

**Land Gastropoda of Suriname,
with the description of a new species of *Nesopupa***

C.O. VAN REGTEREN ALTENA

Rijksmuseum van Natuurlijke Historie, Leiden

INTRODUCTION AND ACKNOWLEDGEMENTS

In 1974 I published a paper on the land Prosobranchia of Suriname. In addition several persons have found pulmonates new to the fauna of Suriname (one of them a new species of *Nesopupa*) and the number of localities where already known species have been found has much increased. So I have resolved to publish these data, notwithstanding the fact that some genera, inter alia *Omalonyx*, *Bulimulus* and *Fuconulus*, and some species of already known genera are in need of revision. In this way I am able to produce a survey of the distribution of the greater part of the land Gastropoda of Suriname.

In the first part of this paper, a systematic list of the species (incomplete: see above), all species are enumerated with their localities and/or references to the literature where these localities can be found, the new species of *Nesopupa* is described and, where necessary, comments on some of the species are given. In the second part the localities at which each species occurs are arranged in three zones and the distribution of the species is discussed.

Unless otherwise mentioned in the list of persons following this paragraph the specimens are in the Rijksmuseum van Natuurlijke Historie at Leiden (RMNH). I could not have written this paper without the help of many persons to whom I am most grateful. First of all my thanks are due to Dr. D.C. Geijskes who for many years was resident in Suriname

and who during my three months sojourn in that country and afterwards always was so kind as to answer in detail any question which I put to him. Dr. H.E. Coomans of the Zoological Museum at Amsterdam (ZMA) has procured me all the material from Suriname in the collection of this museum and some information on it. Likewise the Director of the Surinaams Museum at Paramaribo (SM) sent the specimens in his museum on loan to me. Furthermore I am indebted to those who collected the material; their names are abbreviated as follows in a chronological list:

- Ht: A. Halberstadt, before 1850.
 F: D.L. Fernandes, Wilhelmina Mountains Expedition, VII-VIII. 1926 (ZMA). For itinerary see: Tijdschr. Kon. Ned. aandr. Gen. 1927: map 9.
 K: Koloniaal Instituut, XII.1930 (ZMA).
 G: D.C. Geijskes, XI.1938 – VIII.1973 (with interruptions) and X.1952 (SM), XII.1956 (SM), X.1959 (SM).
 Co: H.W.C. Cossee, III.1939.
 C: P.H. Creutzberg, Suriname Expedition 1948/49 (SM).
 N: collector unknown, Nassau Mountains, III.1949 (SM).
 Ld: J. Lindeman, III & V.1949 (SM).
 Cr: W.A. Collier, II.1952 – II.1957.
 B: C.F.A. Bruyning, 1953 – 1955 and without data.
 Hf: H.A. van Hoof, about 1960.
 V: K.H. Voous, VIII.1961 (ZMA).
 S: St. Ligorie, Sipaliwini Expedition, IX – X.1961 (SM).
 Be: Harry Beatty, XI.1961 – II.1962 (SM).
 A: C.O. van Regteren Altena, I – III.1963.
 H: P. Wagenaar Hummelinck, II.1964.
 R: Th.J. Reijenga, IV.1964.
 Ms: G.F. Mees and Mrs. V.J. Mees, V.1965 – IV.1966, XII.1971 – XI.1972.
 Hn: A.A. van Heurn, XI.1965, XII.1966.
 L: J. van der Land, II.1967.
 M: W.J.M. Maassen, VI.1967 – VI.1968¹.
 Hd: M.S. Hoogmoed, II – V.1968.
 Rd: D.G. Reeder, X.1970 (SM).
 BG: M. Boeseman, D.C. Geijskes, D.G. Reeder, and P. Staffeleu, West Suriname Expedition, II – IV.1971 (see Zool. Bijdr. Leiden 15, 1973).

¹ Mr. Maassen wrote on some of his labels "Bröwnsweg (L.B.B. [= Lands Bos Beheer or State Forestry Department] hut bij Irenevallen [near Irene Falls]) which should be "Brownsberg [Browns Mountain] (L.B.B. hut near Irene Falls)".

The districts are enumerated from West to East and are indicated by Roman numbers. I: Nickerie district; II: Coronie district; III: Saramacca district; IV: Suriname district; V: Brokopondo district; VI: Commewijne district; VII: Marowijne district.

Species new for Suriname have been indicated by asterisks.

SYSTEMATIC LIST OF THE SPECIES

Prosobranchia

Helicinidae

Alcacia kuebni (Pfeiffer)

Vernhout, 1914: 26 (*Alcacia sericea* var. *kuebni*); Altena, 1974: 70.

Alcacia sericea (Drouet)

Vernhout, 1914: 26; Altena, 1974: 70.

Lucidella lirata (Pfeiffer)

Vernhout, 1914: 26 (*Lucidella lirata* var. *lamellosa*); Altena, 1960: 49; Altena, 1974: 71.

Cyclophoridae

Neocyclotus (Neocyclotus) rugatus (Guppy)

Altena, 1974: 71.

Neocyclotus (Cyclobidalgoa) translucidus dunooneensis (Bartsch & Morrison)

Altena, 1974: 71.

I: Wilhelmina Mountains, S side (Be).

Neocyclotus (Incidostoma) morrisoni Altena

Altena, 1974: 72.

Neocyclotus (Incidostoma) pari Altena

Altena, 1974: 72.

Pulmonata

Vertiginidae

**Bothriopupa conoidea* (Pfeiffer)

Pilsbry, 1916-1918: 231, pl. 28 figs. 7, 8, 11 (1917).

IV: Paramaribo, end of Commewijnestraat, in brushwood under leaves (M).

**Sterkia rhoadsi* (Pilsbry)

Pilsbry, 1920-1921: 52, pl. 6 figs. 3, 6, 7 (1920); 1948: 1016, figs. 541, 542 (nos. 3, 6, 7) (*Sterkia eyriasi rhoadsi*).

