

THE MOLLUSC FAUNA OF PULAU PANAITAN (PRINSENEILAND) LAND AND FRESHWATER MOLLUSCS

by

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From August 30 till October 1st, 1951, the author and a party of Sundanese mantry collectors accompanied a collecting trip under the leadership of Mr A. HOOGERWERF to Pulau Panaitan, formerly called Prinseneiland in honour of Prince MAURITS of the Netherlands. The main purpose was to collect invertebrates, paying special attention to molluscs.

Pulau Panaitan is a volcanic island covering an area of about 12.000 hectares, situated between $105^{\circ} 4'$ and $105^{\circ} 14'$ E. long., and between $6^{\circ} 32'$ and $6^{\circ} 40'$ S. lat., 10 km from the nearest Java shore and 85 km from the nearest point of the Sumatran coast. For a detailed description of the island, its vegetation and fauna I refer to HOOGERWERF's paper (Treubia 21 1952: 481-489). The island is surrounded by dead and living coral reefs and a sandy beach of varying width. In many places volcanic rocks take the place of reefs, while elsewhere mangrove forests cover large areas. Behind the beach is a girdle of pumice rocks originating from the Mt Krakatau eruption of 1893. Heavy floods carried the rocks into the island where they were deposited forming a girdle of 20 or more meters in width. Since that eruption the island has remained uninhabited. Although in many places the surface is covered with volcanic ashes in layers up to a depth of 60 cm, on top of which is a very thin humus layer, I cannot accept that the flora and fauna were completely destroyed as a result of the eruption or floods. At least so much was left that the fauna and flora have been able to recover since that catastrophe.

Our party landed on the island at Legon Bodjo, Kasuaris Bay, close to the estuary of River Harashas where the first bivouac was set up on Sept. 1. Here, there is a sandy beach protected by dead coral reefs. A fresh-water basin (salinity 0.02‰) forming part of a river was situated behind the camp, while brackish water (salinity 6.76‰) was found nearby. From this bivouac we visited Mt Talon (100 m) on Sept. 2, crossing open forest, incidentally with swampy or marshy areas with nipa, pandan, and harashas. The swamps were for the greater

Kantjana on the opposite side of Kasuaris Bay on Sept. 7. From there we crossed the western peninsula and visited part of the west coast (Sept. 8). We had to cross two or three ridges (50—75 m high) of volcanic rock (basalt) and found large basalt formations along the west coast. Small rivers and streams contained some water, sometimes flowing, sometimes forming temporary stagnant pools. Fishes and large Palaemonids there awaited the return of the rains. Along the eastern coast of the peninsula to the very southern point (Sept. 9) plateaux of dead coral were interrupted here and there by andesite and basalt rock. New corals were growing along the edge. Many large shells of *Hippopus*, *Tridacna* and *Nautilus* covered the beach. South of River Panaitan was a forest of *Sonneratia* and *Avicennia* on completely dry soil on which *Terebralia palustris* had succumbed in great numbers. On Sept. 11 we visited Mt Putri (150 m) via the river Kantjana that contained fresh water in an andesite bed. We reached the shore at Tg Panjalaban (west coast) and returned, following the river Siang part of the way. The estuary of river Darahaju was found to be brackish (Sept. 12) for a considerable distance inland (salinity 1.29 ‰). The coastal region had a vegetation of *Rhizophora mucronata*. An unnamed stream close to our bivouac, contained running water. We followed this stream till we reached its source (Sept. 13). The planned bivouac at Legon Semadang (east coast) had to be cancelled as we could not find any fresh water (Sept. 14). East of Mt Raksa (320 m) and on any place at the east coast all brooks and rivers were dry. The next day (Sept. 15) we landed at Legon Kadam on the north coast, on a broad and sandy beach. Old and dead coral reefs were found, covered by sand but bare towards the sea. Here and there bare basalt rock appears, pointing through the sand or coral so that *Terebra* and *Natica* could live side by side with *Ostrea* and *Littorina*. The river Djangkah had an estuary with brackish water and dense *Rizophora* vegetation along its borders. The unnamed camp river contained fresh and running water (salinity 0.47 ‰). It probably was a tributary of the river Kadam. The river Djangkah is brackish up to 500 m (Sept. 16). The salinity, depending on the tides, varies from 3.45 ‰—22.99 ‰. On Sept. 17 we visited Mt Kadam (150 m), crossing several streams, tributaries of the river Kadam. We sailed to Tg Kadam West and landed at several places on the north-west coast (Sept. 18). Tg Kadam East, River Kadam and fresh-water marshes under *Casuarina* trees were our localities on Sept. 19, while the river Djangkah was visited on Sept. 20. Our party moved to the north-eastern corner of P. Panaitan on Sept. 21. A fresh-water marsh with a vegetation of grasses but without any water was close to our bivouac.

We had to dig for fresh water. It smelled badly. A mountain that appeared as Mt S.4 on the map (187 m) and is called Mt Parat below, mainly consisted of volcanic rock (Sept. 22). We followed the upper part of the bed of an unnamed river without water, which runs from Mt Parat to our camp. South from our site was a very young forest and alang-alang fields, the only fields of this kind on the island. (Sept. 23). Freshwater molluscs were found close to the east coast in a dry and very wide river bed. The fresh-water marsh close to our camp contained many dying fresh-water molluscs. The salinity of the ground water which we used to prepare our meals was found to be 1.24 ‰. Under dead branches and stones fresh-water snails tried to find a last refuge, some few Planorbidae survived (Sept. 24). On the bark of trees the remains of water plants and algae showed the former water level. Among the algae we found the tiny shells of Ancyliidae. On Sept. 25 we searched the camp river over the whole of its length. It had a very shallow but wide bed. The banks were not readily traceable. Many Melaniidae were found, apertures pressed against the dry bottom, the shells hermetically closed. Neritidae behaved in the same way. All shells were alive and had a good chance to survive.

We embarked again Sept. 28 for a new bivouac somewhere at the east coast. At Legon Semadang we found a brackish water swamp, or at least the dying molluscs were brackish water forms. In the southern part of Legon Lentah, north of Mt Raksa we landed in a dense mangrove vegetation consisting of *Sonneratia* and *Avicennia* and further inland of *Rhizophora mucronata*. *Telescopium* in great numbers, together with *Polymesoda* showed the brackish water character. Dead, but still fresh, shells of *Melania*, *Neritina* and *Planorbis* probably had been carried to this place by fresh water during the wet monsoon. However, we failed to find fresh water and therefore concluded our visit to the island.

By kind permission of the authorities, I could compare my shells collected during this trip with those present in the collections of the Amsterdam and Leyden Museums, in the Netherlands. I am greatly obliged to Mrs W. S. S. VAN DER FEEN — VAN BENTHEM JUTTING and Dr C. O. VAN REGTEREN ALTENA for their kind help and hospitality during my stay in that country. Furthermore I wish to thank the leader Mr A. HOOGERWERF and the members of the expedition for their comradeship and the shells they picked up on their routes, giving me information about sites suitable and favourable for my purposes.

The drawings were made by GUSTI ABDULKADIR and SUTARDJO, artists of our Museum. Photographs by Mr F. HUYSMANS of the Photographic Institute of Kebun Raya Indonesia.

Dates on salinity were kindly supplied by Mr C. PH. VEEN of the Laboratorium Penjelidikan Laut, Djakarta (Laboratory for investigation of the sea). I offer those in the following table.

DATES ON SALINITY

Sample	Sept. 1951	hrs	Locality	S. ^o /∞∞
1.	1	12.30	Branch of R. Harashas from which we got fresh-water for our meals. Not in open connection with the sea and separated from it by a heavy sand-wall.	0.02
2.	2	12.30	Brackish water swamp near the bivouac, not in connection with the sea.	6.76
3.	5	11.00	R. Harashas, grid square 19/51 *) about two km from the sea	0.87
4.	13	10.00	R. Darahaju, grid square 172.534, 250 m from the sea	1.29
5.	16	08.00	Unnamed river near the camp, grid square 206.574 about 100 m from the shore	0.47
6.	16	16.00	Estuary R. Djangkah, gr. sq. 197. 567	3.45
7.	17	10.00	Estuary R. Djangkah 200 m from the shore	22.99
8.	17	16.00	Same locality	4.95
9.	23	15.00	Groundwater from the dry swamp near the bivouac from which we got water for preparing our meals	1.24

A list of the literature on P. Panaitan (= Prinseneiland) is also given. Papers dealing with this subject which appeared before 1951 must be read very critically as the records of birds and mammals in many cases are untrustworthy. This matter has already been dealt with by HOOGERWERF. He probably overlooked the passage in VAN BENTHEM JUTTING (1941) recording tigers for the island; however, we could not confirm this record. Tigers and deer are missing in this territory, though they might reach this island incidentally (PIETERS, 1954).

LIST OF THE LITERATURE ON P. PANAITAN

1863. J. N. MOLLIER, De Houtsoorten van Prinseneiland. Tijdschrift voor Nijverheid en Landbouw in Nederl. Indie (9) NS. 4: 257-271.
1885. R. D. M. VERBEEK, „Krakatau” Deel 1. Landsdrukkerij Batavia: 473.
1910. H. Th. KAL, Prinseneiland. Tijdschr. Binnenl. Best. 39: 76-78.
1910. H. A. ELIAS, Met de Laurens Pit naar Prinseneiland en Djoengkoelon. Tijdschr. Binnenl. Best. 39: 186-203.

*) Map: Java & Madura 1:50.000 nr 31/XXXVIII-D, 31/XXXIX-B, 32/XXXVIII-C & 32/XXXIX-A. Army map service U.S. Army, Washington D.C. 1943, 106248.

1910. R. A. EEKHOUT, Prinseneiland en het Schiereiland Djoengkoelon. Tijdschr. Binnenl. Best. 39: 275-305. Idem, Ind. Mercur 1911: 66.
1911. W. C. A. VINK, Rapport omtrent het onderzoek naar den Vischrijktom der wateren rondom Djoengkoelon en Prinseneiland. Meded. Visch. Station 6: 44-52.
1941. W. S. S. VAN BENTHEM JUTTING, Non marine mollusca from the satellite Islands surrounding Java. Arch. Neerl. de Zool. 5: 251-348. Prinseneiland: 255, 322.
1951. A. HOOGERWERF, 31e Dienstrapport. Verslag over de expeditie naar het Natuurpark Pulau Panaitan (Prinseneiland) in Straat Sunda van 30 Augustus—5 October 1951. Djawatan Penjelidikan Alam (Kebun Raya Indonesia), Bogor, Bagian Perlindungan Alam dan Pemburuan, 194 pp.
1953. A. HOOGERWERF, Some notes about the Nature reserve Pulau Panaitan (Prinseneiland) in Strait Sunda, with special reference to the avifauna. Treubia 21: 481-505. 8 photographs.
1953. A. M. R. WEGNER, On a collection of Rhopalocera from Pulau Panaitan (Prinseneiland) with description of a new species (Lepidoptera). Idea 9: 46-50. Plate. O.S.R. publ. No. 36 (a).
1953. M. A. LIEFTINCK, Notes on some Odonata from Panaitan Island, Sunda-Strait (West Java). Idea 9: 51-56. Map. O.S.R. publ. No. 36 (b).
1954. D. PIETERS, Iets over de dieren van Pulau Panaitan en uit aangrenzende streken. Herten en hun belagers. Penggemar Alam 34: 25-35 (Continuation from: De Tropische Natuur).
1954. L. J. M. BUTOT, On *Telescopium telescopium* (Linné) and the description of a new species from P. Panaitan (Prinsen Island) straits of Sunda. Basteria 18: 1-13. Plates 1-2, text fig. 1.

In the following list are enumerated the species of not strictly marine mollusca collected in P. Panaitan. The Auriculidae and Assimineidae will be dealt with in a second paper on marine mollusca. Siphonariidae are included.

In dealing with the species references are given to the literature, in most cases only as far as the distribution in Java or Sumatra is concerned. If the species has already been dealt with by VAN BENTHEM JUTTING in her series Systematic Studies on the non-marine mollusca of the Indo-Australian Archipelago, her list of synonyms is not repeated.

Annotated List of mainly Land- and Freshwater Mollusks of Pulau Panaitan

LAMELLIBRANCHIA

Polymesoda bengalensis (LAMARCK, 1818)

1818. LAMARCK, Hist. Nat. Anim. s. Vert. 5: 554 (*Cyrene*).
1927. VAN DER MEER MOHR, Misc. Zool. Sum. 18: 2 (*Cyrena sinuosa*).
1953. VAN BENTHEM JUTTING, Treubia 22: 49, fig. 10 (with full synonymy of the Javanese records).

22-27. ix. 1951, 1/2 ex. This valve is white and completely devoid of epidermis. A strong groove runs from umbo to the posterior ventral side of the valve. As it was found on the beach it might originate from the coast of Java. We did not find this species living in the island.

***Polymesoda erosa* (SOLANDER, 1786) fig. 2**

1786. SOLANDER, Portland Catalogue: 71, 186 (*Venus*).
 1897. MARTENS, in WEBER Zool. Ergbn. 4: 92 (*Cyrena sumatrensis*).
 1931. OOSTINGH, Arch. Molluskenk. 63: 229 (*Cyrena moussoni*).
 1934. RENSCH, Arch. Molluskenk. 66: - (*Cyrena sumatrensis* = ? *moussoni*).
 1939. ADAM & LELOUP, Res. Sci. Voy. Ind. or. Neerl. (2) 20: 68, pl. 5 f. 1 *Polymesoda* (*Geloina*) *erosa*.
 1953. VAN BENTHEM JUTTING, Treubia 22: 50, fig. 11 (*eximia* SOL. in the fig.) with full synonymy of the javanese records.

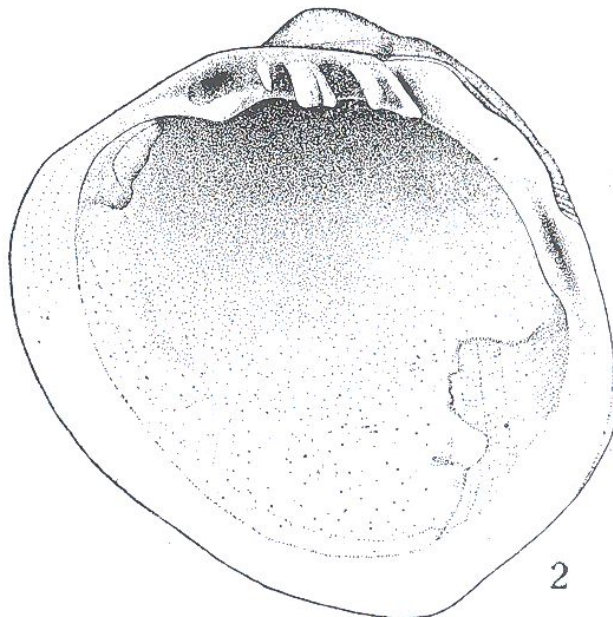


Fig. 2. *Polymesoda erosa* (SOL.) about nat. size.

16. ix. 1951, River Djangkah 2 exx. Living in the mangrove region along the river. The salinity of the estuary of R. Djangkah varies from 3.45‰ to 22.99‰ depending on the tides.

***Polymesoda expansa* (MOUSSON, 1849)**

1849. MOUSSON, Land- und Süsw. Moll. Java: 89, pl. 14 (*Cyrena*).
 1931. OOSTINGH, Arch. Molluskenk. 67: 229 (*Cyrena*).
 1953. VAN BENTHEM JUTTING, Treubia 22: 52, fig. 12.

16. ix. 1951. River Djangkah 5 exx. Big, adult shells, heavily eroded; the salinity varies, depending on the tides from 3.45‰—22.99‰.

28. ix. 1951. Legon Lentah 5 exx. Living together with *Telescopium* in brackish water.

These three *Polymesoda* species have been recorded from Sumatra and Java.

GASTROPODA

***Neritodryas dubia* (GMELIN, 1790)**

1790. GMELIN, Syst. Nat. Ed. 13: 3678 (*Nerita*).
 1849. SOWERBY, Thess. Conch. 10: 517, pl. 111, f. 81-88 (*Neritina*).

1879. MARTENS, N. Syst. Conch. Cab. 10 (2) : 136, pl. 12, fig. 1-7 (*Neritina* (*Neritodryas*)).
 1897. MARTENS, in WEBER: Zool. Ergebn. 4: 218.
 1928. DEGNER, Treubia 10: 384 (*Neritina* (*Neritaea*)).
 1929. VAN BENTHEM JUTTING, Treubia 11: 87 (*Neritina*).

26.ix.1951. Tg Kadam 1 ex. dead in the mangrove. It is an olivaceous black shell, like SOWERBY's fig. 86. A widely distributed freshwater species, but not yet recorded from the islands around Sumatra.

Neritodryas subsulcata SOWERBY, 1836 (fig. 3)

1836. SOWERBY, Conch. Ill. 50: fig. 50 (*Neritina*).
 1879. MARTENS, N. Syst. Conch. Cab. 10 (2) : 142, pl. 12, fig. 11-12 (*Neritina*).
 1928. DEGNER, Treubia 10: 348 (*Neritina* (*Neritodryas*)).
 1931. OOSTINGH, Arch. f. Molluskenk. 63: 185, pl. 19, fig. 1 a, b.
 1933. RENSCH, Zool. Anz.: 208 (*Neritina* (*Neritodryas*)).
 1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 5 (*Neritina*).
 1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 2.
 1937. VAN BENTHEM JUTTING, Treubia 16: 47 (*Neritina*).
 1937. RIECH, Arch. f. Naturgesch. N. F. 6: 75-76.

6.ix.1951. Legon Badjo 1 ex. dead on the beach (H. 7.3 W. 8.6 mm) worn at the ventral side, the spiral ribs are finer than in the next shell, colour-pattern as described below.

22.ix.1951. (fig. 3) north-western peninsula 1 ex. (H. 9, W. 11 mm) dead in a dry river bed, far from the shore. It is clearly denticulated on the columellar wall, the sculpture consists of rounded spiral ribs. It has yellow markings on a dark ground. The dark colour is accentuated so as to form three unclear spiral bands in the specimen from Legon Badjo. A widely distributed species, known also from Java and Sumatra, from Mentawai (DEGNER), and Nias (VAN BENTHEM JUTTING).

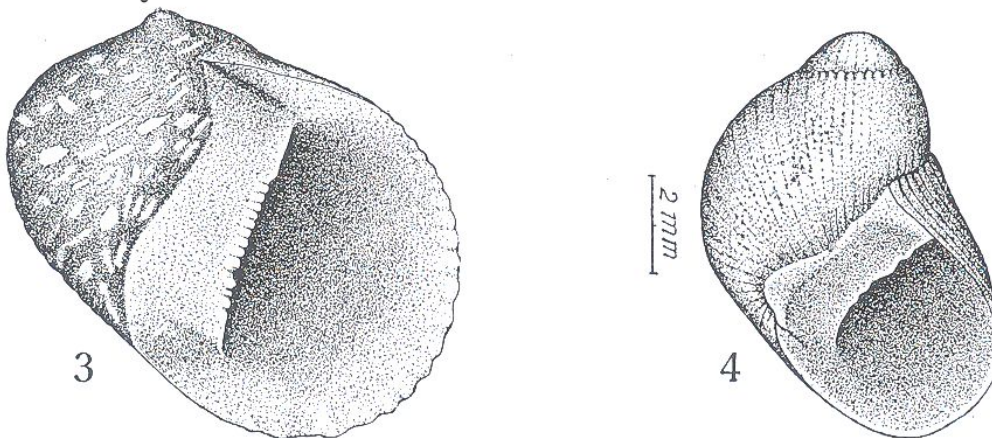


Fig. 3. *Neritodryas subsulcata* (SOW.) $\times 4\frac{1}{2}$
 Fig. 4. *Theodoxus oualaniensis* (LESSON) aberrant form.

***Nerita planospira* ANTON, 1839**

1839. ANTON, Verz. d. Conch: 30.
 1888. PILSBRY, Man. Conch. 10: 21, pl. 3, fig. 48.
 1897. MARTENS, in WEBER: Zool. Ergebn. 4: 219.
 1921. PRASHAD, Rec. Ind. Mus. 22: 501 (*Nerita lineata*).
 1927. OOSTINGH, Misc. Zool. Sum. 10: 3.
 1928. DEGNER, Treubia 10: 385.
 1934. RENSCH, Arch. f. Moll. 66 (6): 339.
 1938. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 19: 51, pl. 4 f. 4, textfig. 16.

16.ix.1951. River Djangkah, 8 exx. Living on stilt roots of *Rhizophora mucronata*. The salinity of the river varies, depending on the tides from 3.45 ‰ to 22.99 ‰. Widely distributed in Indonesia; also recorded for Java (MARTENS); N. E. Sumatra (OOSTINGH, PRASHAD, RENSCH, ADAM & LELOUP).

***Theodoxus diadema* (RECLUZ, 1841)**

1841. RECLUZ, Rev. Zool. (Soc. Cuv.) 4: 277 (*Nerita*)
 1879. VON MARTENS, N. Syst. Conch. Cab. 10 (2): 154, pl. 15, fig. 22-26 (*Neritina*).
 1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 34: 21, pl. 1, fig. 10-10a (*Neritina* (*Clithon*)).
 1908. SCHEPMAN, Siboga Exp. 49 (1a): 11 (*Neritina*).
 1928. DEGNER, Treubia 10: 385 (*Neritina*).
 1929. VAN BENTHEM JUTTING, Treubia 11: 87 (*Neritina*).

28.ix.1951 S. part of Legon Lentah, 1 ex. dead, without spines. It is shining, with two dark spiral bands bordering a yellow zone, the upper part of the last whorl yellowish white. All over the surface small spots of yellow. Widely distributed, also known from Java and Sumatra.

***Theodoxus oualaniensis* (LESSON, 1831) (fig. 4)**

1831. LESSON, Voy. Coquille, Zool. 2: 379 (*Neritina*).
 1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 193, pl. 20, fig. 1-24 (*Neritina ualanensis*).
 1897. MARTENS, in WEBER: Zool. Ergebn. 4: 218 (*Neritina ualanensis*).
 1928. DEGNER, Treubia 10: 385 (*Neritina* (*Clithon*) *ualanensis*).
 1929. VAN BENTHEM JUTTING, Treubia 11: 87 (*Neritina ualanensis*).
 1937. VAN BENTHEM JUTTING, Zool. Med. 20: 102 (*Theodoxus ualanensis*).
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 268 (*Theodoxis*).
 1948. DAMMERMAN, Fauna of Krakatau: 190, 520.

1.ix.1951. Legon Badjo, 3 exx. Living on rocks in the sea (var. *polydelta* MRTS 2 exx., *parcepieta* MRTS 1 ex.).

5.ix.1951. Legon Badjo, 11 exx. Dead on the beach. 4 exx. belong to var. *polydelta* MRTS. The other shells lost their colour pattern. One shell is an aberrant form (fig. 4). I doubt its identity with the present species. It

shows a high spira and has the columellar area sharply bordered. H. 7.3, width 6 mm.

17.ix.1951. Legon Kadam 4 exx. Living on rocks in the sea. Var. *parcepicta* MRTS 3 exx.; var. *conferta* MRTS 1 ex. The last shell is somewhat similar to the aberrant form of the preceding set. The columellar area is not sharply bordered. This is a purely marine species, widely distributed in this Archipelago, which I mention here only as it is a member of a genus of fresh-water shells.

Neritina aculeata (GMELIN, 1790)

1790. GMELIN, Syst. Nat. Ed. 13: 3686 (*Nerita*).

1849. SOWERBY, Thes. Conch. 10: 513, pl. 110, fig. 32-34.

1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 70, pl. 8, fig. 13-15.

1928. DEGNER, Treubia 10: 384.

5.ix.1951. Legon Badjo, 1 ex. juv. Dead on the beach, worn, but duly recognizable. Known from Sumatra, Borneo and Singapore.

