESIA Clench, 1949

Type species.—*Cyclostoma artense* Montrouzier, 1859 (original designation).

***Gassiesia couderti** (Fischer and Bernardi), 1856

Cyclostoma coudertii (sic) Fischer and Bernardi, 1856, *Jour. de Conchy.*, **5**: 299–300, pl. 10, figs. 3–5.

Cyclostoma forbesianus Pfeiffer, 1856, *Proc. Zool. Soc. London*, **1855**: 104.

Cyclostoma bocageanum Gassies, 1863, *Faune Conchy.*, **1**: 76–77, pl. 2, fig. 2.

Gassiesia couderti (Fischer and Bernardi), Franc, 1957, *Moll. Néo-Caledonien*, p. 38, pl. 4, fig. 44 (holotype of *couderti*).

Type locality.—New Caledonia (*couderti*), Lord Howe Island, New Hebrides (*forbesianus*, error for Isle of Pines?), Tuo Island, New Caledonia (*bocageanum*).

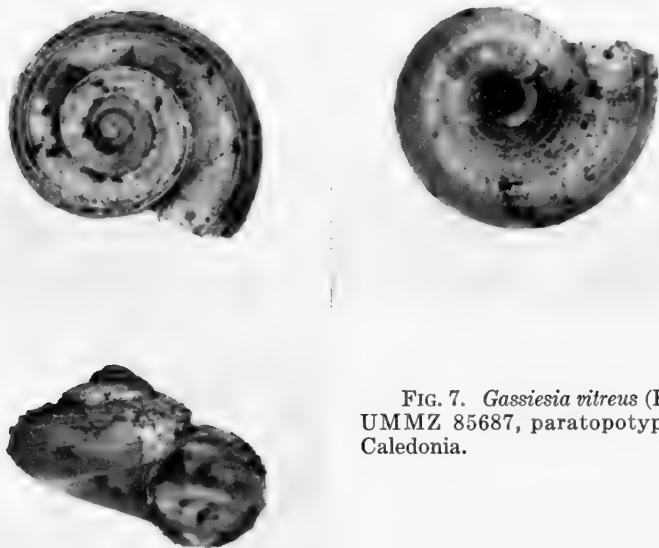


FIG. 7. *Gassiesia vitreus* (Preston), UMMZ 85687, paratopotype; New Caledonia.

**Gassiesia montrouzieri* (Souverbie), 1859

Cyclostoma montrouzieri Souverbie, 1859, Jour. de Conchy., 7: 291–293, pl. 8, fig. 5.

Gassiesia montrouzieri (Souverbie), Franc, 1957, Moll. Néo-Caledonien, pp. 38–39, pl. 4, fig. 45.

Type locality.—Art Island, New Caledonia.

**Gassiesia artense* (Montrouzier), 1859

Cyclotoma (sic) *artense* Montrouzier, 1859, Jour. de Conchy., 7: 286, pl. 8, fig. 1.

Gassiesia artense (Montrouzier), Franc, 1957, Moll. Néo-Caledonien, p. 39, pl. 4, fig. 46.

Type locality.—Art Island, New Caledonia.

**Gassiesia gasterianus* (Gassies), 1866

Cyclostoma gasterianus Gassies, 1866, Jour. de Conchy., 14: 50–51; Gassies, 1871, Faune Conchy., 2: 123, pl. 5, fig. 5.

Cyclostoma vieillardi Gassies, 1870, Jour. de Conchy., 18: 144–145; Gassies, 1871, Faune Conchy., 2: 124–125, pl. 5, fig. 7.

Gassiesia gasterianus (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 39–40, pl. 4, fig. 47.

Type locality.—Art Island, New Caledonia (*guesterianus*), Tuo Island, New Caledonia (*vieillardii* here selected).

****Gassiesia vitreus*** (Preston), 1907. Figure 7.

Ostodes vitreus Preston, 1907, Ann. Mag. Nat. Hist., (7), 19: 220, fig. 8; Franc 1957, Moll. Néo-Caledonien, p. 37, pl. 4, fig. 43.

Type locality.—New Caledonia.

Remarks.—Four paratypes (UMMZ 85687 and CNHM 26775) were examined. The operculum is thin, horny, multispiral (not paucispiral), and has a central depressed nucleus. The specimens are probably juvenile and have most of the basal sculpture reabsorbed. The spiral ribs are fewer and more prominent than in other *Gassiesia*, but the sculptural type is nearer that of *Gassiesia* than the Samoan *Ostodes*. The measurements of the four paratypes are:

	Height	Diameter	H/D ratio	Whorls
CNHM 26775.....	3.9	5.6	0.70	4
	4.1	6.0	0.68	4
UMMZ 85687.....	4.3	6.2	0.69	4 $\frac{1}{8}$
	4.5	6.6	0.68	4 $\frac{1}{4}$

Family DIPLOMMATINIDAE

The family name Diplommatinidae Pfeiffer, 1856, has priority of both time and usage over Cochlostomatidae Tielecke, 1940. Generic classification of the Diplommatinidae is empiric and no phylogenetic conclusions can be drawn at this time (see Solem, 1959, p. 190). The New Caledonian species are usually placed in *Palaina*, although originally described as *Diplommatina*. The many subgeneric names available for *Palaina* probably only signify convergent evolution (see Solem, 1959, p. 190) and are not utilized below.

Genus **PALAINA** O. Semper, 1865

Type species.—*Diplommatina macgillivrayi* Pfeiffer, 1855 (subsequent designation of Iredale, 1944, p. 303).

****Palaina montrouzieri*** (Crosse), 1874¹

Diplommatina montrouzieri Crosse, 1874, Jour. de Conchy., 22: 110, 394–395, pl. 12, fig. 8.

Palaina (Palaina) montrouzieri (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 41, pl. 4, fig. 48 (holotype of *montrouzieri*).

Type locality.—Baie du Sud, New Caledonia.

¹ See Solem (1960).

***Palaina montrouzieri humilior** Cockerell, 1930¹

Palaina montrouzieri var. *humilior* Cockerell, 1930, Jour. of Conch., **19**, (1), p. 20.

Type locality.—In drift a few miles from Bourail, New Caledonia.

***Palaina mariei** (Crosse), 1867

Diplommatina mariei Crosse, 1867, Jour. de Conchy., **15**: 179–180, pl. 7, fig. 6.

Palaina (*Cylindropalaina*) *mariei* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 41, pl. 4, fig. 49 (holotype of *mariei*).

Type locality.—Under dead leaves in forest near Noumea, New Caledonia.

***Palaina perroquini** (Crosse), 1871

Diplommatina perroquini Crosse, 1871, Jour. de Conchy., **19**: 204–205; Crosse, 1873, op. cit., **21**: 44–45, pl. 1, fig. 6.

Palaina (*Macropalaina*) *perroquini* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 42, pl. 4, fig. 51 (holotype of *perroquini*).

Type locality.—New Caledonia.

Palaina obesa (Hedley), 1898

Diplommatina obesa Hedley, 1898, Proc. Linn. Soc. New South Wales, **23**: 102, fig. 10.

Palaina (*Macropalaina*) *obesa* (Hedley), Franc, 1957, Moll. Néo-Caledonien, pp. 41–42, pl. 4, fig. 50.

Type locality.—Oubatche, New Caledonia.

Family HYDROBIIDAE

The radula, operculum, and genital anatomy offer many more characters than the shell for use in formulating a classification. Unfortunately, the New Caledonian species are known from the shell only, except for *Lyogyrus petiti* Crosse, whose radula was examined by Thiele (1928). The shell of *Hydrobia gentilsiana* Crosse is like the Lord Howe Island, New Hebridean, Fijian, and Rapan species belonging to *Fluviopupa* (see Solem, 1959, pp. 194–196), but the operculum has the same process as that found in *Hemistomia*, and the species is tentatively placed in that genus (see Solem, 1960).

Lyogyrus, sens. str., is limited to eastern North America. The placement of a New Caledonian species in this genus seems improbable, but the New Caledonian *L. perroquini* (UMMZ 91577) and the

¹ See Solem (1960).

Massachusetts *L. pupoideus* (CNHM 32823) are almost identical in shell, and opercular and radular (teste Thiele) characters. The New Caledonian species is slightly larger and Thiele retained the name *Heterocyclus* Crosse, 1872, as a section of *Lyogyrus*. This procedure is adopted below. The unusual New Caledonian–North American relationship is paralleled by the Indonesian–North American endodontids (*Stenopylis–Helicodiscus*; see Solem, 1957), the New Zealand–North American frogs (*Leiopelma–Ascaphus*), and possibly the Oriental–North American fresh-water operculates (*Oncomelania–Pomatiopsis*; see van der Schalie and Dundee, 1956).

Crosse (1894) and Franc (1957) recognized two species of New Caledonian *Lyogyrus*. Both are found in the Lac des Grands Kaoris. Judging from the variation found in *Fluviopupa* (see Solem, 1959, p. 195) and the dimorphic shells of *Lyogyrus pupoideus* (CNHM 32823), I suspect that *L. perroquini* Crosse is the female and *L. petiti* Crosse the male of the same species.

Genus **LYOGRYRUS** Gill, 1863

Type species.—*Valvata pupoidea* Gould, 1840 (original designation).

Section **Heterocyclus** Crosse, 1872

Type species.—*Heterocyclus perroquini* Crosse, 1872 (monotype).

***Lyogyrus (Heterocyclus) perroquini** (Crosse), 1872

Heterocyclus perroquini Crosse, 1872, Jour. de Conchy., **20**: 156–157, 355–356, pl. 16, figs. 6, 6a.

?*Valvata ? petiti* Crosse, 1872, op. cit., **20**: 157, 353–354, pl. 16, fig. 7.

Lyogyrus (Heterocyclus) perroquini Crosse, Franc, 1957, Moll. Néo-Caledonien, p. 44, pl. 4, fig. 54 (holotype of *perroquini*).

Lyogyrus (Heterocyclus) petiti (Crosse), Franc, 1957, op. cit., pp. 44–45, pl. 4, fig. 55 (holotype of *petiti*).

Type locality.—Baie du Sud, New Caledonia (*perroquini*), Lac de la Grande vallée des Kaoris, New Caledonia (*petiti*).

Incertae sedis

Hydrobia crosseana Gassies, 1874

Hydrobia crosseana Gassies, 1874, Jour. de Conchy., **22**: 215–216.

Type locality.—Bonde, northeast New Caledonia.

Remarks.—Crosse (1894, pp. 373–374) could not establish the identity of this name and it was omitted by Franc (1957).

Family TRUNCATELLIDAE

The catalogue of Clench and Turner (1948) was not seen by Franc (1957). Without new material and restudy of types, no critical revision of New Caledonian truncatellids can be attempted. Five names have been proposed for New Caledonian populations and the following widely distributed species have been reported from the area: *Truncatella conspicua* Pfeiffer, 1856, *T. guerinii* A. and J. B. Villa, 1841 (of which *T. vitiana* Gould, 1848, and *T. valida* Pfeiffer, 1846, are synonyms), and *T. rustica* Mousson, 1865.

The five names applied to New Caledonian populations are:

Truncatella labiosa Souverbie, 1862

Truncatella labiosa Souverbie, 1862, Jour. de Conchy., **10**: 242-243, pl. 9, fig. 9.

Type locality.—Art Island, New Caledonia.

Remarks.—Clench and Turner (1948, p. 164) consider this a synonym of *T. teres* Pfeiffer.

Truncatella semicostata Montrouzier, 1862

Truncatella semicostata Montrouzier, 1862, Jour. de Conchy., **10**: 243-244, pl. 9, fig. 10.

Type locality.—Art Island, New Caledonia.

Remarks.—Clench and Turner (1948, p. 163) consider this a synonym of *T. marginata* Pfeiffer.

Truncatella diaphana Gassies, 1869

Truncatella diaphana Gassies, 1869, Jour. de Conchy., **17**: 78; Gassies, 1871, Faune Conchy., **2**: 138-139, pl. 5, fig. 16.

Type locality.—Art Island, New Caledonia.

Truncatella subsulcata Gassies, 1878

Truncatella subsulcata Gassies, 1878, Jour. de Conchy., **26**: 338-339; Gassies, 1880, Faune Conchy., **3**: 68-69, pl. 2, fig. 8.

Type locality.—Lifu, Loyalty Islands.

Truncatella cerea Gassies, 1878

Truncatella cerea Gassies, 1878, Jour. de Conchy., **26**: 339-340; Gassies, 1880, Faune Conchy., **3**: 69-70, pl. 2, fig. 9.

Type locality.—Isle of Pines, New Caledonia.

Remarks.—Clench and Turner (1948, p. 196) consider this to be a synonym of *Truncatella ceylanica* Pfeiffer.

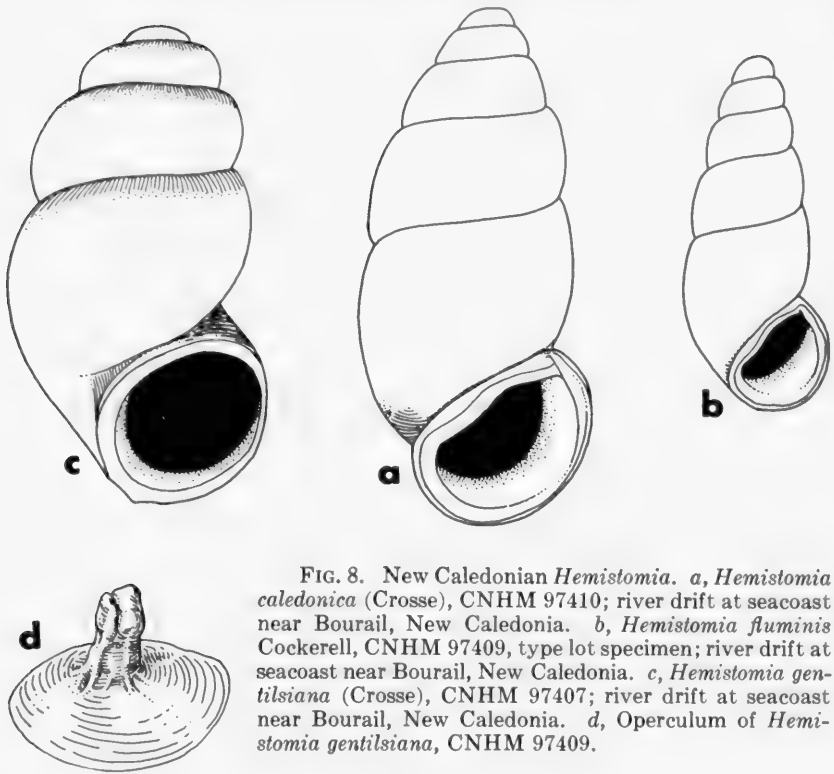


FIG. 8. New Caledonian *Hemistomia*. *a*, *Hemistomia caledonica* (Crosse), CNHM 97410; river drift at seacoast near Bourail, New Caledonia. *b*, *Hemistomia fluminis* Cockerell, CNHM 97409, type lot specimen; river drift at seacoast near Bourail, New Caledonia. *c*, *Hemistomia gentilsiana* (Crosse), CNHM 97407; river drift at seacoast near Bourail, New Caledonia. *d*, Operculum of *Hemistomia gentilsiana*, CNHM 97409.

Family RISSOIDAE

Whether *Hemistomia* and its Australian relatives, *Tatea* and *Angrobia*, are rissoids or hydrobiids is still uncertain. Following Thiele (1929, p. 168), I have placed them in the rissoid subfamily Hemistomiinae. Specimens of the two previously described New Caledonian species (fig. 8, *a*, *b*) collected by T. D. A. Cockerell differed in size quite conspicuously (see Solem, 1960). The species described as *Hydrobia gentilsiana* by Crosse was found to have a clawed operculum (fig. 8, *d*) rather than the smooth hydrobiid type. The shell (fig. 8, *c*) of *gentilsiana* has a quite different facies than that of *Hemistomia* and the opercular claw is bifurcate rather than digitate. Despite these differences I prefer to place *gentilsiana* in *Hemistomia* rather than propose a new genus without studying the radula and genitalia.

Genus **HEMISTOMIA** Crosse, 1872

Type species.—*Hemistomia caledonica* Crosse, 1872 (monotype).

***Hemistomia caledonica** Crosse, 1872. Figure 8, *a*.

Hemistomia caledonica Crosse, 1872, Jour. de Conchy., **20**: 72-73, 352-353, pl. 16, fig. 8; Franc, 1957, Moll. Néo-Caledonien, p. 47, pl. 5, fig. 59 (co-type of *caledonica*).

Type locality.—Vicinity of Noumea, New Caledonia.

***Hemistomia fluminis** Cockerell, 1930. Figure 8, *b*.

Hemistomia fluminis Cockerell, 1930, Jour. of Conch., **19**, (1), pp. 19-20, fig. 9; Franc, 1957, Moll. Néo-Caledonien, pp. 47-48, pl. 5, fig. 60.

Type locality.—River drift a few miles from Bourail, New Caledonia.

*?**Hemistomia gentilsiana** (Crosse), 1874. Figure 8, *c, d*.

Hydrobia gentilsiana Crosse, 1874, Jour. de Conchy., **22**: 112, 395-396, pl. 12, fig. 9; Franc, 1957, Moll. Néo-Caledonien, p. 43, pl. 4, fig. 52 (holotype of *gentilsiana*).

Type locality.—Oubatche, near Pueblo, New Caledonia, in fresh water at 300 meters elevation.

Remarks.—Comparative measurements of the three New Caledonian *Hemistomia* are given by Solem (1960).

Family ASSIMINEIDAE

Classification of the Assimineidae is confused, and no meaningful arraignment of the species is possible at this time. The radula of one New Caledonian species has been examined, but otherwise they are known only from shells and operculi. Only a few comments can be offered on the possible affinities of the New Caledonian morphs.

Specimens of *Hydrocena pygmaea* Gassies (UMMZ 74268) are members of the *Assiminea nitida* Pease complex (see Solem, 1959, p. 199). Pending revision of the entire group, the New Caledonian population can be called *Assiminea nitida pygmaea*. *Hydrocena caledonica* Crosse is the type species of *Crossilla* Thiele, 1928 (a section of *Assiminea*). Possibly *Hydrocena crosseana* Gassies belongs to the same group. *Hydrocena hidalgoi* Gassies has been reported under various generic names all the way from Mauritius to the Philippines and New Caledonia. Possibly more than one species is involved. Following van Benthem Jutting (1956, pp. 354-355, fig. 67), I am placing *hidalgoi* in *Assiminea* rather than *Paludinella*. *Hydrobia savesi* Crosse appears to be an assimineid and is tentatively placed in "*Assiminea*," sens. lat.

The species Franc placed in *Omphalotropis* show diverse affinities. *O. granum* belongs to the species complex which Thiele placed in the section *Oriella* (see Solem, 1959, p. 200). The actual number of species involved is uncertain, but far too many have been recognized, since the populations on each archipelago have been called distinct.

Omphalotropis fischeriana Gassies is not known to me and was not seen by Franc. It is listed under *Incertae sedis*.

Omphalotropis coturnix Crosse (CNHM 32236) and *O. rubra* Gassies (UMMZ 74347) are quite distinctive in appearance. The nucleus of the horny operculum is acentral and the shell has a micro-sculpture of very fine spiral threads. The New Hebridean *Omphalotropis* (see Solem, 1959, pp. 199-204) have the nucleus of the operculum centrally located and the shell is sculptured with spiral lirae crossed by retractive radial riblets. Study of the soft parts may result in recognition of a sectional or subgeneric unit for the New Caledonian species.

Genus ASSIMINEA Fleming, 1828

Type species.—*Assiminea grayana* Fleming, 1828 (monotype).

**Assiminea* (?) *nitida pygmaea* (Gassies), 1867

Hydrocena pygmaea Gassies, 1867, Jour. de Conchy., 15: 63; Gassies, 1871, Faune Conchy., 2: 134, pl. 5, fig. 11.

Type locality.—Art Island, New Caledonia.

Remarks.—Franc (1957, p. 49) listed *Hydrocena pygmaea* as a questionable synonym of *Assiminea crosseana*.

Assiminea (?) *hidalgoi* (Gassies), 1869

Hydrocena hidalgoi Gassies, 1869, Jour. de Conchy., 17: 78; Gassies, 1871, Faune Conchy., 2: 136-137, pl. 5, fig. 14.

Paludinella hidalgoi (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 49-50, pl. 5, fig. 63.

Type locality.—Art Island, New Caledonia.

**Assiminea* (*Crossilla*) *caledonica* (Crosse), 1869

Hydrocena caledonica Crosse, 1869, Jour. de Conchy., 17: 24-25, pl. 2, fig. 4.

Acmella (*Solenomphala*) *turbinata* Preston, 1907, Ann. Mag. Nat. Hist., (7), 19: 220, fig. 9.

Assiminea (*Crossilla*) *caledonica* (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 48-49, pl. 5, fig. 61 (holotype of *caledonica*).

Type locality.—Vicinity of Noumea, New Caledonia (*caledonica*), and New Caledonia (*turbinata*).

***Assiminea (Crossilla) crosseana** (Gassies), 1869

Hydrocena crosseana Gassies, 1869, Jour. de Conchy., **17**: 77–78; Gassies, 1871, Faune Conchy., **2**: 133, pl. 5, fig. 13.

Hydrocena turbinata Gassies, 1871 (not Morelet, 1865), op. cit., **2**: 195–196.