IV: Paramaribo, Zorg en Hoop, garden with greenhouses, Mrs. Broekhuizen leg. (A.); Paramaribo, Cultuurtuin (M).

The specimens agree with the figures of Pilsbry, especially those in the 1948 volume. The resemblance to Pilsbry's fig. 541 (holotype) is particularly striking because here the third whorl is wider than that of the shell figured in 1920 (pl. 6 fig. 6); the latter, a paratype, is also depicted in the 1948 volume (fig. 542, no. 6).

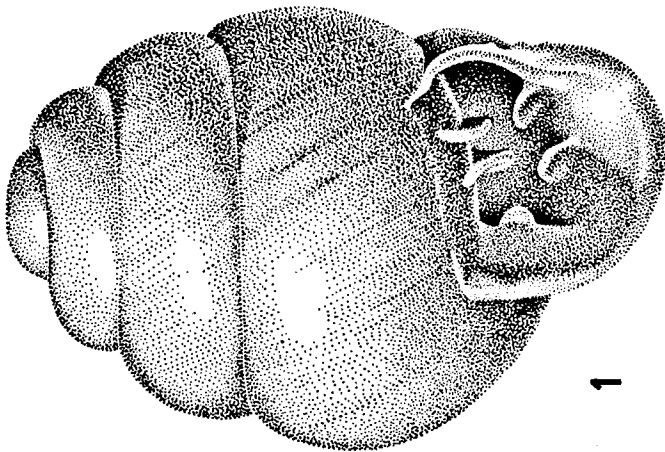
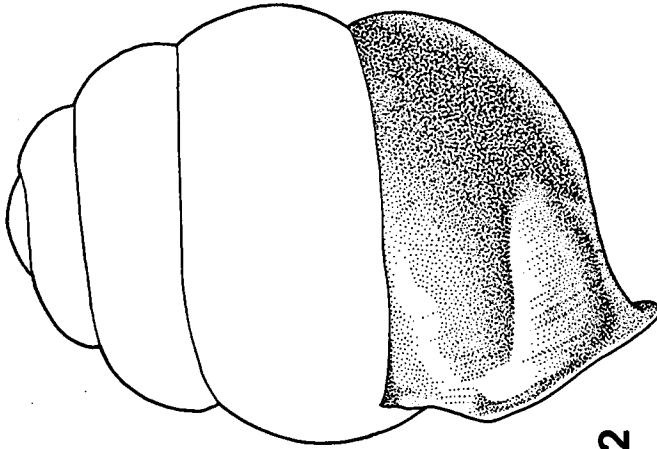
**Nesopupa maasseni* nov. spec. (figs. 1-4).

Holotype: Suriname, Jodensavanne at the Suriname River, opposite the camp kitchen, 22/30.III. 1968 (figs. 1,2; M in RMNH).

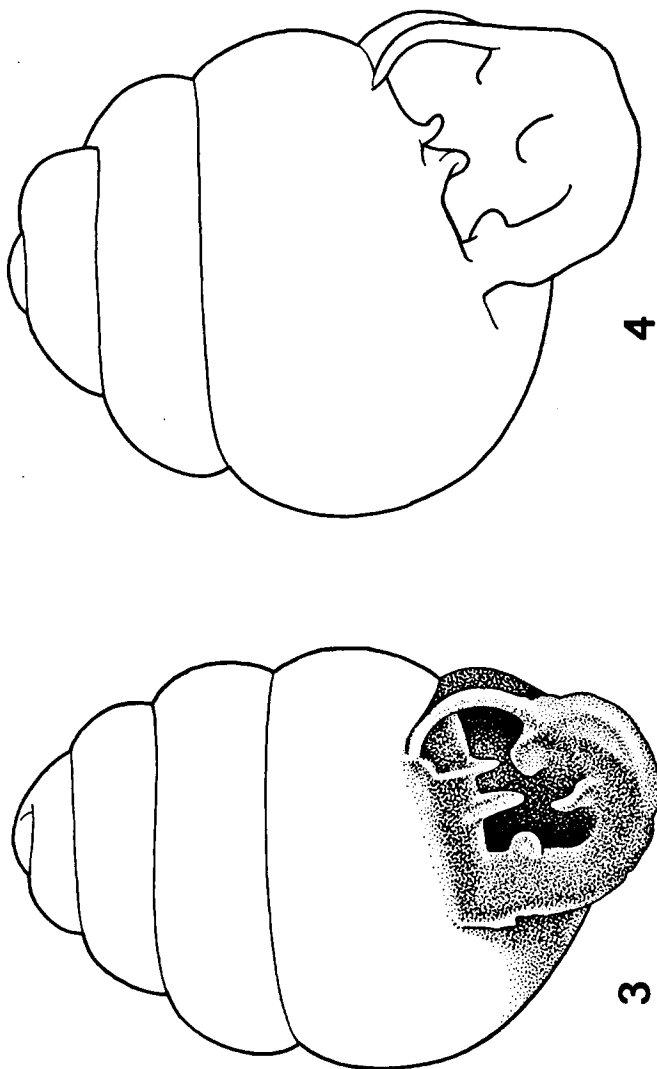
Paratypes: same locality, date and collector: more than 120 specimens (RMNH); + 2 specimens, Academy of Natural Sciences, Philadelphia; + 10 specimens, Bernice P. Bishop Museum, Honolulu, Hawaii; + 2 specimens, British Museum (Natural History), London; + 2 specimens, Field Museum of Natural History, Chicago; + 2 specimens, Museum of Comparative Zoology, Cambridge (U.S.A.); + 2 specimens, Surinaams Museum, Paramaribo; + 2 specimens, United States National Museum, Washington (D.C.). — Suriname, Paramaribo, Cultuurtuin, VI.1968: 6 specimens (M; RMNH). — Suriname, Paramaribo, end of Commewijnestraat, in brushwood under leaves, VI.1968: 42 specimens (M; RMNH).