Neritina auriculata LAMARCK, 1816 (fig. 5 a-e)

1816. LAMARCK, Encycl. Meth. Explic. Planches, pl. 455, fig. 6.

1822. LAMARCK, Anim. s. vert. 6, pt 2: 186.

1849. SOWERBY, Thes. Conch. 10: 509, pl. 113, fig. 135, 136, 137 (*bicanaliculata*), 510, pl. 113, fig. 138 (*subauriculata*).

1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 30, pl. 6, fig. 13-15, 24-27; 32, pl. 6, fig. 20-23 (*rubicunda*); 35, pl. 9, fig. 3-4 (*bicanaliculata*).

1888. PILSBRY, Man. o. Conch. 10: 73, pl. 21, fig. 58, 59 (*auriculata*), fig. 60 (*subauriculata*), 61, 62 (*rostrata*), 63 (*layardi*), 64, 65 (*rubicunda*); 74, pl. 21, fig. 70 (*bicanaliculata*).

1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 34: 23, pl. 1, fig. 13, 13a.

1908. SCHEPMAN, Siboga Exp. 49 (1a): 9 (*auriculata*, *bicanaliculata*).

1928. DEGNER, Treubia 10: 345, 383.

1929. VAN BENTHEM JUTTING, Treubia 11: 86.

1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 4; 89: 2.

1937. VAN BENTHEM JUTTING, Basteria 11: 34 (*auricularia*).

1937. RIECH, Arch. f. Naturgesch. N.F. 6: 69 (*Neripteron auriculata aur.*).

I could neither identify any of my shells with *Neritina aciculata* REEVE, nor with *N. simoni* PRASHAD, 1921. Many shells, however, are referable to *bicanaliculata*, whereas many shells from *bicanaliculata* populations correspond to *subauriculata*, *layardi*, *rostrata* and *rubicunda*. These names are already in the synonymy of *N. auriculata* but for *N. rubicunda* MARTENS. As I have not seen the Borneo shell I cannot prove its identity with *auriculata*, but with PILSBRY I think this shell identical.

Neritina auriculata LAM. develops auricles as does *N. bicanaliculata*. In the first species the wings are horizontally pointing in opposite direction. In *bicanaliculata* the wings are diverging, pointing backwardly. Now

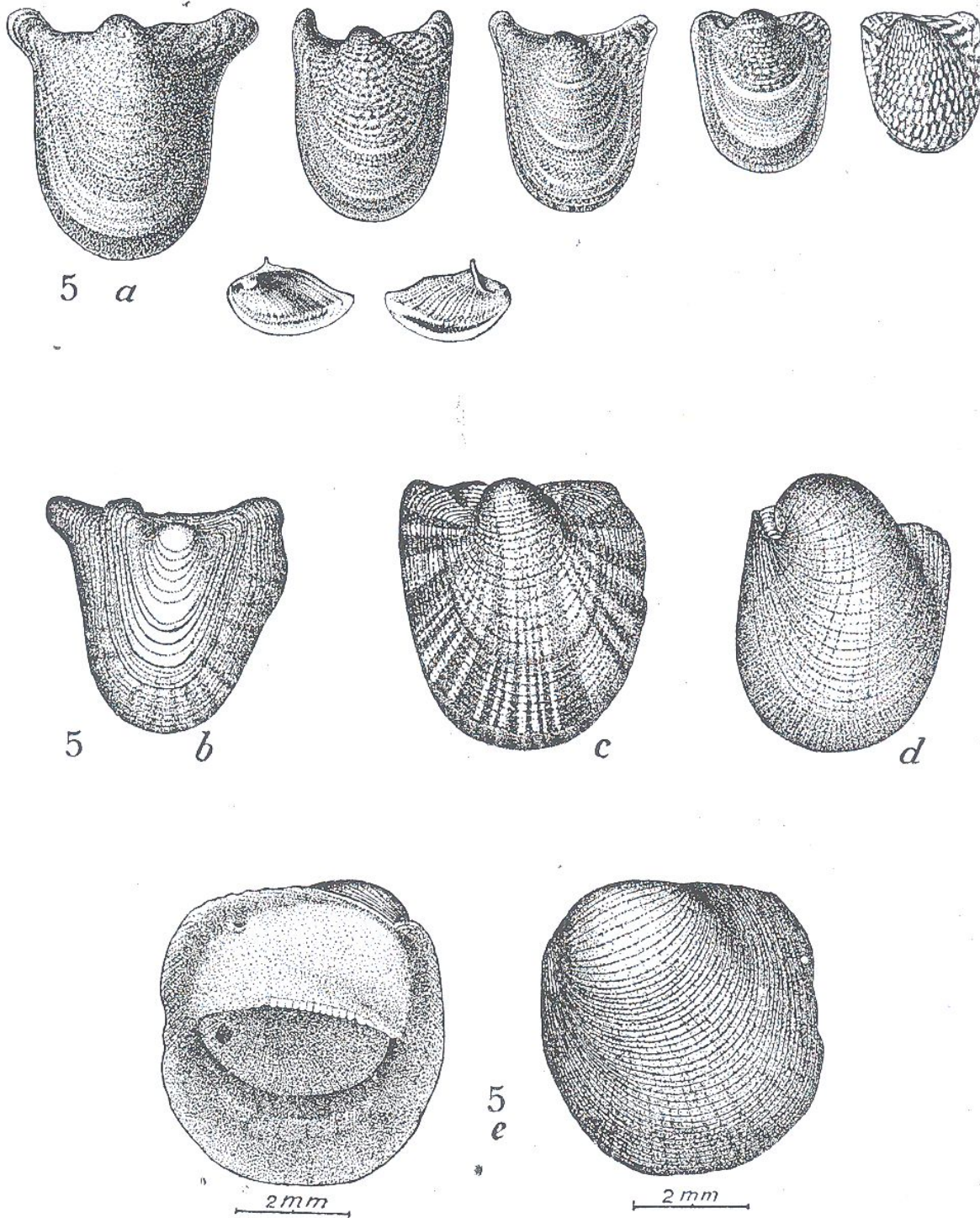


Fig. 5. *Neritina auriculata* LAM.

- a. Series of shells from R. Kadam seen from above, operculum from in- and outside. $\times 1\frac{1}{2}$.
- b. Shell from unnamed river. With two pairs of ears clearly visible $\times 1\frac{1}{2}$.
- c. Shell from R. Darahaju with stripes radiating from the apex $\times 2\frac{1}{2}$.
- d. Shell from R. Djangkah with the sides parallel. Ears not developed $\times 2\frac{1}{2}$.
- e. Juv. shell from R. Kadam.

I cannot always separate the *bicanaliculata* forms from the eared *auriculata* in my series, not one shell being typical, the ears being always wider than the cited figures indicate. The *subauriculata* form is varying in the direction of *N. rostrata*, *rubicunda* and *auriculata*. This stage can persist quite a long time, the ears may even never develop. In other cases the eared *auriculata* or *bicanaliculata* form shows up already in very young shells. The *subauriculata-rubicunda-rostrata* form is in my series generally unicoloured brown or violet brown. The auriculated shells being generally tessellated with white and violet, but this is no strict rule. There is a third type of this species present in the Panaitan collection that has more or less the outline of *N. dilata* BROD. Its colour-pattern shows white and black stripes of different width, radiating from the apex. In the same population however there are shells of the *rostrata* form showing the same pattern, whereas one shell from a different locality is tessellated in the beginning but striped later on. I can only refer all of my Panaitan shells to *Neritina auriculata* LAMARCK.

12.ix.1951. River Darahaju, 11 exx. Living attached to solid matter, floating wood, and stones. The shells are short and rounded in front with diverging sides and rounded ears. The last whorl is only slightly projecting seen from the aperture. It is remarkable for its pattern consisting of light and dark stripes radiating from the apex (fig. 5c). It has many closely set, concentric threads on the epidermis. Under the epidermis the shell shows a tessellated pattern. Four shells have the sides somewhat parallel and the ears more square (L. 13.7, W. 13, H. 6 mm). 2 ex. dead, no epidermis, tessellated. Salinity 1.29 ‰.

16.ix.1951. River Djangkah, 39 shells. Living on floating wood, dead leaves and stones. These shells are much more curved than shells of the preceding set. Some of them show the same radiating stripes. First part of the last whorl nearly always clearly visible seen from the aperture. Eleven shells have a somewhat rounded outline, but the other shells have the sides nearly parallel. Ears are not developed (fig. 5d). One shell is quite similar to the shells of the preceding set, having rounded ears. Young shells show spiral threads in the epidermis. These threads are much stronger than the concentric ones that may even disappear. The majority are of a uniform brownish colour. I quote MARTENS, 1879, pl. 6, fig. 13-15, 20-23; PILSBRY, 1888, pl. 21, fig. 63 and SOWERBY, 1849, pl. 113, fig. 138 to illustrate this set (L. 15.2, W. 11.2, H. 7.2 mm). Salinity varying and depending on the tides from 3.45 ‰—22.99 ‰.

17.ix.1951. River Kadam, 110 exx. (fig. 5a). Living on floating and dead leaves. Four juvenile shells are rather flat and broad, the youngest

with spiral threads, while the three others have concentric threads on the epidermis (fig. 5e). 36 shells are similar to the shells from River Djangkah (fig. 5d). There is no tessellated pattern, the shells being of a uniform olivaceous brownish colour (L. 15, W. 10.6, H. 6.4 mm). Seventy shells have a tessellated pattern and the ears fully developed. They are referable to *N. bicanaliculata*. My shells, however, have broader ears than the figures cited. The ears are never pointing in opposite direction, but are diverging backwardly. The posterior edge is always concave except in young shells in which it is straight (L. 20.7, W. 16, H. 8 mm). Two more shells were dead.

20.ix.1951. Unnamed river near the camping site. 18 exx. Living on floating wood and leaves. Fourteen shells belong to the much curved type with parallel sides, lacking the ears. Four shells, 2 ad. and 2 juv. have the ears fully developed. The larger of the two adults clearly shows two pairs of ears (fig. 5b). The younger pair belonging to a younger stage, are pointing nearly in opposite direction. The general outline is much like the outline of *N. tahitensis* LESS. (PILSBRY, 1888, pl. 22 f. 71). That species is showing the same variation as does *auriculata*, (*sandwichensis*, *dilatata*, *tahitensis*, *vespertina* and *auriculata* SOW. non LAM.) (L. 18.7, W. 18.6, H. 7.9 mm). Salinity 0.47 ‰.

22.ix.1951. Unnamed river running from Mt Parat 5 exx. Living on dead leaves floating on the water or on the bottom of a small basin forming part of the river, containing little water. The ears are square, not prolonged, the sides nearly parallel. One shell shows a tessellated pattern on the older part and radiating stripes on the younger part. Two shells are tessellated all over, two are of a uniform oliveaceous brown colour. Three tubes of a marine worm are attached to one of these (L. 17.7, W. 14.1, H. 7.4).

25.ix.1951. 6 exx. dead. Two alive, same locality. Two dead shells of a uniform olivaceous brown colour, the others tessellated.

28.ix.1951. 5 dead shells, tessellated. Similar in form to the shells of the preceding set. Probably originating from Legon Samadang at the East Coast.

Widely distributed in Indonesia.

Neritina communis (QUOY & GAIMARD, 1834)

1834. QUOY & GAIMARD, Voy. Astrolabe, Zool. 3: 195, pl. 65, fig. 12-14 (*Neritina*).
1849. MOUSSON, Land- und Süßw. Moll. Java: 80, pl. 12, fig. 11 (Non f. 7).
1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 113, pl. 2, fig. 3-4; pl. 11, fig. 1-9.
1928. DEGNER, Treubia 10: 384.

1929. VAN BENTHEM JUTTING, *Treubia* 11: 86.

1937. VAN BENTHEM JUTTING, *Zool. Med.* 20: 103.

5.ix.1951. Legon Badjo, 1 ex. dead on the beach. It is violet with a few small, triangular white markings (H. 7.1, W. 6 mm). Widely distributed.

Neritina pulligera (LINNE, 1767)

1767. LINNE, *Syst. Nat.* ed. 12: 1253 (*Nerita*).

1879. MARTENS, *N. Syst. Conch. Cab.* 10 (2): 52, pl. 9, fig. 5-6 (*Neritina iris*).

1849. MOUSSON, *Land- und Süßsw. Moll. Java*: 81, pl. 12, fig. 10 (*N. iris*).

1908. SCHEPMAN, *Siboga Exp.* 49 (1a): 9 (*N. pulligera* var. *sumatrana*).

1899. DAUTZENBERG, *Ann. Soc. Roy. Mal. Belg.* 34: 23, pl. 1, fig. 12 (*N. sumatrana*).

1928. DEGNER, *Treubia* 10: 383, 346 (*iris, pennata, pulligera, sumatrana, cryptospira*).

1929. VAN BENTHEM JUTTING, *Treubia* 11: 87 (*iris, pulligera*).

1931. OOSTINGH, *Arch. f. Molluskenk.* 63: 186, pl. 19, fig. 2 a, b (*N.p. fa sumatrana*); 187 (*petitii*).

1934. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 84/85: 4.

1937. VAN BENTHEM JUTTING, *Zool. Med.* 20: 103.

1937. VAN BENTHEM JUTTING, *Basteria* 2: 34.

• 1941. VAN BENTHEM JUTTING, *Arch. Neerl. Zool.* 5: 270.

17.ix.1951. River Kadam, 4 exx. Living, very juvenile. The ear is very small but conspicuous. The spire is sunken and bordered by a sutural ridge. The surface is tessellated. The black stripes accentuated under the periphery and form a spiral band (H. 4, W. 5 mm).

21.ix.1951. One shell dead on the beach. The spira is sunken and the last whorl wholly embraces it. There is a sutural ridge that hardly produces an ear. Colour light brown, lighter in the beginning, ornated with very fine small, black undulating stripes, arranged in two spiral bands. This character is similar in the preceding set. Inside, the aperture is very much worn but there are traces of an orange zone in the labrum. The base shows a *squamipicta*-pattern. The colour on the columellar plate seems to have been bluish black as some traces are still visible. The columella is finely denticulated. This shell is undoubtedly identical with *N. iris* in the SCHEPMAN collection from Ambon (leg. SEMMELINCK) and from Java (leg. JUNGHUHN). I could study these shells in the Amsterdam Museum. I am inclined to unite *N. squamipicta* RECLUZ with the present species. Widely distributed.

Neritina sulculosa MARTENS, 1879 (fig. 6)

1879. MARTENS, *N. Syst. Conch. Cab.* 10 (2): 69, pl. 8, fig. 23-26 (*spiralis* REEVE); 278 (*sulculosa*).

1888. PILSBRY, *Man. o. Conch.* 10: 60, pl. 20, fig. 36.

1908. SCHEPMAN, *Siboga Exp.* 49 (1a): 10.

16.ix.1951. River Djangkah, 2 exx. alive (fig. 6). Salinity varying from 3.45‰ to 22.99‰ according to the tides. Description and figures cited come very close to our shells which are smaller and have only 9 teeth on the columella. Two shells from Kema (Celebes) in the SCHEPMAN collection (leg. SEMMELINCK) with which I could compare my shells correspond very well, but the spira is projecting a little in my shells and hardly so in the Kema-shells. There is no reason, in my opinion, to separate the Panaitan *Neritina* from this species. Recorded from Celebes, Buton (SCHEPMAN) and Flores (MARTENS).

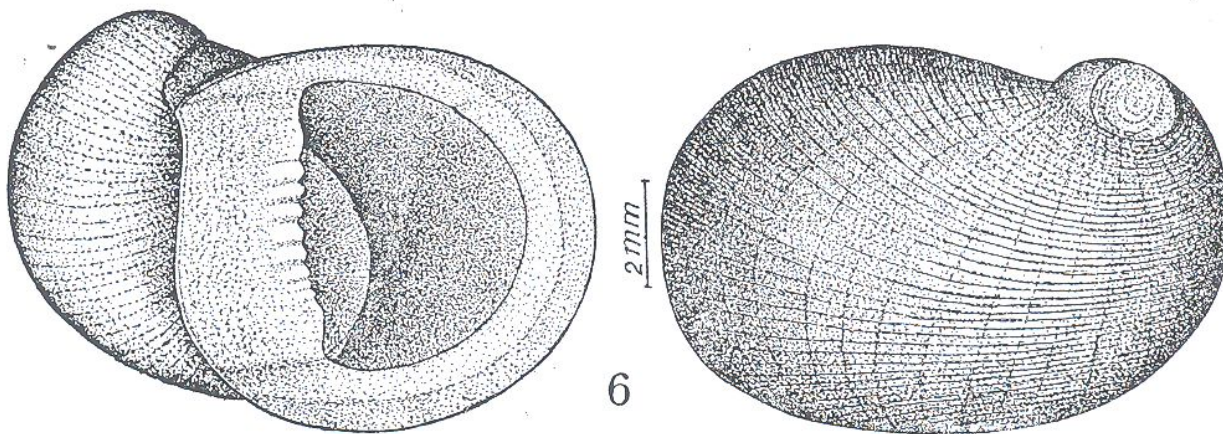


Fig. 6. *Neritina sulculosa* MARTENS seen from ventral and dorsal side. R. Djangkah.

Neritina turrita (GMELIN, 1790)

1709. GMELIN, Syst. Nat. Ed. 13: 3686 (*Nerita*).
 1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 105, pl. 2, fig. 5; pl. 11, fig. 18-19, 22-23.
 1849. MOUSSON, Land- und Süsw. Moll. Java: 80, pl. 12, fig. 11.
 1898. HENDERSON, The Nautilus 12: 25.
 1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 34: 20, pl. 1, fig. 8, 8b (*turrita* and *semiconica*).
 1908. SCHEPMAN, Siboga Exp. 49 (1a): 10 (*semiconica*), (*turr. cumingiana*) (*variegata* var. *strigilata*).
 1927. OOSTINGH, Misc. Zool. Sum. 10: 4 (*Neritina turrita* fa *strigilata*).
 1928. DEGNER, Treubia 10: 347, 384 (*turrita*, *semiconica*, *cumingiana*).
 1929. VAN BENTHEM JUTTING, Treubia 11: 87.
 1931. OOSTINGH, Arch. f. Molluskenk. 63: 185 (*Theodoxus turritus*).
 1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 5.
 1937. VAN BENTHEM JUTTING, Treubia 16: 47.
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 269.

17.ix.1951. River Kadam. One dead shell. White, under a light brownish epidermis, with oblique black stripes, somewhat smaller than the white zones (L. 16.3, W. 13 mm) (*turrita*).

21.ix.1951. River Kadam. One dead shell (L. 23.2, W. 18 mm) (*turrita*).

25.ix.1951. Unnamed river near the bivouac: one dead shell (L. 25, W. 19.5 mm) (forma *semiconica*).

27.ix.1951. Same locality, one dead shell (L. 22, W. 17 mm) (forma *semiconica*).

28.ix.1951. Legon Samadang. One dead shell in a soil sample (L. 23, W. 16.2 mm) (*turrita*). Widely distributed.

Neritina variegata LESSON, 1831 (fig. 7)

1831. LESSON, Voy. Coquille Zool. 2: 378.

1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 98, pl. 10, fig. 11-17.

1898. HENDERSON, The Nautilus 12: 15.

1921. PRASHAD, Rec. Ind. Mus. 22: 500.

1928. DEGNER, Treubia 10: 347, 384.

1929. VAN BENTHEM JUTTING, Treubia 11: 87.

1933. RENSCH, Zool. Anz.: 207.

1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 5.

1934. RENSCH, Arch. Molluskenk. 66: 339.

1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 2.

1937. VAN BENTHEM JUTTING, Treubia 16: 47.

1938. ADAM & LELOUP, Res. Sci. Voy. Ind. or Neerl. II fasc. 19: 66, fig. 21.

1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 269.

11.ix.1951. 14 juv. shells and 1 adult. Living about 100 m from the coast in River Kantjana.

17.ix.1951. 6 juv. shells alive in River Kadam.

21.ix.1951. 3 dead shells, same locality.

22.ix.1951. in an unnamed river 17 dead and 48 living ex.

25.ix.1951. 20 dead and 94 living exx. same locality.

26.ix.1951. 6 living exx. (fig. 7) dry river near the bivouac.

All kinds of varieties, banded, spotted or striped are represented in the sets. The animals are living on stones and other solid substratum, but many of them were collected alive in the dry mud of the river beds. A red spot on the columella is nearly always present. Also widely distributed.

Neritina violacea (GMELIN, 1790)

1790. GMELIN, Syst. Nat. Ed. 13: 3685 (*Nerita*).

1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 37, pl. 7, fig. 1-14 (*crepidularia*).

1897. MARTENS in WEBER: Zool. Ergebn. 4: 218 (*crepidularia*).

1921. PRASHAD, Rec. Ind. Mus. 22: 498.

1923. OOSTINGH, Meded. Landb. Hooges. 26: 34 (*crepidularia*) with full synonymy.

1927. OOSTINGH, Misc. Zool. Sum. 10: 54 (*Theodoxis violacea*).

1927. DEGNER, Treubia 10: 383 (*crepidularia*).

1929. VAN BENTHEM JUTTING, Treubia 11: 87 (*crepidularia*).

1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 89: 1 (*crepidularia*).
 1937. VAN BENTHEM JUTTING, Zool. Med. 20: 158 (*crepidularia*).
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 269.

Three shells have been collected on the beach on 5, 17 and 19.ix.1951. All shells are very small (H. 7, W. 9.2; 6.4, 8.2; 9.5, 13.2 mm). One shell comes close to *N. siquyorensis* RECL.

A common species in Indonesia.



Fig. 7. *Neritina variegata* LESSON from dry River $\times 2.4$
 Fig. 8. *Neritina zigzag* LAMARCK. R. Djangkah $\times 2.4$

Neritina zigzag LAMARCK, 1822 (fig. 8)

1822. LAMARCK, Anim. s. Vert. Ed. 1, 6. 2: 185.
 1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 101, pl. 10, fig. 20-24 (*ziczac*).
 1898. HENDERSON, The Nautilus 12: 15 (*ziczac*).
 1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 34: 19, pl. 1, fig. 7, 7a (*ziczac*).
 1921. PRASHAD, Rec. Ind. Mus. 22: 500 (*ziczac*).
 1927. OOSTINGH, Misc. Zool. Sum. 10: 3 (*Theodoxis ziczac*).
 1928. DEGNER, Treubia 10: 384 (*ziczac*).
 1929. VAN BENTHEM JUTTING, Treubia 11: 87 (*ziczac*).
 1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 5 (*ziczac*).
 1937. VAN BENTHEM JUTTING, Treubia 16: 47 (*ziczac*).

12.ix.1951. River Darahaju, 8 exx. Living on floating wood, mixed with var. *serrulata* RECL. Salinity 1.29 ‰.

16.ix.1951. River Djangka (fig. 8). 72 living exx. (with var. *serrulata* RECL.). Salinity varying from 3.45 ‰ to 22.99 ‰ depending on the tides.

21 and 25.ix.1951. 2 dead shells on the beach.

Septaria suborbicularis (SOWERBY, 1825)

1825. SOWERBY, Catal. Tankverville Coll. App.: 10 (*Navicella*).
 1881. MARTENS, N. Syst. Conch. Cab. 10a (2): 31, pl. 6 f. 5-14 (*Navicella*).
 1897. MARTENS in WEBER, Zool. Ergebn. 4: 84.
 1912. SCHEPMAN, Proc. Mal. Soc. 10: 238.

1923. OOSTINGH, Meded. Landbouwhoogesch. 26: 39 (with full synonymy).
 1928. DEGNER, Treubia 10: 385.
 1929. VAN BENTHEM JUTTING, Treubia 11: 87.
 1931. OOSTINGH, Arch. f. Molluskenk. 63: 188.
 1937. VAN BENTHEM JUTTING, Treubia 16: 47.
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 271.