Hydrocena turrata Gassies, 1880, op. cit., **3**: 71—new name for *turbinata* Gassies, 1871 (not Morelet, 1865).

Assiminea crosseana (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 49, pl. 5, fig. 62.

Type locality.—Art Island, New Caledonia (*crosseana*), Noumea, New Caledonia (*turbinata*).

*“**Assiminea**” **savesi** Crosse, 1887

Hydrobia savesi Crosse, 1887, Jour. de Conchy., **35**: 304; Crosse, 1894, op. cit., **42**: 374–375, pl. 7, fig. 8; Franc, 1957, Moll. Néo-Caledonien, p. 44, pl. 4, fig. 53 (holotype of *savesi*).

Type locality.—Thio, New Caledonia.

Remarks.—Specimens collected by T. D. A. Cockerell in 1928 (see Solem, 1960) clearly show the two pale brown stripes on the body whorl mentioned in the original description. This is a characteristic color pattern of the Assimineidae and the aspect of the shell is that of some of the widespread species of *Assiminea*. Without preserved material, or even dried specimens with operculi, generic reference must be tentative. This species is very questionably listed as *Assiminea*. Three adult shells had 4 to 4 $\frac{3}{8}$ whorls, were 1.31 to 1.49 mm. in height and 0.82 to 0.92 mm. in diameter.

Genus **OMPHALOTROPIS** Pfeiffer, 1851

Type species.—*Cyclostoma aurantiaca* Deshayes, 1834 (subsequent designation of Gude, 1921, p. 355).

Section **Oriella** Thiele, 1927

Type species.—*Omphalotropis submaritima* Quodras and Moellendorff, 1894 (original designation).

***Omphalotropis (Oriella) granum** (Pfeiffer), 1855

Hydrocena granum Pfeiffer, 1855, Proc. Zool. Soc. London, **1854**: 308–309.

Hydrocena (Omphalotropis) maritima Montrouzier, 1863, Jour. de Conchy., **11**: 74–75, 165–166, pl. 5, fig. 4.

Omphalotropis granum (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, p. 51, pl. 5, fig. 66.

Type locality.—Isle of Pines, New Caledonia (*granum*) and Art Island, New Caledonia (*maritima*).

SECTION UNKNOWN

**Omphalotropis* (?) *coturnix* (Crosse), 1867

Hydrocena coturnix Crosse, 1867, Jour. de Conchy., 15: 181-184, pl. 7, fig. 5.

Omphalotropis coturnix (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 50, pl. 5, fig. 64.

Type locality.—In woods near Noumea, New Caledonia.

**Omphalotropis* (?) *rubra* (Gassies), 1874

Hydrocena rubra Gassies, 1874, Jour. de Conchy., 22: 214-215; Gassies, 1880, Faune Conchy., 3: 70-71, pl. 4, fig. 8.

Omphalotropis rubra (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 51, pl. 5, fig. 65.

Type locality.—Baie du Sud, New Caledonia.

Incertae sedis

Hydrocena fischeriana Gassies, 1863

Hydrocena fischeriana Gassies, 1863, Faune Conchy., 1: 115, pl. 7, fig. 18.

Omphalotropis fischeriana (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 51-52.

Type locality.—Vicinity of Balade, New Caledonia.

Remarks.—The identity of this species can be discovered only by the study of topotypic material.

Hydrocena diaphana Gassies, 1863

Hydrocena diaphana Gassies, 1863, Faune Conchy., 1: 114-115, pl. 6, fig. 6.

Type locality.—Fresh-water swamps on the Isle of Pines, New Caledonia.

Remarks.—Crosse (1894, p. 391) could not classify this species from the description and figure. He had seen no specimen and dropped the name from the faunal list.

Family PLANORBIDAE

Hubendick (1948, 1955) established a phylogenetic classification of the planorbid snails. New Caledonia has three genera represented,

the physoid high-spined *Physastra* (*Isidora* of Franc, 1957, pp. 84–88), the high-spined, spirally ribbed *Glyptophysa*, and the minute, planulate *Gyraulus*. Two names listed by Franc (1957) probably are based on introduced or mislabeled specimens.

Planorbis morletianus Crosse, 1887¹ (type locality Baie du Sud, New Caledonia) (Franc, 1957, p. 89, pl. 9, fig. 121) may be a young specimen of the European *Planorbis planorbis* Linnaeus or *P. carinatus* Müller. The New Caledonian name could be based on either an introduced population or a mislabeled lot.

Planorbis ingenuus Morelet, 1857 (type locality New Caledonia) (Franc, 1957, pp. 90–91) is even more suspect. The only illustration (Gassies, 1863, pl. 7, fig. 16) resembles some of the North American *Helisoma* and is completely unlike any Pacific Ocean species. In the same paper, Morelet described *Ampullaria ormophora* as coming from New Caledonia. No ampullariids have been found east of Wallace's Line and I suspect that the locality for *Planorbis ingenuus* is equally untrustworthy.

Genus **PHYSASTRA** Tapparone-Canefri, 1883

Type species.—*Physastra vestita* Tapparone-Canefri, 1883 (original designation).

Remarks.—Hubendick (1948) showed that *Isidora* refers to species with a pseudopenis. The New Caledonian species have a true penis and must be placed in *Physastra*. Fifteen names have been applied to New Caledonian *Physastra*, and Franc (1957) recognized twelve species. Solem (1959, pp. 162–164) showed that the New Hebridean *Physastra* are anatomically identical with *P. dohiolum* Gassies (as figured by Hubendick, 1948). The shell variation of the New Hebridean populations encompassed most of the New Caledonian "species." In the 1880's, E. L. Layard wrote W. D. Hartman (letter in the Carnegie Museum) that he had seen different "species" of New Caledonian *Physastra* in copulation. Without field studies, no revision of the "species" is possible. It is quite probable, however, that the fifteen names will be reduced to only one or two species.

A chronological list of the named forms follows. It is intended *only* as a nomenclatural guide and is not a list of *species*.

Physastra nasuta (Morelet), 1857

Physa nasuta Morelet, 1857, Bull. Soc. d'Hist. Nat. Moselle, 8: 28.

¹ Not to be confused with the Venezuelan *Planorbis moreletianus* Clessin, 1884.

Physa castanea Gassies, 1863 (not Lamarck, 1822), Faune Conchy., 1: 80, pl. 6, fig. 14.

Isidora nasuta (Morelet), Franc, 1957, Moll. Néo-Caledonien, p. 85, pl. 9, fig. 113.

Type locality.—Sanctam-Mariam de Balade, New Caledonia.

Physastra obtusa (Morelet), 1857

Physa obtusa Morelet, 1857, Bull. Soc. d'Hist. Nat. Moselle, 8: 28; Gassies, 1863, Faune Conchy., 1: 81–82, pl. 6, fig. 7.

Isidora obtusa (Morelet), Franc, 1957, Moll. Néo-Caledonien, p. 86, pl. 9, fig. 115.

Type locality.—Sanctam-Mariam de Balade, New Caledonia.

Physastra hispida (Morelet), 1857

Physa hispida Morelet, 1857, Bull. Soc. d'Hist. Nat. Moselle, 8: 28–29; Crosse, 1868, Jour. de Conchy., 16: 321–322, pl. 13, fig. 3.

Isidora hispida (Morelet), Franc, 1957, Moll. Néo-Caledonien, pp. 87–88.

Type locality.—Sanctam-Mariam de Balade, New Caledonia.

Physastra caledonica (Morelet), 1857

Physa caledonica Morelet, 1857, Bull. Soc. d'Hist. Nat. Moselle, 8: 29; Crosse, 1868, Jour. de Conchy., 16: 320–321, pl. 13, fig. 2.

Isidora caledonica (Morelet), Franc, 1957, Moll. Néo-Caledonien, p. 86, pl. 9, fig. 116.

Type locality.—Sanctam-Mariam de Balade, New Caledonia.

Physastra tetrica (Morelet), 1857

Physa tetrica Morelet, 1857, Bull. Soc. d'Hist. Nat. Moselle, 8: 29; Crosse, 1868, Jour. de Conchy., 16: 325–327, pl. 13, figs. 4, 4a.

Isidora tetrica (Morelet), Franc, 1957, Moll. Néo-Caledonien, p. 84, pl. 9, fig. 111 (holotype of variety beta).

Type locality.—Sanctam-Mariam de Balade, New Caledonia.

Physastra auriculata (Gassies), 1857

Physa auriculata Gassies, 1857, Jour. de Conchy., 6: 274–275, pl. 9, figs. 5–6.

Isidora auriculata (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 85, pl. 9, fig. 114.

Type locality.—Marshes near Balade, New Caledonia.

Physastra kanakina (Gassies), 1857

Physa kanakina Gassies, 1857, Jour. de Conchy., 9: 275, pl. 9, figs. 7–8.

Type locality.—In the river at Balade, New Caledonia.

Remarks.—Franc (1957, p. 86) considered this a synonym of *P. caledonica*.

Physastra guillaini (Crosse and Marie), 1868

Physa guillaini Crosse and Marie, 1868, Jour. de Conchy., 8: 324–325, pl. 13, fig. 1.

Isidora guillaini (Crosse and Marie), Franc, 1957, Moll. Néo-Caledonien, pp. 84–85, pl. 9, fig. 112 (holotype of *guillaini*).

Type locality.—Tangoin near Noumea, New Caledonia.

Physastra artensis (Gassies), 1869

Physa artensis Gassies, 1869, Jour. de Conchy., 17: 76; Gassies, 1871, Faune Conchy., 2: 141–142, pl. 7, fig. 8.

Type locality.—Art Island, New Caledonia.

Remarks.—Franc (1957, p. 84) listed this as a doubtful species.

Physastra varicosa (Gassies), 1871

Physa varicosa Gassies, 1871, Faune Conchy., 2: 197.

Isidora varicosa (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 88.

Type locality.—Boulari Bay, New Caledonia.

Physastra incisa (Gassies), 1880

Physa incisa Gassies, 1880, Faune Conchy., 3: 72, pl. 2, fig. 13.

Type locality.—Bourail, New Caledonia.

Remarks.—Franc (1957, p. 85) listed this as a synonym of *P. guillaini*.

Physastra doliolum (Gassies), 1874

Physa doliolum Gassies, 1874, Jour. de Conchy., 22: 379–380; Gassies, 1880, Faune Conchy., 3: 73, pl. 2, fig. 14.

Isidora doliolum (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 87, pl. 9, fig. 118.

Type locality.—Ouagap, New Caledonia.

Physastra perlucida (Gassies), 1880

Physa perlucida Gassies, 1880, Faune Conchy., 3: 75–76, pl. 4, fig. 9.

Isidora perlucida (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 86–87, pl. 9, fig. 117.

Type locality.—Isle of Pines, New Caledonia.

Physastra sarasini (Dautzenberg), 1923

Physa sarasini Dautzenberg, 1923, Nova Caledonia, Zool., 3: 152, fig. 4.

Isidora sarasini (Dautzenberg), Franc, 1957, Moll. Néo-Caledonien, p. 87, pl. 9, fig. 119.

Type locality.—Vallée de Ngoi at 200 meters altitude, New Caledonia.

Genus GLYPTOPHYSA Crosse, 1872

Type species.—*Physa petiti* Crosse, 1872 (original designation).

Remarks.—The remarkable sculpture of spiral ribs at once separates this monotypic genus from the other New Caledonian physoid planorbs. *Physa aliciae* Reeve, from Australia, has the same type of sculpture. Iredale (1943) created the genus *Glyptamoda* for the Australian species. Neither *Glyptophysa* nor *Glyptamoda* has been dissected and their affinities remain to be determined.

***Glyptophysa petiti** (Crosse), 1872

Physa petiti Crosse, 1872, Jour. de Conchy., 20: 71–72.

Glyptophysa petiti Crosse, 1872, op. cit., 20: 152–153, pl. 7, fig. 4.

Isidora (Glyptophysa) petiti (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 88, pl. 9, fig. 120 (holotype of *petiti*).

Type locality.—Lac de la Grande vallée des Kaoris, New Caledonia.

Genus GYRAULUS Charpentier, 1837

Type species.—*Planorbis hispidus* Draparnaud, 1805 (= *albus* Müller) (subsequent designation of Dall, 1870).

Remarks.—*Gyraulus*-like snails are world wide in distribution and their taxonomy is presently chaotic. One New Caledonian species, *G. montrouzieri* Gassies, is known from the New Hebrides (Solem, 1959, pp. 164–166); otherwise the species are known only from New Caledonia.

Usually three species are recognized. Possibly *Planorbis fouqueti* Gassies may be a variant of *G. montrouzieri*, corresponding to the *infralineatus* form of the Indonesian *convexiusculus* (see van Benthem Jutting, 1931).

***Gyraulus montrouzieri** (Gassies), 1863

Planorbis montrouzieri Gassies, 1863, Faune Conchy., 1: 79, pl. 7, fig. 17.

?*Planorbis fouqueti* Gassies, 1871, Jour. de Conchy., 18: 146; Gassies, 1871, Faune Conchy., 2: 139–140, pl. 5, fig. 10.

Gyraulus montrouzieri (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 90, pl. 9, fig. 122.

Type locality.—Swamp near Kanala, New Caledonia (*montrouzieri*) and Boulari, New Caledonia (*fouqueti*).

***Gyraulus rossiteri** (Crosse), 1871

Planorbis rossiteri Crosse, 1871, Jour. de Conchy., 19: 204; Gassies, 1880, Faune Conchy., 3: 76-77, pl. 1, fig. 25.

Gyraulus rossiteri (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 90, pl. 9, fig. 123 (holotype of *rossiteri*).

Type locality.—Mare, Loyalty Islands.

Family ANCYLIDAE

Classification of the Ancyliidae is based entirely upon the structures of the soft parts. Neither of the two New Caledonian species has been dissected. Franc (1957, pp. 91-92) tentatively referred them to *Protancyclus*. The shells are quite different in appearance, and Hubendick (1958) showed that *Protancyclus* is actually a modified, but primitive, planorbid genus. Pending study of the animals, the New Caledonian species are left in *Ancyclus*, sens. lat.

Genus ANCYLUS Geoffroy, 1767

Type species.—*Patella lacustris* Linnaeus, 1758 (monotype).

Ancyclus reticulatus Gassies, 1865

Ancyclus reticulatus Gassies, 1865, Jour. de Conchy., 13: 212; Gassies, 1871, Faune Conchy., 2: 143-144, pl. 4, fig. 17.

Protancyclus reticulatus (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 91-92.

Type locality.—Art Island, New Caledonia.

Ancyclus noumeensis Crosse, 1871

Ancyclus noumeensis Crosse, 1871, Jour. de Conchy., 19: 203-204; Crosse, 1872, op. cit., 20: 356, pl. 16, fig. 5.

Protancyclus noumeensis (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 92, pl. 10, fig. 124.

Type locality.—Noumea, New Caledonia.

Family VERONICELLIDAE (=Vaginulidae)

Both of the New Caledonian species were undoubtedly introduced by man. *Eleutherocaulus alte* Ferussac probably came from Africa

and *Angustipes plebeius* Fischer from South America or the West Indies. Detailed references to the two species can be found in Solem (1959, pp. 41-42).

Eleutherocaulus alte (Ferussac), 1823

Vaginulus alte Ferussac, 1823, Hist. Nat. Moll. terr. fluv., 2: 96X, pl. 8A, fig. 6.

Laemicaulus alte (Ferussac), Franc, 1957, Moll. Néo-Caledonien, p. 93, pl. 10, fig. 125 (radula).

Type locality.—Pondicherry, India.

Angustipes (Sarasinula) plebeius (Fischer), 1868

Vaginulus plebeius Fischer, 1868, Jour. de Conchy., 16: 145-146; Gassies, 1871, Faune Conchy., 2: 12, pl. 1, fig. 1.

Vaginulus (Sarasinula) plebeius Fischer, Franc, 1957, Moll. Néo-Caledonien, pp. 93-94, pl. 10, fig. 126 (radula).

Type locality.—Art Island, New Caledonia.

Family SUCCINEIDAE

Classification of the Succineidae depends upon a knowledge of the genital anatomy and the radular structure. None of the New Caledonian species has been dissected. Neighboring island groups have species which show a correlation between radula and shell microsculpture. The differences are probably of supraspecific value (Solem, 1959, p. 54) although all the species are here retained under *Succinea*. The shell microsculpture of the New Caledonian species suggests that they belong in the section *Papusuccinea* Iredale, 1941.

Genus SUCCINEA Draparnaud, 1801

Type species.—*Helix putris* Linnaeus, 1758.

Section *Papusuccinea* Iredale, 1941

Type species.—*Succinea strubelli* Strubell, 1895 (original designation).

Remarks.—The New Caledonian species are listed chronologically.

**Succinea (Papusuccinea) montrouzieri* Crosse, 1867

Succinea australis Fischer, 1860 (not Ferussac, 1821), Jour. de Conchy., 8: 199; Gassies, 1863, Faune Conchy., 1: 19, pl. 1, fig. 1.

Succinea montrouzieri Crosse, 1867, Jour. de Conchy., **15**: 433-435, pl. 12, fig. 5; Franc, 1957, Moll. Néo-Caledonien, p. 95, pl. 10, fig. 127 (holotype of *montrouzieri*).

Type locality.—Art Island, New Caledonia.

***Succinea (Papusuccinea) paulucciae* Gassies, 1870**

Succinea paulucciae Gassies, 1870, Jour. de Conchy., **18**: 140; Gassies, 1871, Faune Conchy., **2**: 15, pl. 1, fig. 3; Franc, 1957, Moll. Néo-Caledonien, p. 96.

Type locality.—Lifu, Loyalty Islands.

***Succinea (Papusuccinea) fischeri* Gassies, 1871**

Succinea fischeri Gassies, 1871, Faune Conchy., **2**: 15-16, pl. 7, fig. 17; Franc, 1957, Moll. Néo-Caledonien, p. 95.

Type locality.—Conception, near Noumea, New Caledonia.

***Succinea (Papusuccinea) calcara* Gassies, 1874**

Succinea calcara Gassies, 1874, Jour. de Conchy., **22**: 375; Gassies, 1880, Faune Conchy., **3**: 11, pl. 1, fig. 1; Franc, 1957, Moll. Néo-Caledonien, p. 96.

Type locality.—Art Island, New Caledonia.

***Succinea (Papusuccinea) viridicata* Gassies, 1880**

Succinea viridicata Gassies, 1880, Faune Conchy., **3**: 12, pl. 1, fig. 2; Franc, 1957, Moll. Néo-Caledonien, p. 95.

Type locality.—Along running water near Bourail, New Caledonia.

Family **ATHORACOPHORIDAE**

A detailed criticism of the monograph by Grimpe and Hoffmann (1925) is presented in Solem (1959, pp. 44-52). Franc (1957) had no new material and only summarized the results of Grimpe and Hoffmann. The variation found in New Hebridean populations of *Aneitea* raised grave doubts as to the validity of most of the species named by Grimpe and Hoffmann. Without new material, only a nomenclatural checklist can be presented.

Triboniophorus is an Australian genus and the New Caledonian record of *Aneitea sarasini* Grimpe and Hoffmann as a species of *Triboniophorus* appears doubtful. The types were evidently juvenile and their classification is uncertain. The bases for generic separation of *Aneitea* and *Triboniophorus* are given in Solem (1959, pp. 45-46).

Aneityopsis Grimpe and Hoffmann, 1925, is an objective synonym of *Aneitea* Gray, 1860, since they have the same type species.

The New Caledonian species are listed in chronological order under *Aneitea*.

Genus ANEITEA Gray, 1860

Type species.—*Aneitea macdonaldi* Gray, 1860 (monotype).

Aneitea hirudo (Fischer), 1868

Athoracophorus hirudo Fischer, 1868, Jour. de Conchy., 16: 146, 225–234, pl. 11, figs. 1–4.

Aneitea (*Aneityopsis*) *hirudo* (Fischer), Franc, 1957, Moll. Néo-Caledonien, p. 98, pl. 10, fig. 129 (radula).

Type locality.—New Caledonia.

Aneitea modesta (Crosse and Fischer), 1870

Athoracophorus modesta Crosse and Fischer, 1870, Jour. de Conchy., 18: 238; Gassies, 1871, Faune Conchy., 2: 13–14, pl. 2, fig. 1.

Aneitea (*Aneityopsis*) *modesta* (Crosse and Fischer), Franc, 1957, Moll. Néo-Caledonien, p. 99, pl. 10, fig. 130 (radula).

Type locality.—New Caledonia.

Aneitea sarasini Grimpe and Hoffmann, 1925

Aneitea sarasini Grimpe and Hoffmann, 1925, Nova Caledonia, Zool., 3: 415–417, figs. 15a, 16a, 17a, 18a, 20, pl. 5, fig. 1a–b.

Aneitea (*Triboniophorus*) *sarasini* Grimpe and Hoffmann, Franc, 1957, Moll. Néo-Caledonien, p. 97, pl. 10, fig. 128 (radula).

Type locality.—On Mount Humboldt, New Caledonia, at 1100 meters altitude.

Aneitea ehrmanni Grimpe and Hoffmann, 1925

Aneitea ehrmanni Grimpe and Hoffmann, 1925, Nova Caledonia, Zool., 3: 418–419, figs. 15b, 16b, 17b, 18b, 20, pl. 5, fig. 6a–f.