Description. — Maximum length of shell 1.8 mm, maximum diameter 1.0 mm, maximum number of whorls 5 (figs. 1-3; one exception: 1.3 × 0.95 mm, 3½ whorls, fig. 4); whorls convex, with a deep suture, slowly increasing in width, smooth, with a lens (× 25) only growth lines can be discerned. Aperture with five teeth: two parietals, two palatals and one columellar. Outermost parietal tooth sometimes connected with outer lip (fig. 3), a feature sometimes occurring in *Nesopupa* [see pl. 30 figs. 4 and 14, *N. tantilla* (Gould) and *N. dentifera* (Pease), in Pilsbry, 1918-1920]. Second parietal tooth next to the first; little or no parietal callus. Upper palatal tooth largest, second palatal tooth smaller and more interiorly placed. Columellar tooth somewhat above the middle of the columella. Outer lip reflected, especially below, with a small dent corresponding to the first palatal tooth. When turned 45°, just behind the aperture a larger dent is seen which ends in the little dent at the outer lip.

Name. — Named in honour of Mr. W.J.M. Maassen, who, in addition



Figs. 1-2. *Nesopupa maasseni* nov. spec., holotype (RMNH). Jodensavanne at the Suriname River, 22-30.III.1968, W.J.M. Maassen coll. Length somewhat more than 1.6 mm. W.C.G. Gerrenaar del.



Figs. 3-4. *Nesopupa maasseni* nov. spec., paratypes (RMNH). Jodensavanne at the Suriname River, 22-30.III.1968, W.J.M. Maassen coll. 3: length about 1.8 mm. 4: length about 1.3 mm. W.C.G. Gertenaar del.

to this *Nesopupa*, has added some species to the fauna of Suriname and many new localities for already known species.

Discussion. — I have long hesitated before describing this species and I have sent specimens of it to various museums hoping the curator could identify them. Dr. Alan Solem of the Field Museum of Natural History, Chicago, was the first to suggest that it might be a *Nesopupa*; he advised me to send specimens to Dr. Yoshio Kondo of the Bernice P. Bishop Museum, Honolulu, Hawaii. Dr. Kondo wrote me that it is closely allied to *Nesopupa dubitabilis* (Cooke & Pilsbry). This was also the opinion of Dr. R. Robertson of the Academy of Natural Sciences, Philadelphia, who sent me specimens of this species for comparison. *N. dubitabilis* is indeed similar to my species, but it has more quickly increasing whorls, a shallower suture, the teeth are more developed, there is a less deep dent behind the aperture, which dent is not visible in the outer lip, which itself is less expanded below. These differences are indeed small, but they are, more or less, present in all my specimens.

Mr. J.F. Peake of the British Museum (Natural History), London, found my specimens similar to *N. cocosensis* Dall, of which the early whorls do not increase so quickly, but which in the other characters shows the same differences as *N. dubitabilis* does. I agree also with Mr. Peake that the species of *Sterkia* have "a more columellar appearance", and, moreover, the margin of the aperture is more continuous. Mr. Peake did not rule out the possibility that it might be a *Vertigo*, but I found no species in the genus *Vertigo* resembling it as much as, for instance, *Nesopupa dubitabilis*.

All my specimens are empty shells. Although my species may be an imported one, there are as yet no imported species from the Pacific Islands known to occur in Suriname. As it is a very small snail, more species will perhaps be found in tropical South America, and anatomical research will perhaps show additional differences between the South American species and those found on the Pacific Islands. In view of the conchological characters alone I would place this species without hesitation in the genus *Nesopupa*.

Occurrence in Suriname. — IV: Jodensavanne, opposite to camp kitchen (M); Paramaribo, Cultuurtuin, and end of Commewijnestraat (M).

Chondrinidae

Gastrocopta (Gastrocopta) servilis oblonga (Pfeiffer)

Vernhout, 1914: 20 (*Pupa eyriesi*); Altena, 1960: 49.

I: Nieuw Nickerie, various localities (M); Wageningen, on orchids (BG).

IV: Paramaribo, various localities (M); Purmerend, near the river (H).

VI: Braamspunt, from a piece of wood (A).

Gastrocopta (Geminidens) geminidens (Pilsbry)

Altena, 1960: 49.

IV: Jodensavanne, near the synagogue (M).

Valloniidae

Pupisoma dioscoricola insigne (Pilsbry)

Altena, 1960: 49.

Pupisoma minus Pilsbry

Altena, 1960: 49.

**Strobilops labyrinthica morsei* Dall

Dall, 1885: 263; Baker, 1925: 3.

IV: Jodensavanne (M).

Ferrussaciidae

Cecilioides consobrina (Orbigny)

Altena, 1960: 50.

IV: Paramaribo, Zorg en Hoop (M).

**Opeas pumilum* (Pfeiffer)

Pilsbry, 1906: 200, pl. 28 figs. 72-74 (*Opeas goodalli*).

VII: Bigiston, under plants on the banks of the river (M).

The genus *Opeas* belongs to the Ferrussaciidae according to the late Professor H.B. Baker.

Subulinidae

Subulina octona (Bruguière)

Vernhout, 1914: 19; Altena, 1960: 50.

I: camp near Avanavero Falls in Kabalebo River (BG); shell ridge near Cupido at the Maratakka River (A); Hertenrits near Wageningen (G); Nieuw Nickerie, various localities (A, M); Wageningen, on orchids (BG).

III: Bethania 228, about 3 km NNW of Groningen (A); Raleigh Falls (M, Ms); bank of Saramacca River near end of Garnizoenspad (A); Tangimama Creek, between stones in the falls (M).

IV: Jodensavanne, near the synagogue (A, M); Onverdacht (M); Paramaribo, various localities (G, Cr, A, M); Purmerend, near the river (H); Republiek near Zanderij (M).

V: Brokopondo, on decaying tree trunks (Ms).

VI: Nieuw Amsterdam (M).

VII: Albina, various localities (A, M); Bigiston, under plants on the banks of the river (M).