11.ix.1951. River Siang, W. Coast. One ex. living on rock, freshwater.
 17.ix.1951. River Kadam. One ex. alive, far inland, freshwater.

Septaria tessellata (LAMARCK, 1818)

1818. LAMARCK, Anim. s. Vert. 2 (6): 182 (*Navicella*).
 1849. MOUSSON, Land- und Süßsw. Moll. Java: 85, pl. 12 f. 13 (*naculifera*).
 1897. MARTENS in WEBER: Zool. Ergebn. 4: 86, 218 (*tessellata* var. *clypeolum*).
 1898. ALDRICH, Nautilus 12: 3.
 1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 31: 23, pl. 1, fig. 14, 14a (*tessellata*);
 24, pl. 1, f. 16 (*clypeolum*); 25 (*insignis* RVE) (*compressa*); 25, pl. 1, f. 15.
 1921. PRASHAD, Rec. Ind. Mus. 22: 501.
 1927. OOSTINGH, Misc. Zool. Sum. 10: 5.
 1928. DEGNER, Treubia 10: 385 (*tessellata*); 386 (*clypeolum*, *compressa*, *insignis*,
lineata).
 1929. VAN BENTHEM JUTTING, Treubia 11: 87 (*tessellata*, *clypeolum*, *oblonga*).
 1931. OOSTINGH, Arch. Moll. k. 13: 189.
 1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 89: 1.
 1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 2.
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 271.

12.ix.1951. River Darahaju. 1 ex. Alive on floating wood. A tube of a marine worm is attached to the shell (var. *lineata* LAM.). The salinity was 1.29 ‰.

16.ix.1951. 18 exx. alive. River Djangkah (Salinity 3.45 ‰—22.99 ‰)

17.ix.1951. 2 exx. alive. River Kadam.

20.ix.1951. 10 exx. alive in an unnamed river near the bivouac. Salinity 0.47 ‰.

Neritilia rubida (PEASE, 1865) (fig. 9)

1865. PEASE, Proc. Zool. Soc. London: 514 (*Neritina*).
 1867. PEASE, Amer. Journ. Conch. 3: 385, pl. 24, fig. 5 (*Neritina*).
 1879. MARTENS, N. Syst. Conch. Cab. 10 (2): 244, pl. 23, fig. 19-20.
 1888. PILSBRY, Man. of Conch. 10: 54, pl. 17, fig. 84; pl. 18 *fig. 85.
 1908. SCHEPMAN, Siboga Exp. 49 (1a): 14.
 1918. SCHEPMAN, Zool. Med. 4: 19.

12.ix.1951. River Darahaju, one dead and worn shell in a soil sample.

13.ix.1951. 2 exx. alive on rock in an unnamed river near the bivouac. Salinity 1.29 ‰.

19.ix.1951. 100 exx. Alive in the mangrove area between River Kadam and the coast' (fig. 9).

22.ix.1951. 32 living exx. in a dry river bed of an unnamed river.

23.ix.1951. 2 living exx. same locality.

25.ix.1951. 51 living exx. same locality.

N. rubida is a small, horny-coloured, or light brown to yellowish-red, unicolorous shell of three whorls. Transversely egg-shaped, shining, translucent, very much rounded, without sculpture except the very fine lines of growth only. The spire hardly protrudes, suture distinct, apex blunt. Aperture oblique, outer lip sharp, reddish to the edge and still more reddish towards top and base of the columellar side. Columellar lip without any teeth. Area flat at the base; somewhat rounded towards the top of the aperture, sharply bordered, polished. Seen from the base the edge of the aperture is twice sinuated. Greatest diameter of shell 5 mm.

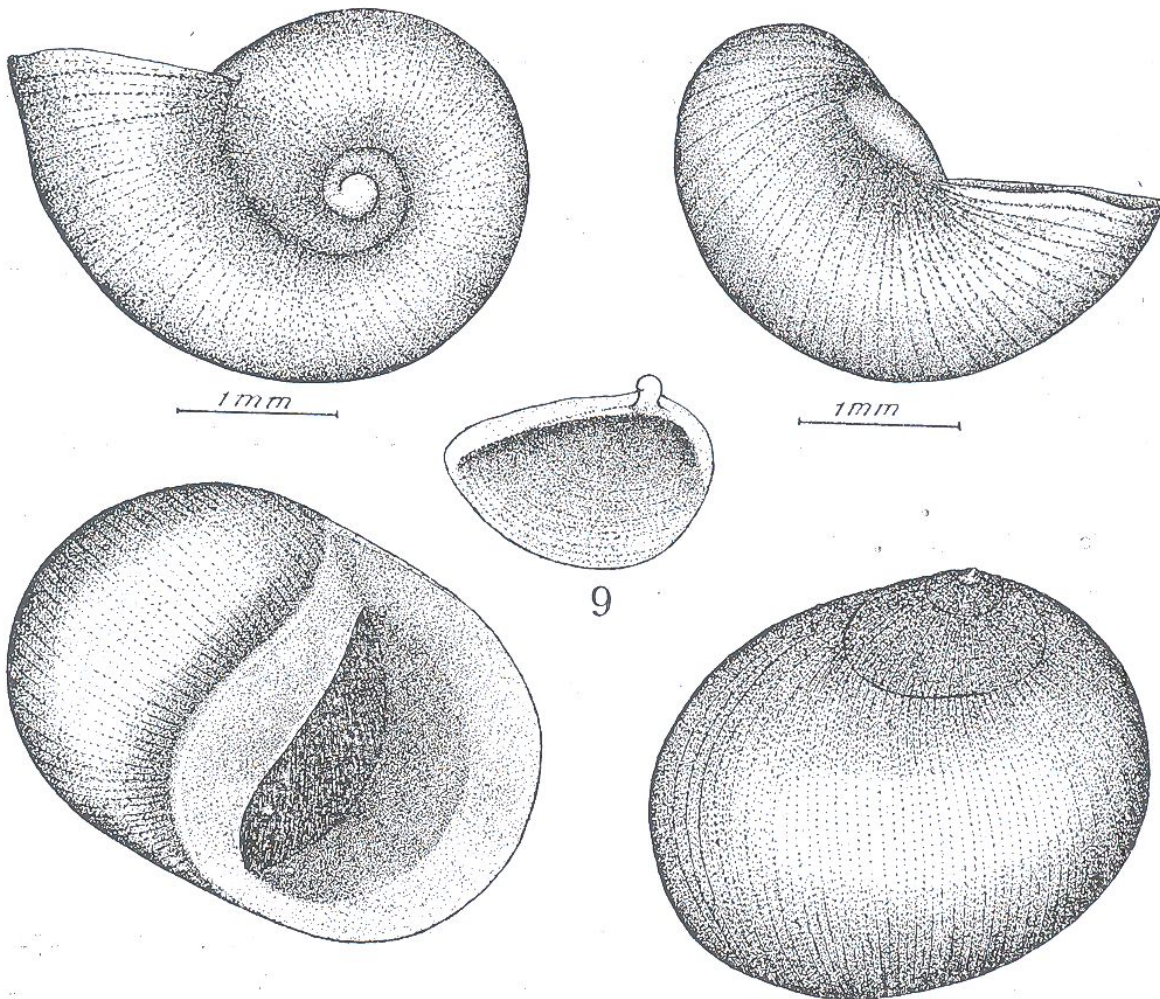


Fig. 9. *Neritilia rubida* (PEASE) different views and operculum seen from inside.

The operculum is flat, of corneous colour, with an erected white plate on the columellar edge which bears a square tooth-like projection.

The shells lack the black stripes and the lighter coloured area of the original diagnosis. On comparison of the Panaitan shells with *rubida* shells in the Amsterdam Museum I found them to belong to this species.

Distribution: Polynesia. In the Indo-Australian Archipelago this freshwater shell is known from Celebes, Obi and Northern New Guinea.

Cyclophorus perdix perdix (BRODERIP & SOWERBY, 1830) (fig. 10)

1830. BRODERIP & SOWERBY, Zool. Journ. 5: 50 (*Cyclostoma perdix*).
 1849. MOUSSON, Land- und Süßw. Moll. Java: 55, pl. 7 f. 2 (*Cyclostoma zollingeri*).
 1932. VAN BENTHEM JUTTING, Treubia 14: 103.
 1934. RENSCH, Trop. Binnengewässer Suppl. 12: 740.
 1937. VAN BENTHEM JUTTING, Zool. Meded. 20: 158.
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 272.
 1948. VAN BENTHEM JUTTING, Treubia 19: 552, fig. 12 with other references.

I do not include the „Sumatra” references of *C. perdix* or *C. zollingeri* because they will probably prove to belong to *C. perdix tuba* (SOW.), the Sumatran subspecies.

It is curious that in P. Panaitan this species is only represented by the *zollingeri* form of *perdix perdix*. The shells recorded as *zollingeri* from Sumatra (and Banka) are probably small *tuba* shells (vide RENSCH, 1934 l.c.).

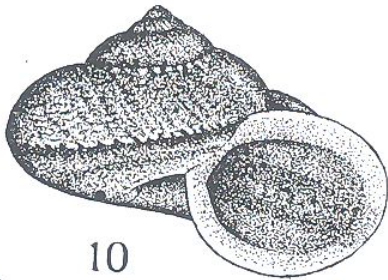


Fig. 10. *Cyclophorus perdix perdix* (BROD. & SOW.) × 2
Mt. Talon.

Our species is known from Java, Nusa Kambangan and Krakatau (ante 1883).

2.ix.1951. 8 ex. dead, Mt Talon region.
(fig. 10).

8.ix.1951. 2 exx., dead, West Coast region.

9.ix.1951. 2 exx., dead.

10.ix.1951. 3 exx., dead, R. Owar region.

11.ix.1951. 3 exx., dead, Mt Putri region.

16.ix.1951. 1 ex. dead.

17.ix.1951. 1 ex. dead, R. Kadam region.

20.ix.1951. 1 ex. dead. The carina of the preceding whorl remains visible as the suture is descending. The aperture is deformed.

22-27.ix.1951. 3 exx., dead among beach shells.

25.ix.1951. 2 exx., dead.

In order to illustrate the smallness of these sets I give the measurements in millimeters of resp. height and maximum diameter including peristome.

Sept.

2	221.5—28.5; 20—26.4; 20—26; 19.7—26.7; 19—23.6; 19.5—24; 18.8—24.8; 20—25.7.
8	18—23.
9	16.2—22.1; 18—24.1.
10	18.2—24; 16.5—22.1; 18.7—23.8.
11	18.2—22.4; 18—23.5; 18—21.7.
16	18.7—26.
20	18.6—23.3.
25	19—25.

Lagochilus ciliferum (MOUSSON, 1849)

1849. MOUSSON, Land- und Süßw. Moll. Java: 56, pl. 7 f. 3 (*Cyclotus*).
 1867. MARTENS, Preuss. Exp. O. As. Zool. 2: 139 (*Cyclophorus*).
 1898. HENDERSON, The Nautilus 12: 17 (*Japonia*).
 1928. DEGNER, Treubia 10: 364 (*Japonia*).
 1937. VAN BENTHEM JUTTING, Treubia 16: 49, 50 (*Japonia*).
 1948. VAN BENTHEM JUTTING, Treubia 19: 557, fig. 15.

3.ix.1951. 4 exx., dead and 2 exx., alive. The dead shells from a soil sample taken between River Karea and River Harashas. The two living specimens are readily recognised by the characteristic hairs. MARTENS (1867) doubted the occurrence of this species in Sumatra. VAN BENTHEM JUTTING (1937) recorded HENDERSON's shells from Enggano I. and included Sumatra (l.c. p. 50) in the distribution. In her systematic studies (1948), however, the distribution of this species is merely stated to be Java.

Lagochilus ciliocinctum (MARTENS, 1865)

1865. MARTENS, Monatsber. Akad. Berlin: 52 (*Cyclophorus*).
 1935. PARAVICINI, Arch. für Molluskenk. 67: 61 (*Japonia*).
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 273 (*Japonia trochulus*).
 1948. VAN BENTHEM JUTTING, Treubia 19: 560, fig. 18.

Of the 191 shells collected, some 20 were taken alive. *L. ciliocinctum* is a very common gastropod in the island in all localities. It is a ground dwelling species, but two living shells were taken from small trees. I follow VAN BENTHEM JUTTING in uniting *L. trochulus* (MARTENS) and the present species. In the Panaitan shells spiral ridges are totally absent, even in living and well preserved dead shells which still bear the rows of stiff black hairs. Many shells show the radiating brown flames which do not reach the periphery, leaving a light peripheral band. In some shells the flames continue on the base, starting from blotches which form an interrupted spiral band below the periphery. Sometimes only the blotches are

present or they are confluent, forming an uninterrupted band. Unicolorous light and darker shells occur and even a completely dark olivaceous variety is present in several individuals.

As *L. ciliocinctus* has been found in every place visited, I do not give a detailed record of the localities. It is known from Java, Bawean and Nusa Kambangan. PARAVICINI (1935) mentioned a shell from Sumatra.

***Lagochilus obliquistriatum* BULLEN, 1904 var. (fig. 11a, b)**

1904. BULLEN, Proc. Mal. Soc. 6: 110, pl. 6, fig. 4-5.

1914. LESCHKE, Mitt. Naturhist. Mus. Hanmburg 31: 214 (*Japonia*).

1949. VAN BENTHEM JUTTING, Treubia 10: 564, fig. 20.

On account of their much larger size and more depressed form many shells of the available sets were at first doubtfully referred to *obliquistriatum* BULLEN. In any case our shells are much wider than high. However, they have the same oblique sculpture between the lirae as *obliquistriatum*. The lirae are provided with short hairs. Shells larger than 10 mm in diameter were first identified by Mrs VAN DER FEEN-VAN BENTHEM JUTTING as *L. macromphalum* MOELLENDORFF, but while studying the lot in the Amsterdam Museum we had to alter our opinion again. *L. macromphalum* is a *Lagochilus* with only weak spiral lirae and a much thinner shell. Moreover, the radiating brown flames along the suture are missing in the panaitan shells. In my opinion the present shells are only large depressed forms of *obliquistriatum* BULLEN, not separable from this species.

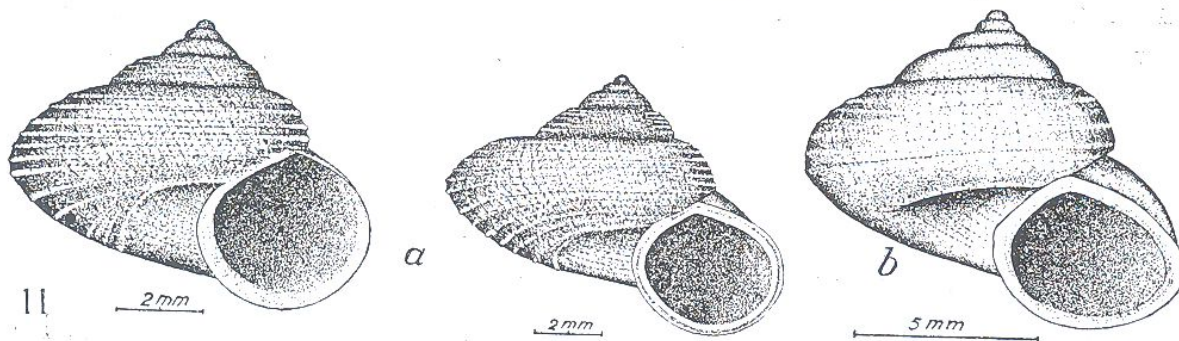


Fig. 11. *Lagochilus obliquistriatum* BULLEN var.
a. semi-adult and adult shell.
b. shell from Mt. Parat.

2.ix.1951. Mt Talon Region, 1 dead shell.

3.ix.1951. 2 exx., alive and 8 dead; 20 shells in a soil sample and one shell in another sample (fig. 11 a).

5.ix.1951. 1 ex. dead.

11.ix.1951. 1 ex. dead, Mt Putri.

13.ix.1951. 1 ex. dead.

18.ix.1951. 10 exx., dead and 1 alive from Tg Kadam West.

22.ix.1951. 4 exx., dead north-western corner of P. Panaitan; 8 exx., dead and 7 exx., alive from Mt Parat (fig. 11 b). Especially this set was at first misidentified as *L. macromphalum*, because form as well as the very large umbilicus strongly recall that species. The set of shells collected alive, are plain brownish gray, without radiating flames. There are 11 to 14 spiral lirae which bear hairs on most of them.

25.ix.1951. 1 damaged shell.

28.ix.1951. 3 dead shells in bottom samples from Legon Semadang. *L. obliquistratum* is only known from Java.

Measurements of the 22 Sept. shells are in mm:

diam.	Height	Apert.
11	9	5.1
10.7	8.4	5
10.4	8.2	5
10.8	9.8	5.5
10.7	9	5.5
9.9	7.7	5
10.6	8	4.5

Genus *Leptopoma* PFEIFFER, 1874

Two species of *Leptopoma* are found living in P. Panaitan, widely spread all over the island. Live specimens of *L. perlucidum* were collected from the foliage and trunks of living trees. The only two live specimens of *L. altum* were taken from soil. As it is possible that *altum* took refuge into the layer of dead leaves on the ground, there is no definitive proof of its being a ground-dwelling species, contrary to *perlucidum*. Otherwise it is remarkable that no living *perlucidum* was found on the ground.

Leptopoma altum MOELLENDORFF, 1897 (fig. 12)

1897. MOELLENDORFF, Nachr. Blatt. 29: 90.

1912. SCHEPMAN, Proc. Mal. Soc. London 10: 237.

1929. VAN BENTHEM JUTTING, Treubia 11: 81.

1933. RENSCH, Zool. Anz. 102: 196, 200 (*L. (?) wallacei altum*).

1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 2 (*L. (?) wallacei altum*).

1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 272.

1949. VAN BENTHEM JUTTING, Treubia 19: 565, fig. 22.

A very common species in P. Panaitan. Dead shells mixed with *perlucidum*, were found on the ground. The length varies from 9.7 to 13.5 mm, the diameter from 10 to 14 mm. Of the measured shells 71% is wider than

high, 7% higher than wide and in 22% height equals width. There are 3 to 6 raised spiral threads above the periphery. These threads are always more pronounced than the lines which occur in *L. perlucidum*. Many shells are banded with three wider or smaller brown spiral bands. Sometimes the last whorl is unicolorous brown, with a white zone below the periphery, or dirty yellowish white, or brown, with a lighter umbilical region.

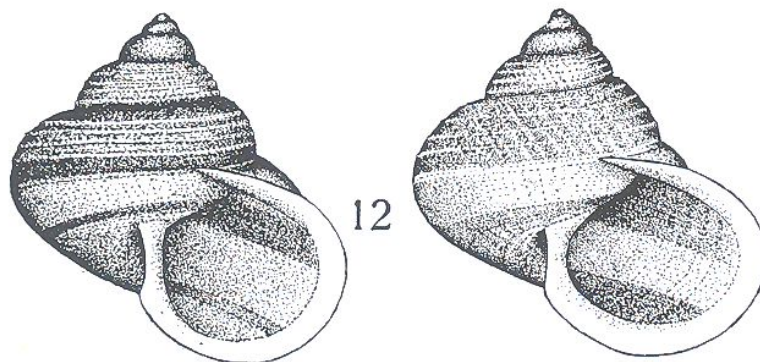


Fig. 12. *Leptopoma altum* MLLDFF. Two differently coloured shells $\times 2\frac{1}{2}$.

About 150 specimens were collected in all parts of the island, and it is of no use to record all localities.

Leptopoma altum has been recorded from Nusa Kambangan, S. Java (SCHEPMAN, VAN BENTHEM JUTTING) and from Pulu Weh, N. Sumatra (RENSCH, VAN BENTHEM JUTTING).

Leptopoma perlucidum (GRATELOUP, 1840) (fig. 13)

- 1830. LESSON, Voy-Coq. Zool. 2: 346, pl. 13 fig. 6 (*Cyclostoma vitrea*) non DRAPARNAUD 1801.
- 1840. GRATELOUP, Actes Soc. Linn. Bordeaux 11: 169 (*Cyclostoma*).
- 1898. HENDERSON, The Nautilus 12: 217 (*vitreum*).
- 1925. VAN BENTHEM JUTTING, Treubia 6: 143 (*vitreum*).
- 1935. PARAVICINI, Arch. Molluskenk. 67: 61, 174 (*vitreum*).
- 1937. VAN BENTHEM JUTTING, Treubia 16: 49 (*vitreum*).
- 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 272 (*vitreum*).
- 1948. VAN BENTHEM JUTTING, Treubia 19: 566, 567, fig. 23 (*vitreum*).
- 1952. FORCART, Arch. Molluskenk. 81: 85 (*L. (Dermatocera) perlucidum*).

Like *L. altum*, this species is found all over the island. The height varies from 11.8 to 17.1 mm and the diameter from 12.3 to 16.9. 37% is wider than high, 43% higher than wide and in 20% height and width are equal. All shells are plain white, spiral lines are visible, the peripheral one stronger, but the lines do not become raised threads as in *altum*.

Thirteen living specimens on foliage and trunks, the green body shining through the shell. Many dead shells on the ground, mixed with

altum. About 120 empty shells collected in all parts of the island. It is not necessary to record all localities.

It has a wide distribution. PARAVICINI recorded a shell from Sumatra.

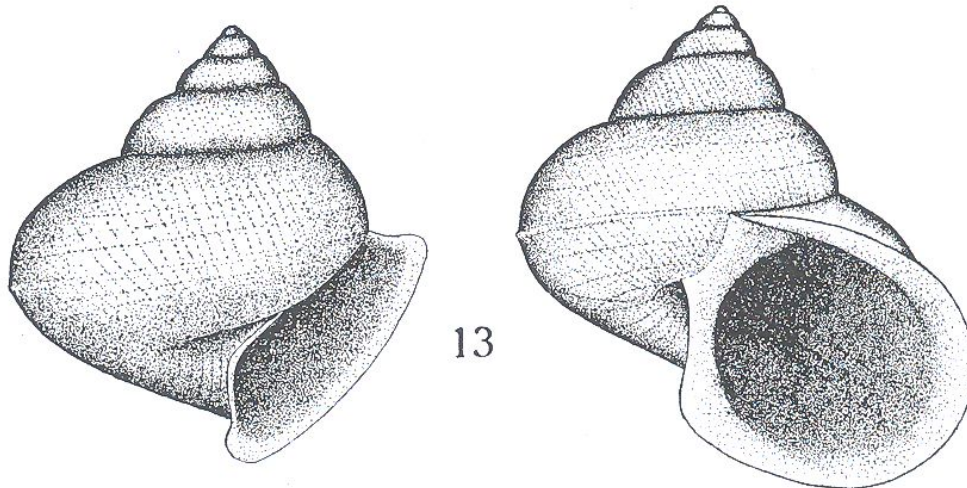


Fig. 13. *Leptopoma perlucidum* (GRAT.) different views $\times 3$.

Alycaeus crenilabris MOELLENDORFF, 1897

1897. MOELLENDORFF, Nachr. Blatt. 29: 93.

1948. VAN BENTHEM JUTTING, Treubia 19: 571, fig. 26.

8.ix.1951. W. Coast region, 2 dead and 8 living exx. They are somewhat larger than the figures given by VAN BENTHEM JUTTING 1948, the diameter averages 3.8 and the height 4 mm. The two dead shells are juveniles and purely white. The constriction of the last whorl and the sutural tube are not yet developed. The shells were taken from the ground where they lived in crevices along surface roots of heavy trees. The species was known from Java only.