Aneitea ehrmanni var. *biglandula* Grimpe and Hoffmann, 1925, op. cit., 3: 419–421, figs. 15c, 16c, 17c, 18c, 20, pl. 5, fig. 2a–b.

Aneitea (*Aneityopsis*) *ehrmanni* Grimpe and Hoffmann, Franc, 1957, Moll. Néo-Caledonien, p. 99, pl. 10, fig. 131 (radula).

Type locality.—Forest at 250 meters, Coula-Boréaré, New Caledonia (*ehrmanni*), and 800–1,000 meters on Mount Kanala, New Caledonia (*biglandula*).

Aneitea simrothi Grimpe and Hoffmann, 1925

Aneitea simrothi Grimpe and Hoffmann, 1925, Nova Caledonia, Zool., 3: 421-423, figs. 15e, 16g, 17d, 18e, 20, pl. 5, figs. 5a-b, 14a-b.

Aneitea simrothi var. *oubatchensis* Grimpe and Hoffmann, 1925, op. cit., 3: 423-425, figs. 16h, 17e, 18f, pl. 5, fig. 4a-b.

Aneitea (Aneityopsis) simrothi Grimpe and Hoffmann, Franc, 1957, Moll. Néo-Caledonien, p. 100, pl. 10, fig. 132 (radula).

Type locality.—In axil of *Pandanus* at 1,300 meters on summit of Mount Ignambi, New Caledonia (*simrothi*) and 100 meters near Oubatche, New Caledonia (*oubatchensis*).

Aneitea platei Grimpe and Hoffmann, 1925

Aneitea platei Grimpe and Hoffmann, 1925, Nova Caledonia, Zool., 3: 425-427, figs. 16f, 17f, 18d, 20, pl. 5, fig. 9a-d, pl. 6, fig. 7.

Aneitea (Aneityopsis) platei Grimpe and Hoffmann, Franc, 1957, Moll. Néo-Caledonien, p. 100, pl. 10, fig. 133 (radula).

Type locality.—Between *Pandanus* leaves at 800-1,000 meters on Mount Kanala, New Caledonia.

Aneitea rouxi Grimpe and Hoffmann, 1925

Aneitea rouxi Grimpe and Hoffmann, 1925, Nova Caledonia, Zool., 3: 427-428, figs. 15d, 16e, 17g, 20, pl. 5, fig. 7a-c.

Aneitea (Aneityopsis) rouxi Grimpe and Hoffmann, Franc, 1957, Moll. Néo-Caledonien, p. 101, pl. 10, fig. 134 (radula).

Type locality.—Forest at 800 meters on Mount Kanala, New Caledonia.

Aneitea neocaledonica Grimpe and Hoffmann, 1925

Aneitea neocaledonica Grimpe and Hoffmann, 1925, Nova Caledonia, Zool., 3: 428-429, figs. 16d, 17h, 18g, 20, pl. 5, fig. 15.

Aneitea (Aneityopsis) neocaledonica Grimpe and Hoffmann, Franc, 1957, Moll. Néo-Caledonien, p. 101, pl. 10, fig. 135 (radula).

Type locality.—In fallen palm fronds at 800 to 1,000 meters on Mount Kanala, New Caledonia.

Family **TORNATELLINIDAE**

The classification utilized below is that contained in a monograph of the Tornatellinidae by Cooke and Kondo, now in press at the Bishop Museum. The necessary data were supplied by Dr. Kondo.

Genus **ELASMIAS** Pilsbry, 1910

Type species.—*Tornatellina aperta* Pease, 1864 (original designation).

***Elasmias mariei** (Crosse), 1874

Tornatellina mariei Crosse, 1874, Jour. de Conchy., **22**: 109–110, 393–394, pl. 12, fig. 7.

Elasmias mariei (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 102, pl. 10, fig. 136 (holotype of *mariei*).

Type locality.—Baie du Sud, New Caledonia.

Genus **LAMELLIDEA** Pilsbry, 1910

Type species.—*Pupa peponum* Gould, 1847 (original designation).

Section **Tornatellinops** Pilsbry, 1919

Type species.—*Tornatellina novoseelandica* Pfeiffer, 1852 (original designation).

***Lamellidea (Tornatellinops) noumeensis** (Crosse), 1870

Tornatellina noumeensis Crosse, 1870, Jour. de Conchy., **18**: 244; Gassies, 1871, Faune Conchy., **2**: 95–96, pl. 8, fig. 16.

Lamellidea (Tornatellinops) noumeensis (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 102–103, pl. 10, fig. 137 (holotype of *noumeensis*).

Type locality.—Maitre Island, Noumea, New Caledonia.

Family **PUPILLIDAE** (=Vertiginidae)

The nine species reported from New Caledonia are placed in four genera. *Cylindrovertilla* (not *Cylindroverticilla* as in Franc, 1957) is known only from New Caledonia and the New South Wales–Queensland coastal area of Australia; *Nesopupa* is widely distributed in the Pacific, Oriental, and Ethiopian regions; *Gastrocopta* is nearly worldwide; and *Pupisoma* is almost circumtropical. The specific affinities of the New Caledonian *Nesopupa* remain to be determined. *Gastrocopta pediculus* has been spread by man over the Pacific and *G. servilis* is from the West Indies. *G. obstructa* has not been examined by a pupillid specialist and its taxonomic position is unknown. The identity of *Pupa condita* Gassies, 1870, is uncertain.

Genus **CYLINDROVERTILLA** O. Boettger, 1881

Type species.—*Pupa fabreana* Crosse, 1872 (subsequent designation of Pilsbry, 1920, p. 43).

***Cylindrovertilla paitensis** (Crosse), 1872

Pupa paitensis Crosse, 1872, Jour. de Conchy., **20**: 227; Crosse, 1874, op. cit., **22**: 392-393, pl. 12, fig. 6.

Cylindroverticilla (sic) *paitensis* (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 104-105, pl. 11, fig. 139 (holotype of *paitensis*).

Type locality.—Paita, east coast of New Caledonia.

***Cylindrovertilla fabreana** (Crosse), 1872

Pupa fabreana Crosse, 1872, Jour. de Conchy., **20**: 359-360; Crosse, 1874, op. cit., **22**: 392-393, pl. 12, fig. 6.

Cylindroverticilla (sic) *fabreana* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 104, pl. 11, fig. 138 (holotype of *fabreana*).

Type locality.—Anse Vata, Noumea, New Caledonia.

Genus **NESOPUPA** Pilsbry, 1900

Type species.—*Pupa tantilla* Gould, 1847 (original designation).

Nesopupa (Nesopupa) lifouana (Gassies), 1871

Pupa lifouana Gassies, 1871, Faune Conchy., **2**: 98-99; Gassies, 1873, Jour. de Conchy., **21**: 53-54, pl. 2, fig. 8.

Nesopupa (Nesopupa) lifouana (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 105.

Type locality.—Under ferns and in moss, Lifu, Loyalty Islands.

Nesopupa (Nesopupa) mariei (Crosse), 1871

Pupa mariei Crosse, 1871, Jour. de Conchy., **19**: 202-203; Crosse, 1872, op. cit., **20**: 358-359, pl. 16, fig. 3.

Nesopupa (Nesopupa) mariei (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 106.

Type locality.—Vicinity of Noumea, New Caledonia.

Genus **GASTROCOPTA** Wollaston, 1878

Type species.—*Pupa acarus* Benson, 1856 (subsequent designation of Pilsbry, 1916-18, p. 7).

***Gastrocopta (Sinalbinula) pediculus** (Shuttleworth), 1852

Pupa pediculus Shuttleworth, 1852, Mittheil. naturf. Gesell. Bern, **1852**: 296.

Gastrocopta pediculus (Shuttleworth), Franc, 1957, Moll. Néo-Caledonien, pp. 106-107, pl. 11, fig. 140.

Type locality.—Marquesas Islands.

Gastrocopta (Sinalbinula) obstructa (Gassies), 1871

Pupa obstructa Gassies, 1871, Faune Conchy., 2: 97-98; Gassies, 1873, Jour. de Conchy., 21: 52-53, pl. 2, fig. 7.

Gastrocopta (Sinalbinula) obstructa (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 107.

Type locality.—Conception near Noumea, New Caledonia.

***Gastrocopta (Gastrocopta) servilis** (Gould), 1843 (= *lyonsiana* Ancey, 1892)

Pupa servilis Gould, 1843, Jour. Boston Soc. Nat. Hist., 4: 356, pl. 16, fig. 14.

Pupa lyonsiana Ancey, 1892, Mem. Soc. Zool. France, 5: 713.

Gastrocopta (Gastrocopta) servilis (Gould), Pilsbry, 1916, Man. Conch., (2), 24: 70-75, pl. 14, figs. 4-7.

Type locality.—Matanzas, Cuba (*servilis*), and Punahu, Oahu, Hawaiian Islands (*lyonsiana*).

Remarks.—Specimens were collected at several localities by T. D. A. Cockerell in 1928 (see Solem, 1960). Comparison of these examples with many lots of *G. servilis* collected in the Dutch West Indies by P. Wagenaar Humelinck (CNHM) led me to formalize the suggestion made by Pilsbry (1916, p. 142) that the species *lyonsiana* was based upon introduced individuals of the Antillean *G. servilis*.

Genus **PUPISOMA** Stoliczka, 1873

Type species.—*Pupa lignicola* Stoliczka, 1871 (monotype).

***Pupisoma (Ptychopatula) dioscoricola** (C. B. Adams), 1845

Helix dioscoricola C. B. Adams, 1845, Proc. Boston Soc. Nat. Hist., 2: 16.

Helix vimontiana Crosse, 1874, Jour. de Conchy., 22: 108; Crosse, 1875, op. cit., 23: 217-218, pl. 9, fig. 2.

Pupisoma dioscoricola (C. B. Adams), Pilsbry, 1920, Man. Conch., (2), 26: 36-40, pl. 4, figs. 1-5.

Type locality.—Jamaica (*dioscoricola*) and vicinity of Noumea, New Caledonia (*vimontiana*).

Remarks.—The identity of *Helix vimontiana* is uncertain. Franc (1957, p. 146) placed it as a synonym of *Coneuplecta calculosa*. A shell in the University of Michigan Museum of Zoology (UMMZ 138347) labeled as *Helix vimontiana* was the West Indian species cited here. Probably it was imported on plants from the West Indies.

Incertae sedis

Pupa condita Gassies, 1869

Pupa condita Gassies, 1869, Jour. de Conchy., 17: 73; Gassies, 1871, Faune Conchy., 2: 99-100, pl. 4, fig. 5; Crosse, 1894, Jour. de Conchy., 42: 303-304.

Type locality.—Art Island, New Caledonia.

Remarks.—Crosse (1894, pp. 303-304) suggested that this is a marine snail, possibly belonging to the genus *Rissoa*.

Family ENIDAE (= Buliminidae)

The single species reported from New Caledonia may have been introduced from Africa or Madagascar (see Solem, 1959, p. 60) although several names have been applied to the Pacific populations.

Genus **RHACHISTIA** Connolly, 1925

(= **Eorrhachis** Tomlin and Peile, 1930; **Rhachispeculum** Iredale, 1933; and **Rachistia** Franc, 1957)

Type species.—*Buliminus rhodotaenia* Martens, 1901 (original designation).

***Rhachistia histrio** (Pfeiffer), 1855

Bulimus histrio Pfeiffer, 1855, Proc. Zool. Soc. London, 1854: 124.

Bulimus magenii Gassies, 1856, Jour. de Conchy., 5: 181, pl. 6, fig. 5.

Bulimus bidwilli Cox, 1868, Monog. Australian Land Shells, p. 72, pl. 13, fig. 11.

Rachistia (sic) (*Eorrhachis*) *histrio* (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, p. 108, pl. 11, fig. 141.

Type locality.—Tanna Island, New Hebrides (*histrio*), New Caledonia (*magenii*), and Burnett River, Queensland, Australia (*bidwilli*).

Remarks.—A complete synonymy and discussion of this species can be found in Solem (1959, pp. 60-62).

Family FERUSSACIIDAE

The single New Caledonian species was imported accidentally from the West Indies.

Genus **CECILIOIDES** Ferussac, 1814

Type species.—*Buccinum aciculum* Müller, 1774 (monotype).

Subgenus **GEOSTILBIA** Crosse, 1867

Type species.—*Geostilbia caledonica* Crosse, 1867 (monotype).

***Cecilioides (Geostilbia) aperta** (Swainson), 1840

Macrospira aperta Swainson, 1840, Treatise on Malac., p. 335, fig. 97e-f.

Achatina gundlachi Pfeiffer, 1850, Zeitschr. f. Malak., 7: 80.

Geostilbia caledonica Crosse, 1867, Jour. de Conchy., 15: 186-187, pl. 7, fig. 4.

Caecilioides (Geostilbia) gundlachi (Pfeiffer), Pilsbry, 1909, Man. Conch., (2), 20: 45, pl. 4, figs. 58-59, 62.

Caecilioides (Geostilbia) caledonica (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 109, pl. 11, fig. 142 (holotype of *caledonica*).

Type locality.—Cuba (*gundlachi*), under leaves and old wood in the gardens of Noumea, New Caledonia (*caledonica*), and unknown (*aperta*).

Family **SUBULINIDAE**

Subulinids probably were native to the West Indies, but they have been spread throughout the world by commerce. Most of the introduced populations have been described, at one time or another, as new species. In only a few cases have the synonymies been completely re-worked. I consider it highly improbable that any of the New Caledonian subulinids are native, but it is presently impossible to ascertain the identity of some named forms. They are listed as *incertae sedis*.

***Subulina octona** (Bruguière), 1792

Bulimus octona Bruguière, 1792, Encycl. Method., 1: 325.

Subulina octona (Bruguière), Franc, 1957, Moll. Néo-Caledonien, p. 110, pl. 11, fig. 143.

Type locality.—Guadeloupe, West Indies.

***Lamellaxis (Allopeas) gracilis** (Hutton), 1834

Bulimus gracile Hutton, 1834, Jour. Asiatic Soc. Bengal, 3: 93.

Bulimus artensis Gassies, 1866, Jour. de Conchy., 14: 50; Gassies, 1871, Faune Conchy., 2: 94-95, pl. 3, fig. 9.

Bulimus diaphanus Gassies, 1859 (not Pfeiffer, 1855), Jour. de Conchy., 7: 370.

Bulimus souverbianus Gassies, 1863, Faune Conchy., 1: 52-53, pl. 2, fig. 5—new name for *Bulimus diaphanus* Gassies.

Opeas gracile (Hutton), Franc, 1957, Moll. Néo-Caledonien, p. 111, pl. 11, fig. 144.

Type locality.—Mirzapur, India (*gracile*), and Art Island, New Caledonia (*artensis* and *souverbianus*).

Pseudopeas tuckeri (Pfeiffer), 1846

Bulimus tuckeri Pfeiffer, 1846, Proc. Zool. Soc. London, 1846: 30.

Pseudopeas tuckeri (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, p. 112.

Type locality.—Sir Charles Hardy's Island, northeast coast of Queensland, Australia.

Incertae sedis**Opeas gracile** var. **neocaledonicum** Pilsbry, 1906. Figure 9.

Opeas gracile var. *neocaledonicum* Pilsbry, 1906, Man. Conch., (2), 18: 130, pl. 24, fig. 29.

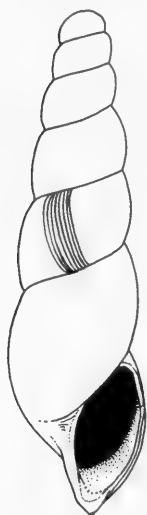


FIG. 9. *Opeas gracile* var. *neocaledonicum* Pilsbry, ANSP 24133, holotype; New Caledonia.

Type locality.—New Caledonia.

Remarks.—The holotype (ANSP 24133) appears to be an aberrant individual of *Lamellaxis gracilis* (Hutton).

Bulimus (Subulina) pronyensis Gassies, 1879

Bulimus (Subulina) pronyensis Gassies, 1879, Jour. de Conchy., 27: 126–127; Gassies, 1880, Faune Conchy., 3: 43–44, pl. 3, fig. 18.

Opeas pronyense (sic) (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 111.

Type locality.—Vicinity of Prony Bay, New Caledonia.

Remarks.—Known from a single example.

Bulimus blanchardianus Gassies, 1863

Bulimus blanchardianus Gassies, 1863, Faune Conchy., 1: 53, pl. 6, fig. 1.

Opeas blanchardianum (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 111-112.

Type locality.—In the interior of New Caledonia.

Remarks.—Known from a single specimen which may have been "a broken or abnormal shell, or possibly a marine form" (Pilsbry, 1906, p. 178).

Family ENDODONTIDAE

The Endodontidae are the dominant land snails of New Caledonia in both number of species and number of genera. A bewildering variety of sizes, shapes, colors, and sculptures have evolved, and adequate classification of the species is difficult. Endodontids dominate the fauna of most of Australia and all of New Zealand, and are very important on the Polynesian and Melanesian islands.

Tom Iredale and others have published over 90 generic names for the endodontid snails of Australia, New Zealand, Lord Howe, Norfolk, and the Kermadec Islands. Many more are available for the New Caledonian and Polynesian species. In trying to classify the New Hebridean (Solem, 1959, pp. 77-89) and New Caledonian endodontids I was fortunate in being able to examine shells of about 90 per cent of the named genera. Shape, whorl increment, coloration, ribbing, and apertural dentition apparently are characters which vary widely, producing convergent evolution in totally different lineages. Although a few species show indications of a transition between the basic types, apical sculpture of the Endodontidae seems to present the most satisfactory shell character for use in classification (see Solem, 1959, pp. 78-80). Since less than 5 per cent of the Pacific endodontids have had *any* portion of their soft parts described and figured, present classification must be based completely on conchology.

The New Caledonian endodontids can be divided into two series of genera, one with spiral apical sculpture, the other with radial apical sculpture. *Platyrhytida* has lost the apical sculpture and its affinities are unknown. The two series are shown graphically (fig. 10). The resultant classification is radically different from that presented by Franc (1957). For comparison, the two are presented side by side in Table 1.

Only the genus *Rhytidopsis* comes close to showing a transition between the radial and spiral apical sculpture. The aberrant *R. minutula* has fine wavy spiral apical sculpture and has lost(?) the prominent radial ribs on the spire while retaining the microsculpture. *R. prevostiana* is larger, with prominent radial ribs. Part of its apex

has spiral wavy lines, the rest radial ribs. *R. corymbus* has the typical radial ribs of *Pararhytida* and *Tropidotropis*. *R. chelonites* has the sculpture reduced to micro-radials over the entire shell. A few genera in other parts of the Pacific show a similar transition, so that it cannot be assumed that spiral and radial sculpture in different regions implies phylogenetic relationships. Nevertheless, the differences in apical sculpture provide useful criteria for a provisional classification of species within a particular region.

Table 1.—Classification of the New Caledonian Endodontidae

Franc (1957)	Solem (this paper)
? <i>Charopa</i>	s. <i>Andrefrancia</i> , Groups I, II, IV-VI
r. <i>Ptychodon</i>	s. <i>Andrefrancia</i> , Group III
s. <i>Acanthoptyx</i>	s. <i>Acanthoptyx</i>
r. <i>Tropidotropis</i>	r. <i>Tropidotropis</i>
? <i>Flammulina</i>	
r. (<i>Rhytidopsis</i>)	r. <i>Rhytidopsis</i>
s. (<i>Monomphalus</i>)	s. <i>Monomphalus</i>
r. <i>Pararhytida</i>	r. <i>Pararhytida</i>
(<i>Pararhytida</i>)	(<i>Pararhytida</i>)
(<i>Micromphalia</i>)	(<i>Micromphalia</i>)
(<i>Plesiopsis</i>)	(<i>Plesiopsis</i>)
r., s. <i>Allodiscus</i>	
? (<i>Platyrrhytida</i>)	? <i>Platyrrhytida</i>

r=radial apical sculpture; s=spiral apical sculpture; ?=smooth apical whorls.

Of the New Caledonian species that Franc (1957) listed as belonging to the Endodontidae, *Helix kanakina* Gassies, 1866, *H. inculta* Gassies, 1874, *Charopa gassiesiana* Preston, 1907, and *C. marionae* Preston, 1907, appear to belong to the Paryphantidae and are discussed below (pp. 488-489).