Leptinaria lamellata (Potiez & Michaud)

Vernhout, 1914: 20; Altena, 1960: 50 (*Leptinaria unilamellata*).

I: Sipaliwini, forest (Ms).

III: Bethania 228, about 3 km NNW of Groningen (A); Costeri Creek, SE of Bigi Poika (V); Raleigh Falls, between stones on the bank of the falls (M); Tangimama Creek, between stones on the banks of the falls (M).

IV: at the Coropina Creek near Republiek (A); Jodensavanne, various localities (A, M); Paramaribo, various localities (G, Cr, A, M); Zanderij, various localities (M).

V: Browns Mountain, ca. 475 m (Ms); Browns Mountain, L.B.B. hut near Irene Falls (M); Brownsweg (M).

VII: Albina, borders of roads and waste ground (A); Bigiston, under plants on the banks of the river (M); Nassau Mountains, ca. 530 m (Ms).

Leptinaria unilamellata (Orbigny) was originally described s.n. *Helix unilamellata* Orbigny, 1835, which name is preoccupied by *Helix unilamellata* Menke, 1828. The variety or subspecies *concentrica* (Reeve) is included in this species.

* *Lamellaxis clavulinus* (Potiez & Michaud)

E. & E. Marcus, 1968: 192, figs. 4-10.

I: Nieuw Nickerie, refuse dump (M).

IV: Paramaribo, Prins Hendriklaan, land in between brushwood (M).

The specimens (shells only) agree with figs. 4 and 5 of E. & E. Marcus (1968).

Lamellaxis gracilis (Hutton)

Vernhout, 1914: 18 (*Opeas gracile*).

I: Nieuw Nickerie, various localities (M).

IV: Kwattaweg near Pomona (A); Paramaribo, various localities (Cr, A, M); Republiek near Zanderij (M); Zanderij (M).

V: Brokopondo (Ms).

VII: Albina, various localities (A, M).

Lamellaxis beurni (Vernhout) (fig. 5)

Vernhout, 1914: 19 (*Opeas beurni*).

I: Nickerie River, Lombok Falls, woodland (BG); Sipaliwini, forest (Ms).

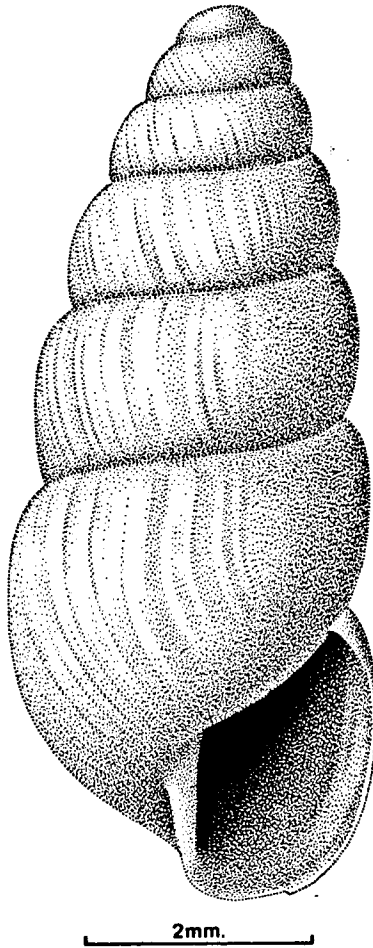


Fig. 5. *Lamellaxis beurni* (Vernhout), holotype (RMNH). Surroundings of Paramaribo, 1911, van Heurn coll. Length 8 mm. H. Heijn del.

III: Raleigh Falls (M); Tangimama Creek, between stones on the banks of the falls (M).

IV: Jodensavanne, various localities (M); Paramaribo, cultuurtuin (M).

V: Browns Mountain, 475 m (Ms); Browns Mountain, L.B.B. hut near Irene Falls (M).

VI: near E-W road, swamp-forest (R).

VII: Bigiston, under plants on the banks of the river (M); Nassau Mountains, ca. 530 m (Ms).

Examination of the radula has shown that it is a species of *Lamellaxis*. As Vernhout's figure is not satisfactory, I have given a new figure of the holotype. The shell has a maximum length of 11 mm.

Lamellaxis micrus (Orbigny)

Vernhout, 1914: 18 (*Opeas micra*); Altena, 1960: 50 (*Lamellaxis micra*).

I: beach near mouth of Corantijn River (A); shell ridge near Cupido at the Maratakka River (A); Nieuw Nickerie, various localities (M); Wageningen, on orchids (BG).

IV: Paramaribo, various localities (Cr, M); Powaka (Ms); Zanderij, various localities (M).

V: Brokopondo, on a decaying tree trunk (Ms).

VII: Albina, along borders of roads and on waste ground (A); Bigiston, under plants on the banks of the river (M).

Beckianum beckianum (Pfeiffer)

Vernhout, 1914: 19 (*Opeas beckianum*); Altena, 1960: 50 (*Synopeas beckianum*).

I: shell ridge near Cupido at the Maratakka River (A); Nieuw Nickerie, various localities (M).

III: Bethania 228, about 3 km NNW of Groningen (A); Raleigh Falls (M, Ms).

IV: Jodensavanne, various localities (A, M); Kwattaweg near Pomona (A); Paramaribo, various localities (Cr, A, M); Purmerend, near the river (H).

V: Browns Mountain, L.B.B. hut near Irene Falls (M); forest opposite Kabel Station (H).

VII: Bigiston, under plants on the banks of the river (M).

Oleacinidae

Varicella (Luntia) insignis (Smith)

Altena, 1960: 50 (*Varicella cf. clappi*); Altena, 1964: 139 (*Leptinaria (Luntia) insignis*).

IV: Jodensavanne, near the synagogue (M); Paramaribo, various localities (M).

VII: Albina, at the foot of Albina Mountain (M).

The radula of this species has been studied by the late Professor H.B.