Pila conica (GRAY, 1828)

1848. GRAY, Wood Suppl. Index Test, pl. 7 f. 22 (*Ampullaria*).

1849. MOUSSON, Land- und Süßw. Moll. Java: 60, pl. 8, fig. 2 (*Ampullaria scutata*).

1897. MARTENS in WEBER, Zool. Ergebn. 4: 18 (*Ampullaria scutata*).

1912. SCHEPMAN, Proc. Mal. Soc. London 10: 236 (*Ampullaria scutata*).

1915. KOBELT, N. Syst. Conch. Cab. 20 (1): 83, pl. 35, fig. 6 (*Pachylabra javanica*); 90, pl. 38, fig. 6, 7 (*Pachylabra javanica* var. *fruhstorferi*); 92, pl. 39, fig. 7, 8 (*Pachylabra pilula*); 93, pl. 40, fig. 1-5, 8, 9 (*Pachylabra conica*); 100, pl. 42, fig. 3-9 (*compacta*).

1921. PRASHAD, Rec. Ind. Mus. 22: 477 (*Pachylabra*).

1923. OOSTINGH, Med. Landbouwhoogesch. 26: 56 (*Pachylabra*).

1928. DEGNER, Treubia 10: 371 (*Pachylabra*).

1929. VAN BENTHEM JUTTING, Treubia 11: 86 (*Ampullaria*).

1931. OOSTINGH, Arch. Molluskenk. 63: 191.

1931. VAN BENTHEM JUTTING, Treubia 13:10, fig. 11-13.
 1932. VAN BENTHEM JUTTING, Treubia 14: 103.
 1934. RENSCH, Tropische Binnengew. 5 (13): 218.
 1934. RENSCH, Zool. Jahrb. Syst. 65: 396.
 1935. OOSTINGH, Med. Dienst v.d. Mijnb. in N.I. 26: 41,
 1935. PARAVICINI, Arch. Molluskenk. 67: 62, 175 (*Ampullaria scutata*).
 1937. VAN BENTHEM JUTTING, Zool. Med. 20: 105, pl. 4, fig. 10, 11; 159.
 1938. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 19: 75.
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 276.

2.ix.1951. Mt Talon Region, River Harashas, 12 exx., dead, 2 alive.

5.ix.1951. River Harahas, 4 exx., dead and 5 alive; one stray operculum.

23.ix.1951. One dead and bleached shell on the N.E. beach.

The living specimens were taken from the muddy ground. Nipa vegetation, paku laut and waru laut indicated that the sea was not far away. The scanty water that was left tasted brackish, according to the botanist who told me so. As the mollusc fauna consisted of fresh-water species I filled a bottle with the „brackish” water. The salinity proved to be 0.87‰. Two large shells are among the material collected. They come close to *P. pilula* and *P. compacta* REEVE as figured by KOBELT 1915. The shells measure 50.5 mm in height and have a diameter of 42.3 mm. This species is a common one in Borneo, Sumatra and Java.

Viviparus javanicus (VON DEM BUSCH, 1844) (fig. 14 a, b)

1844. VON DEM BUSCH, in Phillippi, Abb. and Beschr. 5 (1): 114, pl. 1, f. 11, 12 (*Paludina javanica*).
 1849. MOUSSON, Land und Süßsw. Moll. Java: 62, pl. 8, f. 3, 4, 5. (*Paludina javanica* and *angularis*).
 1890. BOETTGER, Ber. Sb. Naturf. Ges.: 155, pl. 6, f. 5 (*Paludina javanica*).
 1891. BOETTGER, Ber. Sb. Naturf. Ges.: 249 (*Paludina chinensis* var. *richthofeni* and *P. javanica*).
 1897. MARTENS in WEBER, Zool. Ergebn. 4: 21:24 (*Vivipara*).
 1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 34: 17 (*Paludina javanica*).
 1909. KOBELT, N. Syst. Conch. Cab. 21 (1): 251, pl. 52, f. 1-7 (*Vivipara javanica*); 253, pl. 48, f. 11 (*Vivipara javanica celebensis*); 254, pl. 48, f. 12-15 (*Vivipara javanica macassarica*); 255, pl. 48, f. 16 (*Vivipara javanica saleyerica*); 255, pl. 48, f. 8, 9 (*Vivipara javanica richthofeni*); 256, pl. 52, f. 10-11 (*Vivipara javanica moussoni*); 258, pl. 53, f. 5 (*Vivipara javanica royeri*); 259, pl. 54, f. 16-19 (*Vivipara javanica virescens*); 260, pl. 54, f. 11-12* (*Vivipara gratiosa*); 262, pl. 54, f. 9-10 (*Vivipara hortulana*).
 1921. PRASHAD, Rec. Ind. Mus. 22: 480 (*Vivipara*).
 1922. VAN HEURN & PARAVICINI, Natuurk. Tijdschr. N.I. 82: 31, fig. 10 (*Vivipara javanica*).
 1923. OOSTINGH, Meded. Landbouwhoogesch. 26: 54.
 1928. DEGNER, Treubia 10: 372 (*Vivipara*).
 1929. VAN BENTHEM JUTTING, Treubia 11: 86 (*Vivipara*).

1934. RENSCH, *Trop. Binnengewasser* 5 (14).
 1934. RENSCH, *Zool. Jahrb. Syst.* 65: 397.
 1934. RENSCH, *Arch. Molluskenk.* 66.: 338 (*Vivipara*).
 1935. OOSTINGH, *Wetensch. Med. Dienst Mijnb. in N.I.* 26: 39.
 1935. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 95: 4.
 1935. PARAVICINI, *Arch. Molluskenk.* 67: 175.
 1937. VAN BENTHEM JUTTING, *Zool. Med.* 20: 107, 158.
 1941. VAN BENTHEM JUTTING, *Arch. Neerl. Zool.* 5: 276.

2.ix.1951. Mt Talon Region, 26 dead shells. Many shells have a shoulder near the suture and a basal shoulder is indicated (fig. 14a). In 6 shells the whorls are more regularly rounded (fig. 14b). Very faint narrow spiral bands are visible on the greenish yellow surface. All shells are more or less umbilicated. Many shells have a black peristome.

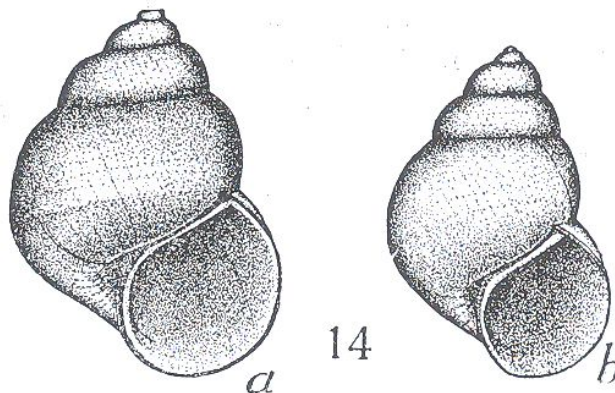


Fig. 14. *Viviparus javanicus* (v.d. BUSCH) from the Mt. Talon region $\times 1\frac{1}{2}$.
 a. Shell with sutural and basal shoulder.
 b. Shell with regularly rounded whorls.

5.ix.1951. 5 dead shells in R. Harashas, far inland. A dense vegetation of nipah, waru laut and paku laut. The river bed was nearly dry and the shells had succumbed long since. However, *Pila* and *Planorbis* were found alive in the little water that was left. Salinity 0.87 ‰. The shells are distinctly shouldered at base and suture. Umbilicus as a narrow slit.

This very variable species is widely spread in Sumatra and Java. I did not venture to apply one of the many varietal names to these shells. I am hesitant to include *sumatrensis* DKR in the synonymy of this species. In Java-shells of this species I have never seen *sumatrensis* forms.

Truncatella guerinii A. & J.B. VILLA, 1841

1841. A. & J. B. VILLA, *Conch. Terr. et fluv. Milan*: 59.
 1846. PFEIFFER, *Zeitschr. Malakozoologie* 3: 182 (*valida*).
 1867. MARTENS, *Preuss. Exp. O. Asien. Zool.* 2: 162 (*valida*).
 1923. OOSTINGH, *Med. Landbouwhooges.* 26: 59, pl. f. 5 a, b, c (*valida*).
 1925. VAN BENTHEM JUTTING, *Treubia* 6: 144 (*valida*).
 1930. OOSTINGH, *Misc. Zool. Sum.* 49: 3 (*valida*).
 1931. RENSCH, *Zool. Jahrb. Syst.* 61: 395 (*valida*).
 1931. OOSTINGH, *Arch. Molluskenk.* 63: 192 (*valida*).
 1935. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 95: 4 (*valida*).

1948. DAMMERMAN, Fauna of Krakatau: 72 (*valida*).

1948. CLENCH & TURNER, Occasional Papers on Molluscs 1 (13): 167, pl. 23 f. 12-13.

We have found many dead shells of this species in many places along the beach, and in samples of soil, taken close to the shore. It is a very common species along the coastal region of Indonesian islands.

Omphalotropis columellaris QUADRAS & MOELLENDORFF, 1893 (fig. 15)

1893. QUADRAS & MOELLENDORFF, Nachr. Blatt. 25: 183.

1941. VAN BENTHEM JUTTING, Arch. Neerl Zool. 5: 279, fig. 1.

1953. BUTOT, De Trop. Nat. 33: 30.

This species is known from the Philippines and from the islands of Noordwachter and Klein Kombuis, in Djakarta bay. It is also known from W. Java, Ujung Kulon Nature Reserve. Although this shell is only recorded twice from Indonesia, I think it will prove to be widely distributed. I have found it in great numbers in all the islands of Djakarta bay and it is abundant in P. Panaitan, so that it is not necessary to give all localities.

- *O. columellaris* is a tree-living land snail that can be found always attached to the underside of leaves of trees and shrubs. Dead shells were found in great numbers in samples of soil.

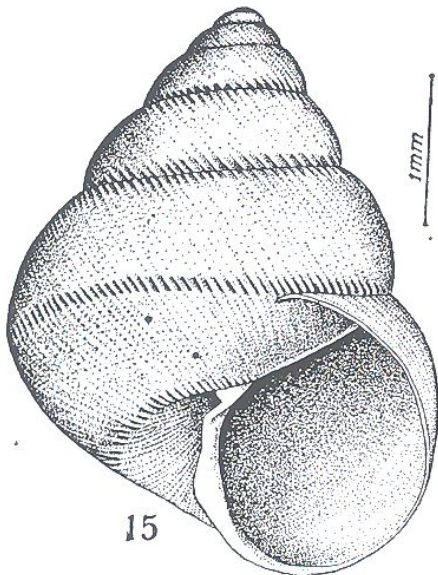


Fig. 15. *Omphalotropis columellaris* QUADR. & MLLDFF.

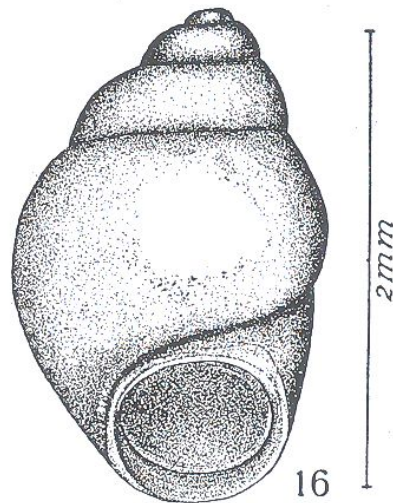


Fig. 16. *Stenothyra ventricosa* (QUOY & GAIM.) from R. Darahaju.

Stenothyra ventricosa (QUOY & GAIMARD, 1834) (fig. 16)

1834. QUOY & GAIMARD, Voy. de l'Astrol., Zool. 3: 173, pl. 58, f. 6-8. (*Paludina*).

1849. MOUSSON, Land- und Süßw. Moll. Java: 63, pl. 8, f. 6 (*Paludestrina*).

1893. SCHEPMAN, Notes Leyden Museum 15: 155.

1897. MARTENS in WEBER, Zool. Ergebn. 4: 210, pl. 9, f. 7 (*Stenothyra moussoni*).

1929. VAN BENTHEM JUTTING, *Treubia* 11: 86 (*S. moussoni* and *S. ventricosa*).
 1934. RENSCH, *Zool. Jahrb. Syst.* 65: 399.
 1937. VAN BENTHEM JUTTING, *Zool. Med.* 20: 103.
 1941. VAN BENTHEM JUTTING, *Arch. Neerl. Zool.* 5: 277.
 1948. DAMMERMAN, *Fauna of Krakatau*: 190, 519.

9.ix.1951. 1 ex. alive at the S. coast of the Western Peninsula.

12.ix.1951. More than 200 exx. alive. Living on the bottom of the estuary of River Darahaju. (fig. 16).

This species is known from Celebes, Java, Sumbawa, Sumba and from the Krakatau group. It is almost sure that it will turn up in many other parts of Indonesia, especially in Sumatra.

Faunus ater (LINNE, 1758)

1758. LINNE, *Syst. Nat. Ed.* 10: 746, No. 441 (*Strombus*).
 1849. MOUSSON, *Land- und Süssw. Moll. Java*: 63, pl. 10, f. 1 (*Pirena atra*).
 1897. MARTENS in WEBER, *Zool. Ergebn.* 4: 191.
 1898. ALDRICH, *Nautilus* 12: 3.
 1899. DAUTZENBERG, *Ann. Soc. Mal. Belg.* 34: 15, pl. 2, f. 10.
 1928. DEGNER, *Treubia* 10: 381, 345.
 1929. VAN BENTHEM JUTTING, *Treubia* 11: 86.
 1931. OOSTINGH, *Misc. Zool. Sum.* 53: 2.
 1931. OOSTINGH, *Arch. Molluskenk.* 63: 190.
 1934. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 84/85: 8.
 1935. PARAVICINI, *Arch. Molluskenkunde* 67: 63.
 1937. VAN BENTHEM JUTTING, *Zool. Med.* 20: 109.

10.ix.1951. 1 dead shell from the beach.

12.ix.1951. 1 dead shell from the beach.

The species was not found living in the island. It is widely distributed and also known from Sumatra and Java.

Brotia testudinaria (VON DEM BUSCH, 1842)

1842. VON DEM BUSCH, PHILIPPI, *Abb. und Beschr.* 1: 3, pl. 1, f. 14 (*Melania*).
 1849. MOUSSON, *Land- und Süssw. Moll. Java*: 66, pl. 11, f. 1-3 (*Melania destidunaria*)
 sic!
 1874. BROT, *N. Syst. Conch. Cab.* 24 (1): 49, pl. 6, f. 3, 3a (*Melania testudinaria*);
 52, pl. 6, f. 5 (*Melania angulifera*).
 1890. BOETTGER, *Ber. Senckenb. Naturf. Ges.*: 151 (*Melania*).
 1891. BOETTGER, *Ber. Senckenb. Naturf. Ges.*: 245 (*Melania*).
 1897. MARTENS in WEBER, *Zool. Ergebn.* 4: 31 (*Melania*).
 1897. STRUBELL, *Nachr. Blatt.* 29: 11 (*Melania strigata*).
 1912. SCHEPMAN, *Proc. Mal. Soc.* 10: 236 (*Melania*).
 1914. LESCHKE, *Mitth. Naturhist. Mus. Hamburg* 31: 217 (*Melania*).
 1929. VAN BENTHEM JUTTING, *Treubia* 11: 84 (*Melania testudinaria*); 85 (*Melania strigata*).

1932. VAN BENTHEM JUTTING, Treubia 14: 103 (*Melania*).
 1932. OOSTINGH, Meded. Landbouwhoogesch. 26: 42 (*Sulcospira*).
 1934. RENSCH, Trop. Binnengew. 5: 242 (*Brotia*).
 1935. OOSTINGH, Med. Dienst Mijnb. N.I. 26: 29 (*Sulcospira*).
 1935. PARAVICINI, Arch. Molluskenkunde 67: 175 (*Melania*).
 1937. VAN BENTHEM JUTTING, Zool. Med. 20: 110, 159.
 1938. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 19: 87, f. 31 (*Sulcospira*).
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 280.

21.ix.1951. 2 exx. dead. Legon Kadam, var. *striatula* (MOUSSON). The species seemed to be confined to Java. Yet VAN BENTHEM JUTTING recorded a shell from Sumatra.

Sermyla riquetii (GRATELOUP, 1840) (fig. 17)

1840. GRATELOUP, Actes Soc. Linn. Bordeaux 2: 433, pl. 3, f. 28 (*Melania*).
 1890. BOETTGER, Ber. Senckenb. Naturf. Ges.: 154 (*Melania*).
 1897. MARTENS in WEBER, Zool. Ergebn. 4: 74, 193, 305 (*Melania*).
 1928. DEGNER, Treubia 10: 381 (*Melania*, only for Banka).
 1929. VAN BENTHEM JUTTING, Treubia 11: 85 (*Melania*).
 1934. RENSCH, Zool. Jahrb. Syst. 65: 410 (*Melania*).
 1937. VAN BENTHEM JUTTING, Zool. Med. 20: 121. (*Thiara* (*Sermyla*)).

12.ix.1951. R. Darahaju, 1 ex. dead from a soil sample. It is small, turreted, and though the 13 ribs show a concavity as a shallow spiral groove under the suture called a "constriction" in the next discussion, I cannot describe this shell as having a sort of collar causing the whorl to be wrapped round its preceding one in a step wise fashion.

16.ix.1951. R. Djangkah, 2 exx. dead, small turreted, one inhabited by a pagurid. With 18 resp. 20 ribs on the last whorl. Again the ribs show a constriction under the suture, but the whorls are not fixed step-wise to their predecessors.

17.ix.1951. Beach of Legon Kadam, 1 ex. dead, small, turreted, rolled. No constriction. There are 18 ribs on the last whorl.

19.ix.1951. In the mangrove region north of Legon Kadam. 32 exx. dead (fig. 17). All shells highly turreted, dagger-shaped. Ribs numerous, about 20 of them on the last whorl. Sometimes constricted near the suture, sometimes the constriction is present on the middle whorls only. Length about 15 mm.

22.ix.1951. 1 ex. dead in a marsh near the bivouac. Small, turreted, 13 ribs, showing the constriction under the suture.

25.ix.1951. 1 ex. dead, turreted, though not slender, 13 ribs, the constriction under the suture hardly visible.

26.ix.1951. 5 exx. dead. Ovate conical to turreted, 13 to 16 very strong bent ribs on the last whorl which make the suture crenulated. In one shell the whorls of the spira are fixed step-wise, constriction of the ribs under the suture hardly perceptible. 1 ex. dead, slender, highly turreted, dagger-shaped, 18 ribs on the last whorl, not constricted under the suture. One dead shell from the beach, ovate conical, 16 strong ribs, not constricted under the suture, suture crenulated, no "collar", no stepwise spira. alt.: 11.5×5.8 mm.

28.ix.1951. 3 dead juvenile shells from a sample of soil. Shells turreted, about 14 ribs without constriction under the suture. Southern part of Legon Lentah, 4 dead shells, turreted to dagger-shaped, about 15 ribs on the last whorl, very faintly constricted. Length 13 mm.

On the authority of VAN BENTHEM JUTTING, 1937 l.c. I exclude *Thiara tornatella* from the synonymy. My shells correspond perfectly to RENSCH's fig. 5 which clearly shows the constriction under the suture, at least the larger, slender one. This is not a constant feature and depends on the degree of thickening of the ribs and bending in a S-form. Besides, as I have shells from Lombok at hand, which were identified by RENSCH, I am unable to say if the constriction meant by me is the same as the collar meant by VAN BENTHEM JUTTING. If the figure of RENSCH represents true *riquetii*, as VAN BENTHEM JUTTING states, my Panaitan shells belong to that species. Judging from the figures at my disposal, I am inclined, however, to include *tornatella* LEA in the synonymy of *riquetii*. In the collection of the Bogor Museum I looked in vain for *tornatella* shells of the late Major OUWENS. Under nr. 57/31 I found two unidentified shells, the only two that can be the *tornatella* mentioned by VAN BENTHEM JUTTING, 1937. The label gives Tjitarik, Sukabumi, as locality. These shells have 14 resp. 15 ribs on the last whorl, the constriction is present in both shells, but the facies is different, i.e. more convex and spindle-shaped, not turreted. On the other hand, the whorls of the spire are not fixed stepwise. In comparison with these shells the Panaitan shells have the spire with whorls fixed stepwise. In OUWENS' shells the spiral ribs crossing the vertical ones are very coarse, forming thorn-like nodules. In this respect OUWENS' shells perfectly apply to the description of *riqueti* in BROU. 1874: 333.

Thiara riquetii is so far known from Celebes, Borneo, Lombok, Java (BOETTGER). I think it will turn up in Sumatra as well.

***Thiara scabra* (MULLER, 1774)**

1774. MÜLLER, Verm. terr. et fluv. Succ. Hist. 2: 136 (*Buccinum*).

1849. MOUSSON, Land- und Süsww. Moll. Java: 76, pl. 11, f. 11, 12 (*Melania spinulosa*); 77, pl. 12, f. 2 (*Melania scabrella*), pl. 12, f. 3, 4 (*Melania granum*).

1850. LEA, Proc. Zool. Soc. London: 184 (*Melania acanthica*).
1880. SCHEPMAN in VETH, Midden Sumatra, Moll.: 15, pl. 3, fig. 10 (*Melania scabra*); 16 (var. *inermis*).
1881. BOCK, Proc. Zool. Soc. London: 632 (*Melania datura*).
1890. BOETTGER, Ber. Senckenb. Natf. Ges.: 153 (*Melania scabra*).
1891. BOETTGER, Ber. Senckenb. Natf. Ges.: 248 (*Melania scabra*).
1896. SCHEPMAN, Notes Leyden Mus. 18: 139, pl. 2, f. 7 (*Melania pagoda* var. *costulata*).
1897. MARTENS in WEBER, Zool. Ergebn. 4: 62, pl. 4, f. 6-12, pl. 9, f. 8, 9 (*Melania scabra* and vars *spinulosa*, *acanthica nodosocostata*, *angulifera*, *mutica*); 65 (*Melania granum*).
1898. ALDRICH, Nautilus 12: 3 (*Melania scabra*).
1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 34: 10, pl. 2, f. 3, 3 b (*Melania acanthica*).
1900. MARTENS, Nachr. Blatt. 32: 12 (*Melania scabra* var. *spinulosa*).
1906. BULLEN, Proc. Mal. Soc. 7: 14 (*Melania scabra*, *datura*); 15 (*Melania pagoda*).
1912. SCHEPMAN, Proc. Mal. Soc. 10: 237 (*Melania scabra*, *mutica*).
1921. PRASHAD, Rec. Ind. Mus. 22: 492 (*Melanoides scabra*).
1928. DEGNER, Treubia 10: 378 (*Melania acanthica*, *datura*, *granum*); 379 (*scabra* and vars); 344 (*Melania scabra*).
1929. VAN BENTHEM JUTTING, Treubia 11: 85 (*Melania acanthica*, *scabra*, *pagoda*, *costulata*, *angulifera*, *granum*, *mutica*, *nodosocostata*, *spinulosa*).
1929. VAN BENTHEM JUTTING, Misc. Zool. Sum. 42: 3 (*Melania scabra*).
1931. OOSTINGH, Arch. Molluskenk. 63: 190 (*Melanoides scabra*).
1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 9 (*Thiara scabra*).
1934. RENSCH, Arch. Molluskenk. 66: 338 (*Melania scabra*).
1934. RENSCH, Trop. Binnengew. 5: 234 (*Melania scabra*).
1934. RENSCH, Zool. Jahrb. Syst. 65: 409 (*Melania scabra*).
1935. OOSTINGH, Wetensch. Med. Dienst Mijnb. N.I. 26: 10 (*Thiara scabra* vars *nodosocostata*, *mutica*, *conspicuecostata*).
1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 6 (*Thiara scabra*).
1935. PARAVICINI, Arch. Molluskenk. 67: 63 (*Melania satura*, (sic) *pagoda*, *scabra*).
1937. RIECH, Arch. Naturgesch. N.F. 6: 49 (*Melania scabra*).
1937. VAN BENTHEM JUTTING, Zool. Med. 20: 118, 159 (*Thiara scabra*).
1937. VAN BENTHEM JUTTING, Treubia 16: 49 (*Thiara scabra*).
1938. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 19: 89, pl. 5 f. 6 (*Melania scabra*).
1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 280 (*Thiara scabra*).