APEX WITH SPIRAL SCULPTURE

The most "typical" endodontids found on New Caledonia are those Franc (1957, pp. 113-125) placed in *Charopa*. The latter is a New Zealand genus in which the shell has smooth apical whorls. The genotype, *Helix coma* Gray, shows traces of radial ribbing on the apex and *Charopa* may represent a secondary derivative from a radially ribbed group. The New Caledonian "*Charopa*" have an apical sculpture of 18 to 20 spiral lirae. A similar sculpture of 10 to 12 spiral lirae is found in the New Zealand, Polynesian, and Melanesian *Mocella* (Solem, 1959, p. 83). East Australian and Tasmanian genera such as *Roblinella* and *Gyrocochlea* have the same sculpture as the New Caledonian species, but differ in shape and size. For several

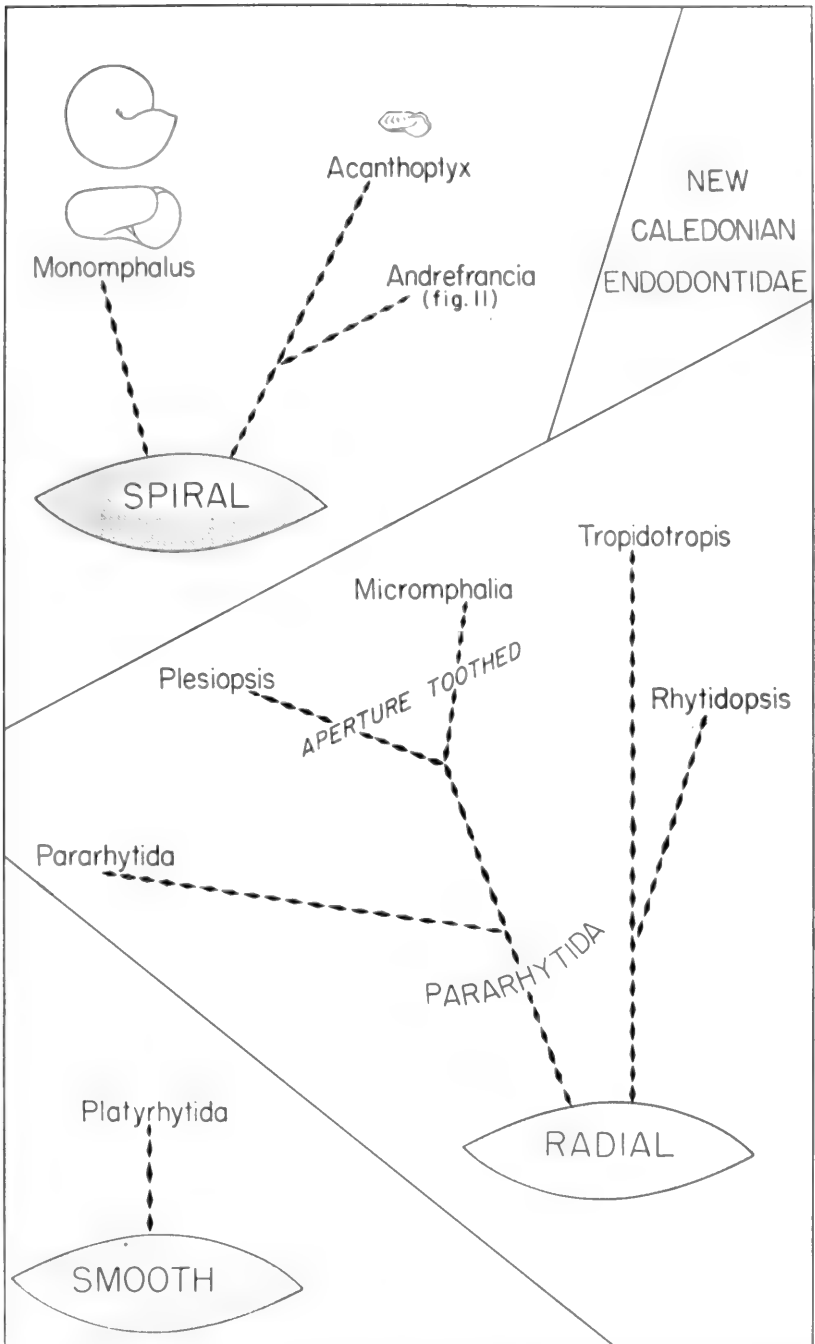


FIG. 10. Classification of the New Caledonian Endodontidae, showing probable relationships within basic sculptural types.

reasons it seems probable that few lirae is the primitive condition and many lirae the advanced (see Solem, 1959, p. 298). Besides apical sculpture, the New Caledonian species differ from *Mocella* in having a larger umbilicus and a partial "ridge" inside the umbilicus.

Genus **ANDREFRANCIA** Solem, 1960

Type species.—*Helix rhizophorarum* Gassies, 1865 (original designation).

Remarks.—Using Iredalean taxonomy, six genera would have been recognized. The "species groups" outlined below have the same basic apical sculpture and probably are modifications from the same ancestral stock. The groups (fig. 11) are readily separable but form a homogeneous series in comparison with other New Caledonian endodontids. Without a better understanding of speciation and local distribution, nomenclatural recognition of more supra-specific groups would be unwise.

Acanthoptyx Ancey, 1888, may be only an extreme modification of the *Andrefrancia* complex, although it is retained as a distinct genus at this time.

Andrefrancia was proposed (see Solem, 1960) for the New Caledonian species formerly placed in *Charopa* and *Ptychodon* and is dedicated to Dr. André Franc, whose monograph (Franc, 1957) stimulated this work.

I. GROUP OF **Andrefrancia alveolus** (Gassies), 1881

Color brown or flammulated; umbilicus contained 4.5 to 5 times in the diameter; lip very sinuous; radial ribs sinuately retractive; suture more or less channeled.

Remarks.—*Andrefrancia subcoacta* is nearest the generalized Group VI, while *A. alveolus* represents a specialization paralleling the New Zealand *Fectola* in lip and sutural characters. *Fectola* differs in having radial apical sculpture and a much wider umbilicus.

***Andrefrancia alveolus** (Gassies), 1881

Helix alveolus Gassies, 1881, Jour. de Conchy., **29**: 336-337, pl. 11, fig. 1.

Charopa alveolus (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 117.

Type locality.—Baie du Prony, New Caledonia.

***Andrefrancia margueritae** (Preston), 1907. Figure 12.

Charopa margueritae Preston, 1907, Ann. Mag. Nat. Hist., (1), **19**: 217, fig. 2.

Charopa alveolus Franc, 1957 (not Gassies, 1881), Moll. Néo-Caledonien, pl. 12, fig. 150 (holotype of *margueritae*).

PICTURE KEY TO ANDREFRANCIA















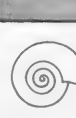





CHARACTER	GROUP					
	I	II	III	IV	V	VI
SIZE (mm)	4.5-6.6	6-8	1.75-3	3-5	4-6	3-5
SUTURE	 channeled			 normal		
LIP	sinuate	<i>slanted</i>				
SCULPTURE	prominent			barely visible	reduced	prominent
BODY WHORL	rounded				moderately keeled	rounded
DIAMETER/ UMBILICUS RATIO	 4.5-5	 3-4	 4-6	 8-12	 35-4	 25-45
SPIRE						
APERTURE	toothless		toothed	toothless		
WHORLS						

FIG. 11. Picture key to *Andrefrancia*.



FIG. 12. *Andrefrancia margueritae* (Preston), ANSP 98180, paratype; New Caledonia.

Type locality.—New Caledonia.

Remarks.—A paratype (ANSP 98180) showed several important differences from *A. alveolus* (CNHM 46239). The latter is smaller, proportionately higher, the apex elevated rather than sunken, the suture more deeply channeled, and the ribbing much finer and more strongly sinuate. Comparative measurements of the two species are given in Table 2.

Table 2.—Variation in Group I *Andrefrancia*

Species	Height	Diameter	H/D Ratio	Whorls
<i>Andrefrancia alveolus</i> CNHM 46239.....	2.53	4.84	52.4	4 $\frac{3}{8}$
	2.80	4.67	60.1	4 $\frac{3}{8}$
<i>Andrefrancia margueritae</i> ANSP 98180 (paratype)..	2.87	6.66	43.2	4 $\frac{1}{2}$

**Andrefrancia subcoacta* (Gassies), 1870

Helix subcoacta Gassies, 1870, Jour. de Conchy., 18: 140; Gassies, 1871, Faune Conchy., 2: 24, pl. 1, fig. 10.

Charopa subcoacta (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 122–123, pl. 12, fig. 160 (holotype of *subcoacta*).

Type locality.—Art Island, New Caledonia.

II. GROUP OF *Andrefrancia dispersa* (Gassies), 1863

Color brown; whorls loosely coiled; size large; umbilicus contained 3 to 4 times in the diameter; lip not sinuous.

Remarks.—The relatively large size (6–8 mm.), rapid whorl increment, and narrow umbilicus are diagnostic. *A. dispersa* is nearest the Group VI prototype and *A. calliope* is the largest and most specialized.

**Andrefrancia rusticula* (Gassies), 1859

Helix rusticula Gassies, 1859, Jour. de Conchy., 7: 369; Gassies, 1863, Faune Conchy., 1: 28, pl. 1, fig. 11.

Helix melitae Gassies, 1870, Jour. de Conchy., 18: 141; Gassies, 1871, Faune Conchy., 2: 24–25, pl. 1, fig. 9.

Charopa rusticula (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 117–118, pl. 12, figs. 151 (holotype of *rusticula*), 151a (holotype of *melitae*).

Type locality.—Isle of Pines, New Caledonia (*rusticula*), and Art Island, New Caledonia (*melitae*).

**Andrefrancia dispersa* (Gassies), 1863

Helix gyrina Gassies, 1859 (not Deshayes, 1850), Jour. de Conchy., 7: 369.

Helix dispersa Gassies, 1863, Faune Conchy., 1: 29, pl. 1, fig. 12—new name for *gyrina* Gassies, 1859 (not Deshayes, 1850).

Charopa dispersa (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 121, pl. 12, figs. 157a (holotype of *dispersa*), 157b (holotype of *ahena*), pl. 13, fig. 157.

Charopa ahena Preston, 1907, Ann. Mag. Nat. Hist., (7), 19: 217, fig. 1.

Type locality.—Isle of Pines, New Caledonia (*gyrina*) and New Caledonia (*ahena*).

Remarks.—A paratype of *Charopa ahena* Preston (ANSP 98184) has been damaged and retains only 3½ whorls. The whorl increment of the holotypes is not identical (see Franc, 1957, pl. 12, fig. 157a, 157b) but the two forms may be ecological races.

**Andrefrancia calliope* Crosse, 1869

Helix calliope Crosse, 1869, Jour. de Conchy., 17: 413–414; Crosse, 1874, op. cit., 22: 97–98, pl. 2, fig. 1.

Charopa calliope (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 122, pl. 13, fig. 159 (holotype of *calliope*).

Type locality.—New Caledonia.

III. GROUP OF *Andrefrancia vincentina* (Crosse), 1870

Color pale horn; size minute (1.75 to 3 mm.); aperture variously toothed.

Remarks.—Because of the toothed aperture these species have usually been referred to the New Zealand–Polynesian *Ptychodon*–*Thaumatodon* complex. Apertural dentition has developed several times in the Endodontidae, and I consider that apical sculpture is a much more conservative character. *Ptychodon* and *Thaumatodon* have radially ribbed apical whorls and are much larger. The Indonesian *Beilania* (see Solem, 1957) has the same type of apical sculpture, but the sculpture is much coarser. All the New Caledonian toothed species have the same apical sculpture as the untoothed shells. *A. vincentina* is very close to the toothless *A. saburra* (the smallest member of Group VI); *A. berlieri* has a more complicated tooth structure; and *A. derbesianus* and *A. cockerelli* have a very complicated apertural dentition. Probably they were derived from three different ancestors, but for practical purposes of identification they can be lumped together.

****Andrefrancia vincentina* (Crosse), 1870**

Helix vincentina Crosse, 1870, Jour. de Conchy., **18**: 238–239, 406–407, pl. 13, fig. 5.

Ptychodon (Thaumatodon) vincentina (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 129, pl. 14, fig. 168 (holotype of *vincentina*).

Type locality.—Saint Vincent, New Caledonia.

****Andrefrancia derbesianus* (Crosse), 1875**

Helix derbesianus Crosse, 1875, Jour. de Conchy., **23**: 143; Crosse, 1879, op. cit., **27**: 44–45, pl. 2, fig. 2.

Endodonta (Thaumatodon) quadridens Gude, 1905, Jour. Malac., **12**, (1), p. 13, pl. 4, fig. 9a–d.

Ptychodon (Thaumatodon) derbesianus (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 128–129, pl. 14, fig. 167 (holotype of *derbesianus*).

Type locality.—Vicinity of Noumea, New Caledonia (*derbesianus*), and Artillery Point, Noumea, New Caledonia (*quadridens*).

Remarks.—A paratype of *E. quadridens* (UMMZ 138324) did not show any significant differences from specimens of *derbesianus*.

****Andrefrancia cockerelli* Solem, 1960**

Andrefrancia cockerelli Solem, 1960, Not. Nat., **338**: 2–4, figs. 4–7.

Type locality.—River drift at sea coast a few miles from Bourail, New Caledonia.

Remarks.—The trilamellate aperture and widely spaced ribbing are distinctive and easily separate *A. cockerelli* from the otherwise similar *A. derbesianus*.

***Andrefrancia berlieri** (Crosse), 1875

Helix berlieri Crosse, 1875, Jour. de Conchy., 23: 144; Crosse, 1879, op. cit., 27: 43-44, pl. 2, fig. 3.

Ptychodon (Thaumatodon) berlieri (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 128, pl. 14, fig. 166 (holotype of *berlieri*).

Type locality.—Vicinity of Noumea, New Caledonia.

IV. GROUP OF **Andrefrancia ostiolum** (Crosse), 1870

Shell with elevated spire; umbilicus very narrow; and ribbing greatly reduced.

Remarks.—The "milky" color and nearly smooth shells approximate the zonitid taxa, but fresh shells show the spiral apical sculpture of *Andrefrancia*. *A. ostiolum* is the most specialized, while *A. melaleucarum* and *A. bourailensis* are closer to the Group VI prototype.

***Andrefrancia ostiolum** (Crosse), 1870

Helix ostiolum Crosse, 1870, Jour. de Conchy., 18: 240-241; Crosse, 1873, op. cit., 21: 341-342, pl. 14, fig. 5.

Helix morosula Gassies, 1871, Faune Conchy., 2: 48-49, pl. 7, fig. 18.

Helix koutoumensis Gassies, 1871, op. cit., 2: 182.

Charopa ostiolum (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 114-115, pl. 11, fig. 145 (holotype of *ostiolum*).

Type locality.—New Caledonia (*ostiolum*), Conception near Noumea, New Caledonia (*morosula*), and Koutoumo Island, New Caledonia (*koutoumensis*).

***Andrefrancia bourailensis** (Gassies), 1872. Figure 13.

Helix bourailensis Gassies, 1872, Jour. de Conchy., 20: 336-337; Gassies, 1873, op. cit., 21: 336, pl. 14, fig. 4.

Andrefrancia bourailensis (Gassies), Solem, 1960, Not. Nat., 338: 4.

Type locality.—Bourail, New Caledonia.

Remarks.—Omitted by Franc (1957), this species was rediscovered in material collected by T. D. A. Cockerell and redescribed by Solem (1960).

***Andrefrancia melaleucarum** (Gassies), 1872

Helix melaleucarum Gassies, 1872, Jour. de Conchy., 20: 367; Gassies, 1873, op. cit., 21: 338, pl. 14, fig. 7.

Charopa melaleucarum (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 115, pl. 11, fig. 146 (holotype of *melaleucarum*).

Type locality.—Nou Island, New Caledonia (here selected).

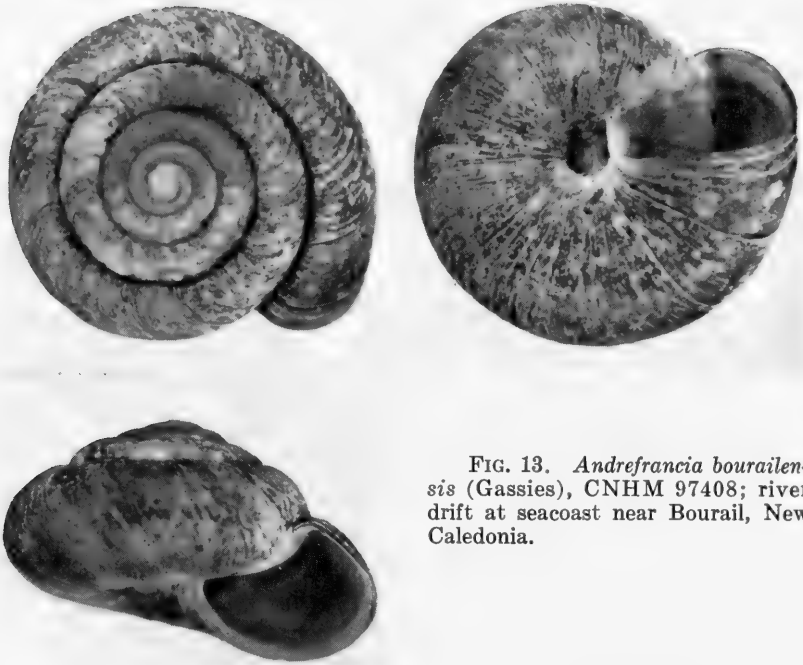


FIG. 13. *Andrefrancia bourailensis* (Gassies), CNHM 97408; river drift at seacoast near Bourail, New Caledonia.

V. GROUP OF *Andrefrancia costulifera* (Pfeiffer), 1854

Shell medium-sized; flammulated with red and horn; slightly to distinctly keeled; ribs widely spaced or obsolete; umbilicus contained 3.5 to 4 times in the diameter.

Remarks.—The members of this series approach *Rhytidopsis* but differ in the large umbilicus and partially keeled body whorl. The degree of carination and prominence of the ribs vary widely. Field studies may result in subspecific recognition of some of the names synonymized below, but presently available data do not permit any varietal recognition.

**Andrefrancia costulifera* (Pfeiffer), 1854

Helix costulifera Pfeiffer, 1854, *Conch. Icon.*, *Helix*, pl. 201, fig. 1418.

Helix pinicola Gassies, 1863 et seq. (not Pfeiffer, 1854), *Faune Conchy.*, 1: 27, pl. 1, fig. 10.

Helix bazini Crosse, 1874, *Jour. de Conchy.*, 22: 105, 180–181, pl. 4, fig. 1.

Charopa bazini (Crosse), Franc, 1957, *Moll. Néo-Caledonien*, pp. 115–116, pl. 11, fig. 147 (holotype of *bazini*).

Type locality.—Isle of Pines, New Caledonia (*costulifera*) and Baie du Sud, New Caledonia (*bazini*).

Incertae sedis

The figures of the following two named entities suggest that they may be members of the *costulifera* complex. Without critical restudy of the types in the British Museum, no definite classification is possible.

Helix pinicola Pfeiffer, 1854

Helix pinicola Pfeiffer, 1854, Conch. Icon., *Helix*, pl. 201, fig. 1413.

Type locality.—Isle of Pines, New Caledonia.

Remarks.—Sykes (1895, p. 72) suggested that this might not be a New Caledonian snail.

Helix tatrix Pfeiffer, 1855

Helix tatrix Pfeiffer, 1855, Proc. Zool. Soc. London, 1854: 92; Pfeiffer, 1877, Syst. Conch. Cab., I, 12, (4), p. 528, pl. 162, figs. 14-17.

Type locality.—Lord Howe's Island, New Hebrides (error?).

Remarks.—No species at all similar to this has been found in the New Hebrides (Solem, 1959) or on Lord Howe Island off Australia (Iredale, 1944). *Helix tatrix* may prove, like *Cyclostoma forbesianus* Pfeiffer (see p. 425), to be based on a mislabeled shell from the Isle of Pines.

VI. GROUP OF **Andrefrancia rhizophorarum** (Gassies), 1865

Shell small, unicolored; body whorl rounded; ribs relatively close-set; umbilicus contained 2.5 to 4.5 times in the diameter and usually possessing an internal angulation.

Remarks.—This is the most generalized group of *Andrefrancia*. The named forms are very similar and careful field studies are needed to determine the exact amount of speciation which has occurred. *A. saburra* is the smallest morph and nearest to Group III. *A. vetula* and *A. rhizophorarum* are the largest and nearest to Group II. The named forms are listed chronologically.

***Andrefrancia vetula** (Gassies), 1858

Helix vetula Gassies, 1858, Jour. de Conchy., 7: 69-70; Gassies, 1863, Faune Conchy., 1: 29, pl. 1, fig. 13.

Charopa vetula (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 124, pl. 12, fig. 162a (holotype of *vetula*), pl. 13, fig. 162.

Type locality.—New Caledonia.

***Andrefrancia rhizophorarum** (Gassies), 1865

Helix rhizophorarum Gassies, 1865, Jour. de Conchy., **13**: 211; Gassies, 1871, Faune Conchy., **2**: 23, pl. 1, fig. 11.

Charopa rhizophorarum (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 124–125, pl. 13, fig. 163.

Type locality.—Port-de-France, New Caledonia.

***Andrefrancia noumeensis** (Crosse), 1870

Helix noumeensis Crosse, 1870, Jour. de Conchy., **18**: 241; Crosse, 1874, op. cit., **22**: 100–101, pl. 3, fig. 6.

Charopa noumeensis (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 116–117, pl. 11, fig. 148 (holotype of *noumeensis*).

Type locality.—Vicinity of Noumea, New Caledonia.

***Andrefrancia decreta** (Gassies), 1871

Helix decreta Gassies, 1871, Faune Conchy., **2**: 180–181; Gassies, 1873, Jour. de Conchy., **21**: 47–48, pl. 2, fig. 3.

Helix subtersa Gassies, 1878, op. cit., **26**: 330–331; Gassies, 1880, Faune Conchy., **3**: 26–27, pl. 1, fig. 14.

Charopa decreta (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 119, pl. 12, fig. 154 (holotype of *decreta*).

Type locality.—Nou Island, New Caledonia (*decreta*), and vicinity of Noumea, New Caledonia (*subtersa*).

***Andrefrancia taslei** (Crosse), 1874

Helix taslei Crosse, 1874, Jour. de Conchy., **22**: 107–108, 181–182, pl. 4, fig. 2.