Baker, to whom I am indebted for the following notes (in litt. 9.VII.1965): "All the teeth are unicuspid as in the Jamaican subgenus *Varicellina* and the typical Puerto Rican *Vagavarix*. But, apparently it has only 8 centrifugals each side of the central and the 3rd centrifugal is considerably larger than the inner 2. Both of these are peculiar features; in most groups of *Varicella* studied, the teeth are more numerous and the innermost centrifugal is as large as, or larger than the others. Although the data of the soft parts would be necessary to place it exactly, I judge that *Luntia* is a fairly distinct subgenus of *Varicella*. *Varicella* s.s. and the other Jamaican subgenera have more cusps [ectocoines]."

Euglandina striatula Vernhout

Vernhout, 1914: 5.

Euglandina surinamensis Vernhout

Vernhout, 1914: 6.

III: Raleigh Falls (M).

IV: Jodensavanne, near the synagogue (M); Palmanaribo Creek at the Suriname River (A); Paramaribo and surroundings (G); Torarica at the Suriname River (A).

V: Browns Mountain, ca. 475 m (Ms).

VII: Bigiston, bank of river (A).

Acavidae

Strophocheilus (Megalobulimus) oblongus (Müller)

Vernhout, 1914: 10; Bequaert, 1948: 70; Van Benthem Jutting, 1964: 79.

II: camp Coronie, 14 km W of Coppename River (G); Coronieweg, km 107 (A).

III: Bethania 228, about 3 km NNW of Groningen (A); Groningen, shell ridge (G); Plantation Caledonia at the lower Saramacca River (K).

IV: Garnizoenspad near Paramaribo (L); Paramaribo, various localities (G, Co, Cr, B, Hn, M); side-branches (leidingen) 5 and 6 of Saramacca Canal (Cr).

VI: Charlottenburg (Ht); Lust en Rust (Co); Mot creek near Alliance (Hf).

In Suriname *Strophocheilus oblongus* is restricted to the northern, coastal zone. However, the species is also found in northern Brazil close to the border of Suriname. Dr. D.C. Geijskes has assured me that the specimens mentioned by Bequaert as from "Kantani, western Paroe Savanna, near the Brazilian border" have not been found in Suriname (as inferred by Bequaert), but south of the border in Brazil. This

locality is less than 10 km south of the border at approximately 2°23' N 55°40' W. It is remarkable that the species occurs here in surroundings where the soil contains little lime; the specimens were obtained on a granitic mountain.

Bulimulidae

Eudolichotis aurissciuri (Guppy)

Vernhout, 1914: 10 (*Auris distorta*); Altena, 1964: 140.

I: Corantijn River, Matapi, in forest (BG); Corantijn River, Post Tigrie (Hd); Lucie River to 43.1 km N (near Kabalebo River) (F); Kabalebo River, Avanavero Falls, in camp on forest path (BG); Nickerie River, in swamp forest (Ld); Upper Koboeri River (BG).

III: Raleigh Falls, Foengo Island (Ms); Raleigh Falls, under leaves (M); Singrilanti near Matta (Ms); Voltz Mountain (Ms).

IV: Berlijn (Hd); Jodensavanne (Cr); Jodensavanne, near the synagogue (M); Paramaribo (G); Paramaribo, Prins Hendriklaan, in dry trench (M); Paramaribo, road to Lelydorp (Cr); Powaka (M); Zanderij (M).

V: Brownsweg (Hd); Browns Mountain (Ms); Ligolio at the Upper Suriname River (Gran Rio) (Ms).

Drymaeus flavidus (Menke)

Vernhout, 1914: 12.

Drymaeus interruptofasciatus Vernhout

Vernhout, 1914: 11

**Drymaeus papyraceus* (Mawe)

Troschel, 1848: 547 (*Bulimus lita*); Drouet, 1859: 60 (*Bulimus papyraceus*); Pilsbry, 1897-1898: 250, pl. 51 figs. 1-3 (1898).

I: near Lucie River (F).

One specimen of *Drymaeus papyraceus* was found by Mr. D.L. Fernandes in 1926 (ZMA); the specimen has lost its apex (fig. 6). This record makes the identification by Troschel and Drouet more probable.

Drymaeus quadrifasciatus Vernhout

Vernhout, 1914: 12.

I: left branch of Kabalebo River (G); Upper Koboeri River (BG).

IV: Jodensavanne near the synagogue (M); Lelydorp, in *Bromelia* on tree trunk (G).

VII: Tapanahoni River, Granholo, on orchid (G).

Drymaeus semimaculatus Pilsbry

Vernhout, 1914: 11.



Fig. 6. *Drymaeus papyraceus* (Mawe) (ZMA). Near Lucie River, 1926, D.L. Fernandes coll. Length 30 mm. Chr. Hoom Jr. photogr.

- I: shell ridge near Cupido on the Maratakka River (A).
 III: Bethania 228, about 3 km NNW of Groningen (A).
 IV: Jodensavanne, near the synagogue (M).

Drymaeus succineus Vernhout
 Vernhout, 1914: 13.

Odontostomidae

Tomigerus (Tomigerus) cumingii Pfeiffer
 Altena, 1964: 141.

Orthalicidae

Sultana sultana (Dillwyn)

Vernhout, 1914: 17 (*Orthalicus sultana*).

I: Lucie River to 43.1 km N (near Kabalebo River) (F); Nickerie River, on bush in forest creek behind Meteocamp near Blanche Marie Falls (BG); Sipaliwini Expedition (S); Wilhelmina Mountains, S side (Be).

III: Raleigh Falls (Ms); Voltz Mountain, granite slab W of mountain (Ms).

IV: Jodensavanne (Cr); Jodensavanne, near the synagogue (M).

V: Browns Mountain, ca. 475 m (Ms); Browns Mountain, near Irene Falls (Rd).

VII: Moengotapoe trail, first patch of forest on shell ridge (C); Nassau Mountains, km 6 (C).