1.ix.1951. 1 ex. alive. Uniform dark brown, with 8 sharply shouldered whorls, the shoulder bearing 6 spines on the last whorl, pointing obliquely outward. The spines continue on the whorl as small folds. They are hollow and triangular. The last whorl shows coarse revolving ribs which become very small and thread-like above the periphery and are hardly visible between shoulder and suture. The coarser ribs on the basal part of the whorl bear short, stiff, black hairs at regular intervals. They are somewhat bent at the end. The shell measures 15.5×9 mm.

13.ix.1951. 4 ex. alive. Belonging to the same species as the former shell and the next one. There are two pairs, one pair with and the other

pair without spines. Of the first pair one has six, the other twelve. In the latter the "spines" are hardly prolonged. The hairs on the revolving ribs are missing in this shell, but are present in the other. Alt. resp. 23, and 17.7 mm width resp. 10.5 and 10 mm. In the second pair there is a shoulder. One shell has 7 vertical ribs with a faint tendency to form spines, the second shell has ribs only on the older part of the last whorl, while the younger part shows growth-lines only.

17.ix.1951. One ex. alive, R. Kadam. It has a light brown colour and is ornated with red brown zigzag lines from suture to base. There are 8 spines on the last whorl. There are no other differences with the shell of Sept. 1st. Measurements: Alt. 13, width 8.4 mm. All the shells mentioned are true *acanthica* forms as figured and described by BROU. 1874, N. Syst. Conch. Cab. 24 (1): 279, pl. 28, fig. 10 b, c. All specimens from flowing freshwater. Widely distributed.

Melanoides clavus (LAMARCK, 1822) fig. 18 a, b

1822. LAMARCK, Anim. s. vert. 2: 165 (*Melania clavus*).
 1850. LEA, Proc. Zool. Soc. London: 181 (*Melania sobria*).
 1874. BROU, N. Syst. Conch. Cab. 24 (1): 175, pl. 21, f. 17, 17 a-c (*clavus*); 177, pl. 21, f. 16, 16 a (*christobalensis*); 178, pl. 21, f. 5, 5 a-b (*sobria*); 180, pl. 21, f. 6 (*moesta*); 181, pl. 21, f. 7, 7 a (*costellaris*); 186, pl. 21, f. 10, 10 a (*papuensis*); 340, pl. 34, f. 3 (*recentissima*).
 1898. ALDRICH, Nautilus 12: 3 (*Melania sobria*).
 ? 1898. HENDERSON, Nautilus 12: 14 (*Thiara badia*).
 1928. DEGNER, Treubia 10: 342, 377 (*Melania sobria*); 343 (*Melania costellaris*).
 1928. JUTTING, Treubia 10: 155 (*Melania clavus*).
 1933. RENSCH, Zool. Anzeiger: 207 (*Melania clavus*).
 1934. RENSCH, Zool. Jahrb. Syst. 65: 415 (*Melania clavus*).
 1934. RENSCH, Trop. Binnengew. 5: 239 (*Melania clavus*).
 1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 9 (*Thiara sobria*).
 1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 5 (*Thiara clavus*).
 ? 1937. VAN BENTHEM JUTTING, Treubia 16: 49 (*Thiara badia*).
 1937. RIECH, Arch. Naturgesch. N.F. 6: 62 (*Melania clavus*).

17.ix.1951. 2 dead and worn shells from the beach of Legon Kadam (fig. 18 b).

22.ix.1951. 6 cxx. alive, on the dry bottom of a river bed (fig. 18 a). These shells are identical with *sobria* LEA in the SCHEPMAN collection. One dead shell differs in having whorls which are slightly rounded, and shorter than the living shells. It has a narrow white zone along the suture. The uppermost whorls of all shells are vertically ribbed. There is no spiral sculpture. The species is known all over the Indonesian Archipelago, including Sumatra, Java, Nias, Mentawai and P. Weh.

Melanoides punctata (LAMARCK, 1822)

1822. LAMARCK, Anim. s. vert. 2 (6): 165 (*Melania*).
1857. MOUSSON, Journ. de Conch. 6: 162 (*Melania monile*); 161 (*Melania arctecava*).
1874. BROU, N. Syst. Conch. Cab. 24 (1): 159, pl. 19, f. 10 (*semiornata*); 165, pl. 20, f. 1, 1 a, b (*arctecava*); 168, pl. 20, f. 4, 4 a (*punctata*); 170, pl. 20, f. 5, 5 a, b (*litigiosa*); 171, pl. 20, f. 9, 9 a (*laevigata*); 172, pl. 20, f. 8, 8 a, b (*pantherina*); 173, pl. 20, f. 7 (*monile*).
1881. BOCK, Proc. Zool. Soc. London: 632, nr 27 (*Melania laevigata*).
1898. ALDRICH, The Nautilus 12: 3 (*Melania arctecava*).
1921. PRASHAD, Rec. Ind. Mus. 22: 490 (*monile*); 491 (*litigiosa*).
1928. DEGNER, Treubia 10: 376 (*Melania laevigata, litigiosa, monile, arctecava*).
1929. VAN BENTHEM JUTTING, Treubia 11: 84 (*Melania laevigata, ornata, semiornata, monile, arctecava*).
1933. RENSCH, Zool. Anzeiger: 207 (*Melania punctata*).
1934. RENSCH, Zool. Jahrb. Syst. 65: 411 (*Melania punctata*).
1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 5 (*Melania punctata, pantherina, litigiosa, monile*).
1937. RIECH, Arch. Naturgesch. N. F. 6: 60 (*Melania punctata*).

It is with some hesitation that I bring some bleached and worn shells to this species, after having compared them with samples from the SCHEP-MAN collection in the Amsterdam Museum, named *Melania punctata* = *albescens* LEA. In synonymizing other species I followed RIECH and RENSCH.

16.ix.1951. One broken shell from R. Djangkah, last whorl and four younger whorls partially left. The whorls are flat, there is no spiral sculpture. Uniformly dark greenish brown. Aperture damaged. Comes closest to BROU, fig. 9, of *Melania laevigata*.

17.ix.1951. One shell from the beach of Legon Kadam, without top whorls. It has the colour-pattern and form of *Melania pantherina*.

19.ix.1951. One dead shell from the beach. Only the three last whorls are present. It agrees with SCHEP-MAN's *punctata* shells from Timor (Kupang).

22.ix.1951. 1 ex. dead in a dry river, running from Mt Parat. The shell has an oblique spire, caused by a repaired 6th or 7th whorl.

Melanoides punctata is widely distributed, and also known from Sumatra, Java, P. Weh and Nias.

Melanoides plicaria (BORN, 1780) (fig. 19)

1780. BORN, Test. Mus. Caes. Vindob.: 389, pl. 16, f. 14 (*Helix*).
1874. BROU, N. Syst. Conch. Cab. 24 (1): 129, pl. 16, f. 2, 2a (*acutissima*); 132, pl. 16, f. 4 (*salomonis*); 127, pl. 15, f. 10, 10 a (*anthracina*); 134, pl. 16, f. 6, 6 a (*perplicata*); 129, pl. 16, f. 3, 3 a-d (*hastula*); 144, pl. 18, f. 1, 1 a (*terebriformis*); 162, pl. 19, f. 6 (*cincta*).

1897. MARTENS in WEBER, Zool. Ergebn. 4: 41 (*Melania plicaria*); 42, pl. 10, f. 8, 8 b (*cineta*); 42, pl. 3, f. 1, 2 (*acutissima*).
1898. ALDRICH, Nautilus 12: 3 (*Melania perplicata*).
1898. HENDERSON, Nautilus 12: 15 (*Melania hastula*).
1921. PRASHAD, Rec. Ind. Mus. 22: 489 (*Melanoides plicaria* and *acutissima*).
1928. DEGNER, Treubia 10: 343 (*Melania plicaria*); 375 (*Melania acutissima*) 377 (*Melania perplicata* and *plicaria*).
1929. VAN BENTHEM JUTTING, Treubia 11: 84 (*Melania acutissima*, *anthracina*, *plicaria* and *terebriformis*).
1934. RENSCH, Zool. Jahrb. Syst. 65: 413 (*Melania*).
1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 4 (*Thiara acutissima*) and *anthracina*; 5 (*Thiara plicaria*).
1937. VAN BENTHEM JUTTING, Treubia 16: 49 (*Thiara hastula*).
1937. RIECH, Arch. f. Naturgesch. N. F. 6: 58 (*Melania plicaria*).
1938. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 19: 95, pl. 5, f. 10 (*Melania plicaria*).
1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 281 (*Thiara plicaria*).

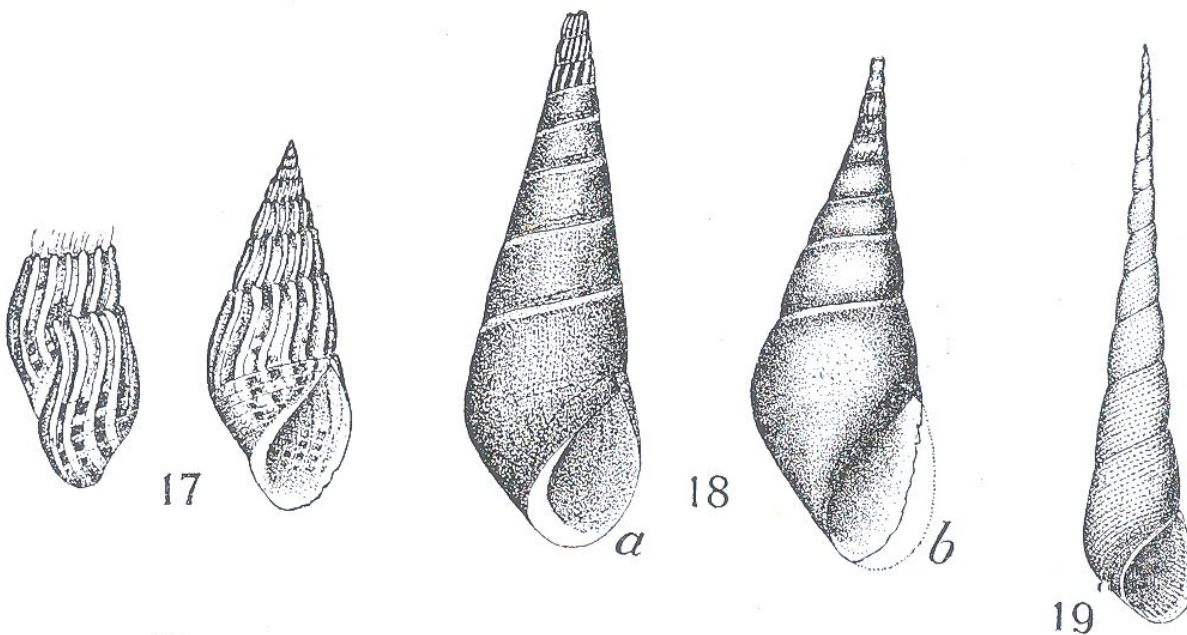


Fig. 17. *Sermyla riguetii* (GRAT.) N. of Legon Kadam $\times 2\frac{1}{2}$.

Fig. 18. *Melanoides clavus* (LAMARCK) $\times 1\frac{1}{2}$.

a. Shell from a dry river bed.

b. Shell from the beach of Legon Kadam.

Fig. 19. *Melanoides plicaria* (BORN) juv. Shell from R. Kadam $\times 1\frac{1}{2}$.

17.ix.1951. R. Kadam, 3 exx. Living on the muddy bottom of a pool in which some water was left by the river (fig. 19).

25.ix.1951. One broken and bleached shell.

Our shells come very close to *M. terebriformis* BROU. The species is found in several islands of the Archipelago including Java and Sumatra, P. Weh, Enggano and Mentawai.

Melanoides tuberculata truncatula (LAMARCK, 1822) (fig. 20 a-e)

1822. LAMARCK, Anim. s. Vert. 1 ed. 2 (6) : 167 (*Melania truncatula*).
1849. MOUSSON, Land- und Süßw. Moll. Java: 73 (*Melania tuberculata*); pl. 11, f. 6, 7 (*Melania tuberculata* var. *virgulata*, *plicifera*); 70, pl. 11, f. 8 (*Melania unifasciata*).
1880. SCHEPMAN, VETH, Midden Sumatra Moll.: 16, pl. 3, f. 11 (*Melania tuberculata*).
1881. BOCK, Proc. Zool. Soc. London: 632 (*Melania malayana*).
1890. BOETTGER, Ber. Senckenb. Naturf. Ges.: 152 (*Melania tuberculata* var. *parreyssi* and *malayana*).
1891. BOETTGER, Ber. Senckenb. Naturf. Ges. 152 (*Melania malayana*); 246 (*Melania tuberculata* and var. *parreyssi*).
1897. MARTENS in WEBER, Zool. Ergebn. 4: 56-59 (*Melania tuberculata* var. *plicifera*, *virgulata*); 58, pl. 4, f. 1 (*seminuda*); 59, pl. 4, f. 2, 3 (var. *angularis*), pl. 4, f. 4 (*truncatula*); 56 (*Melania crepidinata*); 61, pl. 4, f. 21, 22 (*Melania pulchella*).
1898. ALDRICH, The Nautilus 12: 3 (*Melania tuberculata*).
1900. MARTENS, Nachr. Blatt. 32: 12 (*Melania tuberculata* var. *virgulata*).
1906. BULLEN, Proc. Mal. Soc. 6: 130 (*Melania tuberculata*); 15, 130 (*Melania unifasciata*).
1921. PRASHAD, Rec. Ind. Mus. 22: 492 (*Melania tuberculata* var. *angularis*, *seminuda*, *truncatula*, *virgulata*).
1922. VAN HEURN & PARAVICINI, Natuurk. Tijdschr. N.I. 82: 32 (*Melania tuberculata*).
1925. VAN BENTHEM JUTTING, Treubia 6: 144 (*Melania tuberculata* and var. *seminuda*).
1926. VAN DER MEER MOHR, Misc. Zool. Sum. 8: 2 (*Melania tuberculatus truncatulus*).
1928. DEGNER, Treubia 10: 377, 378 (*Melania crepidinata*, *pulchella*, *tuberculata* vars *plicifera*, *seminuda*, *truncatula*, *virgulata*, *unifasciata*); 344 (*Melania tuberculata*).
1928. HAAS, Senckenbergiana: 94-95 (*Melania*).
1929. VAN BENTHEM JUTTING, Treubia 11: 84-85 (*Melania tuberculata* and vars. *malayana*, *plicifera*, *seminuda*, *truncatula*, *virgulata*, *crepidinata*, *parreyssi*, *unifasciata* and *rivularis*).
1929. VAN BENTHEM JUTTING, Misc. Zool. Sum. 42: 3 (*Melania tuberculata* var. *seminuda*).
1930. VAN DER MEER MOHR, Treubia 12: 196 (*Melania tuberculata* var. *truncatula*).
1931. OOSTINGH, Arch. Molluskenk. 63: 190 (*Melania tuberculata* var. *seminuda*).
1932. OOSTINGH, Meded. Landbouwhoogesch. 26: 44 (*Melanoides crepidinata* and *tuberculata*).
1932. VAN BENTHEM JUTTING, Treubia 14: 103 (*Melania tuberculata*).
1933. RENSCH, Zool. Anzeiger: 207 (*Melania tuberculata truncatula*).
1934. RENSCH, Trop. Binnengew. 5: 228 (*Melania tuberculata truncatula*).
1934. RENSCH, Arch. Molluskenk. 66: 338 (*Melania tuberculata truncatula*).
1934. RENSCH, Zool. Jahrb. Syst. 65: 400, fig. 2 (*Melania tuberculata truncatula*).
1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 9 (*Thiara tuberculata*); 10 (var. *malayana*).
1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 6 (*Thiara tuberculata* vars *angularis*, *seminuda*, *truncatula*).
1935. PARAVICINI, Arch. Molluskenk. 67: 63, 175 (*Melania unifasciata*).
1935. OOSTINGH, Wetensch. Med. Dienst Mijnb. N.I. 26: 15, pl. 1, f. 8-11 (*Melania tuberculata tegalensis*); 13-15 (*Melania tuberculata* and vars *seminuda*, *virgulata*).

1936. FORCART, Verh. Naturf. Ges. Basel 47: 138 (*Melania truncatula*).
 1937. VAN BENTHEM JUTTING, Zool. Med. 20: 129 (*Thiara tuberculata*).
 1937. RIECH, Arch. Naturgesch. N.F. 6: 55 (*Melania tuberculata truncatula*).
 1937. VAN BENTHEM JUTTING, Treubia 16: 49 (*Thiara tuberculata*).
 1938. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 19: 96, pl. 5, f. 11 (*Melania tuberculata truncatula*).
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 282 (*Thiara tuberculata*).
 1948. DAMMERMAN, Fauna of Krakatau: 72, 102, 190, 519 (*Thiara tuberculata*).
 1949. SCHUSTER, De viscultuur in de visvijvers op Java, Dept. Landbouw & Visserij, Dienst van de Landbouw, Publ. nr. 2: 198 (*Thiara tuberculata*).

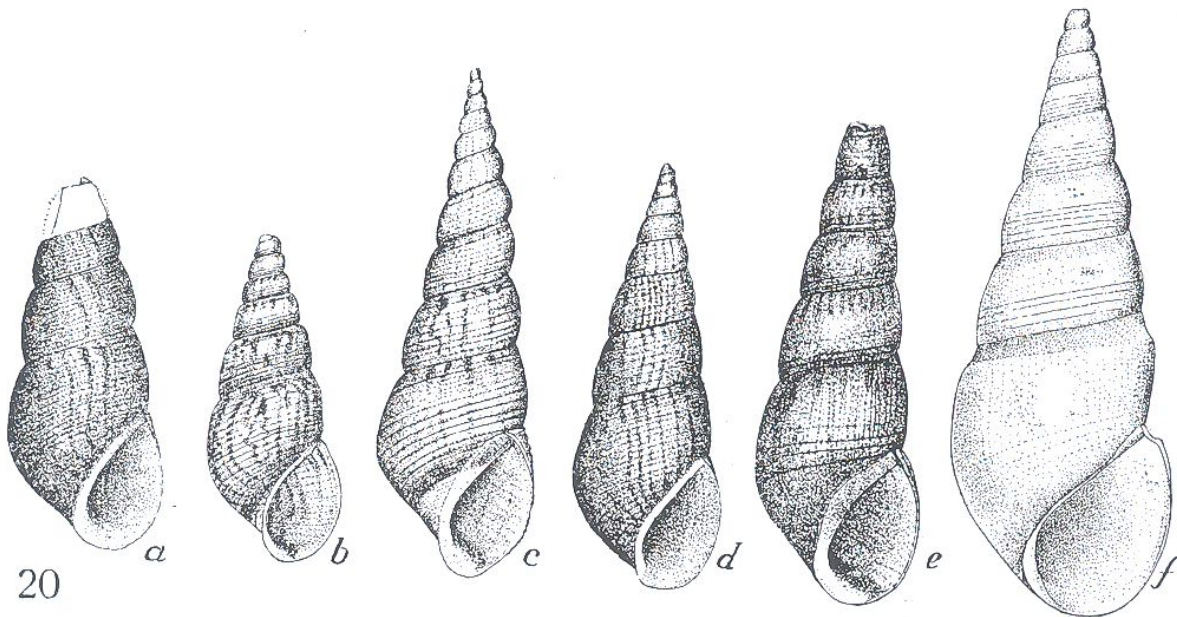


Fig. 20. *Melanoides tuberculata truncatula* (LAMARCK) $\times 1,7$.

- a. Shell from a river on the north-west coast
 b. Shell with angular whorls
 c. Shell with the spire bent, same loc. as d.
 d. shell from T. Kadam mangrove region. fa. *pyramis*
 e. Shell from the beach
 f. Shell from Legon Kadam beach

Melanoides tuberculata truncatula is a very common shell in P. Panaitan, as it is in any other part of Indonesia. The discussion of all shells collected is only done in order to define the sets more clearly, while the names applied to them may serve to give some idea about the shell on hand. I followed RENSCH and RIECH in uniting several species in *M. tuberculata truncatula*.

1.ix.1951. 10 exx. Alt. of largest shell 25.6 mm. Two of them are vertically ribbed, as *plicifera*. The others bear spiral ribs, especially on the top whorls, while on the younger whorls „incised grooves” is a better term for this sculpture. Where the next whorl is attached to a spiral rib of the preceding whorl, the suture is canaliculated.

1-7.ix.1951. One shell inhabited by a pagurid, (fig. 20 e) collected near the beach. Length 34 mm without top whorls, 6 whorls left. It agrees fairly well with description and figure of *Melanoides sluiteri* PRASHAD 1921, Rec. Ind. Mus. 22: 490, pl. 14, f. 11, 12, or better still, with *Melania nicobarica* in BROU 1874, N. Syst. Conch. Cab. 24 (1): 235, pl. 25, f. 11. Especially the words "abschüssig convex" can be applied to the Panaitan shell, that shows the three impressed grooves at the base of each whorl, just above the suture. There are faint vertical folds and short brown flames regularly placed along the suture.

2.ix.1951. 5 exx., 3 alive, 2 with pagurids. Intermediate between *M. adpersa* TROSCHEL and *montrouzieri* in BROU l.c., pl. 25, f. 15 and pl. 26, f. 4, 4 a. Four exx. dead of the *virgulata* type. One shell has a brown peripheral band in addition to the sutural flames.

4.ix.1951. One small shell of 10 mm in length with spiral ribs and a sutural peripheral and basal band. The latter only visible in the aperture.

5.ix.1951. 7 dead shells from the Harashas region. One of the form of *M. sluiteri* PRASHAD, length 26 mm, 5 whorls left, but with irregular brown flames. The others are *unifasciata* MOUSSON in form but they show brown sutural flames in addition to the basal band. Length 23 mm, 7 whorls left, thin shells. 3 juv. shells dead in a sample of soil, same locality, largest shell 5 mm. 4 dead shells of the *seminuda* type.

9.ix.1951. Six shells with pagurids, from near the beach. Very slender, of a light colour, with sutural flames and a basal spiral band. The flames continue as interrupted lines towards the base; incised spiral grooves. On the top whorls spiral ribs which are crossed by faint vertical folds. It is a *pyramis* shell with the vertical folds less strong.

13.ix.1951. Eight shells alive, with very regular spiral grooves. Two shells show a basal brown band, one juv. shell (1.6 × 6.8 mm) is a *plicifera*. 3 dead shells, one of which is a *pyramis*, the second has an *adpersa* form, the width being relatively larger than in normal *truncatula* shells, the third has a peripheral and a basal brown band. It corresponds fairly well to *bifasciata* MOUSSON (BROU 1874, pl. 24, f. 14 b).

16.ix.1951. One dead shell rolled, of the *pyramis* type, about 30 mm in length, last whorl of a uniform light brownish colour, the many spiral grooves hardly impressed. Coarser ribs on the top whorls which are crossed by faint folds.

17.ix.1951. Mt Kadam region. One dead and worn shell which is truncated as MARTENS' fig. of *truncatula* (MARTENS l.c., pl. 4, f. 4). It lacks the vertical riblets on the younger whorls. The spiral grooves are hardly impressed. In the SCHEPMAN collection I found two shells

from Flores under the name of *turriculus* LEA which agree sufficiently with my shell as does fig. 7 a on pl. 25 in BROU, 1874 and his fig. 1c on pl. 23 (*arthuri* BROU). One shell from R. Kadam. Dead. I identified this shell as *parreyssi*, but later I found it impossible to separate it from the hardly ribbed *pyramis* shells mentioned above. Eleven exx. collected alive in the Tg Kadam region. Of the *seminuda* type in sculpture but in form more alike to *unifasciata*. Thin shells. One shell, 30 mm high has the spiral grooves hardly impressed, otherwise it is a good *parreyssi*. None of the shells has vertical ribs. Eight dead shells, some inhabited by pagurids from near the shore of Legon Kadam; two badly preserved shells are probably *punctata*. The others show the spiral ribs on the older and the incised grooves on the younger whorls. One shell has vertical folds in the middle whorls only. Twelve juv. and 3 adults from a sample of soil. The adults are exactly like *tuberculata seminuda* shells in the SCHEPMAN collection. Two worn shells of the *parreyssi* form. Mt Kadam region.