Charopa ochracea Gude, 1905, Jour. of Malac., **12**, (1), p. 13, pl. 4, fig. 8a–c.

Charopa taslei (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 121–122, pl. 13, fig. 158.

Type locality.—Near Noumea, New Caledonia (*taslei*), and Artillery Point, Noumea, New Caledonia (*ochracea*).

***Andrefrancia saburra** (Gassies), 1874

Helix saburra Gassies, 1874, Jour. de Conchy., **22**: 207–209; Franc, 1953, Bull. Soc. Zool. France, **78**, (1), p. 72, fig. 1.

Charopa saburra (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 118–119, pl. 13, fig. 153.

Type locality.—Art Island, New Caledonia.

Andrefrancia confinis (Gassies), 1875

Helix confinis Gassies, 1875, Jour. de Conchy., **23**: 227–228; Gassies, 1880, Faune Conchy., **3**: 25, pl. 1, fig. 13.

Charopa confinis (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 123-124.

Type locality.—Nou Island, New Caledonia.

***Andrefrancia lifuana** (Gude), 1905

Charopa lifuana Gude, 1905, Jour. of Malac., **12**, (1), p. 12, pl. 4, fig. 6a-c.

Charopa lifouana (sic) Gude, Franc, 1957, Moll. Néo-Caledonien, p. 123, pl. 12, fig. 161 (holotype of *lifuana*).

Type locality.—Lifu, Loyalty Islands.

***Andrefrancia gwendolinae** (Preston), 1907

Charopa gwendolinae Preston, 1907, Ann. Mag. Nat. Hist., (7), **19**: 218, fig. 3; Franc, 1957, Moll. Néo-Caledonien, p. 117, pl. 12, fig. 149 (holotype of *gwendolinae*).

Type locality.—New Caledonia.

Remarks.—A paratype (ANSP 98198) is 6.77 mm. in diameter and 3.68 mm. high, with $6\frac{1}{4}$ whorls. The tightly wound whorls and sunken spire are diagnostic, with the umbilicus contained 4 times in the diameter. This species is perhaps nearest Group I.

Incertae sedis

Helix cimex Pfeiffer, 1854

Helix cimex Pfeiffer, 1854, Conch. Icon., *Helix*, pl. 201, fig. 1411.

Type locality.—Lord Howe's Island, New Hebrides (error?).

Remarks.—The figure is very poor, but possibly this is a third species from the Isle of Pines that has been mislabeled (see pp. 425, 461). The type is in the British Museum.

Genus **ACANTHOPTYX** Ancey, 1888

Shell with spiral apical sculpture; radial ribs irregular and produced into thin lamellae; body whorl with two or three carinae.

Type species.—*Helix acanthinula* Crosse, 1868 (monotype).

Remarks.—*Acanthoptyx* probably represents an extreme modification of the *Andrefrancia* complex, but the conchological differences are large enough to warrant generic separation. Pilsbry (1894, pl. 9, fig. 25) showed that the radula of *A. acanthinula* has typically endodontid dentition.

***Acanthoptyx acanthinula** (Crosse), 1868

Helix acanthinula Crosse, 1868, Jour. de Conchy., **16**: 94-96, pl. 1, fig. 6.

Acanthoptyx acanthinula (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 125-126, pl. 13, fig. 164 (holotype of *acanthinula*).

Type locality.—Noumea, New Caledonia.

Acanthoptyx subacanthinula (Crosse), 1894

Charopa subacanthinula Crosse, 1894, Jour. de Conchy., **42**: 238-240, pl. 8, fig. 2.

Acanthoptyx subacanthinula (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 126.

Type locality.—Baie du Sud, New Caledonia.

Genus **MONOMPHALUS** Ancey, 1882 (= **Psyra** Hutton, 1883)

Shell with spiral apical sculpture, rest of shell with strong to reduced radial ribs and typical endodontid microsculpture; spire flat or concave; umbilicus very minute; body whorl very high.

Type species.—*Helix bavayi* Crosse and Marie, 1868 (here designated).

Remarks.—*Monomphalus* has generally been placed in *Flammulina*, *Rhytidopsis*, or the paryphantid genus *Diplomphalus*. The shell microsculpture shows that it is an endodontid, while the spiral apical sculpture separates it from *Flammulina* or *Rhytidopsis*.

***Monomphalus lifuana** (Montrouzier), 1860

Helix lifuana Montrouzier, 1860, Jour. de Conchy., **8**: 206, 317-318, pl. 11, fig. 5.

Helix lifouana Marie, 1867, op. cit., **15**: 18—an unnecessary emendation.

Flammulina (*Monomphalus*) *lifouana* (sic) (Montrouzier), Franc, 1957, Moll. Néo-Caledonien, pp. 134-135, pl. 15, fig. 177.

Type locality.—Lifu, Loyalty Islands.

***Monomphalus bavayi** (Crosse and Marie), 1868

Helix bavayi Crosse and Marie, 1868, Jour. de Conchy., **16**: 149-151, pl. 8, fig. 3.

Flammulina (*Monomphalus*) *bavayi* (Crosse and Marie), Franc, 1957, Moll. Néo-Caledonien, p. 133, pl. 15, fig. 174.

Type locality.—Mount Mou, New Caledonia.

Monomphalus cerealis (Crosse), 1868

Helix cerealis Crosse, 1868, Jour. de Conchy., **16**: 151-152, pl. 9, fig. 1.

Flammulina (*Monomphalus*) *cerealis* (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 133-134, pl. 15, fig. 175 (holotype of *cerealis*).

Type locality.—Mount Mou, New Caledonia.

Monomphalus gentilsiana (Crosse), 1870

Helix gentilsiana Crosse, 1870, Jour. de Conchy., **18**: 136, 403-404, pl. 13, fig. 4.

Flammulina (*Monomphalus*) *gentilsiana* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 135.

Type locality.—Kanala, New Caledonia.

***Monomphalus rossiteriana** (Crosse), 1871

Helix rossiteriana Crosse, 1871, Jour. de Conchy., **19**: 201-202.

Helix heckeliana Crosse, 1872, op. cit., **20**: 71; Crosse, 1873, op. cit., **21**: 347-350, pl. 14, fig. 1—unnecessary new name for *Helix rossiteriana*.

Flammulina (*Monomphalus*) *heckeliana* (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 134, pl. 15, fig. 176 (holotype of *heckeliana*).

Type locality.—Baie du Sud, New Caledonia.

RADIALLY RIBBED APICES

Genus **TROPIDOTROPIS** Ancey, 1888

Shell planulate; spire flattened; periphery sharply keeled; sculpture reduced; umbilicus widely open, apex radially ribbed.

Type species.—*Helix trichocoma* Crosse, 1868 (monotype).

Remarks.—*Tropidotropis* may be an extreme modification of the *Rhytidopsis* stock, but the soft parts of both genera are essentially unknown.

***Tropidotropis trichocoma** (Crosse), 1868

Helix trichocoma Crosse, 1868, Jour. de Conchy., **16**: 158-160, pl. 8, fig. 6.

Charopa (*Tropidotropis*) *gudei* Preston, 1907, Ann. Mag. Nat. Hist., (7), **19**: 220, fig. 7.

Tropidotropis trichocoma (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 126-127, pl. 14, fig. 165a-b (holotype of *trichocoma*).

Type locality.—Mount Mou, New Caledonia (*trichocoma*), and New Caledonia (*gudei*).

Genus **RHYTIDOPSIS** Ancey, 1882

Shell small (7 mm.); apex radially ribbed; whorls inflated; radial sculpture prominent or reduced.

Type species.—*Helix chelonites* Crosse, 1868 (monotype).

Remarks.—The New Zealand species usually associated with *Rhytidopsis*, such as *Flammulina chiron* Gray, have smooth nuclear whorls. Their general appearance is the same as that of *Rhytidopsis*, but this is probably the result of convergent evolution.

The anatomy of *Rhytidopsis chelonites* was noted by Saint Simon (1880).

***Rhytidopsis chelonites** (Crosse), 1868

Helix chelonites Crosse, 1868, Jour. de Conchy., **16**: 157-158, pl. 9, fig. 2.

Flammulina (Rhytidopsis) chelonites (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 130-131, pl. 14, fig. 169.

Type locality.—Mount Mou, New Caledonia.

***Rhytidopsis minutula** (Crosse), 1870

Helix minutula Crosse, 1870, Jour. de Conchy., **18**: 241; Crosse, 1874, op. cit., **22**: 101, pl. 2, fig. 2.

Flammulina (Rhytidopsis) minutula (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 132, pl. 15, fig. 173 (holotype of *minutula*).

Type locality.—New Caledonia.

***Rhytidopsis prevostiana** (Crosse), 1874

Helix prerostiana Crosse, 1874, Jour. de Conchy., **22**: 106, 388-390, pl. 12, fig. 3.

Flammulina (Rhytidopsis) prerostiana (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 131-132, pl. 15, fig. 171 (holotype of *prerostiana*).

Type locality.—Baie du Sud, New Caledonia.

Rhytidopsis corymbus (Crosse), 1874

Helix corymbus Crosse, 1874, Jour. de Conchy., **22**: 106-107, 390-391, pl. 12, fig. 4.

Flammulina (Rhytidopsis) corymbus (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 131, pl. 14, fig. 170 (holotype of *corymbus*).

Type locality.—Model farm near Noumea, New Caledonia.

Rhytidopsis rouxi (Dautzenberg), 1923

Rhytida rouxi Dautzenberg, 1923, Nova Caledonia, Zool., **3**: 137, figs. 1-3.

Flammulina (Rhytidopsis) rouxi (Dautzenberg), Franc, 1957, Moll. Néo-Caledonien, p. 132, pl. 15, fig. 172.

Type locality.—Summit of Mount Ignambi, New Caledonia.

Genus **PARARHYTIDA** Ancey, 1882

Shell medium- to large-sized (10 to 40 mm.); spire elevated; body whorl rounded to keeled; apex radially ribbed; radial ribs prominent or obsolete.

Type species.—*Helix dictyodes* Pfeiffer, 1847 (subsequent designation of Pilsbry, 1894, p. 52).

Remarks.—The evolutionary developments within *Pararhytida* are recognized by the three sectional names—*Pararhytida* (sens. str.), *Micromphalia*, and *Plesiopsis*. *Micromphalia* is the most generalized and seems near the *Rhytidopsis* stock, from which it most obviously differs in having apertural teeth. *Plesiopsis* is a specialization in apertural dentition, although retaining a generalized shell sculpture. *Pararhytida*, sens. str., has the sculpture reduced, the shell becoming progressively more carinate, and the size reaches the maximum found in the Endodontidae.

Section *Pararhytida*, sens. str.

Shell large (17 to 40 mm.), carinated; sculpture reduced.

**Pararhytida* (*Pararhytida*) *dictyodes* (Pfeiffer), 1847

Helix dictyodes Pfeiffer, 1847, Proc. Zool. Soc. London, 1846: 111.

Helix dictyoides (sic) Pfeiffer, 1852, Conch. Icon., *Helix*, pl. 80, fig. 423.

Pararhytida (*Pararhytida*) *dictyodes* (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, pp. 136–137.

Type locality.—New Guinea (error).

**Pararhytida* (*Pararhytida*) *mouensis* (Crosse), 1868

Helix mouensis Crosse, 1868, Jour. de Conchy., 16: 152–154, pl. 8, fig. 5.

Pararhytida (*P.*) *mouensis* (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 137–138.

Type locality.—Mount Mou, New Caledonia.

**Pararhytida* (*Pararhytida*) *dictyonina* (Euthyme), 1885

Helix dictyonina Euthyme, 1885, Bull. Soc. Malac. France, 2: 257–260; Crosse, 1894, Jour. de Conchy., 42: 243–244, pl. 8, fig. 4.

Pararhytida (*P.*) *dictyonina* (Euthyme), Franc, 1957, Moll. Néo-Caledonien, p. 137, pl. 15, fig. 178 (holotype of *dictyonina*).

Type locality.—Noumea, New Caledonia.

**Pararhytida* (*Pararhytida*) *marteli* (Dautzenberg), 1907

Trochomorpha (*Videna*) *marteli* Dautzenberg, 1907, Jour. de Conchy., 54: 257–259, pl. 8, figs. 7–9.

Pararhytida (*P.*) *marteli* (Dautzenberg), Franc, 1957, Moll. Néo-Caledonien, p. 138.

Type locality.—Forest of Mount Ignambi, New Caledonia.

Section *Micromphalia* Ancey, 1882

Shell medium-sized (9 to 15 mm.); spire elevated; aperture with basal denticle; sculpture reduced; umbilicus minute.

Type species.—*Helix abax* Marie, 1870 (subsequent designation of Zilch, 1959, p. 224).

***Pararhytida (Micromphalia) vieillardi** (Crosse and Marie), 1867

Helix vieillardi Crosse and Marie, 1867, Jour. de Conchy., **15**: 58–60, pl. 4, fig. 5.

Pararhytida (Micromphalia) vieillardi (Crosse and Marie), Franc, 1957, Moll. Néo-Caledonien, pp. 139–140.

Type locality.—Summit of Mount Mou, New Caledonia.

***Pararhytida (Micromphalia) caledonica** (Crosse), 1868

Helix caledonica Crosse, 1868, Jour. de Conchy., **16**: 92–94, pl. 1, figs. 4, 4a.

Pararhytida (Micromphalia) caledonica (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 139, pl. 16, fig. 180 (holotype of *caledonica*).

Type locality.—Bogota, shore of Lake Kanala, New Caledonia.

***Pararhytida (Micromphalia) abax** (Marie), 1870

Helix abax Marie, 1870, Jour. de Conchy., **18**: 139, 420–422, pl. 13, fig. 6.

Pararhytida (Micromphalia) abax (Marie), Franc, 1957, Moll. Néo-Caledonien, pp. 138–139, pl. 16, fig. 179 (holotype of *abax*).

Type locality.—Baie du Sud, New Caledonia.

Section Plesiopsis Ancey, 1888

Shell medium-sized (10 mm.); spire flat; radial sculpture very prominent; body whorl rounded; aperture with complex dentition.

Type species.—*Helix lombardoi* Montrouzier, 1860 (monotype).

***Pararhytida (Plesiopsis) lombardoi** (Montrouzier), 1860

Helix lombardoi Montrouzier, 1860, Jour. de Conchy., **8**: 206–207, 318–320, pl. 11, fig. 6.

Helix lombardeaui Marie, 1867, Jour. de Conchy., **15**: 18—an unnecessary emendation.

Pararhytida (Plesiopsis) lombardeaui (Montrouzier, emend.), Franc, 1957, Moll. Néo-Caledonien, p. 140, pl. 16, fig. 181.

Type locality.—Hienghène, New Caledonia.

SMOOTH APICAL WHORLS

Genus **PLATYRHYTIDA** Cockerell, 1894

(= *Platystoma* Ancey, 1882, not Meigen, 1803, or Agassiz, 1829, and *Saissetia* Ancey, 1888, not Déplanche, 1858)

Type species.—*Helix saisseti* Gassies, 1860 (original designation).

Remarks.—The species included in *Platyrhytida* are diverse in size and sculpture, but agree in their type of whorl increment and in having a minute umbilicus which is often plugged by a callus. Quite possibly *Platyrhytida* is polyphyletic, but without dissection of the soft parts no conclusions can be drawn. There are few positive shell features on which to base a classification. *H. astur* has been shown to have endodontid dentition; otherwise even family position would be uncertain.

Usually *Platyrhytida* is considered to be a subgenus of the New Zealand *Allodiscus*. The latter has a typically endodontid microsculpture and a much tighter whorl increment. *Platyrhytida* has either a smooth shell (*P. perroquiniana* and *P. baladensis*) or reduced radial ribs with a criss-cross microsculpture of fine lines between the broad low radials (*P. turneri*, *P. saisseti*, and *P. goulardiana*).

P. saisseti is the most specialized species, being largest in size and having the radial ribs beaded.

**Platyrhytida turneri* (Pfeiffer), 1860

Helix turneri Pfeiffer, 1860, Proc. Zool. Soc. London, 1860: 135.

Helix astur Souverbie, 1860, Jour. de Conchy., 8: 205–206, 315–316, pl. 11, fig. 7.

Helix oclusa Gassies, 1865, op. cit., 13: 210–211; Gassies, 1871, Faune Conchy., 2: 20–21, pl. 2, fig. 13.

Helix oriunda Gassies, 1880, op. cit., 3: 20; Gassies, 1880, Jour. de Conchy., 28: 325–326, pl. 10, fig. 2.

Allodiscus (Platyrhytida) turneri (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, p. 141, pl. 16, fig. 182.

Type locality.—New Caledonia (*turneri* and *astur*), Port-de-France, New Caledonia (*occlusa*), and forests of model farm near Yahoue, New Caledonia (*oriunda*).

Remarks.—*Helix turneri* was described “between February and May, 1860” and *Helix astur* “April 1, 1860.” The question of priority is uncertain, and, following Franc, I am arbitrarily utilizing Pfeiffer’s name.

**Platyrhytida baladensis* (Souverbie), 1863

Helix baladensis Souverbie, 1863, Jour. de Conchy., 11: 276–277, pl. 12, fig. 1.

Helix bruniana Gassies, 1872, op. cit., 20: 365–366; Gassies, 1873, op. cit., 21: 337–338, pl. 14, fig. 6.

Allodiscus (Platyrhytida) bruniana (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 142–143, pl. 16, fig. 185.

Type locality.—Balade, New Caledonia (*baladensis*), and Ouagap, New Caledonia (*bruniana*).

***Platyrhytida perroquiniana** (Crosse), 1869

Helix perroquiniana Crosse, 1869, Jour. de Conchy., 17: 414–415; Crosse, 1870, op. cit., 18: 410–411, pl. 13, fig. 2.

Allodiscus (Platyrhytida) perroquiniana (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 142, pl. 16, fig. 184 (holotype of *perroquiniana*).

Type locality.—Baie du Sud, New Caledonia.

Platyrhytida goulardiana (Crosse), 1870

Helix goulardiana Crosse, 1870, Jour. de Conchy., 18: 136–137, 405–406, pl. 13, fig. 3.

Allodiscus (Platyrhytida) goulardiana (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 142.

Type locality.—Mount Mou, New Caledonia.

***Platyrhytida saisseti** (Gassies), 1871

Helix saisseti Montrouzier, 1860, Jour. de Conchy., 8: 205, 313–315, pl. 11, fig. 4.

Helix saisseti Gassies, 1871, Faune Conchy., 2: 20—a valid emendation.

Allodiscus (Platyrhytida) saisseti (Montrouzier), Franc, 1957, Moll. Néo-Caledonien, pp. 141–142, pl. 16, fig. 183.

Type locality.—Kanala, New Caledonia.

Superfamily LIMACACEA

The limacoid snails have replaced the more primitive Arionacea (Endodontidae) on continental areas and are an important part of the snail fauna on most Pacific islands. It was thus extremely surprising to find that they are almost completely absent from New Caledonia. Franc (1957, pp. 143–150) listed nine New Caledonian limacoid species, four introduced and five “endemic.” The latter are known from shells only and their family position is uncertain. Two are listed as Pulmonata *incertae sedis*, while three are placed in *Orpiella (Halozonites)* at the suggestion of H. B. Baker.

Of the introduced species, *Coneuplecta calculosa* and *Liardetia samoensis* are Polynesian species spread by natives, *Deroceras laeve* is a European slug, and *Hawaiiia minuscula* a North American–West Indian species widely disseminated by commerce. They are listed below, but references to supraspecific categories have been thought unnecessary.

Hawaiiia minuscula (Binney), 1841

Helix minuscula Binney, 1841, Boston Jour. Nat. Hist., 3: 435, pl. 22, fig. 4.

Hawaiiia minuscula (Binney), Pilsbry, Land Moll. N. America, 2, (1), pp. 420-425, figs. 228-229; Franc, 1957, Moll. Néo-Caledonien, p. 148, pl. 17, fig. 192.

Type locality.—Ohio, United States of America.

Deroceras laeve (Müller), 1774

Limax laevis Müller, 1774, Verm. terr. et fluv. Hist., 2: 2.

?*Limax mouensis* Gassies, 1871, Faune Conchy., 2: 14.

Deroceras laeve (Müller), Pilsbry, 1948, Land Moll. N. America, 2, (2), pp. 539-552, figs. 289-291; Franc, 1957, Moll. Néo-Caledonien, pp. 149-150, pl. 17, fig. 193.

Type locality.—Denmark (*laeve*) and Mount Mou, New Caledonia (*mouensis*).

Coneuplecta (Durgellina) calculosa (Gould), 1852

Helix calculosa Gould, 1852, U. S. Explor. Exped. Wilkes, Shells, p. 48.

Helix dendrobia Crosse, 1868, Jour. de Conchy., 16: 96-97, pl. 1, fig. 5.

Coneuplecta (Durgellina) calculosa (Gould), H. B. Baker, 1941, Bull. B. P. Bishop Mus., 166: 234-236, pl. 62, fig. 13; Franc, 1957, Moll. Néo-Caledonien, pp. 146-147, pl. 17, fig. 189.

Type locality.—Tahiti, Society Islands (*calculosa*), and on the trees at Koe, New Caledonia (*dendrobia*).

***Liardetia (Liardetia) samoensis** (Mousson), 1865

Nanina samoensis Mousson, 1865, Jour. de Conchy., 13: 165-166.