On the label of *Sultana sultana* of the Tapanahoni Expedition the date shown is 15.VII.1904; on that day the expedition had just passed the Pedrosoengo Falls.

Orthalicus bensoni (Reeve)

Vernhout, 1914: 15 (*Zebra bensoni*).

I: Coeroeni Island and further up-stream as far as Lucie-line (G); Corantijn River, Matapi, forest (BG); shell ridge near Cupido at the Maratakka River (A); Nickerie River, near Meteocamp at Blanche Marie Falls (BG); Sipaliwini Expedition (S); Sipaliwini (Ms); "Tracé Falla Watra, Coppename" = between Fallawatra River and Coppename River, near the border of Nickerie district (G); Wilhelmina Mountains, S side (Be).

III: Bethania 228, about 3 km NNW of Groningen (A); Raleigh Falls (Ms); Voltz Mountain, granite slab W of the mountain (Ms).

IV: Jodensavanne, several localities (Cr, M); Zanderij (M).

VII: Alamando-soela, Upper Tapanahoni River (G); Bigiston, along the Marowijne River (M).

Corona perversa (Swainson)

Vernhout, 1914: 16.

I: New River (= Corantijn River), Post Tigrie (Hd); Sipaliwini Expedition (S); Sipaliwini (Ms).

III: Raleigh Falls, on trunk in forest on island in the falls (M).

IV: Jodensavanne, various localities (M); Lelydorp, road to Zanderij (Cr).

V: Brokopondo, in forest (Ms); Kraka near Phedra (Hn).

Amphibulimulidae

Simpulopsis corrugata Guppy

Vernhout, 1914: 18.

Systrophiidae

Happia (Happiella) surinamensis (Pfeiffer)Vernhout, 1914: 5 (*Scolodonta surinamensis*).

I: Nieuw Nickerie, various localities (M).

III: Raleigh Falls, between stones on the banks of the falls (M).

IV: Jodensavanne, various localities (M); Meerzorg on border of road (M); Paramaribo, Cultuurtuin (M); Purmerend, near the river (H).

[French Guyana: island between island Portal and the eastern bank of the Marowijne River (A)].

Streptaxidae

Streptartemon glaber (Pfeiffer)Vernhout, 1914: 4 (*Streptaxis glaber*).

I: Nieuw Nickerie, various localities (M).

III: Bethania 228, about 3 km NNW of Groningen (A).

IV: Paramaribo, various localities (Cr, M); Purmerend, at the river (H).

Huttonella bicolor (Hutton)Vernhout, 1914: 4 (*Ennea bicolor*).

I: Nieuw Nickerie, various localities (M).

IV: Paramaribo, various localities (Cr, M).

Polygyridae

Thysanophora (Lyroconus) plagioptrycha (Shuttleworth)

Altena, 1960: 50.

IV: Paramaribo, Cultuurtuin (M).

Camaenidae

Solaropsis cicatricata (Beck)Vernhout, 1914: 7 (*Solaropsis pellisserpentis*).

I: Sipaliwini Expedition (S).

IV: Garnizoenspad, on shell ridge (B); Jodensavanne, near the synagogue (M); Zanderij (M).

V: Brokopondo (Ms).

VII: Nassau Mountains, km 7 (N); Nassau Mountains, ca. 530 m (Ms).

The valid name of this and the third species of this genus I owe to Dr. A. Solem, who revised our collection some years ago.

Solaropsis kuehni (Pfeiffer)

Vernhout, 1914: 8 (*Solaropsis kübni*).

I: Wilhelmina Mountains, S side (Be).

IV: Jodensavanne, near Indian village (M); Zanderij, various localities (M).

V: Browns Mountain, ca. 475 m (Ms); between Kabel Station and Brownsweg (Ms).

VII: Nassau Mountains, ca. 530 m (Ms).

The name '*kübni*' I have altered to '*kuehni*' in accordance with the International Code of Zoological Nomenclature, art. 32 (C) (i).

Solaropsis undata (Lightfoot)

Vernhout, 1914: 7 (*Solaropsis serpens*).

III: Bethania 228, about 3 km NNW of Groningen (A); Raleigh Falls (M).

VII: Nassau Mountains, ca. 530 m (? not adult, Ms).

See remark sub *S. cicatricata*.

Helminthoglyptidae

Averellia (*Trichodiscina*) *coarctiliata* (Deshayes)

Altena, 1964: 141.

DISCUSSION OF THE DISTRIBUTION

The localities in the first part are sometimes mentioned with different names which, nevertheless, could be the same. So, for instance, this may be the case with "Coronie, van Heurn 1911", and one of the other two localities in that district, etc. But in table I only the localities "Paramaribo and surroundings, 1900, 1904", "Paramaribo, van Heurn 1911" and "Paramaribo, after 1938" are taken together.

In the table the localities are grouped in three zones: the zone of the shell ridges in the coastal area (zone 1), that of the savannas (zone 2), and the zone of the inland area (zone 3) which zone is mainly mountainous. It will be clear that certain of the species with large shells are wholly or mainly confined to one or two zones, or reach their limits of distribution in the East or West of Suriname.

The three zones contain the following localities:

Zone 1:

- I: beach near the mouth of the Corantijn River; Cupido at the Maratakka River; Hertenrits near Wageningen; Nickerie (Voltz); Nickerie River, in swamp forest; near Nieuw Nickerie; Wageningen.
- II: Coronie, van Heurn 1911; Coronie, camp 14 km of C ppenname River; Coronie weg, km 107.
- III: Bethania 228; Garnizoenspad, shell ridge; Groningen; Karel Franois; Plantation Caledonia; bank of Saramacca River, near Garnizoenspad; Sidoredjo; Tambaredjo.
- IV: Garnizoenspad, near Paramaribo; Garnizoenspad on shell ridge; Kwattaweg, near Pomona; Lelydorp; Lelydorp, road to Zanderij²; Meerzorg; Onverdacht; Palmanaribo Creek at the Suriname River; Paramaribo and surroundings, 1900, 1904, Paramaribo, van Heurn 1911, and Paramaribo (including Charlesburg, Comb , Cultuurtuin etc.) after 1938; Paramaribo, road to Lelydorp; Plantation Peperpot; Purmerend; side-branches (leidingen) 5 and 6 of Saramacca Canal; Torarica at the Suriname River.
- VI: Braampunt; Charlottenburg; Lust en Rust; Mot Creek near Alliance; Nieuw Amsterdam; swamp forest near E-W road.
- VII: at the Marowijne River (Schepman); Moengoetapoe trail; Wane Creek, Sarama forest.