18.ix.1951. Twenty-four exx. alive in a small river on the north-west coast (fig. 20a). All shells decollated. Agree with *montrouzieri* in BROU, pl. 25, f. 15, some however have the less curved whorls of *turriculus* LEA. The spiral sculpture of impressed grooves is much finer than in the other sets.

19.ix.1951. One very fine shell collected alive. It is of the *parreyssi* or *pyramis* type, having the colour of the latter, but lacking its vertical riblets on the top whorls. 398 shells in the mangrove region of Legon Kadam, partly alive, partly dead or inhabited by pagurids. Largest shell 25 mm. The top whorls of all shells show a sculpture of raised spiral ribs which become impressed grooves on the younger whorls. Most shells show the slender *pyramis* form, only two are vertically ribbed on the top whorls. About 10 shells show the *adpersa* outline. The colour pattern consist of red-brown flames along the suture, the flames continue over the whorl as interrupted lines. Some few shells are very darkly coloured. Sixteen shells have a conspicuous spiral band along the periphery in addition to the basal band which is present in all shells. It is, however, not possible to separate them as there are many intermediates. Is *M. bifasciata* MOUSSON a synonym of *tuberculata truncatula*?

20.ix.1951. Two dead shells of the *adpersa* type.

21.ix.1951. Three worn shells from the beach. One with the additional brown band on the periphery.

22.ix.1951. 27 exx. alive in the bed of a dry river running from Mt Parat. These shells, of which the largest measures 30 mm in length; are

inseparable from the set of Sept. 19th. I refer to the figures of *unifasciata* MOUSSON and *bifasciata* MOUSSON. All shells have more or less vertically ribbed top whorls. They are of a very dark olivaceous brown colour and show the peripheral band and the basal one. Only one shell has brown dots below the suture. Same locality, 39 dead shells. Colour much lighter, only two shells have two bands, some are unicolourous, many with flames and stripes, partly with the basal band present. Sixty-two shells have vertically ribbed top whorls. Numerous living exx.; same locality. All fully adult, identifiable as *pyramis* BENSON, many of them with vertically ribbed top whorls. One juvenile shell from the marsh near the bivouac.

23.ix.1951. Five exx. alive. Without bands or vertical ribs; flamulated.

25.ix.1951. 18 dead shells, the four larger ones typical *pyramis* shells, without any colour pattern, top whorls vertically ribbed. One dead shell, well preserved, 23 mm in length and 9.7 mm in diameter. There are seven whorls, angulated and consequently the spira with the whorls fixed step wise. Spiral ribs all over the whorls. Similar to *angularis* MARTENS, but very solid (fig. 20 b).

20.ix.1951. Living in the same river bed of the set of Sept. 22nd. Some shells show a third brown band along the suture as in *M. trifasciata* BTTG. in the SCHEPMAN collection. In another set numerous exx. alive.

26.ix.1951. Thirteen exx. alive. Mangrove of Tg Kadam (fig. 20d). The shells come very close to *parreyssi* and *pyramis* and in my opinion are inseparable from the other shells collected, especially not separable from those collected Sept. 25th. The largest shell of this set measures 34 mm in length. The shells are not banded, but do show flamules along the suture. The spiral grooves are hardly impressed. This set was compared with shells of the SCHEPMAN collection in the Amsterdam Museum and I found them identical with *crepidinata* REEVE from Java. The figures of *crepidinata* in BROTH 1874 are however very poor and I do not recognize my shells in them. *Melania crepidinata* REEVE is in the synonymy of *tuberculata truncatula*, according to RIECH (l.c.). In the foregoing lines I therefore referred to *pyramis* and *parreyssi* as the only satisfying figures for the Panaitan shells. When RENSCH and RIECH are referring too many species to *M. truncatula*; *M. parreyssi*, *pyramis* and *crepidinata* are to be left out together, as belonging to one species. A comparison of the types will be necessary to identify my *pyramis*, *parreyssi* and *crepidinata* shells definitely. One shell has the spire bent to the left. It possesses the basal brown band. Fourteen juvenile shells from a marsh east of Tg Kadam (fig. 20c).

28.ix.1951. Five juv. shells, dead, in the S part of Legon Kadam. One badly damaged shell from a soil sample in Legon Samedang. Same locality, 41 juv. shells from another sample of soil.

Melanoides cfr. tuberculata truncatula (LAMARCK, 1822) (fig. 20f).

Sept. 21st in Legon Kadam two shells were collected of the following dimensions: Height 45.5 resp. 43 mm, width 15.8 resp. 16 mm.

I felt inclined to identify these shells as *Melania coarctata* LAMARCK, (BROT 1874: 78, pl. 9, f. 3). Comparing the description with the shells on hand, these ones are lacking the nodules on the shoulder and the inconspicuous vertical folds which are characteristics of *coarctata*. A classification as *Melania javanica* must be rejected because of the entirely different form. Both shells have 9 whorls, the apical whorls being broken off. The top whorls which are present show spiral grooves (or should I say "ribs"?). In the middle whorls, only the basal part is grooved and in the younger whorls the grooves are disappearing. There are about 6 grooves above the suture. There are neither vertical folds nor any other vertical sculpture. The suture is deep, canaliculated. Under the suture the whorl is constricted and forms a weak shoulder that has become fully developed and sharply angulated in the second shell. The aperture is small, (14.5 mm) but wide at the base (9.5 mm). The base is rounded, the labrum thickened and protruding, the callus very strong, the columella short and arched, the only feature that it has in common with *javanica*. Traces of a brownish epidermis are left on one shell. The top whorls show vertical flames between the sutures, while in the younger whorls only short brown stripes under the suture remain.

Telescopium telescopium (LINNE, 1758) (Plate 4, fig. 1)

1758. LINNE, Syst. Nat. Ed. 10: 760 (*Trochus telescopium*).
 1880. MARTIN, Die Tertiärschichten auf Java: 66, pl. 12, f. 1 (*Cerithium montisselae*).
 1890. BOETTGER, Ber. Senckenb. Natf. Ges.: 167 (*Telescopium fuscum*).
 1897. MARTENS, Zool. Ergebn. 4: 180 (*Potamides*).
 1921. PRASHAD, Rec. Ind. Mus. 22: 493 (*Potamides*).
 1923. OOSTINGH, Med. Landbouwhoogesch. 26: 75 (*Potamides*).
 1927. VAN DER MEER MOHR, Misc. Zool. Sum. 18: 2 (*Potamides*).
 1928. DEGNER, Treubia 10: 381 (*Potamides*).
 1929. VAN BENTHEM JÜTTING, Treubia 11: 86 (*Potamides*).
 1931. OOSTINGH, Arch. Molluskenk. 63: 195.
 1934. RENSCH, Arch. Molluskenk. 66: 339.
 1938. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 19: 99.
 1941. VAN REGTEREN ALTENA, Leidsche Geol. Med. 13: 12 (*Telescopium titan*); 13 (*Telescopium telescopium*).

1945. VAN REGTEREN ALTENA, Zool. Meded. 25: 145.
 1947. WISSEMA, Young tertiary and quaternary gastropoda from the island of Nias, Thesis Leiden: 46.
 1949. SCHUSTER, De viscultuur in de visvijvers op Java. Dept. Land & Visserij Dienst van de Landbouw, Publ. nr. 2: 198.
 1954. BUTOT, Basteria 18: 2, pl. 1 figs. 1, 2, pl. 2 figs. 1, 3 lower row.

22-27.ix.1951. One damaged and rolled shell from the beach. It has a heavy basal ridge as in *T. titan*.

28.ix.1950. Southern part of Legon Lentah, 4 exx. alive. The species is very numerous in this locality which it shares with the next species. They do not however mix up, but remain in the seaward part.

Telescopium mauritsi BUTOT, 1954 (Plate 4, fig. 2)

1954. BUTOT, Basteria 18: 1-13. Plate 1 f. 3-4—2 f. 2, 3 above textfig. 1.

28.ix.1951. 5 exx. alive. S. part of Legon Lentah. It lives together with *Telescopium telescopium*. It does not mix up with that species but lives in the landward part of the area. The border is the edge of the *Rhizophora mucronata* vegetation that is replaced by *Sonneratie* and *Avicennia* towards the shore.

Siphonaria laciniosa (LINNE, 1758)

1758. LINNE, Syst. Nat. Ed. 10: 781 (*Patella*).
 1913. SCHEPMAN, Siboga Exp. 49 (1 f), part 6: 460 (*Siphonaria exigua*).
 1931. OOSTINGH, Arch. Molluskenk. 63: 222 (*Siphonaria exigua*).
 1939. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 20: 7, pl. 2, f. 1 a, b, c; textfig. 1 (*Siphonaria siphon*).
 1945. VAN REGTEREN ALTENA, Zool. Meded. 25: 149 (*Siphonaria exigua* and *siphon*).
 1946. HUBENDICK, Kgl. Svensk. Vetensk. Akad. Handl. 23 (3), no. 5: 47, pl. 3, f. 16-19.

8.ix.1951. 5 exx. alive on rocks on the West Coast.

19.ix.1951. 75 exx. alive on a flat rock near the bivouac.

26.ix.1951. 20 exx. alive on dead coral on the beach. Living together with *S. pisangensis* and *S. atra*.

27.ix.1951. 16 exx. alive on rocks.

In all localities the rocks are submerged when the water is high. This species is known from all over Indonesia.

Siphonaria pisangensis HUBENDICK, 1947.

1947. HUBENDICK, Bull. Mus. Roy. d'Hist. Nat. Belg. 19 (23): 3, fig. 1, 2.
 1939. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 20: 9, pl. 2, f. 1, 2 (*Siphonaria funiculata* (non) REEVE).

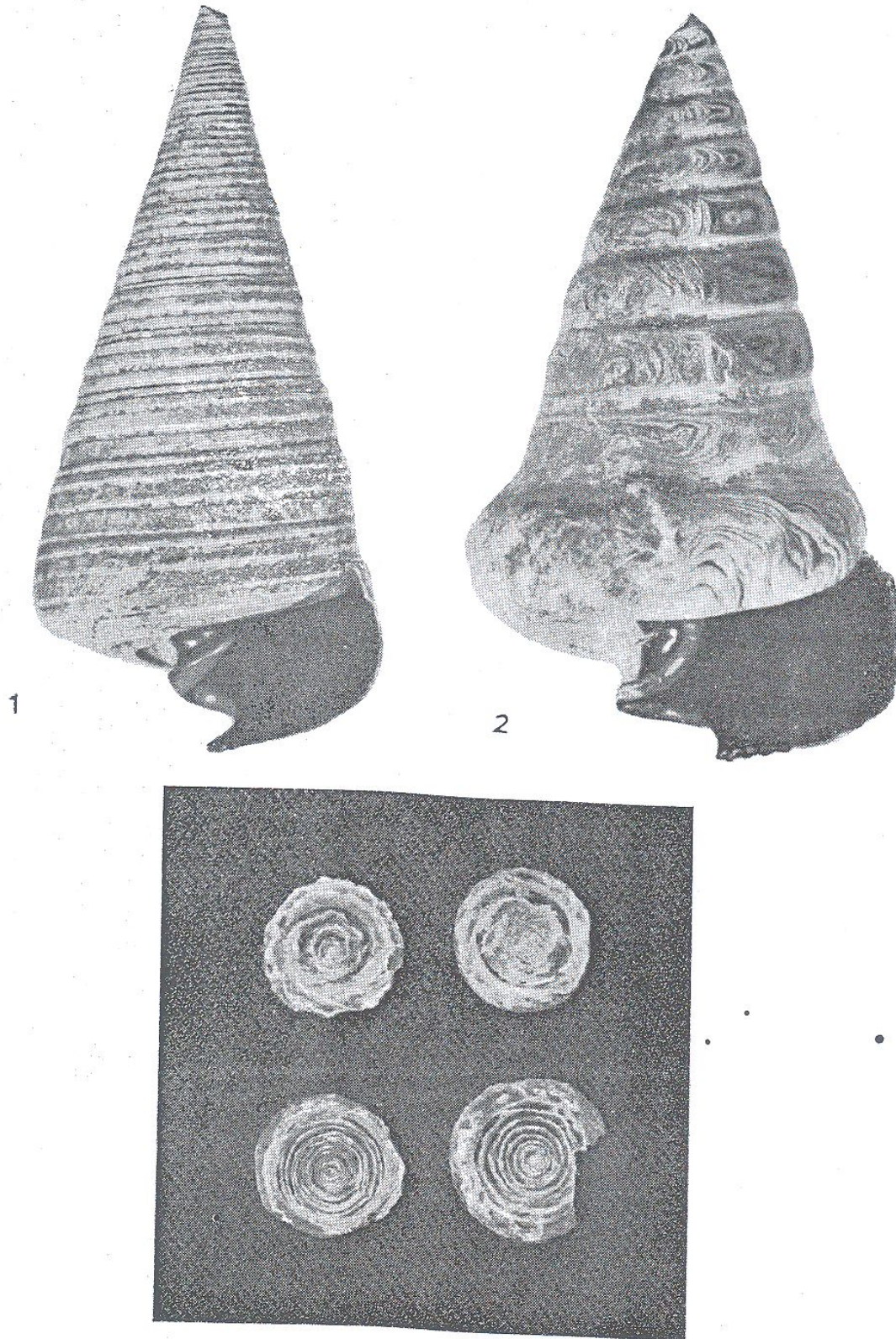


Plate 4. Fig. 1. *Telescopium telescopium* (L.). Fig. 2. *Telescopium mauritsi* BUTOT 1954
operculum: upper row: *T. mauritsi* BUTOT lower row: *T. telescopium* (L.) (from Bas-
teria 1954).

26.ix.1951. 7 exx. alive, on dead coral on the beach. Living together with *S. lacioniosa* and *S. atra*. Measurements: L. 12, W. 11.3, H. 5; 11.3, 9.4, 4.7 mm. The species was only known from Nw. Guinea. Although, my shells are smaller, I do not doubt about the identification, as description and cited figures correspond entirely with my shells.

Siphonaria atra QUOY & GAIMARD, 1834

1834. QUOY & GAIMARD, Voy. Astrol. Zool. 2: 337, pl. 25, f. 41, 42.
 1939. ADAM & LELOUP, Res. Sci. Voy. Ind. Or. Neerl. (2) 20: 9, pl. 2, f. 3 a, b; textfig. 2.
 1946. HUBENDICK, Kungl. Sv. Vetensk. Akad. Handl. 23 (3), no. 5: 52, pl. 4, f. 5-7.

19.ix.1951. One ex. alive on a flat rock near the bivouac. A small shell with 18 prominent ribs of which two on the siphonal canal. Length 15.7, H. 4.4, W. 10.3 mm. Black inside.

26.ix.1951. One ex. alive on dead coral on the beach together with *S. laciniosa* and *S. pisangensis*. A large shell with 19 prominent ribs, two of which on the siphonal canal. L. 23.4, H. 4.5, W. 17 mm. Black inside.

Limnaea rubiginosa MICHELIN, 1831 (fig. 21)

1831. MICHELIN, Mag. de Zool. 1 (22) (*Limnaeus*).
 1834. DESHAYES, Voy. de l'Inde par Belanger: 418, pl. 2, f. 13, 14 (*Limnaea succinea*).
 1849. MOUSSON, Land und Süßsw. Moll. Java: 42, pl. 5, f. 1 (*Limnaeus succineus* var. *javanica*); 43, pl. 5, f. 2, 3 (*Limnaeus longulus* and vars *gracilis* and *brevis*).
 1879. MARTENS in WEBER, Zool. Ergebn. 4: 3, pl. 1, f. 3-7, pl. 12, f. 2, 4 (*Limnaca javanica* and vars *costulata*, *intumescens*, *ventrosa*, *turgidula*, *subteres*, *angustior* and *porrecta*).
 1880. SCHEPMAN in VETH, Midden Sumatra 4: 9 (*Limnaea javanica*).
 1890. BOETTGER, Ber. Senckenb. Naturf. Ges.: 150 (*Limnaeus javanica* vars *intumescens* and *longula*).
 1891. BOETTGER, Ber. Senckenb. Natf. Ges.: 244 (*Limnaeus javanicus* vars *subteres* and *longula*).
 1899. DAUTZENBERG, Ann. Soc. Roy. Mal. Belg. 34: 8 (*Limnaea javanica*).
 1906. BULLEN, Proc. Mal. Soc. 7: 14, pl. 2, f. 5-6 (*Limnaca bongsonensis* and *L. excavata*).
 1912. SCHEPMAN, Proc. Mal. Soc. 10: 235 (*L. javanica* var.).
 1913. SCHEPMAN, Siboga Exp. 6, Monogr. 49 (1 f): 459 (*L. javanica*).
 1921. PRASHAD, Rec. Ind. Mus. 22: 470 (*L. javanica* vars *intumescens*, *subteres*, *angustior*, *porrecta*, *costulata*, *turgidula*).
 1922. VAN HEURN & PARAVICINI, Natuurk. Tijdschr. N.I. 82: 29, fig. 6 (*L. javanica*); 30 (var. *turgidula*).
 1923. OOSTINGH, Meded. Landbouwhoogesch. Wageningen 23: 156 (*L. javanica* and var. *obesa*).
 1928. DEGNER, Treubia 10: 369 (*L. bongsonensis*, *excavata*, *javanica* with vars *angustior*, *costulata*); 370 (*intumescens*, *porrecta*, *subteres* and *turgidula*).

1929. VAN BENTHEM JUTTING, Treubia 11: 83 (*L. javanica* and vars *angustior*, *costulata*, *gibberula*, *intumescens*, *longula*, *obesa*, *porrecta*, *spirulata*, *subteres*, *ventrosa*).
1929. VAN BENTHEM JUTTING, Misc. Zool. Sum. 42: 1 (*L. javanica* vars *angustior*, *costulata*, *intumescens*, *ventrosa*).
1934. RENSCH, Trop. Binnengewässer 5: 204 (*L. succinea*).
1935. OOSTINGH, Wetensch. Med. Dienst Mijnb. N.I. 26: 117 (*L. javanica*).
1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 89: 1 (*L. javanica*).
1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 7 (*L. javanica* and vars *angustior* and *intumescens*).
1935. PARAVICINI, Arch. Molluskenk. 67: 62, 175 (*Limnasa javanica* (sic) and *L. javanica*).
1937. VAN BENTHEM JUTTING, Zool. Med. 20: 97, pl. 4, f. 1-5 (*L. javanica*).
1939. ADAM & LÉLOUP, Res. Sci. Voy. Ind. Or. Neerl. 20 (2): 11, pl. 2, f. 5 (*L. javanica*).
1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 291 (*L. javanica*).
1951. HUBENDICK, Kungl. Svenska Vet. Akad. Handl. 3 (4), no. 1: 154, f. 341, 342 (race *rubiginosa* of *L. auricularia*).

17.ix.1951. Seven exx., dead, on our way to Mt Kadam in shallow pans without water (fig. 21). Shells with shoulder, and long spire (vars *obesa* and *brevis*).

19.ix.1951. 55 exx. dead in dry mangrove swamp between the east coast of Legon Kadam and R. Kadam. Shells with, or without a shoulder, some with a very short spire.

20.ix.1951. 3 exx. alive west of Legon Kadam in shallow pans. Salinity of the ground water 1.24 ‰.

22.ix.1951. 40 exx. dead in a dry marsh near the bivouac. Shells with, or without a shoulder, high spire.

23.ix.1951. 7 exx. dead, same locality (*subteres*).

15.ix.1951. 1 ex. dead, same locality (*subteres*).

26. ix. 1951. 10 exx. dead. Marsh, east of Tg Kadam West. All shells with a shoulder.

28.ix.1951. 6 exx., dead, juv. from a sample of soil.

HUBENDICK, who thoroughly studied the Lymnaeidae of the world, classified *L. javanica* as belonging to the race *rubiginosa* of the super-species *auricularia*. This species has a wide distribution in all parts of the Indonesian Archipelago. In P. Panaitan it does not inhabit rivers.

Anisus convexiusculus (HUTTON, 1850) (fig. 22)

1849. MOUSSON, Land- und Süßw. Mollusken Java: 44, pl. 5, f. 4 (*Planorbis tondanensis*) (NON QUOY & GAIMARD).
1850. HUTTON, Journ. As. Soc. Bengal 18 (2): 657 (*Planorbis*).
1891. BOETTGER, Ber. Senckenb. Natf. Ges.: 245 (*Planorbis compressus* and *infralineatus*).
1897. MARTENS, Zool. Ergebn. 4: 13, pl. 1, f. 17-21, pl. 12, f. 7, 10 (*Planorbis compressus*).

1906. BULLEN, Proc. Mal. Soc. 7: 129, textfig. (*Planorbis sagoensis*).
 1921. PRASHAD, Rec. Ind. Mus. 22: 473 (*Gyraulus*).
 1922. VAN HEURN & PARAVICINI, Natuurk. Tijdschr. N.I.: 31 (*Planorbis compressus*).
 1928. DEGNER, Treubia 10: 370 (*Planorbis convexiusculus* and *sagoensis*).
 1929. VAN BENTHEM JUTTING, Treubia 11: 83 (*Planorbis convexiusculus* and *infralineatus*).
 1931. VAN BENTHEM JUTTING, Treubia 13: 6-7, fig. 1-4 (*Planorbis*).
 1934. RENSCH, Zool. Jahrb. 65: 354 (*Gyraulus*).
 1934. RENSCH, Trop. Binnengew. 5: 209 (*Gyraulus*).
 1935. PARAVICINI, Arch. Molluskenk. 67: 175.
 1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 7 (*Gyraulus*).
 1935. OOSTINGH, Wetensch. Med. Dienst Mijnb. N.I. 26: 117 (*Gyraulus*).
 1937. VAN BENTHEM JUTTING, Zool. Meded. 20: 96 (*Gyraulus*).
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 291.