Zonites subfulvus Gassies, 1866, op. cit., 14: 49; Gassies, 1871, Faune Conchy., 2: 16, pl. 1, fig. 4.

Kaliella subfulva (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 147, pl. 17, fig. 190a-c.

Type locality.—Upolu, Samoa (*samoensis*), and Art Island, New Caledonia (*subfulvus*).

Remarks.—A full discussion of the species is given by Solem (1959, pp. 96-97).

Genus ORPIELLA (Gray), 1855

Type species.—*Helix scorpio* Gould, 1847 (monotype).

Remarks.—The three New Caledonian species are referred to this complex with a great deal of hesitation. The anatomy of *Helicarion woodwardi* has been poorly figured, but the identity of this shell with

Helix artensis is unknown. Even its family position is uncertain. The general appearance of these shells recalls some of the *Orpiella*. For this reason they have here been tentatively placed in that genus. This reference is so tentative that I did not accept *Orpiella* as a genus present in New Caledonia (Solem, 1959).

***Orpiella (Halozonites) artensis** (Souverbie), 1859

Helix artensis Souverbie, 1859, Jour. de Conchy., 7: 289-291; Gassies, 1863, Faune Conchy., 1: 19-20, pl. 1, fig. 2.

Microcystis artensis (Souverbie), Franc, 1957, Moll. Néo-Caledonien, pp. 145-146, pl. 17, fig. 188.

Type locality.—Art Island, New Caledonia.

***Orpiella (Halozonites) desmazuresi** (Crosse), 1872

Zonites desmazuresi Crosse, 1872, Jour. de Conchy., 20: 225-226; Crosse, 1873, op. cit., 21: 256-258, pl. 11, fig. 1.

Microcystis desmazuresi (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 144, pl. 16, fig. 186.

Type locality.—Vicinity of Noumea, New Caledonia.

Orpiella (Halozonites) woodwardi (Godwin-Austen), 1903

Helicarion (?) *woodwardi* Godwin-Austen, 1903, Proc. Malac. Soc. London, 5, (4), pp. 298-299, pl. 9, fig. 2a-g; Franc, 1957, Moll. Néo-Caledonien, pp. 147-148, pl. 17, fig. 191.

Type locality.—Lifu, Loyalty Islands.

Remarks.—Some specimens collected on Lifu by A. Willey, who found the type specimens, were in the UMMZ collection. They were not identified, but were the same as *O. artensis*. It is thus possible that *H. woodwardi* may be a synonym, but only study of the type specimen can determine its relationship.

Family **BULIMULIDAE**

Genus **Placostylus** Beck, 1837

Type species.—*Placostylus bootis* Menke (emended), which has been subsequently restricted to the New Caledonian *Limax fibratus* Martyn, 1789 (see Pilsbry, 1900, p. 19).

Remarks.—The International Commission on Zoological Nomenclature (Opinion 456) invalidated Martyn's names as a group but stated that requests for preservation of individual names would be favorably received. Martyn's species was beautifully figured and a

type locality designated by Pain (1958). I prefer to retain Martyn's name rather than to try to determine the identity of one of the ill-figured and badly described synonyms from the late 1700's and early 1800's. While this is against the letter of the International Code, it is a much more practical solution.

If varietal names are accepted as being nomenclaturally available, there are more than 130 named forms of New Caledonian *Placostylus*. The current rules of nomenclature are inconclusive, but it is possible to eliminate the varietal names on the basis that they are "infrasub-specific" forms. Since most of the names proposed as varieties are of dubious validity under the best of circumstances (see p. 420), their elimination can only simplify matters.

In prefacing his revision of the *fibratus* complex, Pilsbry (1900, p. 35) quoted Dante's famous "All hope abandon, ye who enter here." The bewildering variation and chaotic literature defy any solution based on library work or existing museum collections. Pilsbry (1901-1902, pp. liii-liv) tentatively recognized 34 New Caledonian species. Franc (1957, pp. 150-161) listed only 22 (including one described after Pilsbry's monograph) and overlooked *P. strattoni* Pain (1955, pp. 18-19, fig. 9).

Neither classification is satisfactory, but for nomenclatural purposes Pilsbry's is here adopted. The primary purpose of this list is to provide type locality data for the currently named species and their principal synonyms. The many early names applied to ill-copied figures of *P. fibratus* Martyn are not listed but can be found in Pilsbry (1900, pp. 39-42). All validly proposed synonyms accompanied by precise type locality data are included, but a few unfigured forms with the type locality "New Caledonia" have been omitted. Their identity could be discovered only by recovery of missing type specimens. Speculation on them is a waste of printed pages.

Careful analysis of the variation in extensive collections from local populations is the only way in which any revision of the speciation can be attempted. Some information overlooked by Franc (1957) has been added, but remarks are limited to indicating where Franc's classification differed from that of Pilsbry.

The New Caledonian *Placostylus* are usually divided into two groups, ranked as sections by Pilsbry (1901-1902, pp. 67-68) and genera by Franc (1957, pp. 160-161). I indicated (Solem, 1959, fig. 5) that the New Caledonian species were monophyletic, the shell divergence between the sections (or genera) representing minor habitat adaptations, as previously suggested by Pilsbry (1900, p. 67).

Careful study of the shells indicates that the New Caledonian species are much more closely related to each other than to any species from other island groups.

The sectional division of Pilsbry is retained here to indicate the arboreal versus terrestrial groupings.

Section *Leucocharis* Pilsbry, 1900

Type species.—*Bulimus pancheri* Crosse, 1870 (original designation).

Placostylus (Leucocharis) pancheri (Crosse), 1870

Bulimus pancheri Crosse, 1870, Jour. de Conchy., 18: 137-138, 411-412, pl. 13, fig. 7.

Leucocharis pancheri (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 160-161, pl. 21, fig. 213.

Type locality.—Mountains near Boulari, New Caledonia.

Placostylus (Leucocharis) loyaltiensis (Souverbie), 1879

Bulimus loyaltiensis Souverbie, 1879, Jour. de Conchy., 27: 25-26, pl. 3, fig. 1.

Leucocharis loyaltiensis (Souverbie), Franc, 1957, Moll. Néo-Caledonien, p. 161, pl. 21, fig. 214.

Type locality.—Mare, Loyalty Islands.

Placostylus (Leucocharis) porphyrocheila (Dautzenberg and Bernier), 1901

Leucocharis porphyrocheila Dautzenberg and Bernier, 1901, Jour. de Conchy., 49: 215-216, pl. 7, figs. 5-6; Franc, 1957, Moll. Néo-Caledonien, p. 161, pl. 21, fig. 215 (holotype of *porphyrocheila*).

Type locality.—New Caledonia.

Remarks.—A variety *rubicunda* from Houailou, New Caledonia, was described by Dautzenberg and Bernier (1901, p. 301, pl. 8, fig. 6) only a few months after the original description. When the type locality of the nominate form can be established, the variety may be considered a validly described subspecies. Until then I prefer to leave it in nomenclatural limbo.

Section *Placostylus*, sens. str.

Placostylus (Placostylus) eddystonensis (Pfeiffer), 1855

Bulimus eddystonensis Pfeiffer, 1855, Proc. Zool. Soc. London, 1855: 88; Pfeiffer, 1856, Nov. Conch., 1: 54, pl. 16, figs. 1, 2.

Bulimus hienguenensis Crosse, 1871, Jour. de Conchy., **19**: 181 (substitute name).

Bulimus servaini Euthyme, 1885, Bull. Soc. Malac. France, **2**: 244-246.

Placostylus hienghenensis (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 158, pl. 20, fig. 208.

Type locality.—Eddystone Island, Solomon Islands (*eddystonensis*, error subsequently corrected to Hienguen, New Caledonia, by Gassies, 1863, p. 260), Isle of Pines (*servaini*).

Placostylus (Placostylus) bavayi (Crosse and Marie), 1868

Bulimus bavayi Crosse and Marie, 1868, Jour. de Conchy., **16**: 161-164, pl. 8, fig. 1.

Placostylus dupuyi Kobelt, 1890, Syst. Conch. Cab., I, (13a), pp. 43-44, pl. 10, figs. 3, 4.

Placostylus bavayi (Crosse and Marie), Franc, 1957, Moll. Néo-Caledonien, p. 159, pl. 20, fig. 210.

Type locality.—Summit of Mount Mou, New Caledonia (*bavayi*), and New Caledonia (*dupuyi*).

Placostylus (Placostylus) bondeensis (Crosse and Souverbie), 1869

Bulimus bondeensis Crosse and Souverbie, 1869, Jour. de Conchy., **17**: 270-272, pl. 8, fig. 1.

Placostylus bondeensis (Crosse and Souverbie), Franc, 1957, Moll. Néo-Caledonien, p. 159, pl. 20, fig. 209.

Type locality.—Bonde, New Caledonia.

Placostylus (Placostylus) layardi Kobelt, 1891

Placostylus layardi Kobelt, 1891, Syst. Conch. Cab., I, (13a), pp. 110-111, pl. 27, figs. 1, 2.

Placostylus curtus "Crosse" Pilsbry, 1900, Man. Conch., (2), **13**: 33, pl. 7, fig. 17, pl. 8, figs. 23, 24.

Placostylus layardi Kobelt, Franc, 1957, Moll. Néo-Caledonien, pp. 159-160, pl. 20, fig. 211.

Type locality.—Tie-baghi Mountain, near Coumac, northwestern New Caledonia (*layardi*).

Remarks.—Pilsbry (1900, p. 33) raised Crosse's varietal name *curta* to specific rank in the belief that *Diplomorpha layardi* Ancey, 1884, was congeneric. *Diplomorpha* is a distinct genus (see Solem, 1959, pp. 137-138), and Kobelt's name should be retained.

Placostylus (Placostylus) savesi Crosse, 1886

Placostylus savesi Crosse, 1886, Jour. de Conchy., **34**: 163-165, pl. 7, figs. 3, 3a.

Type locality.—Pouembo, New Caledonia.

Remarks.—Franc (1957, p. 159) suggested that this might be a synonym of *P. bavayi*.

Placostylus (Placostylus) rossiteri (Brazier), 1881

Bulimus rossiteri Brazier, 1881, Proc. Linn. Soc. New South Wales, **6**: 586–587.

Bulimus (Placostylus) rossiteri Brazier, Crosse, 1881, Jour. de Conchy., **29**: 338–340, pl. 12, fig. 6.

Placostylus rossiteri (Brazier), Franc, 1957, Moll. Néo-Caledonien, p. 160, pl. 20, fig. 212.

Type locality.—Bonedondia village, Nehone Bay, New Caledonia.

Placostylus (Placostylus) alexander (Crosse), 1855

Bulimus alexander Crosse, 1855, Rev. Mag. Zool., (2), **7**: 34, 83–84, pl. 4, figs. 1–3.

Placostylus alexander (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 152, pl. 18, fig. 194.

Type locality.—New Caledonia.

Remarks.—Pilsbry (1900, pp. 35–37) lists a number of varietal names. If they had been advanced to subspecific rank and refigured, these would be nomenclaturally available from the time of such usage, but under present circumstances they are not acceptable.

Placostylus (Placostylus) corpulentus (Gassies), 1871

Bulimus corpulentus Gassies, 1871, Faune Conchy., **1**: 183–184.

Placostylus corpulentus (Gassies), Kobelt, 1891, Syst. Conch. Cab., I, (13a), pp. 121–122, pl. 30, fig. 1.

Type locality.—Isle of Pines, New Caledonia (here selected).

Remarks.—Reported from the Isle of Pines by Pain (1955, p. 11), but not mentioned by Franc (1957).

Placostylus (Placostylus) abbreviatus (Gassies), 1871

Bulimus abbreviatus Gassies, 1871, Faune Conchy., **2**: 192; Gassies, 1880, Faune Conchy., **3**: 41–42, pl. 4, fig. 1.

Type locality.—Unknown (restricted to Lifu, Loyalty Islands, by Gassies, 1880, p. 41).

Remarks.—Not mentioned by Franc (1957).

Placostylus (Placostylus) kanalensis Kobelt, 1891

Placostylus kanalensis Kobelt, 1891, Syst. Conch. Cab., I, (13a), pp. 99–100, pl. 24, figs. 1–3.

Placostylus (kanalensis var.?) *subeffusus* Kobelt, 1891, Syst. Conch. Cab., I, (13a), pp. 101–102, pl. 24, fig. 6.

Placostylus houailouensis Dautzenberg, 1901, Jour. de Conchy., **49**: 301–302, pl. 8, figs. 4, 5.

Placostylus canalensis (sic) (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 154, pl. 19, fig. 198.

Type locality.—Kanala, New Caledonia (*kanalensis*), Tchio Island, New Caledonia (*subeffusus*), and Houailou, New Caledonia (*houailouensis*).

Placostylus (Placostylus) fibratus (Martyn), 1789

Limax fibratus Martyn, 1789, Universal Conch., pl. 25 (see Pilsbry, 1900, pp. 40–41, for the synonyms based on copies of this figure or references to it).

Bulimus auris-midae Reeve, 1848, Conch. Icon., *Bulimus*, fig. 170.

Bulimus bairdii Reeve, 1848, op. cit., fig. 272.

Bulimus insignis Petit, 1850, Jour. de Conchy., **1**: 57, pl. 3, fig. 1.

Bulimus danieli Crosse, 1855, Rev. Mag. Zool., (2), **7**: 84–85, pl. 4, figs. 4, 5.

Bulimus edwardsianus Gassies, 1863, Faune Conchy., **1**: 40–41, pl. 4, fig. 2.

Bulimus ouensis Gassies, 1870, Jour. de Conchy., **18**: 142; Gassies, 1871, Faune Conchy., **2**: 68–69, pl. 3, fig. 5.

Bulimus pinicola Gassies, 1870, Jour. de Conchy., **18**: 142–143; Gassies, 1871, Faune Conchy., **2**: 59–60, pl. 4, fig. 1.

Bulimus infundibulum Gassies, 1871, Faune Conchy., **2**: 86–87 (Pain, 1955, pp. 16–17, figs. 6, 7, considers this a valid subspecies of *P. fibratus*).

Bulimus aesopeus Gassies, 1871, Faune Conchy., **2**: 87–88; Gassies, 1871, Jour. de Conchy., **21**: 51, pl. 2, fig. 6.

Bulimus lalannei Gassies, 1871, Faune Conchy., **2**: 185–187.

Bulimus imbricatus Gassies, 1871, op. cit., **2**: 187–188.

Bulimus albo-roseus Gassies, 1871, op. cit., **2**: 189.

Bulimus patens Gassies, 1871, op. cit., **2**: 190.

Bulimus superfasciatus Gassies, 1871, op. cit., **2**: 190.

Bulimus necouensis Gassies, 1871, op. cit., **2**: 191.

Bulimus carbonarius Gassies, 1871, op. cit., **2**: 191–192.

Bulimus bulbulus Gassies, 1871, op. cit., **2**: 193–194.

Bulimus insignior Euthyme, 1885, Bull. Soc. Malac. France, **2**: 242–243.

Placostylus (fibratus var.?) *knoblauchii* Kobelt, 1890, Syst. Conch. Cab., I, (13a), pp. 15–16, pl. 3, fig. 1.

Placostylus leucolenus Crosse, 1895, Jour. de Conchy., **43**: 80–82, pl. 5, fig. 6.

Placostylus fibratus bourailensis Cockerell, 1929, Nautilus, **42**, (3), p. 74, pl. 2, figs. 4–6.

Placostylus fibratus powelli Pain, 1955, Jour. de Conchy., **95**: 12–14, figs. 2, 3.

Placostylus fibratus mosesi Pain, 1955, op. cit., **95**: 14, fig. 4.

Placostylus fibratus (Martyn), Franc, 1957, Moll. Néo-Caledonien, pp. 152-153, pl. 18, fig. 195.

Placostylus (*Placostylus*) *fibratus kumacensis* Pain, 1958, Jour. of Conch., 24, (8), pp. 276-277, pl. 8, lower figures.

Type locality.—Isle of Pines, New Caledonia (*pinicola*, *aesopeus*, *carbonarius*, *insignior*, *leucolenus*), New Caledonia (*insignis*, *aurismidae*, *danieli*, *knoblauchii*), unknown (*bairdii*), Nekete, New Caledonia (*edwardsianus*), Ouen Island, New Caledonia (*ouensis*), Koutoumo Island, New Caledonia (*infundibulum*), Boulari, New Caledonia (*lalannei*, *patens*, *superfasciatus*, *imbricatus*), Alcmene Island, New Caledonia (*alboroseus*), Necoue, New Caledonia (*necouensis*), vicinity of Noumea, New Caledonia (*bulbulus*), Ile Amere, New Caledonia (*fibratus*), Baie du Sud, New Caledonia (*powelli*), vicinity of Goro, New Caledonia (*mosesi*), and 1,250 feet elevation in the Tiebaghi Mountain near Kumac, New Caledonia (*kumacensis*).

Remarks.—The type locality of typical *fibratus* has long been uncertain. Charles Hedley concluded from the narrative of Cook's voyage that the Ile Amere between the Isle of Pines and New Caledonia was the type station (see Pilsbry, 1900, pp. 235-236). Cockerell (1929, p. 76) suggested that the Isle of Pines was more probable. Pain (1958) reported that typical *P. fibratus* was still living on Ile Amere in 1945, and this can be designated as type locality.

***Placostylus* (*Placostylus*) *arenosus* (Gassies), 1878**

Bulimus arenosus Gassies, 1878, Jour. de Conchy., 26: 333-334; Gassies, 1880, Faune Conchy., 3: 40, pl. 3, fig. 1.

Type locality.—Lifu, Loyalty Islands.

Remarks.—Franc (1957) does not mention this species.

***Placostylus* (*Placostylus*) *ouveanus* (Mousson), 1869**

Bulimus ouveanus "Dotzauer" Mousson, 1869, Jour. de Conchy., 17: 60-62, pl. 4, figs. 4, 4a.

Type locality.—Uvea, Loyalty Islands.

Remarks.—Franc (1957, p. 152) listed this as a synonym of *P. fibratus*.

***Placostylus* (*Placostylus*) *falcicula* (Gassies), 1871**

Bulimus falcicula Gassies, 1871, Faune Conchy., 2: 190-191.

Placostylus falcicula (Gassies), Pain, 1949, Jour. of Conch., 23, (2), pp. 39-40, 2 figs.

Type locality.—Baie du Sud, New Caledonia.

Remarks.—Franc (1957, p. 152) listed this as a synonym of *P. fibratus*.

Placostylus (Placostylus) albersi Dautzenberg and Bouge, 1923

Bulimus eximius Albers, 1857 (not Reeve, 1842), Malak. Blätt., 4: 96-97.

Bulimus souvillei Morelet, 1857, Bull. Soc. Hist. Nat. Moselle, 8: 26—an unidentifiable name (see Dautzenberg, 1923, p. 146).

Placostylus albersi Dautzenberg and Bouge, 1923, Nova Caledonia, Zool., 3, (1), p. 146—new name for *eximius* Albers, 1857 (not Reeve, 1842); Franc, 1957, Moll. Néo-Caledonien, p. 153, pl. 18, fig. 196.

Type locality.—New Caledonia (*eximius*), Sanctam-Mariam de Balade (*souvillei*).

Remarks.—Franc (1957, p. 153) listed several of Pilsbry's species as synonyms. If this course is adopted, one of these names must be used for the species. The identity of *Bulimus souvillei* is not known and the name should be treated as a *nomen dubium*.

Placostylus (Placostylus) lamberti (Gassies), 1869

Bulimus lamberti Gassies, 1869, Jour. de Conchy., 17: 72-73; Gassies, 1871, Faune Conchy., 2: 69-70, pl. 3, fig. 6.

Placostylus lamberti (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 154-155, pl. 19, fig. 199.

Type locality.—Uvea, Loyalty Islands.

Placostylus (Placostylus) bouleriensis (Souverbie), 1869

Bulimus bouleriensis Souverbie, 1869, Jour. de Conchy., 17: 417-418; Gassies, 1871, Faune Conchy., 2: 60-61, pl. 1, fig. 12.

Type locality.—Woods around Boulari, New Caledonia.

Remarks.—Franc (1957, p. 154) considered this to be a synonym of *P. lamberti*.

Placostylus (Placostylus) guestieri (Gassies), 1869

Bulimus guestieri Gassies, 1869, Jour. de Conchy., 17: 72; Gassies, 1871, Faune Conchy., 2: 74-75, 192-193, pl. 3, fig. 11.

Bulimus cicatricosus Gassies, 1871, Faune Conchy., 2: 72-73, pl. 4, fig. 2.

Bulimus (bavayi var.?) *rhinocheti* Kobelt, 1891, Syst. Conch. Cab., I, (13a), pp. 75-76, pl. 18, fig. 1.

Type locality.—Uvea, Loyalty Islands (*guestieri*), Kanala, New Caledonia (*cicatricosus*, *rhinocheti*).

Remarks.—Franc (1957, p. 153) listed this as a synonym of *P. albersi*.

Placostylus (Placostylus) senilis (Gassies), 1869

Bulimus senilis Gassies, 1869, Jour. de Conchy., **17**: 71–72; Gassies, 1871, Faune Conchy., **2**: 65–68, pl. 2, fig. 15.

Bulimus subsenilis Gassies, 1878, Jour. de Conchy., **26**: 331–332; Gassies, 1880, Faune Conchy., **3**: 39–40, pl. 2, fig. 1.