Zone 2:

- I: Kabalebo River, near Avanavero Falls; Matapi, at the Corantijn River; Upper Kaboeri River.
- III: Costeri Creek, SE of Bigi Poika; Singrilanti near Matta.
- IV: Berlijn; Coropina Creek, near Republiek; Jodensavanne; Powaka; Republiek, near Zanderij; Zanderij.
- V: Kraka, near Phedra.
- VII: Albina; Bigiston.

Zone 3:

- I: Coeroeni Island and surroundings; Fallawatra Trac ; left branch of Kabalebo River; Lucie River; Lucie River to 43.1 km N; Nickerie River, at Blanche Marie Falls; Nickerie River, at Lombok Falls; Sipaliwini; Post Tigrie, at the Corantijn River; Wilhelmina Mountains, S side.
- III: Raleigh Falls; Tangimama Creek; Voltz Mountain.
- V: Brokopondo; Browns Mountain; Brownsweg; Guyana Gold Place, on Mindrinetrie Creek; near Irene Falls, Browns Mountain; Jan

² Perhaps in the zone of the savannas.

name of species	approximate maximum length or width of shell in mm	number of localities in zone		
		1	2	3
<i>Alcacia kuehni</i>	5.5	1	2	4
<i>Alcacia sericea</i>	6.0	2	1	4
<i>Lucidella lirata</i>	4.1	4	2	1
<i>Neocyclotus rugatus</i>	19.5	0	0	1
<i>Neocyclotus translucidus dunoensis</i>	17.0	0	1	4
<i>Neocyclotus morrisoni</i>	15.5	0	0	1
<i>Neocyclotus pari</i>	23.0	0	0	1
<i>Bothriopupa conoidea</i>	1.5	1	0	0
<i>Sterkia rhoadsi</i>	2.1	1	0	0
<i>Nesopupa maasseni</i>	1.8	1	1	0
<i>Gastrocopta serivilis oblonga</i>	2.5	8	0	0
<i>Gastrocopta geminidens</i>	1.9	2	1	0
<i>Pupisoma dioscoricola insigne</i>	1.2	1	0	0
<i>Pupisoma minus</i>	1.0	1	0	0
<i>Strobilops labyrinthica morsei</i>	2.1	0	1	0
<i>Ceciloides consobrina</i>	2.5	2	0	0
<i>Opeas pumilum</i>	5.5	0	1	0
<i>Subulina octona</i>	20.0	13	5	3
<i>Leptinaria lamellata</i>	13.0	3(4?)	6	7
<i>Lamellaxis clavulinus</i>	7.0	2	0	0
<i>Lamellaxis gracilis</i>	12.0	3	3	1
<i>Lamellaxis beurni</i>	11.0	2	2	7
<i>Lamellaxis micrus</i>	6.0	7	4	1
<i>Beckianum beckianum</i>	8.0	9	2	3
<i>Varicella insignis</i>	7.0	2	2	0
<i>Euglandina striatula</i>	46.5	0	0	1
<i>Euglandina surinamensis</i>	38.0	4	2	2
<i>Strophocheilus oblongus</i>	100.0	12	0	0
<i>Eudolichotis aurissciuri</i>	43.0	12	8	7
<i>Drymaeus flavidus</i>	19.0	0	0	2
<i>Drymaeus interruptofasciatus</i>	18.0	1	0	1
<i>Drymaeus papyraceus</i>	30.0	0	0	1
<i>Drymaeus quadrifasciatus</i>	16.5	1	2	3
<i>Drymaeus semimaculatus</i>	25.0	4	1	0
<i>Drymaeus succineus</i>	11.5	1	0	0
<i>Drymaeus surinamensis</i>	24.5	1	0	0
<i>Tomigerus cumingii</i>	7.0	1	0	0
<i>Sultana sultana</i>	67.0	1	1	11
<i>Orthalicus bensoni</i>	62.0	4	4	10
<i>Corona perversa</i>	76.5	1	2	5
<i>Simpulopsis corrugata</i>	9.0	1	0	0
<i>Happia surinamensis</i>	6.5	5	1	1
<i>Streptartemon glaber</i>	6.5	5	0	0
<i>Huttonella bicolor</i>	7.0	2	0	0
<i>Thysanophora plagioptrycha</i>	3.0	2	0	0
<i>Solaropsis cicatricata</i>	52.0	1	2	4
<i>Solaropsis kuehni</i>	18.0	1	2	4
<i>Solaropsis undata</i>	46.0	2	0	1(2)
<i>Averellia coarctiliata</i>	13.0	1	0	0

Basi Gado Mountain; forest opposite Kabel Station; between Kabel Station and Brownsweg; Ligolio, Upper Suriname River; Upper Saramacca River.

VII: Alamandon-soela, Upper Tapanahoni; Lawa River; at the Marowijne (Tapanahoni Expedition); Nassau Mountains; Tapanahoni River; Tapanahoni River, Granholo.

In the table a total of 49 species is enumerated of which seven are Prosobranchia and 42 Pulmonata. The largest number, viz. 39, occur in zone 1, 25 in zone 2, and 27 in zone 3. Sixteen species (nine in one locality) are restricted to zone 1, two species (both in one locality) to zone 2, and six species (five in one locality) to zone 3. In the zones 1 + 2 four species are found, in zones 1 + 3 two, in zones 2 + 3 two, and in all three zones 17 respectively. All species, especially the smaller ones which hitherto have been found in one locality only, will very probably be found in more localities and perhaps also in other zones. So this outline is only provisional, but some cautious conclusions may be drawn here.