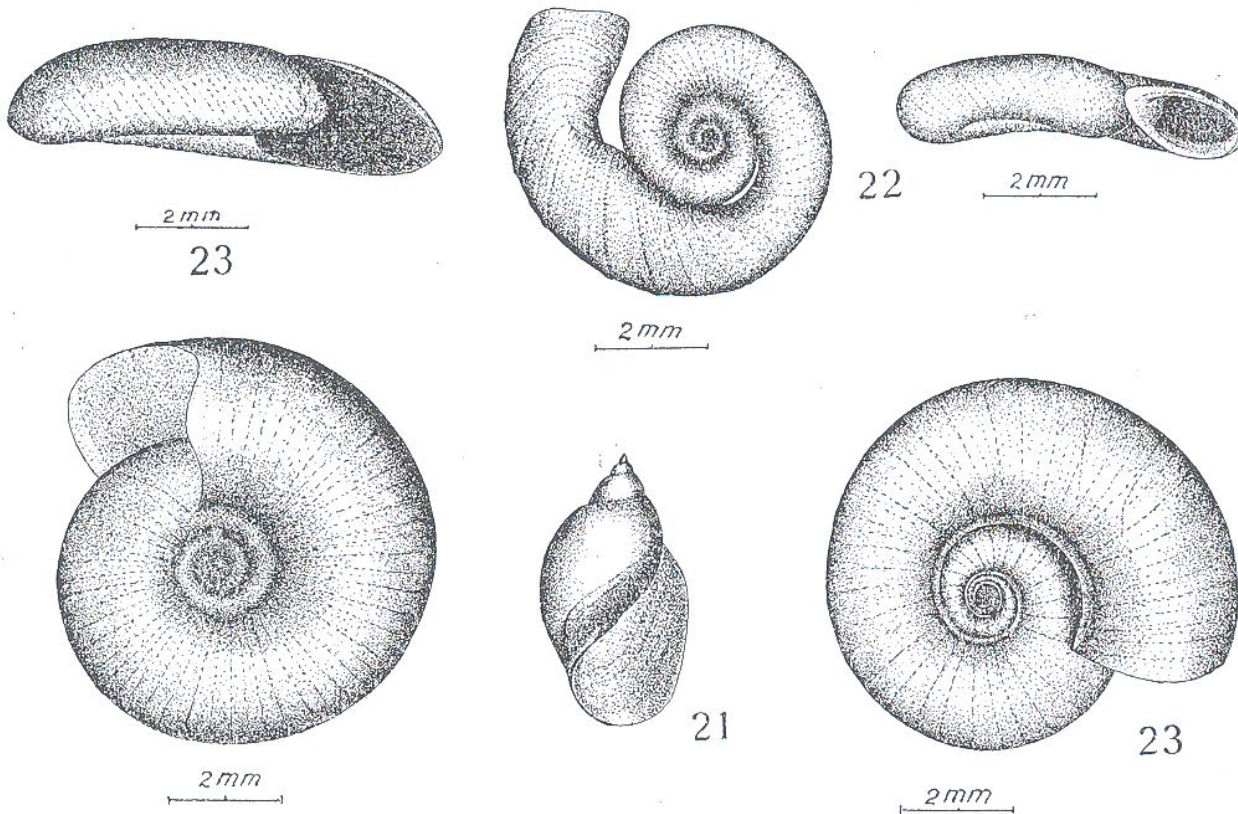


Fig. 21. *Lymnaea rubiginosa* MICHELIN.

Fig. 22. *Anisus convexiusculus* (HUTTON) with loose last whorl, different views.

Fig. 23. *Hippeutis thienemanni* RENSCH different views.

1.ix.1951. Fourteen exx. Living on dead branches and leaves in a pool near the camp, the water of which was suitable for preparing our meals. In one shell the third whorl is partly loose from the fourth. Besides the top whorls are in another plane so that the shell is irregularly coiled and the last whorl is descending. Salinity 0.02 ‰.

5.ix.1951. 27 exx. dead in a sample of soil from R. Harashas region. Some of them are typical *infralineatus*. Same locality, 5 dead exx. Three shells are typical *infralineatus*, two others are lacking the spiral striation.

17.ix.1951. 26 exx. dead in a sample of soil. Typical *convexiusculus*, two or three show traces of spiral sculpture, some are more or less angular.

19.ix.1951. 32 exx. dead from a place between the coast and R. Kadam in a mangrove forest. One shell is distinctly carinated (var. *japonica* MARTENS). The var. *siamensis*, although present in this and other sets, cannot be separated, not one being typical.

22.ix.1951. Numerous exx. in a marsh near the camp. All of them dead, some fresh, still containing the animal. Fully adult shells have the peristome much thickened and white. Growth development continuing, the old peristome may stay as a varix, the new part protrudes as a telescope tube, a feature that could be observed also in shells from other sets. Some shells are distinctly keeled, but none of the shells show spiral sculpture.

23.ix.1951. Same locality, 64 shells, some still alive. There is one *infralineatus* in the set, with a distinct carina. Salinity of the ground water 1.24 ‰.

26.ix.1951. 42 exx. dead from a dry marsh east of Tg Kadam. One shell has a diameter of 8 mm. It has two "varices". Some shells might be called *siamensis*.

28.ix.1951. Southern part of Legon Lentah, 2 dead shells and numerous dead shells from a sample of soil. One shell is irregularly coiled, the younger half of the last whorl is completely disconnected (fig. 22).

This species has a wide distribution and is also known from Sumatra and Java.

• **Hippeutis thienemanni** RENSCH, 1934 (fig. 23)

1934. RENSCH, Trop. Binnengew. 5: 214, pl. 8, f. 18-21.

1953. BUTOT, De Tropische Natuur 33: 30 (*Planorbis thienemanni*).

17.ix.1951. 11 dead exx. in a sample of soil from the R. Kadam region. Same locality, one dead ex.

19.ix.1951. 15 dead exx. in a dry mangrove forest.

22.ix.1951. 23 exx. dead, in a dry marsh near the bivouac, salinity of the ground water 1.24 ‰.

23.ix.1951. Same locality, 7 exx. dead.

26.ix.1951. 34 exx. dead in a swamp east of Tg Kadam. The largest shell has a diameter of 8 mm (fig. 23).

28.ix.1951. 40 exx. dead in a sample of soil.

The type has been described from S. Sumatra, Musi region. I have seen shells from N. E. Sumatra, Ambalutu Estates, Kisaran; it is also known from W. Java.

Planorbis badae BOLLINGER 1914, seems to be smaller than our species. diam. 4½ mm having 4½ whorls. *H. thienemanni* according to the original diagnosis 6.2 mm having 5 whorls. I have not seen *badae*. For comparison I had *Planorbis thienemanni* shells identified by Mrs VAN DER FEEN-VAN BENTHEM JUTTING.

Segmentina calathus (BENSON, 1850)

1850. BENSON, Annals & Mag. N.H. 5 (2): 349 (*Planorbis*).
 1897. MARTENS in WEBER, Zool. Ergebn. 4: 15 (*Planorbis*).
 1921. PRASHAD, Rec. Ind. Mus. 22: 474.
 1928. DEGNER, Treubia 10: 370.
 1929. VAN BENTHEM JUTTING, Treubia 11: 83.
 1931. VAN BENTHEM JUTTING, Treubia 13: 8, fig. 5, 6.
 1952. BUTOT De Tropische Natuur 32: 18.
 1953. BUTOT, De Tropische Natuur 33: 30.

19.ix.1951. 7 exx. dead in a dry mangrove between R. Kadam and the coast.

22.ix.1951. 13 exx. dead in a dry marsh near the bivouac, salinity of the groundwater 1.24 ‰.

28.ix.1951. 187 exx. dead in a sample of soil.

The shell, being a *Segmentina*, is easily distinguished from *Hippeutis thienemanni*, by the septae, besides the base is flatter and the umbilicus is closed.

Known from Sumatra, Java and Aru Is.

Ferissia javana (MARTENS, 1897)

1897. MARTENS in WEBER, Zool. Ergebn. 4: 15, pl. 1, f. 35-37 (*Ancylus javanus*); 16, pl. 1, f. 38, 39; pl. 12, f. 8 (*Ancylus celebensis*).
 1929. VAN BENTHEM JUTTING, Treubia 11: 83 (*Ancylus javanus*).
 1931. VAN BENTHEM JUTTING, Treubia 13: 8, fig. 7, 8, 9, 10 (*Protancylus javanus*).
 1934. RENSCH, Trop. Binnengew. 5: 215, nr. 11.

22.ix.1951. 9 exx. dead, in a dry marsh near the bivouac. The shells are white, bleached, without periostracum and in bad condition. Found in dry algae, forming bands around trees thus indicating the water level in the passed wet season. Salinity of the ground water 1.24 ‰. Only known from Java and Celebes. I think it will turn up in Sumatra some day.

Filicaulis bleekerii (KEFERSTEIN, 1865)

1865. KEFERSTEIN, Zeitschr. Wiss. Zool. 15: 118, pl. 9, f. 1-7 (*Veronicella (Vaginula) Bleekerii*).
1880. SCHEPMAN in VETH, Midden Sumatra Moll: 5, pl. 2, f. 1 (*Vaginula hasselti*).
1928. DEGNER, Treubia 10: 364 (*Vaginula bleekeri*).
1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 292 (*Vaginula bleekeri*).
1948. DAMMERMAN, Fauna of Krakatau: 72 (*Collingea strubelli*).
1952. VAN BENTHEM JUTTING, Treubia 21: 331, fig. 9-14.

4.ix.1951. One ex. alive under wood. The species has a wide distribution.

Succinea minuta MARTENS, 1867

1867. MARTENS, Preuss. Exp. O. As. 2: 388.
1912. SCHEPMAN, Proc. Mal. Soc. 10: 235, pl. 10, fig. 12, 13 (*S. javanica*).
1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool 5: 293 (*S. javanica*).
1948. DAMMERMAN, Fauna of Krakatau: 517 (*S. javanica*).
1952. VAN BENTHEM JUTTING, Treubia 21: 342, f. 19, 21, 23,

28.ix.1951. One dead shell in a sample of soil.

Known from Java, Krakatau and some of the lesser Sunda Islands.

Nesopupa malayana (ISSEL, 1874) (fig. 24)

1874. ISSEL, Moll. Born. Ann. Mus. Civ. Genova 6: 416, pl. 5, f. 30-32 (*Vertigo malayanus*).
1909. MARTENS, Mitt. Zool. Mus. Berlin 4: 263 (*Pupa*).
1920. PILSBRY, Man. of Conch. (2) 25: 342, pl. 32, f. 14, 15, 16.
1935. RENSCH, Sitzungsber. Ges. Naturf. Freunde: 317.
1937. RENSCH, Arch. Naturgesch. N.F. 6: 579.

18.ix.1951. Two exx. alive (fig. 24) under a dead tree trunk on coral debris in the wood along the shore of the north coast, Tg Kadam West.

The angular lamella just reaches the upper terminal of the labrum. It is still of a brown colour and not yet mature. The second shell is not yet full grown. It shows the parietal and a faint columellar plica. The species is known from Borneo, Philippines, India, Timor, Sumba. I have seen many specimens from many islands in Djakarta bay. This is the first record of the species from the western Indonesian region connecting India with the Lesser Sunda Isles. It will probably turn up also in Java and Sumatra.

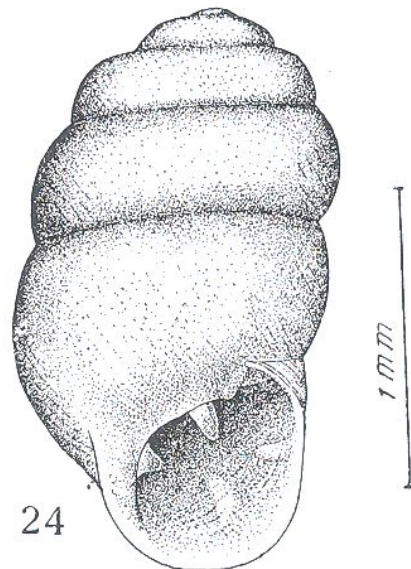


Fig. 24 *Nesopupa malayana* (ISSEL)

Gastrocopta euryomphala PILSBRY, 1934

1934. PILSBRY, *Man. of Conch.* (2) 28: 120, pl. 22, f. 3-6.
 1941. VAN BENTHEM JUTTING, *Arch. Neerl. Zool.* 5: 295.
 1952. VAN BENTHEM JUTTING, *Treubia* 21: 356, f. 36.

1.ix.1951. 17 dead shells in a sample of soil.

6.ix.1951. 47 dead shells in a sample of soil.

9.ix.1951. 87 dead shells in a sample of soil from the south coast. There are slender and very short shells in this sample. Two exx. in an other sample. This Philippine species occurs almost everywhere in the islands of Djakarta bay. It is not known from Java.

Prosopeas achatinaceum (PFEIFFER, 1846)

1846. PFEIFFER, *Symbolae* 3: 82 (*Bulimus*).
 1925. VAN BENTHEM JUTTING, *Treubia* 6: 143.
 1928. DEGNER, *Treubia* 10: 362.
 1930. VAN DER MEER MOHR, *Treubia* 12: 296.
 1933. RENSCH, *Zool. Anz.*: 207.
 1934. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 84/85: 13.
 1935. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 95: 8.
 1948. DAMMERMAN, *Fauna of Krakatau*: 72, 92, 102.
 1952. VAN BENTHEM JUTTING: *Treubia* 21: 385, fig. 58.

5.ix.1951. 4 exx. dead.

It has a wide distribution, being also known from Sumatra and Java.

Opeas clavulinum (POTIEZ & MICHAUD, 1838)

1838. POTIEZ & MICHAUD, *Gall. Moll. Mus. Douai* 1: 136, pl. 14, f. 9, 10 (*Bulimus*).
 1926. VAN DER MEER MOHR, *Misc. Zool. Sum.* 8: 2 (*Opeas javanicum*).
 1935. PARAVICINI, *Arch. Molluskenk.* 67: 61 (*Opeas javanicum*).
 1952. VAN BENTHEM JUTTING, *Treubia* 21: 381, fig. 59.

1.ix.1951. 16 exx. dead in samples of soil.

3.ix.1951. 50 shells partly in samples of soil.

4.ix.1951. 13 shells from under stones and branches.

6.ix.1951. 26 shells from samples of soil.

8.ix.1951. 14 shells, west coast region.

12.ix.1951. 2 shells from a sample of soil.

20.ix.1951. 2 shells.

22.ix.1951. 1 shell from Mt Parat.

28.ix.1951. 1 shell from Legon Semadang, in a sample of soil. Also known from Sumatra and Java.

Opeas gracile (HUTTON, 1834)

1834. HUTTON, *Journ. As. Soc. Bengal* 3: 93, f. 84-85 (*Bulimus*).
 1880. SCHEPMAN in VETH, *Midden Sumatra Moll.* 4: 9, pl. 2, f. 4 (*Stenogyra gracilis* and *Stenogyra panayensis*).

1925. VAN BENTHEM JUTTING, Treubia 6: 143 (*Opeas gracilis*).
 1928. DEGNER, Treubia 10: 362 (*Opeas gracile*); 363 (var. *panayense*).
 1930. VAN DER MEER MOHR, Treubia 12: 296.
 1934. RENSCH, Trop. Binnengew. 4: 756.
 1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 11.
 1935. VAN BENTHEM JUTTING, Misc. Zool. Sum. 95: 8.
 1935. PARAVICINI, Arch. Molluskenk. 67: 61, 174.
 1936. DAMMERMAN, Treubia 16: 135, fig. 7.
 1937. VAN BENTHEM JUTTING, Zool. Med. 20: 159.
 1948. DAMMERMAN, Fauna of Krakatau: 102, 110, 114, 182, 516, fig. 45.
 1952. VAN BENTHEM JUTTING, Treubia 21: 378, fig. 55, 56 a.

3.ix.1951. 8 exx. alive.

12.ix.1951. 16 shells from a sample of soil.

18.ix.1951. 1 damaged shell.

24.ix.1951. 60 exx. dead, from the ground. Among them shells of *panayense*.

28.ix.1951. 3 exx. dead, in a sample of soil from Legon Semadang. Same locality one ex. dead, but very fresh. It is curious that *O. gracile* does not occur so abundantly as *O. clavulinum*. It is also recorded for Sumatra and Java. It is the only species that was recorded for P. Panaitan before (VAN BENTHEM JUTTING 1941: 322).

Charopa (Discocharopa) microdiscus VAN BENTHEM JUTTING, 1951

1951. VAN BENTHEM JUTTING, Basteria 15: 28, fig. 1.
 1952. VAN BENTHEM JUTTING, Treubia 21: 389, fig. 62.
 1953. VAN BENTHEM JUTTING, Treubia 22: 302.

9.ix.1951. One dead shell in a sample of soil from the south coast. It is not damaged and easily recognizable. Known from Celebes, Java and Ambon.

Trochomorpha planorbis (LESSON, 1831)

1831. LESSON, Voy. Coquille Zool. 2: 312, pl. 13, f. 4 (*Helix*).
 1880. SCHEPMAN in VETH, Midden Sumatra Moll. 4: 7.
 1891. MARTENS, in WEBER, Zool. Ergebn. 2: 232.
 1899. DAUTZENBERG, Ann. Soc. Mal. Belg. 34: 4.
 1928. DEGNER, Treubia 10: 359.
 1935. PARAVICINI, Arch. Molluskenk. 67: 61, 172.
 1937. RENSCH, Arch. Naturgesch. N.F. 6: 556.
 1952. VAN BENTHEM JUTTING, Treubia 21: 411, fig. 72, 73.

2.ix.1951. 3 exx. living near the camp on the ground. 1 ex. dead, Mt Talon.

3.ix.1951. 2 exx. One living, one dead.

5.ix.1951. 1 ex. dead. 3 very fresh and large shells near the camp, on the ground.

12.ix.1951. 1 ex. alive.

22.ix.1951. 1 damaged shell on Mt Parat.

28.ix.1951. 1 ex. dead, Legon Semadang.

It has a wide distribution in Indonesia.

Trochomorpha cfr *timorensis* MARTENS, 1867 (fig. 25)

1867. MARTENS, Preuss. Exp. O. Asien 2: 248, pl. 13, f. 6.

1887. TRYON, Manual of Conch. (2) 3: 83, pl. 16, f. 99-1 (*Helix (Videna)*).

1935. RENSCH, Sitzungsber. Ges. Naturf. Fr.: 325.

1936. FORCART, Verh. Naturf. Ges. Basel 47: 140.

1949. VAN BENTHEM JUTTING, Bull. Raffles Mus. 19: 65.

1952. VAN BENTHEM JUTTING, Treubia 21: 418.

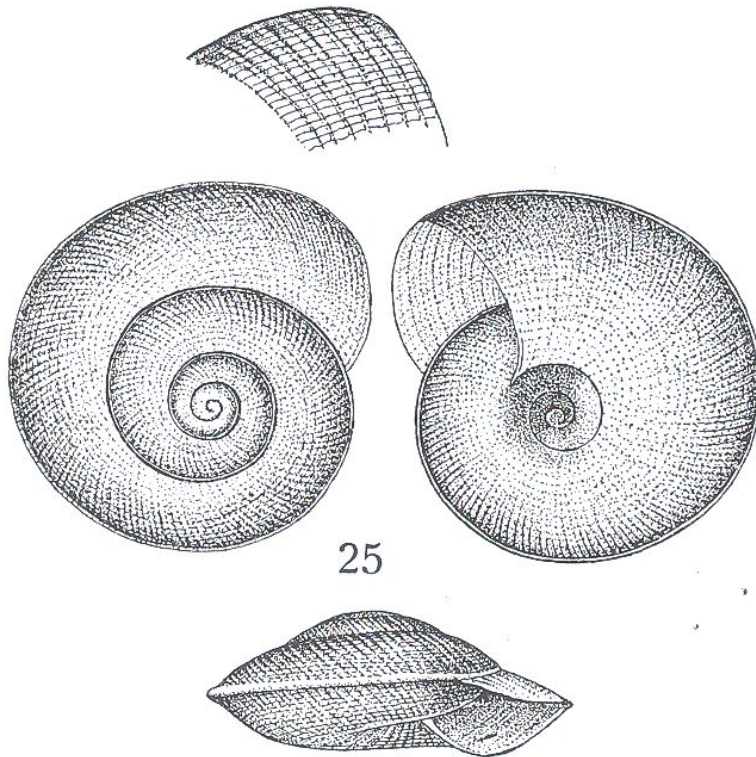


Fig. 25. *Trochomorpha* cfr. *timorensis* MARTENS $\times 6$ different views, part of the sculpture $\times 18$.

25.ix.1951. One very fresh shell. This is a juv. shell of about $4\frac{1}{2}$ whorls, of a uniform, somewhat shining, light horny-brown colour. It is sculptured with irregular, rather coarse lines of growth, crossed by very clear and very fine, hardly impressed, closely set striae on both dorsal and ventral sides. The carina is sharp and nodulous by the radiating lines of growth. The last whorl as wide as the two previous whorls together.

The umbilicus wide and perspective, showing all whorls, though small compared with *T. planorbis*. Diam. 8.4, height 3.6 mm.

I could compare this shell with an adult *timorensis* of 6 whorls from Damar Island, in the SCHEPMAN collection, Amsterdam Museum. It agrees in every respect but for the spiral striation. That the last whorl does not descend at all is due to the fact that this shell is not yet adult. The spiral striation is, in my opinion not sufficient to declare it different from *Tr. timorensis*. The species is known from the Malay Peninsula, Timor and a few of the Lesser Sunda Islands. Unknown from Sumatra and Java.

Coneuplecta bandongensis (BOETTGER, 1890)

1890. BOETTGER, Ber. Senckenb. Naturf. Ges.: 141, pl. 5, f. 3, 3 a, b (*Sitala bandongensis*).

1950. VAN BENTHEM JUTTING, Treubia 20: 388, fig. 5.

2.ix.1951. One fresh shell.

6.ix.1951. One badly damaged and worn shell in a sample of soil. There is however no doubt about its identification. This species has been found on many Indonesian islands, but it is not yet known from Sumatra.

Liardetia indifferens (BOETTGER, 1891)

1891. BOETTGER, Ber. Senckenb. Naturf. Ges.: 256, pl. 3, f. 4, 4 a, b (*Kaliella*).

1950. VAN BENTHEM JUTTING, Treubia 20: 408, fig. 25.

18.ix.1951. One damaged shell. The sculpture is much finer than in *L. doliolum*. Known from the eastern part of the Archipelago including Java. It is not yet known from Sumatra.

Liardetia doliolum (PEIFFER, 1846)

1846. PFEIFFER, Proc. Zool. Soc. London: 41 (*Helix*).

1934. RENSCH, Trop. Binnengew. 4: 749 (*Kaliella*).

1948. DAMMERMAN, Fauna of Krakatau: 515 (*Kaliella indifferens*); 516, fig. 44 (*Kaliella doliolum*).

1949. VAN BENTHEM JUTTING, Bull. Raffles Mus. 19: 64 (*Kaliella doliolum*).

1950. VAN BENTHEM JUTTING, Treubia 20: 410, fig. 28.

3.ix.1951. One adult, fresh and undamaged shell in a sample of soil. This species is known from many islands in the Archipelago, including Java and Sumatra.

Helicarion albellus MARTENS, 1867

1867. MARTENS, Preuss. Exp. O. Asien Zool. 2: 186.

1898. HENDERSON, The Nautilus 12: 16.

1935. PARAVICINI, Arch. Molluskenk. 67: 60, 171 (*Helicarion adolfi*).

1937. VAN BENTHEM JUTTING, *Treubia* 16: 49.
 1941. VAN BENTHEM JUTTING, *Arch. Neerl. Zool.* 5: 309 (*Helicarion adolfi*).
 1950. VAN BENTHEM JUTTING, *Treubia* 20: 417, fig. 35.

2.ix.1951. 2 exx. dead, but fresh. Mt Talon.

3.ix.1951. 1 ex. dead, juv.

4.ix.1951. 1 ex. dead.

26.ix.1951. 1 ex. dead adult.

28.ix.1951. 1 ex. dead in a sample of soil. Legon Semadang. Also known from Sumatra and Java.

Elaphroconcha bataviana (VON DEM BUSCH, 1842)

1842. VON DEM BUSCH in PHILIPPI, *Abb. und Beschr.* 1: 10, pl. 1, f. 3 (*Helix*).
 1928. DEGNER, *Treubia* 10: 322, 357 (*Hemiplecta arguta*).
 1935. PARAVICINI, *Arch. Molluskenk.* 67: 60, 172 (*Hemiplecta arguta*).
 1948. DAMMERMAN, *Fauna of Krakatau*: 513, 515, pl. 11 lower fig. (*Hemiplecta*).
 1950. VAN BENTHEM JUTTING, *Journ. de Conch.* 90: 126.
 1950. VAN BENTHEM JUTTING, *Treubia* 20: 427, fig. 3, 42, 43.

It is not necessary to give a detailed account of the localities as this species was collected nearly every day of our stay on the island. More than 120 shells were brought home, 9 of them alive. None of the adult shells have the carination persistent as in *arguta*, the form known from Sumatra. The peripheral band is narrow in most shells. The umbilical region always stained with brown. The largest shell measures 44 mm maximum diameter and 27.5 mm in height. Known from Java, Sumatra and some satellite islands.