Type locality.—Isle of Pines, New Caledonia (*subsenilis*), and New Caledonia (*senilis*).

Remarks.—Neither of these names is mentioned by Franc (1957).

Placostylus (Placostylus) buccalis (Gassies), 1870

Bulimus buccalis Gassies, 1871, Jour. de Conchy., **18**: 141–142; Gassies, 1871, Faune Conchy., **2**: 58–59, pl. 5, fig. 1.

Type locality.—Ouen Island, New Caledonia.

Remarks.—Franc (1957, p. 153) listed this as a synonym of *P. albersi*.

Placostylus (Placostylus) goroensis (Souverbie), 1870

Bulimus goroensis Souverbie, 1870, Jour. de Conchy., **18**: 76; Gassies, 1871, Faune Conchy., **2**: 76, pl. 4, fig. 3.

Placostylus goroensis (Souverbie), Franc, 1957, Moll. Néo-Caledonien, p. 154, pl. 18, fig. 197.

Type locality.—Goro, New Caledonia.

Placostylus (Placostylus) submariei (Souverbie), 1869

Bulimus submariei Souverbie, 1869, Jour. de Conchy., **17**: 273–274; Souverbie, 1870, op. cit., **18**: 76, pl. 9, fig. 2.

Placostylus submariei (Souverbie), Franc, 1957, Moll. Néo-Caledonien, p. 157, pl. 19, fig. 204.

Type locality.—Bonde, New Caledonia.

Placostylus (Placostylus) mariei (Crosse and Fischer), 1867

Bulimus mariei Crosse and Fischer, 1867, Jour. de Conchy., **15**: 187–192, pl. 7, figs. 1, 2.

Placostylus submariei Kobelt, 1890 (not Souverbie, 1869), Syst. Conch. Cab., **I**, (13a), p. 17, pl. 3, fig. 2.

Placostylus mariei (Crosse and Fischer), Franc, 1957, Moll. Néo-Caledonien, p. 156, pl. 19, fig. 203.

Type locality.—Gatope, New Caledonia.

Placostylus (Placostylus) neckliaiensis Kobelt, 1891

Placostylus (mariei var.?) neckliaiensis Kobelt, 1891, Syst. Conch. Cab., **I**, (13a), pp. 116–117, pl. 28, figs. 5, 6.

Type locality.—Neckliai, west coast of New Caledonia.

Remarks.—Franc (1957, p. 156) listed this as a synonym of *P. duplex*.

Placostylus (Placostylus) porphyrostomus (Pfeiffer), 1851

Bulimus auris-bovinus Reeve, 1848 (not Bruguière, 1792), *Conch. Icon.*, *Bulimus*, fig. 185.

Bulimus porphyrostomus Pfeiffer, 1851, *Proc. Zool. Soc. London*, **1851**: 261; Gassies, 1863, *Faune Conchy.*, **1**: 43, pl. 4, fig. 3.

Bulimus lessoni Petit, 1853, *Jour. de Conchy.*, **4**: 405, pl. 11, fig. 6.

Bulimus singularis Morelet, 1857, *Bull. Soc. d'Hist. Nat. Moselle*, **8**: 27.

Bulimus debeauxi Gassies, 1871, *Faune Conchy.*, **2**: 184–185; Gassies, 1881, *Jour. de Conchy.*, **29**: 337, pl. 11, fig. 4.

Placostylus porphyrostomus (Pfeiffer), Franc, 1957, *Moll. Néo-Caledonien*, p. 155, pl. 19, fig. 200.

Type locality.—New Caledonia (*lessoni*), Portum Galliae, New Caledonia (*singularis*), Isle of Pines, New Caledonia (*debeauxi*), and unknown (*porphyrostomus*).

Placostylus (Placostylus) leoni Haas, 1935

Placostylus leoni Haas, 1935, *Zool. Anz.*, **109**, (7–8), pp. 189–190, fig. 5; Franc, 1957, *Moll. Néo-Caledonien*, p. 155, pl. 19, fig. 201.

Type locality.—Artillery Point, Noumea, New Caledonia.

Placostylus (Placostylus) monackensis Kobelt, 1891

Placostylus monackensis Kobelt, 1891, *Syst. Conch. Cab.*, I, (13a), pp. 104–105, pl. 25, figs. 3–5.

Type locality.—Monack Island, New Caledonia.

Remarks.—Franc (1957, p. 156) listed this as a synonym of *P. duplex*.

Placostylus (Placostylus) duplex (Gassies), 1871

Bulimus duplex Gassies, 1871, *Faune Conchy.*, **2**: 64–65.

Placostylus duplex (Gassies), Crosse, 1894, *Jour. de Conchy.*, **42**: 273–274, pl. 9, fig. 3; Franc, 1957, *Moll. Néo-Caledonien*, p. 156, pl. 19, fig. 202.

Placostylus duplex major "Gassies" Pain, 1955, *Jour. de Conchy.*, **95**: 17, fig. 8.

Type locality.—Nou Island, New Caledonia.

Placostylus (Placostylus) caledonicus (Petit), 1845

Bulimus caledonicus Petit, 1845, *Rev. Mag. Zool.*, **1845**: 53; Gassies, 1863, *Faune Conchy.*, **1**: 44, pl. 5, fig. 3.

Placostylus caledonicus (Petit), Franc, 1957, Moll. Néo-Caledonien, p. 157, pl. 19, fig. 205.

Type locality.—New Caledonia.

Placostylus (Placostylus) poyensis Kobelt, 1891

Placostylus (pseudocaledonicus var.?) *poyensis* Kobelt, 1891, Syst. Conch. Cab., I, (13a), pp. 107–108, pl. 26, figs. 3, 4.

Type locality.—Poya, west coast of New Caledonia.

Remarks.—Franc (1957, p. 156) listed this as a synonym of *P. duplex*.

Placostylus (Placostylus) pseudocaledonicus (Montrouzier), 1859

Bulimus pseudocaledonicus Montrouzier, 1859, Jour. de Conchy., 7: 379, pl. 14, fig. 3.

Bulimus annibal Souverbie, 1869, op. cit., 17: 416–417; Souverbie, 1870, op. cit., 18: 78, pl. 9, figs. 3, 3a.

Bulimus gaudryanus Gassies, 1878, op. cit., 26: 335–337; Gassies, 1880, Faune Conchy., 3: 38, pl. 1, fig. 24.

Placostylus (pseudocaledonicus, var.) *pouenanus* Kobelt, 1891, Syst. Conch. Cab., I, (13a), pp. 92–93, pl. 22, figs. 4, 5.

Placostylus saxtoni "Layard" Kobelt, 1891, op. cit., I, (13a), pp. 97–98, pl. 23, figs. 5, 6.

Placostylus smithii Kobelt, 1891, op. cit., I, (13a), pp. 105–107, pl. 26, figs. 1, 2.

Placostylus goulvainensis Kobelt, 1891, op. cit., I, (13a), pp. 109–110, pl. 26, figs. 5, 6.

Placostylus pseudocaledonicus (Montrouzier), Franc, 1957, Moll. Néo-Caledonien, pp. 157–158, pl. 20, fig. 206.

Type locality.—New Caledonia (*pseudocaledonicus*), Bonde, New Caledonia (*annibal*), Ouagap, New Caledonia (*gaudryanus*), Pouen Island, New Caledonia (*pouenanus*), Koumac, New Caledonia (*saxtoni*), west coast of New Caledonia (*smithii*) and Cape Goulvein, New Caledonia (*goulvainensis*).

Placostylus (Placostylus) scarabus (Albers), 1854

Bulimus scarabus Albers, 1854, Malak. Blätt., 1: 219; Gassies, 1863, Faune Conchy., 1: 46, pl. 5, fig. 2.

Placostylus scarabus (Albers), Franc, 1957, Moll. Néo-Caledonien, p. 158, pl. 20, fig. 207.

Placostylus scarabus verdis Pain, 1955, Jour. de Conchy., 95, (1), pp. 14–16, fig. 5.

Type locality.—New Caledonia (*scarabus*), southwest coast near Port-de-France, New Caledonia (*verdis*).

Placostylus (Placostylus) strattoni Pain, 1955

Placostylus strattoni Pain, 1955, Jour. de Conchy., **95**: 18-19, fig. 9.

Type locality.—New Caledonia.

Remarks.—Not mentioned by Franc (1957). This species was described from a single individual without precise locality data and may be based on a mislabeled shell from another archipelago or a juvenile of one of the other New Caledonian species.

Family **CAMAENIDAE**Genus **Draparnaudia** Montrouzier, 1859

Type species.—*Draparnaudia michaudi* Montrouzier, 1859 (monotype).

Remarks.—The uncertainty of the systematic position of this genus has been fully discussed (Solem, 1959, pp. 120-121). Only dissection of the soft parts can determine whether it is a camaenid, a bulimulid, or a tornatellinid.

***Draparnaudia singularis** (Pfeiffer), 1854

Helix singularis Pfeiffer, 1854, Conch. Icon., *Helix*, pl. 200, fig. 1407a, b.

Draparnaudia singularis (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, pp. 162-163, pl. 21, fig. 216; Solem, 1959, Fieldiana, Zool., **43**, (1), pp. 122-123, pl. 8, fig. 7 (holotype of *singularis*).

Type locality.—Aneiteum Island, New Hebrides (cited by mistake as Koondah Mountains, near Calicut, India, in the original description and later corrected [Proc. Zool. Soc. London, **1854**:289]).

***Draparnaudia michaudi** Montrouzier, 1859

Helix sinistrorsa Deshayes, 1840 (not Serres, 1838), Hist. Nat. Moll. fluv. terr., **2**, (2), p. 24, pl. 161, figs. 19-21.

Draparnaudia michaudi Montrouzier, 1859, Jour. de Conchy., **7**: 288.

Draparnaudia sinistrorsa (Deshayes, not Serres), Franc, 1957, Moll. Néo-Caledonien, p. 163, pl. 21, fig. 218.

Type locality.—New Caledonia (*sinistrorsa* and *michaudi*).

Remarks.—Pilsbry (1901-1902, p. 16) recognized Montrouzier's variety "B" under the name *castaneofasciata*. This large shell from Art Island has a broad chestnut band at the periphery of the body. If the population deserves nomenclatural recognition, the name should date from Pilsbry's usage. There is another unnamed variety on Lifu (see Pilsbry, op. cit., p. 283), but I do not choose to give it nomenclatural status.

***Draparnaudia gassiesi gassiesi** Pilsbry, 1902

Bulimus turgidulus Gassies, 1871 (not Deshayes, 1864), Faune Conchy., 2: 188-189; Gassies, 1873, Jour. de Conchy., 21: 49, pl. 2, fig. 4.

Draparnaudia gassiesi Pilsbry, 1902, Man. Conch., (2), 14: lxxi.

Draparnaudia turgidulus (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 163, pl. 21, fig. 217.

Type locality.—Nou Island, New Caledonia.

***Draparnaudia gassiesi microumbilicata** Solem, 1960

Draparnaudia gassiesi microumbilicata Solem, 1960, Not. Nat., 338: 6, fig. 8.

Type locality.—River drift at seacoast a few miles from Bourail, New Caledonia.

***Draparnaudia crossei** Pilsbry, 1901

Draparnaudia crossei Pilsbry, 1901, Man. Conch., (2), 14: 17, pl. 3, figs. 10, 11; Franc, 1957, Moll. Néo-Caledonien, p. 164, pl. 21, fig. 219.

Type locality.—New Caledonia.

Remarks.—Specimens in the American Museum of Natural History from Uvea, Loyalty Islands, provide the first definite locality record. They were compared with the holotype and three paratypes (ANSP 31520).

***Draparnaudia lifuana** Pilsbry, 1901

Bulimus theobaldianus Gassies, 1870 (not Benson, 1857), Jour. de Conchy., 18: 143; Gassies, 1871, Faune Conchy., 2: 93, pl. 3, fig. 9.

Draparnaudia lifuana Pilsbry, 1901, Man. Conch., (2), 14: 17-18, pl. 3, figs. 7-9, 12-15.

Draparnaudia lifouana (sic) Pilsbry, Franc, 1957, Moll. Néo-Caledonien, p. 164, pl. 21, fig. 220.

Type locality.—Lifu, Loyalty Islands.

Family **BRADYBAENIDAE*****Bradybaena similaris** (Ferussac), 1821

Helix similaris Ferussac, 1821, Tabl. Syst. Limacons, 3: 47.

Bradybaena similaris (Ferussac), Franc, 1957, Moll. Néo-Caledonien, p. 165, pl. 21, fig. 221.

Type locality.—Timor.

Remarks.—One of the most widely distributed culture snails.

Family HELICIDAE

Helix (Cryptomphalus) aspersa Müller, 1774

Helix aspersa Müller, 1774, Hist. Vermium, 2: 59.

Helix (Cryptomphalus) aspersa (Müller), Franc, 1957, Moll. Néo-Caledonien, p. 165.

Type locality.—Italy.

Remarks.—A European snail introduced to serve as food.

Family PARYPHANTIDAE (= Rhytididae)

The paryphantids are one of the dominant land snail taxa of Australia, New Zealand, New Caledonia, and South Africa. Solem (1959, pp. 147–151) reviewed their distribution and classification.

Three groups of paryphantids can be recognized in the New Caledonian fauna:

1. *Diplomphalus-Microphyura*, which is without known extralimital relatives.
2. *Ptychorhytida*, which shows New Zealand and Australian affinities.
3. *Ouagapia*, possibly a polyphyletic category, with species in the New Hebrides, Fijis, Tonga, Samoa, Solomon Islands, Bismarcks, New Guinea, and northern Queensland.

Franc (1957, pp. 174–175) placed two minute species in a fourth genus, *Macrocycloides*. The soft parts of both species are unknown. True *Macrocycloides* is several times their size, has uniform coloration of greasy white, and lacks the fine spiral sculpture characteristic of the New Caledonian species. Until the latter have been dissected, they cannot be classified even to family level with any degree of assurance. They are listed below as Pulmonata *incertae sedis*.

In color, form, and macrosculpture, many paryphantids (carnivorous) and endodontids (herbivorous) are strikingly similar. Several shells described as belonging to one family have, upon study of the soft parts, been shown to belong to the other. Examination of the microsculpture of all available New Caledonian material showed that there is apparently one constant conchological difference between the two families. The Paryphantidae never have radial microriblets present between the macroribs, while all endodontids show at least traces of the radial microsculpture, with the obvious exception of taxa such as *Platyrhytida*, where all sculpture is secondarily lost.

The absence of any microradial sculpture has caused me to transfer *Helix kanakina* Gassies, 1866, *Charopa marionae* Preston, 1907, *Helix inculta* Gassies, 1874, *Charopa gassiesiana* Preston, 1907, and probably *C. vicina* Preston, 1907, from the Endodontidae to the Paryphantidae.

Diplomphalus and *Microphyura* are here left as separate genera, although dissection may result in their being synonymized. Franc (1957, pp. 166-174) followed Thiele (1931, p. 724) in uniting *Ouagapia* and *Ptychorhytida* into one genus. I have referred *Ptychorhytida* to the New Zealand-Australian *Rhytida*, while *Ouagapia* is left as a distinct genus.

Genus **RHYTIDA** Albers, 1860

Type species.—*Helix greenwoodi* Gray, 1850 (original designation).

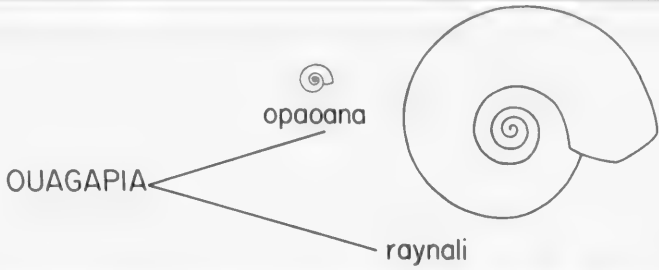
Remarks.—Few species have had the animals dissected and classification must be based entirely on shell characters. I indicated (1959, p. 157) that the New Caledonian species seemed most closely related to some east Australian forms. More detailed study of the New Caledonian species has suggested that parallel evolution may have occurred in the two areas. The adaptive radiation in New Caledonia (fig. 14) has the same range in shell morphology as that which can be traced in Australia from Tasmania north to Queensland. The New Caledonian species in some features more closely approach Australian, in others New Zealand, forms. Without dissection of the animals, no exact classification can be established. Temporarily, I am placing all the New Caledonian species in *Ptychorhytida* and considering it to be a subgenus of *Rhytida*.

Subgenus **Ptychorhytida** Moellendorff, 1903

Type species.—*Helix beraudi* Gassies, 1858 (original designation).

Remarks.—The New Zealand *Rhytida* (sens. str.) differ in having the radial ribs of the spire anastomosing and becoming rugose to pitted on the body whorl and base. The various conchological variations outlined below in New Caledonian species find their parallels in Australian species groups for which Iredale has provided generic names. The phyletic or convergent nature of the similarities can be determined only by dissections. The sequence in the New Caledonian species is so nearly continuous, however, that I suspect convergent evolution rather than multiple introductions.

NEW CALEDONIAN RHYTIDIDAE



	GROUPS				RHYTIDA
	I	II	III	IV	
RADIAL SCULPTURE					
ON TOP	•	•	•		
ON BASE	•	•			I (kanakina)
SPIRAL SCULPTURE		•	•	•	II (beraudi)
APERTURE TOOTHED			•*	•	III (testudinaria) IV (aulacospira)

*only in R. subsidialis

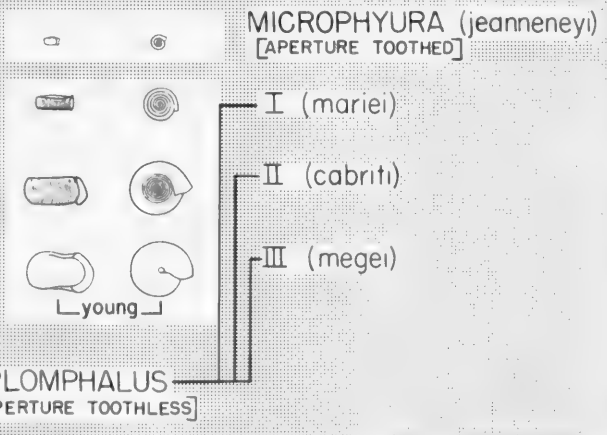


FIG. 14. Classification of the New Caledonian Paryphantidae (=Rhytididae).

Perhaps four New Caledonian species groups can be recognized. Group I has the most generalized shell structure, with Groups II, III, and IV representing increasing specializations.

I. GROUP OF **Rhytida (Ptychorhytida) kanakina** (Gassies), 1866

Shell small; aperture large; untoothed; microsculpture of fine spiral lines; and strong radial ribs continuing into the umbilicus.

Remarks.—These species are usually placed in “*Charopa*” (= *Andrefrancia*), but the lack of microradial shell sculpture suggests that they are paryphantids. In shape and sculpture they correspond to the Tasmanian paryphantids that Iredale placed in *Tasmaphena*.

***Rhytida (Ptychorhytida) kanakina** (Gassies), 1866

Helix kanakina Gassies, 1866, Jour. de Conchy., **14**: 49–50; Gassies, 1871, Faune Conchy., **2**: 35–36, pl. 2, fig. 10.

Helix inculta Gassies, 1874, Jour. de Conchy., **22**: 377–378; Gassies, 1871, Faune Conchy., **2**: 17–18, pl. 1, fig. 7.

Charopa marionae Preston, 1907, Ann. Mag. Nat. Hist., (7), **19**: 219, fig. 4.

Charopa vicina Preston, 1907, op. cit., (7), **19**: 219, fig. 5.

Charopa kanakina (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 119–120, pl. 12, figs. 155a (holotype of *vicina*), 155b (holotype of *marionae*), pl. 13, fig. 155.

Charopa inculta (Gassies), Franc, op. cit., p. 120, pl. 12, fig. 156 (?holotype of *inculta*).

Type locality.—Art Island, New Caledonia (*kanakina*), Baie du Sud, New Caledonia (*inculta*), and New Caledonia (*marionae* and *vicina*).

Remarks.—Franc (1957, p. 120) suggested that the type of *Helix inculta* in the British Museum was not the *inculta* of Gassies, but rather a mislabeled shell. His figured specimen is *R. kanakina* and the synonymization above is based on the labeled type. A paratype of *Charopa marionae* (UMMZ 138293) cannot be separated from *R. kanakina*.

***Rhytida (Ptychorhytida) candeloti** (Crosse and Marie), 1868

Helix candeloti Crosse and Marie, 1868, Jour. de Conchy., **16**: 148–149, pl. 8, fig. 2.

Ouagapia (Ouagapia) candeloti (Crosse and Marie), Franc, 1957, Moll. Néo-Caledonien, p. 168, pl. 21, fig. 223 (holotype of *candeloti*).

Type locality.—Mount Mou, New Caledonia.

Incertae sedis

Charopa gassiesiana Preston, 1907

Charopa gassiesiana Preston, 1907, Ann. Mag. Nat. Hist., (7), 19: 219–220, fig. 6; Franc, 1957, Moll. Néo-Caledonien, p. 118, pl. 12, fig. 152 (holotype of *gassiesiana*).

Type locality.—New Caledonia.

Remarks.—The photograph of the holotype (Franc, 1957, p. 12, fig. 152) suggests that this name is based on a juvenile specimen of one of the heavily sculptured *Ptychorhytida*. Without direct examination of the type, reference to a particular species is impossible. It is listed as a doubtful relative of the *kanakina* complex.