The most striking species of zone 1 is *Strophocheilus oblongus*, which up to now has only been found in this zone at twelve localities³, notwithstanding the fact that it attains a length of about 100 mm. This applies also to *Gastrocopta servilis oblonga* (which is very small), a species known from eight localities, and, to a lesser degree to the somewhat larger *Streptartemon glaber* which occurs at five localities. *Averellia coarctiliata* has probably penetrated Suriname from the West and in 1963 had advanced as far east as the shell ridge near Cupido at the Maratakka River. The first zone will probably remain richest in species on account of the abundance of lime in the shell ridges.

In the second zone, which is the narrowest, only 25 species occur. The localities are mainly situated near rivers or creeks; the savannas themselves probably have a pH which is too low for molluscs, except for *Corona perversa* which was found on the savannas proper by Dr. D.C. Geijskes. The major part of the species in zone 2, viz. 17, are present in all three zones as has been mentioned before. Four species occur in zone 1 and 2, of which *Drymaeus semimaculatus* in four localities in zone 1, and in one in zone 2. Therefore the locality in zone 2 seems to be a southern extension of this species. One species, *Sultana sultana*, lives in zone 1, 2 and 3 in one, one and 11 localities respectively. *Neocyclotus translucidus dunoensis* has been found in one

³ See, however, the remark on this species on p. 40.

locality in zone 2 and in four in zone 3. Thus they seem to have a northern extension into zones 1 and 2, and zone 2 respectively. The two species which were found in zone 1 and 3 only probably also occur in zone 2.

Zone 3 is by far the largest and the most varied; much of the area is covered with primeval forest and the mountains reach altitudes of over 1000 m. It is the least known zone, notwithstanding a number of expeditions and investigations by other persons. Several species, however, are found at more localities in this zone than in the others, and there are large ones among them. The most striking ones have been mentioned already, viz. *Sultana sultana* and *Neocyclotus translucidus dunoensis*. The latter has its eastern limit at Browns Mountain, thus west of the Suriname River.

There are also species which occur in all three zones, but have most localities in zone 3. This is, among others, the case with *Alcadia kuehni*, *A. sericea*, *Lamellaxis beurni*, *Orthalicus bensoni*, *Corona perversa*, *Solaropsis cicatricata* and *S. kuehni*. *Neocyclotus morrisoni*, *N. pari*, and *N. rugatus* occur at one locality only, which is situated at somewhat more than 500 m above sea level. *N. rugatus*, originally only recorded from Trinidad and surroundings, is now known to occur in Suriname — a noticeable extension of the known range. The above-mentioned *Neocyclotus* species will probably be found elsewhere in the mountainous regions of Suriname.

From the foregoing it will be obvious that much, especially in zone 3, still has to be investigated in Suriname before we have a clear picture of the distribution of the land molluscs in this country.

REFERENCES

- ALTENA, C.O. VAN REGTEREN, 1960. On a small collection of land Mollusca from Suriname. — *Basteria* 24: 48-51.
- , 1964. Notes on Suriname land snails. — *Zool. Meded. Leiden* 40: 139-141.
- , 1974. The land Prosobranchia of Suriname with description of two new species of *Neocyclotus*. — *Zool. Meded. Leiden* 48: 69-73.
- BAKER, H.B., 1925. The Mollusca collected by the University of Michigan-Williamson Expedition in Venezuela. — *Occ. Pap. Mus. Zool. Mich.* 156: 1-56.

- BENTHEM JUTTING, W.S.S. van, 1964. *Strophocheilus oblongus* in the stomach of a Surinam bird of prey. — *Basteria* 28: 79-81.
- BEQUAERT, J.C., 1948. Monograph of the Strophocheilidae, a Neotropical family of terrestrial mollusks. — *Bull. Mus. comp. Zool. Harv.* 100: 1-210.
- DALL, W.H., 1885. Notes on some Floridan land and fresh-water shells with a revision of the Auriculacea of the eastern United States. — *Proc. U. S. Natn. Mus.* 7: 255-289.
- DROUET, H., 1859. Essai sur les mollusques terrestres et fluviatiles de la Guyane française: 1-116 (*Mém. Soc. acad. Aube* 23, 1859) Paris.
- MARCUS, E. & E., 1968. Ueber einige Subulinidae (Pulmonata von Sao Paulo). — *Beitr. neotrop. Fauna* 5: 186-208.
- PILSBRY, H.A., 1897-1898. American Bulimulidae: *Bulimulus*, *Neopetraeus*, *Oxychona*, and South American *Drymaeus*. — *Manual Conch.* (2) 11: 1-339. Philadelphia.
- , 1906. Achatinidae: *Stenogyridae* and *Coelioxinae*. — *Manual Conch.* (2) 18: i-xii, 1-357. Philadelphia.
- , 1916-1918. Pupillidae (Gastrocoptinae). — *Manual Conch.* (2) 24: i-xii, 1-380. Philadelphia.
- , 1918-1920. Pupillidae (Gastrocoptinae, Vertigininae). *Manual Conch.* (2) 25: i-ix, 1-401. Philadelphia.
- , 1920-1921. Pupillidae (Vertigininae, Pupillinae). — *Manual Conch.* (2) 26: i-iv, 1-254. Philadelphia.
- , 1948. Land Mollusca of North America (North of Mexico) 2 (2): I-XLVII, 521-1113 (*Monogr. Acad. nat. Sci. Philad.* 3).
- TROSCHEL, F.H., 1848. Mollusca. In: R. SCHOMBURGK, *Reisen in Britisch Guiana in den Jahren 1840-1844* 3: 545-551. Leipzig.
- VERNHOUT, J.H., 1914. The non-marine molluscs of Surinam. — *Notes Leyden Mus.* 36: 1-46.