II. GROUP OF **Rhytida (Ptychorhytida) beraudi** (Gassies), 1858

Shell medium- to large-sized; radial ribs prominent (*beraudi* and *ferrieziana*) or produced into irregular sinuous lamellae (*berneiri*) and continuing into the umbilicus; a few heavy spiral lines (absent in *berneiri*) superimposed on the fine spiral microsculpture.

Remarks.—*R. berneiri* represents an extreme modification but is most similar to the other included species. The three species are much larger than those in Group I and are intermediate in characters between the Tasmanian *Tasmaphena* and the east Australian *Strangesta*.

***Rhytida (Ptychorhytida) beraudi** (Gassies), 1858

Helix beraudi Gassies, 1858, Jour. de Conchy., 7: 68–69; Gassies, 1863, Faune Conchy., 1: 33–34, pl. 1, fig. 18.

Oouagapia (sic) (*Ptychorhytida*) *beraudi* (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 171, pl. 22, fig. 227.

Type locality.—Balade, New Caledonia.

***Rhytida (Ptychorhytida) ferrieziana** (Crosse), 1868

Helix ferrieziana Crosse, 1868, Jour. de Conchy., 16: 278–279; Crosse, 1869, op. cit., 17: 27–28, pl. 1, fig. 4.

Oouagapia (*Ptychorhytida*) *ferrieziana* (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 172–173, pl. 22, fig. 229.

Type locality.—Baie du Sud, New Caledonia.

***Rhytida (Ptychorhytida) berneiri** Dautzenberg, 1901

Rhytida berneiri Dautzenberg, 1901, Jour. de Conchy., 49: 299–301, pl. 8, figs. 1–3.

Ouagapia (Ouagapia) berneiri (Dautzenberg), Franc, 1957, Moll. Néo-Caledonien, pp. 167-168, pl. 21, fig. 222 (holotype of *berneiri*).

Type locality.—Houailou, New Caledonia.

III. GROUP OF *Rhytida (Ptychorhytida) testudinaria* (Gassies), 1859

Shell large; aperture toothless; radial ribs absent from below periphery of body whorl; prominent regular heavy spiral lines in addition to the fine microsculpture; and color variegated.

Remarks.—The heavy spiral lines and reduced radial sculpture are also characteristic of the east Australian group that Iredale called *Echotruda*. In *R. subsidialis* the radials above the periphery of the body whorl are reduced in prominence, thus approaching Group IV in sculpture.

**Rhytida (Ptychorhytida) testudinaria* (Gassies), 1859

Helix testudinaria Gassies, 1859, Jour. de Conchy., 7: 368-369; Gassies, 1863, Faune Conchy., 1: 30, pl. 1, fig. 14.

Helix paulucciae Crosse, 1868, Jour. de Conchy., 16: 154-157, pl. 8, fig. 4.

Helix coguiensis Crosse, 1872, op. cit., 20: 69-70, 148-151, pl. 7, fig. 5.

Ouagapia (Ptychorhytida) testudinaria (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 171-172, pl. 22, fig. 228 (holotype of *paulucciae*).

Type locality.—Forests of Balade, New Caledonia (*testudinaria*), Mount Mou, New Caledonia (*paulucciae*), and Mount Cogui, Baie du Sud, New Caledonia (*coguiensis*).

**Rhytida (Ptychorhytida) inaequalis* (Pfeiffer), 1854

Helix inaequalis Pfeiffer, 1854, Conch. Icon., *Helix*, pl. 198, fig. 1394.

Helix fischeri Gassies, 1857, Jour. de Conchy., 6: 271-272, pl. 9, figs. 1-2.

Helix deplanchei Montrouzier, 1860, op. cit., 8: 320-321.

Ouagapia (Ouagapia) inaequalis (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, p. 169, pl. 21, fig. 225.

Type locality.—Isle of Pines, New Caledonia (*inaequalis*), forests of New Caledonia (*fischeri*), and Kanala, New Caledonia (*deplanchei*).

**Rhytida (Ptychorhytida) subsidialis* (Crosse), 1870

Helix subsidialis Crosse, 1870, Jour. de Conchy., 18: 239-240, 407-408, pl. 13, fig. 1.

Ouagapia (Ptychorhytida) subsidialis (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 173-174.

Type locality.—Vicinity of Mount Mou, New Caledonia.

IV. GROUP OF *Rhytida* (*Ptychorhytida*) *aulacospira* (Pfeiffer), 1846

Radial ribs almost completely lost; impressed spiral lines very prominent; umbilicus moderately open; color usually flammulated.

Remarks.—The east Australian *Murphitella* is comparable in sculpture, although differing in size. *R. aulacospira* has a narrow umbilicus and is clearly related to the other *Ptychorhytida*, but *R. lamberti* with its wide umbilicus approaches *Ouagapia opaoana* in form.

**Rhytida* (*Ptychorhytida*) *aulacospira* (Pfeiffer), 1846

Helix aulacospira Pfeiffer, 1846, Proc. Zool. Soc. London, 1846: 37; Pfeiffer, 1853, Conch. Icon., *Helix*, pl. 150, fig. 975.

Helix multisulcata Gassies, 1857, Jour. de Conchy., 6: 272–273, pl. 9, figs. 3–4.

Helix luteolina Gassies, 1863, Faune Conchy., 1: 35–36, pl. 5, fig. 7.

Helix ouveana Souverbie, 1869, Jour. de Conchy., 17: 416; Souverbie, 1870, op. cit., 18: 82–83, pl. 9, fig. 1 (bad); Gassies, 1871, Faune Conchy., 2: 32–33, pl. 2, fig. 4.

Helix deplanchesi Gassies, 1870, Jour. de Conchy., 18: 141; Gassies, 1871, Faune Conchy., 2: 37–38, pl. 3, fig. 3.

Helix yahouensis Gassies, 1880, op. cit., 3: 37; Gassies, 1880, Jour. de Conchy., 28: 326–327, pl. 10, fig. 1.

Ouagapia (*Ptychorhytida*) *aulacospira* (Pfeiffer), Franc, 1957, Moll. Néo-Caledonien, p. 173, pl. 22, fig. 230.

Type locality.—Unknown (*aulacospira*), New Caledonia (*multisulcata*), Isle of Pines, New Caledonia (*luteolina*), Ouvea, Loyalty Islands (*ouveana*), Lifu, Loyalty Islands (*deplanchesi*), model farm near Yahoue, New Caledonia (*yahouensis*).

Remarks.—The holotype of *Helix aulacospira* is refigured in Solem (1959, pl. 10, figs. 10–12).

?**Rhytida* (*Ptychorhytida*) *lamberti* (Gassies), 1871

Helix lamberti Gassies, 1871, Faune Conchy., 2: 54–55; Gassies, 1873, Jour. de Conchy., 21: 46–47, pl. 2, fig. 1.

Ouagapia (*Ouagapia*) *lamberti* (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 169.

Type locality.—Conception, near Noumea, New Caledonia.

Remarks.—The only specimen seen (CNHM 37013) is a widely umbilicated relative of *R. aulacospira*. Franc (1957, p. 169) mentioned a carina in the umbilicus, which suggests *Ouagapia*. Further study is needed.

Genus **OUAGAPIA** Crosse, 1894

Type species.—*Helix raynali* Gassies, 1863 (monotype).

Remarks.—Several species diverse in both sculpture and size are lumped together under *Ouagapia*. The genotype, *O. raynali*, is the largest (39 mm.) and most specialized species. It has lost the radial ribs completely and has a microsculpture of very fine, impressed spiral lines. *O. villandrei* Gassies from San Christoval in the Solomons has no fine spiral sculpture and has modified radial ribbing. The ribs are prominent on the upper portion of the shell and in the umbilicus, but are absent from the lower half of the body whorl. The unribbed portion of this relatively large species (28 mm.) has a few short, irregular, impressed spiral lines.

Most members of the genus (see Solem, 1959, pp. 159–160) are small (5–8 mm.), with strong radial ribs above the periphery of the body whorl, strong, impressed spiral lines below, and an umbilical ridge. The Polynesian and Melanesian species are relatively simple, but in New Guinea, the Bismarcks, and northern Queensland there are species with a prominent carina on the periphery of the body whorl, a more pronounced umbilical keel, and variously modified surface sculpture. The generic name *Torresiropa* Iredale, 1933, is available for the carinate series and probably could be extended to cover the Polynesian–Melanesian species. Without studying the soft parts of the various species, little would be gained by guessing as to affinities. *O. raynali* has many similarities to the east Australian *Murphitella*. Pending examination of the soft parts *Ouagapia* is left as a single unit.

****Ouagapia raynali*** (Gassies), 1863

Helix raynaldi (sic) Gassies, 1863, Faune Conchy., 1: 34–35, pl. 5, fig. 6—a misspelling corrected to *raynali* by Gassies (1863, p. 332).

Ouagapia (Ouagapia) raynali (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 168, pl. 21, fig. 224.

Type locality.—Near Port-de-France, New Caledonia.

****Ouagapia opaoana*** (Gassies), 1867

Helix opaoana Gassies, 1867, Jour. de Conchy., 15: 61; Gassies, 1871, Faune Conchy., 2: 40, pl. 1, fig. 6.

Ouagapia (Ouagapia) opaoana (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 170–171, pl. 22, fig. 226a–b.

Type locality.—Art Island, New Caledonia.

***Ouagapia rufotincta** (Gassies), 1874

Helix rufotincta Gassies, 1874, Jour. de Conchy., **22**: 376-377; Gassies, 1880, Faune Conchy., **3**: 16, pl. 1, fig. 6.

Ouagapia (Ouagapia) rufotincta (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 170.

Type locality.—Bourail, New Caledonia.

ERRONEOUS LOCALITY

***Ouagapia villandrei** (Gassies), 1865

Helix villandrei Gassies, 1865, Jour. de Conchy., **13**: 210; Gassies, 1868, op. cit., **16**: 271-272, pl. 9, fig. 3.

Type locality.—Interior of New Caledonia (error).

Remarks.—This species was found subsequently on San Christoval Island in the Solomons (see Clapp, 1923).

Genus **DIPLOMPHALUS** Crosse and Fischer, 1873

Type species.—*Helix cabriti* Gassies, 1863 (original designation).

Remarks.—Fischer (1873) showed that the type species had paryphantid dentition, but no other member of the genus has been dissected. The species are conchologically characterized by their concave spire, narrow whorls, and sculpture of incised spiral lines crossing heavy radial ribs. With the assumption that heavy sculpture and a helicoid or planulate shell are primitive characters, the species of *Diplomphalus* can be grouped into three series representing increasing specializations. The name *Pseudomphalus* Ancey (1882, p. 86)¹ is available for Group III but that group is not considered to be strongly enough characterized to warrant taxonomic recognition.

I. GROUP OF **Diplomphalus mariei** (Crosse), 1867

Apex and umbilicus only slightly depressed; body whorl keeled at peripheries but only slightly inflated; size 4.5 to 6.5 mm.; radial ribs prominent.

***Diplomphalus mariei** (Crosse), 1867

Helix mariei Crosse, 1867, Jour. de Conchy., **15**: 211, 312-315, pl. 11, fig. 1.

Diplomphalus mariei (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 178, pl. 23, fig. 236.

Type locality.—Koe, New Caledonia.

¹Type species, *Helix fabrei* Crosse, 1875 (subsequent designation of Zilch, 1960, p. 551).

***Diplomphalus vaysseti** (Marie), 1871

Helix vaysseti Marie, 1871, Jour. de Conchy., **19**: 325-328.

Diplomphalus vaysseti (Marie), Crosse, 1874, op. cit., **22**: 388, pl. 12, fig. 2;
Franc, 1957, Moll. Néo-Caledonien, pp. 177-178, pl. 22, fig. 235.

Type locality.—In the mountains at Cape Colnett, New Caledonia.

***Diplomphalus seberti** (Marie), 1881

Helix seberti Marie, 1881, Jour. de Conchy., **29**: 241-243.

Diplomphalus seberti (Marie), Crosse, 1894, op. cit., **42**: 177, pl. 8, fig. 1;
Franc, 1957, Moll. Néo-Caledonien, p. 177, pl. 23, fig. 234a-c.

Type locality.—Kanala, New Caledonia.

Diplomphalus fischeri Franc, 1953

Diplomphalus fischeri Franc, 1953, Jour. de Conchy., **93**: 81-82, 1 fig.; Franc,
1957, Moll. Néo-Caledonien, pp. 178-179, pl. 23, fig. 237a-b (holotype
of *fischeri*).

Type locality.—New Caledonia.

II. GROUP OF **Diplomphalus montrouzieri** (Souverbie), 1858

Apex and umbilicus moderately depressed; body whorl keeled at peripheries and relatively inflated; diameter 7 to 8.5 mm.; radial ribs more numerous and much finer.

***Diplomphalus montrouzieri** (Souverbie), 1858

Helix montrouzieri Souverbie, 1858, Jour. de Conchy., **7**: 63-65, 296, pl. 8,
fig. 7.

Diplomphalus montrouzieri (Souverbie), Franc, 1957, Moll. Néo-Caledonien,
p. 177.

Type locality.—Art Island, New Caledonia.

***Diplomphalus cabriti** Gassies, 1863

Helix volutella Gassies, 1858 (not Pfeiffer, 1856), Jour. de Conchy., **7**: 70-71.

Helix cabriti Gassies, 1863, Faune Conchy., **1**: 21-22, pl. 1, fig. 4.

Diplomphalus cabriti (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 176-
177, pl. 23, fig. 233a-b (holotype of *cabriti*).

Type locality.—Balade, New Caledonia.

III. GROUP OF **Diplomphalus megei** (Lambert), 1873

Apex partially covered by overlap of body whorl and umbilicus very concave; body whorl rounded at periphery and greatly inflated; diameter 7 to 16 mm.; radial ribs reduced to fine lines.

***Diplomphalus megei** (Lambert), 1873

Helix megei Lambert, 1873, Jour. de Conchy., **21**: 136, 356-357, pl. 14, fig. 3.

Diplomphalus fabrei Crosse, 1875, op. cit., **23**: 136-138, pl. 6, fig. 1.

Diplomphalus megei (Lambert), Franc, 1957, Moll. Néo-Caledonien, p. 176, pl. 23, fig. 232a-b (holotype of *megei*).

Type locality.—Baie du Sud, New Caledonia (*megei* and *fabrei*).

Genus **MICROPHYURA** Ancey, 1882

Type species.—*Helix microphis* Crosse, 1868.

Remarks.—None of the species has been dissected. All are minute (2 to 3.5 mm.), planulate, with narrow whorls, radially ribbed or smooth, with incised spiral lines, and the lip thickened with internal apertural lamellae. The heavily ribbed species are miniatures of Group I *Diplomphalus*, but the smoother species are very similar to the endodontid genus *Stenopylis* (see Solem, 1957) in shape and lip formation. The details of whorl increment, sculpture, and apertural dentition are quite different and the similarities are almost certainly convergent. Anatomical studies may result in placing *Microphyura* as a subgenus of *Diplomphalus*.

***Microphyura microphis** (Crosse), 1868

Helix microphis Crosse, 1868, Jour. de Conchy., **16**: 91-92, pl. 1, fig. 3.

Microphyura microphis (Crosse), Franc, 1957, Moll. Néo-Caledonien, pp. 179-180, pl. 34, fig. 238a-d (holotype of *microphis*).

Type locality.—Under dead moist leaves in woods near Noumea, New Caledonia.

***Microphyura jeanneneyi** (Dupuy), 1894

Diplomphalus jeanneneyi Dupuy, 1894, Feuille des Jeunes Natur., (3), **24**: 138, figs. a-c.

Diplomphalus gravei Dupuy, 1894, op. cit., (3), **24**: 138-139, figs. d-f.

Diplomphalus gravei Crosse, 1896, Jour. de Conchy., **44**: 48-49—emendation of *gravei* Dupuy.

Microphyura gravei (Dupuy), Franc, 1957, Moll. Néo-Caledonien, pp. 180-181, pl. 24, fig. 239a-c (holotype of *gravei*).

Type locality.—Under plant litter in woods at Baie du Sud, New Caledonia (*gravei*) and Teremba, New Caledonia (*jeanneneyi*).

Remarks.—The present rules of nomenclature date the morph *gravei* from Crosse, 1896, and thus the often synonymized name *jeanneneyi* must be used for this species.

****Microphyura cornea* Franc, 1953**

Microphyura cornea Franc, 1953, Jour. de Conchy., **93**: 84–85, fig. 1; Franc, 1957, Moll. Néo-Caledonien, p. 181, pl. 24, fig. 240a–c (holotype of *cornea*).

Type locality.—New Caledonia.

***Microphyura denisi* Franc, 1953**

Microphyura denisi Franc, 1953, Jour. de Conchy., **93**: 85–86, fig. 2; Franc, 1957, Moll. Néo-Caledonien, pp. 181–182, pl. 24, fig. 241a–b (holotype of *denisi*).

Type locality.—New Caledonia.

PULMONATA *incertae sedis*

The following named forms, described from empty shells, cannot be placed in any family category with assurance. Known only from the type lots, often single specimens, their identity and taxonomic position are uncertain. None was seen during this study and the smooth, featureless shells provide few clues as to their correct classification. Rather than continue guessing, I have simply listed them as problematic forms pending examination of the types or collection of new material.

They are listed under their original generic name.

***Helix lalannei* Gassies, 1869**

Helix lalannei Gassies, 1869, Jour. de Conchy., **17**: 71; Gassies, 1871, Faune Conchy., **2**: 49–50, pl. 2, fig. 6.

Microcystis lalannei (Gassies), Franc, 1957, Moll. Néo-Caledonien, pp. 144–145.

Type locality.—Art Island, New Caledonia.

***Helix alleryana* Crosse, 1869**

Helix alleryana Crosse, 1869, Jour. de Conchy., **17**: 414; Crosse, 1874, op. cit., **22**: 99–100, pl. 3, fig. 5.

Microcystis alleryana (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 145, pl. 17, fig. 187 (holotype of *alleryana*).

Type locality.—Mount Mou, New Caledonia.

Remarks.—The smooth apical whorls and longitudinal striations suggest the Endodontidae or Paryphantidae rather than the limacoid taxa. Study of the microsculpture might provide a clew to the relationships.

***Helix conceptionensis* Gassies, 1871**

Helix conceptionensis Gassies, 1871, Faune Conchy., 2: 53-54.

Rhytida conceptionensis (Gassies), Crosse, 1894, Jour. de Conchy., 42: 189-190.

Type locality.—Conception, near Noumea, New Caledonia.

Remarks.—Based on a single individual, this form has not been rediscovered and the location of the type is unknown. It was not listed by Franc (1957).

***Zonites subnitens* (Gassies), 1872**

Helix (Zonites) subnitens Gassies, 1872, Jour. de Conchy., 20: 366; Gassies, 1873, op. cit., 21: 335-336, pl. 14, fig. 8.

Macrocycloides subnitens (Gassies), Franc, 1957, Moll. Néo-Caledonien, p. 175.

Type locality.—Bourail, New Caledonia.

***Zonites hamelianus* Crosse, 1874**

Zonites hamelianus Crosse, 1874, Jour. de Conchy., 22: 104; Crosse, 1875, op. cit., 23: 216-217, pl. 9, fig. 1.

Macrocycloides hamelianus (Crosse), Franc, 1957, Moll. Néo-Caledonien, p. 174, pl. 23, fig. 231 (holotype of *hamelianus*).

Type locality.—Baie du Sud, New Caledonia.

DISCUSSION

Careful systematic revisions of the New Caledonian *Pleuropoma*, *Physastra*, *Aneitea*, and *Placostylus* would probably reduce the 225 named forms listed above to about 160 or 170 valid species, eighteen of which were introduced by human agency. For purposes of discussion, it would be more realistic to assume that there are 6 (instead of 16) *Pleuropoma*, 2 (instead of 15) *Physastra*, 3 (instead of 8) *Aneitea*, and 20 (instead of 36) *Placostylus* actually found in New Caledonia.

If we use these figures, and ignore *Truncatella* and the few named forms listed under *incertae sedis*, the New Caledonian fauna will contain 11 fresh-water species, 23 land prosobranchs, 20 native bulimulids, 49 endemic endodontids, 24 paryphantids, 19 miscellaneous endemic pulmonates and 18 introduced pulmonates—a total of 164 species.

Of the non-introduced land species, 135 in number, 93 (69 per cent) belong to the Bulimulidae, Paryphantidae, or Endodontidae. Most of the remainder, 23 (17 per cent), are land prosobranchs, with only 19 (14 per cent) belonging to other pulmonate families. Com-

pared with the fauna of the New Hebrides (see Solem, 1959, pp. 204–211) this is a very limited and restricted one. Its character is basically the same as that of New Zealand and to a lesser extent Australia, although the degree of endemism, as in the New Hebrides, is exceedingly high. Except for *Draparnaudia singularis*, which is also found in the New Hebrides (Solem, 1959, p. 122) and the fresh-water *Gyraulus* and *Physastra* (op. cit., pp. 163, 164), the New Caledonian species are all either endemic or so widely distributed that introduction by human agency is either strongly suspected or proven.

The very high degree of insular endemism among Pacific land snails is probably due to the long isolation of the faunas, since the overall patterns of distribution (op. cit., pp. 320–329) suggest definite dispersal waves.

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