Hemiplecta humphreysiana (LEA, 1841) (fig. 26)

1841. LEA, *Trans. Americ. Philos. Soc. Philad.* 7: 463, pl. 12, f. 16 (*Helix*).
 ?1867. MARTENS, *Preuss. Exp. O. Asien. Zool.* 2: 237 (*Nanina virens*).
 1880. SCHEPMAN in VETH, *Midden Sumatra* 4 (3): 7 (*Nanina densa*).
 1898. ALDRICH, *Nautilus* 12: 1 (*Nanina gemina*).
 1908. ROLLE, *Nachr. Blatt. Malak. Ges.* 40: 70 (*Nanina (Rhysota) humphreysiana niasensis*).
 1912. SCHEPMAN, *Proc. Mal. Soc.* 3: 230 (*Hemiplecta*).
 1928. DEGNER, *Treubia* 10: 323 (*Hemiplecta humphreysiana* var. *complanata*); 324 (*Hemiplecta gemina*); 357 (*Hemiplecta densa*) (Java and Sumatra records only) var. *atropusca* (Sumatra), *gemina* and *humphreysiana*; ?358 (*virens*).
 1933. RENSCH, *Zool. Anz.* 102: 201.
 1934. RENSCH, *Arch. Molluskenk.* 67: 325.
 1934. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 84/85: 13 (*Hemipl. h. niasensis*).
 1935. VAN BENTHEM JUTTING, *Misc. Zool. Sum.* 95: 8.
 1935. PARAVICINI, *Arch. Molluskenk.* 67: 61, 172.
 1939. ADAM & LELCUP, *Res. Sci. Voy. Ind. Or. Neerl.* (2) 20: 19.

1949. VAN BENTHEM JUTTING, Bull. Raffles Mus. 19: 69.

1950. VAN BENTHEM JUTTING, Journ. de Conch. 90: 124.

1950. VAN BENTHEM JUTTING, Treubia 20: 444, fig. 63, 64.

1-7.ix.1951. Three exx. alive, adult. All shells show a vaguely bordered but clearly visible dark chestnut spiral band above the periphery. A similar basal band is sharply bordered above by the periphery and fades to whitish towards the umbilicus. Between the two bands is a narrow whitish zone. The surface is finely obliquely rugose and finely spirally sculptured. Last whorl rounded and faintly angular, around the umbilicus finely concentrically sculptured. I found similar shells in the SCHEPMAN collection sub nomen *densa* var. *herklotsiana*. Our shells are comparatively higher than normal.

2.ix.1951. Two exx. dead, adult. These shells show a very clear spiral sculpture of faintly impressed grooves crossing the oblique rugous undulations. Is this perhaps *Hemiplecta virens* MARTENS? I do not know this species.

5.ix.1951. One ex. dead, adult, undoubtedly belonging to the forma *gemina* as figured by TRYON, Man. of Conch. (2): 12, f. 54 and *bifasciata* MARTENS 1867, pl. 10, f. 4 (non *gemina* VON DEM BUSCH) (fig. 26).

9.ix.1951. 1 ex. juv. dead.

12.ix.1951. 1 juv. dead.

17.ix.1951. 1 ex. alive, adult from Legon Kadam. It has a very narrow umbilicus compared with the other shells.

20.ix.1951. 1 ex. ad. dead.

25.ix.1951. 1 adult, 2 adults damaged, 2 juv. shells. The adults show the additional brown band above the periphery.

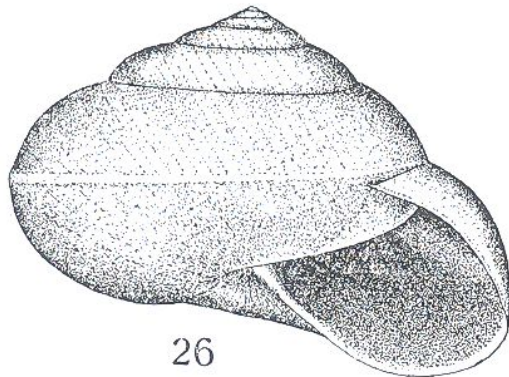
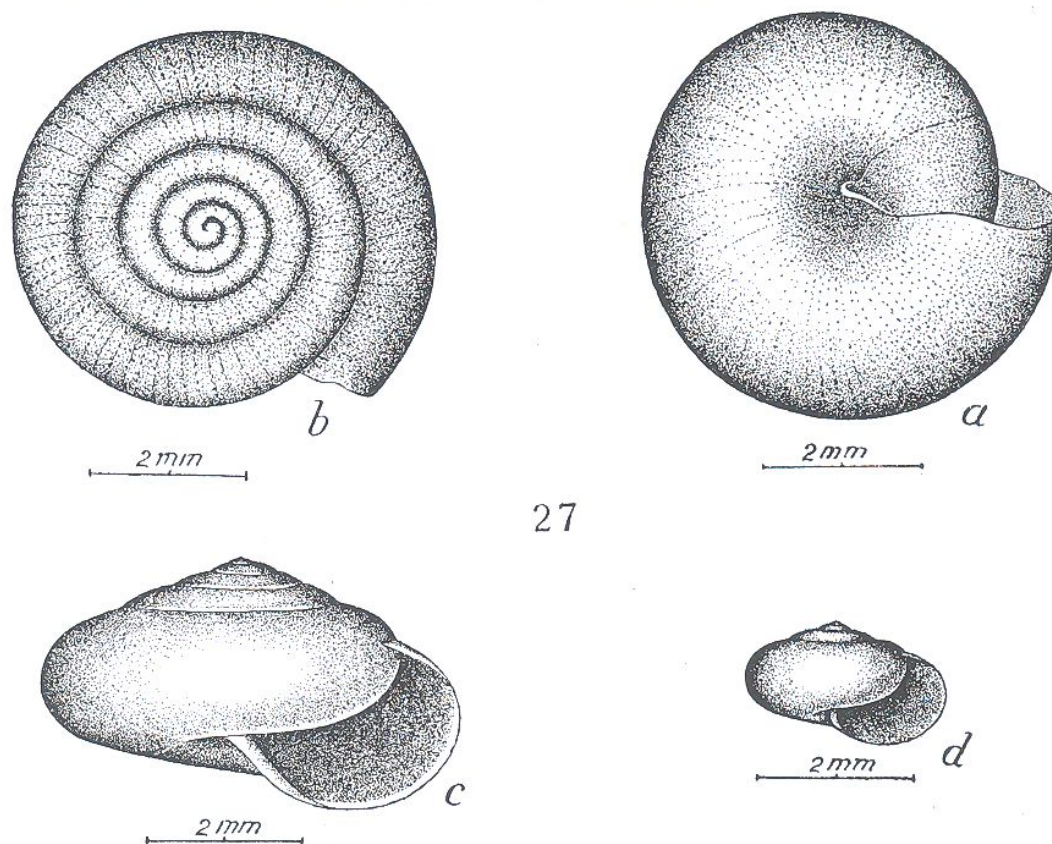


Fig. 26. *Hemiplecta humphreysiana* (LEA) forma *gemina* ($\times 1,3$).

The dimension of the measurable shells are (in millimeters):

date	max. diam.	Height	Height aperture
1-7	40.7	26.3	17.7
	36.4	23.8	16
	37.0	23.6	16
2	39.7	26.0	17.5
	38	26.5	18.5
5	38.7	27.6	16
17	33.0	24.8	16.6
20	34.8	23.0	16.5
25	40.3	26.4	18.0

Microcystina gratilla VAN BENTHEM JUTTING, 1950 (fig. 27 a-e)1950. VAN BENTHEM JUTTING, *Treubia* 20: 448, fig. 68, 69.Fig. 27. *Microcystina gratilla* v. B. JUTTING a, b and c different views d. juv. shell.

In samples of soil, under stones, coral debris and fallen branches and leaves I found this species in great numbers. It was collected on Sept. 1, 2, 3, 4, 6, 8, 9, 12, 18, 20, 21, 25, 26, and 28, alive or dead in 320 specimens. All my shells are larger on the average than is mentioned in the above cited description, having a major diameter of about $4\frac{1}{2}$ mm and $6\frac{1}{2}$ whorls. Besides, my shells lack any spiral sculpture. I therefore doubted the correctness of my identification, which was, however, confirmed afterwards in the Amsterdam Museum by Mrs VAN DER FEEN-VAN BENTHEM JUTTING. Young shells agree with the cited figure and description save for the spiral sculpture, which could not be discovered even under high magnification. In fully adult shells the peristome may have a dark edge. This species is known from Java, Bali and Flores.

Landouria rotatoria (VON DEM BUSCH, 1842)1842. VON DEM BUSCH in PHILIPPI, *Abd. und Beschr.* 1: 2, pl. 1, f. 5 (*Helix*).1880. SCHEPMAN in VETH, *Midden Sumatra* 4: 8 (*Plectotropis sumatrana*).1881. BOCK, P. Z. S. London: 628 (*Helix (Plectotropis) sumatrana*).

1891. MARTENS, Zool. Ergebn. 2: 235 (*Helix rotatoria*); 235 (*Helix (Plectotropis) sumatrana*).
1899. DAUTZENBERG, Ann. Soc. Mal. Belg. 34: 5, pl. 1, f. 1, 1 c.
1906. BULLEN, Proc. Mal. Soc. 7: 128 (*Rectotropis sumatrana*).
1908. ROLLE, Nachr. Blatt. 40: 66 (*Rectotropis sumatrana*).
1925. VAN BENTHEM JUTTING, Treubia 6: 143 (*Plectotropis kraepelini*).
1928. DEGNER, Treubia 10: 361 (*Rectotropis sumatrana*).
1935. PARAVICINI, Arch. Molluskenk. 67: 61.
1937. VAN BENTHEM JUTTING, Zool. Meded. 20: 95, 159.
1934. VAN BENTHEM JUTTING, Misc. Zool. Sum. 84/85: 14 (*Landouria trichotrochium*).
1948. DAMMERMAN, Fauna of Krakatau: 72 (*Plectotropis kraepelini*).
1950. VAN BENTHEM JUTTING, Treubia 20: 461, fig. 79.

2.ix.1951. 1 ex. alive and 3 exx. dead, Mt Talon region.

5.ix.1951. 8 exx. dead.

22.ix.1951. 14 exx. alive, in the ground, under a thin humus layer, apertures closed with an epiphragma. 1 ex. dead in a sample of soil from summit of Mt Parat. 9 exx. dead in a dry river bed, Mt Parat region.

25.ix.1951. 2 exx. dead.

26.ix.1951. 1 ex. dead in a dry marsh, east of Tg Kadam.

28.ix.1951. 1 ex. dead, Legon Semadang. The shells are never very large. The diameter varies between 12 and 15 mm. Widely distributed, also known from Sumatra and Java.

Landouria winteriana (PFEIFFER, 1841)

1841. PFEIFFER, Symbol. Hist. Nat. Helic. 3: 41 (*Helix*).
1928. DEGNER, Treubia 10: 361 (*Rectotropis*).
1937. VAN BENTHEM JUTTING, Zool. Med. 20: 159.
1950. VAN BENTHEM JUTTING, Treubia 20: 463, fig. 80.

5.ix.1951. 4 adults alive.

8.ix.1951. 2 exx. alive, west coast region.

11.ix.1951. 1 ex. alive Mt Putri in a sample of soil.

17.ix.1951. 1 ex. alive in a sample of soil from Legon Kadam.

22.ix.1951. 4 exx. alive.

28.ix.1951. 1 ex. alive in a sample of soil from Legon Semadang. 8 exx., dead, Legon Semadang.

Chloritis helicinoides (MOUSSON, 1848) (fig. 28 a b c)

1848. MOUSSON, Mitt. Naturf. Ges. Zürich 1: 266 (*Helix*).
1911. EHRMANN, Ber. Naturf. Ges. Leipzig 38: 48.
1948. DAMMERMAN, Fauna of Krakatau: 515.
1950. VAN BENTHEM JUTTING, Treubia 20: 475, fig. 90.

A very common species all over the island. More than 100 specimens have been collected, alive and dead. Living on shrubs and on the ground. The specimens from the ground, when not dead, had retracted into their shells, closing the aperture by an epiphragma of white colour, similar to epiphragmas of European *Helices*. The shells are very variable in the

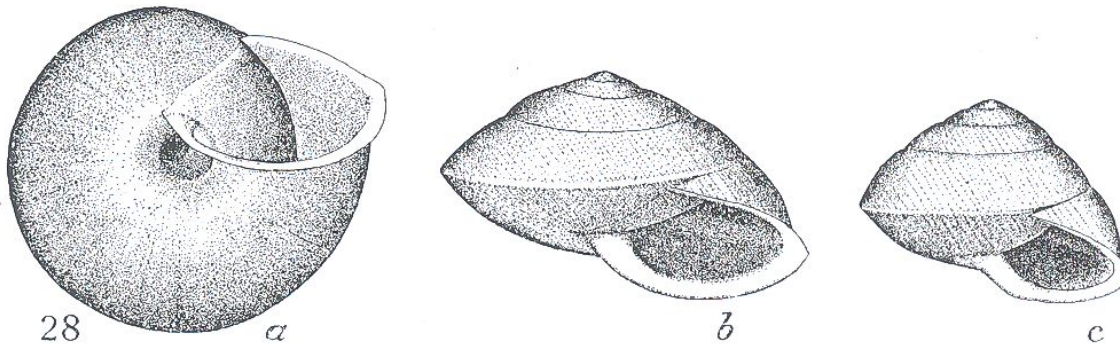


Fig. 28. *Chloritis helicoides* MOUSSON $\times 2.7$.
 a. seen from the base
 b. extremely flat shell
 c. extremely conical shell

height-breadth ratio. In some small specimens the shell is distinctly trochoid, with convex sides. The diameter varies from 8-16.5 mm. The height from 7-10.5 mm. This species is only twice recorded from W. Java: MOUSSON 1848 (Tjiringin), MARTENS 1867 (Anjer). It is further known from Krakatau, Trouwers I., Klapper I., and Klein Kombuis I.

***Amphidromus* ?*perversus* (LINNE, 1758)**

1784. MARTYN, Univ. Conch. 3: pl. 115 (*Limax aureus*).
 1824. DONOVAN, Nat. repository 2, pl. 49, (*Helix perversa*).
 1900. PILSBRY, Man. of Conch. (2) 13: 161, pl. 54, f. 70, 71, 72 (*Amphidromus aureus*).
 1903. GUDE, Journ. of Malac. 10: 56 (*Amphidromus aureus*).
 1941. VAN BENTHEM JUTTING, Arch. Neerl. Zool. 5: 316 (*Amphidromus perversus*).
 Prinseneiland record only.

Amphidromus is an inhabitant of Prinseneiland according to the above references. The island is the type-locality of *Aphidromus aureus* (MARTYN), where it was collected by Sir JOSEPH BANKS, who accompanied COOK on his first voyage, according to PILSBRY on: "Prince island, in Sunda Strait, off the N. W. extreme of Java, on the upper branches of high trees". P. Panaitan (= Prinseneiland) being situated on the W., better on the S. W. extreme of Java, I asked Dr REES of the British Museum for some more information and through his kindness I was provided with the following extract from the official account of COOK's voyage, which he kindly sent to me. COOK was sailing southward from

Batavia, which he left on December 27th, 1770, on his way to Cape of Good Hope and home, as this extract from the official account of the voyage indicates. "On Thursday, the 27th December at six o'clock in the morning we weighed again and stood out to sea. After much delay by contrary winds we weathered Pulo Pare on the 29th and stood in from the main; soon after we fetched a small island under the main, in the midway between Batavia and Bantam, called Maneater's Island. The next day we weathered first Wapping Island and then Pulo Babi. On the 31st we stood over to the Sumatra shore; and on the morning of New Year's day 1771, we stood over for the Java shore. We continued our course as the wind permitted us until three o'clock in the afternoon of the 5th, when we anchored under the south east side of Prince's Island in eighteen fathoms, in order to recruit our wood and water".

From the above it is clear that Sir JOSEPH BANKS collected his shells on Prinseneiland, Jan. 5th., 1771.

For the identification of "*Amphidromus perversus*", mentioned from Prinseneiland I could only compare my shells with the literature on the *Amphidromus* from Prinseneiland as the type of *aureus* could not be traced. My shells however, could neither be identified with *aureus* MARTYN, nor *aureus* PILSBRY. They decidedly do not belong to *Amphidromus perversus*, its races or its varieties in the conception of VAN BENTHEM JUTTING 1950 (Treubia 20: 487). I could not trace the types of *Limax aureus* MARTYN. MARTYN says they were in Mr JACOB FORSTER's collection in 1784. They are not in the British Museum as Dr REES kindly informed me. I cannot accept this species to be extinct owing to the Krakatau disaster of 1883. Were MARTYN's shells and the original shells of BANKS not the same thing? *Limax aureus* MARTYN was in my opinion correctly referred to *Amphidromus perversus* (VAN BENTHEM JUTTING 1941). I have seen his pictures of *aureus*, which clearly represent *A. perversus sultanus*. The pictures in DONOVAN, copied by PILSBRY seem different to me and come closer to my shells, though they are not identical. The outline is different, the whorls less rounded, there is no white zone below the sutures and no reddish brown undulating stripes are to be seen on the median and basal parts. The peristome is not reflected and recurved, but expanded and only very little recurved. The columellar region is similar, but my shells are clearly perforate.

Leaving the systematic position of *A. aureus* as it is for the time being, I can only state that *A. perversus* is no inhabitant of Prinseneiland, at least I did not find it there. If PILSBRY's, DONOVAN's and MARTYN's *aureus* may ultimately prove to be conspecific with the recently collected

Amphidromus shells from Prinseneiland described below, they must fall into the synonymy of *A. banksi* n.sp. MARTYN's name is invalid.

***Amphidromus banksi* nov. sp. (fig. 29 a-e) PLATE 5**

Diagnosis: A sinistral *Amphidromus*(ss) allied to *A. enganoensis* FULTON with a thin outer lip, expanded, but only little recurved, the umbilical callus arching over the umbilicus so that the shells are always perforate.

None of the more than 150 shells collected on P. Panaitan agrees with *Amphidromus aureus* MARTYN, DONOVAN or PILSBRY. Our shells are always sinistral, plain yellow, plain creamy white, or spirally banded with a few

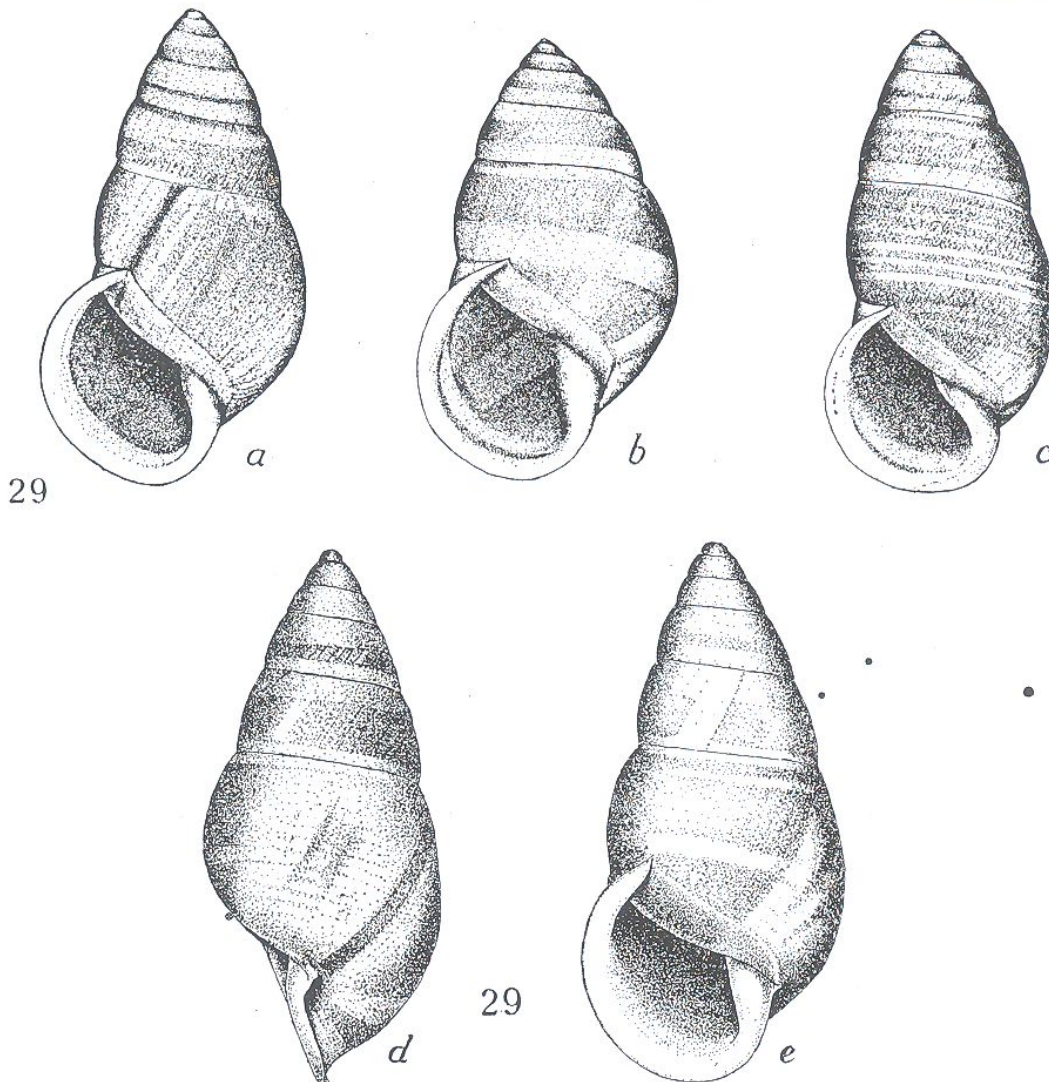


Fig. 29. *Amphidromus banksi* n. sp.
 a. Mt. Kadam region holotype
 b, c, d, e different shells showing the variation in form and pattern

broad or many narrow bands of brown, or some greenish tint. The bands may flow together but then generally leave a yellow, or at least a light coloured girdle along the periphery. Sometimes the last whorl is vertically streaked with dark greenish, the streaks fading, without a sharp border; the spire however is always spirally banded when the shell is not plain yellow or whitish. A very narrow white line is generally visible below the suture. A varix of violet brown is nearly always present on the penultimate and last whorl. In yellow shells this varix is white. The spiral banding stops abruptly at some distance from the varix leaving yellow zones at both sides. The peristome may be coloured violaceous behind. The apex is never coloured dark, the seven whorls are convex but not so much rounded as in PILSBRY's figures of *A. aureus*, the shells being oblong-ovate. The aperture is always dark violet within, except in the yellow or whitish shells. The peristome is thin, broadly expanded and only very little curved at the edge. The columella is thick, almost straight, a little twisted, convexly folded. The reflexed columellar lip bends over the umbilicus, causing a small protuberance as seen from the side. Shells always perforate. The figures in PILSBRY of *A. enganoensis* (1900, *Man. of Conch.* (2) 13, pl. 61, f. 53, 54 and 55) come very close to my shells and the original description of *A. enganoensis* given by FULTON matches nearly with the Panaitan shells. The shells of *A. enganoensis* which I could study in the Amsterdam Museum differ in the wider perforation as the columellar arch is larger, the whorls being more rounded in *enganoensis* shells. In general outline the new species resembles *perversus* forms, but differs from the latter in having a perforate shell, a thin, expanded, hardly reflected outer lip and not a thick recurved one. Furthermore this new species is always coloured olivaceous within the aperture except for the unicolorous yellow or white varieties. It is always sinistral. My shells belong to one species only. They are very numerous all over the island, living in the tree tops, but also in lower regions as I could pick them without climbing a tree, from the leaves or stems. In all regions this *Amphidromus* is equally plentiful, thus showing that they have no preference for special trees.

The type is a shell from the set with reg. nr. 3570 D (fig. 29a) marked nr. 55, collected Sept. 19th. in the Mt Kadam region. It is the first one from the photograph in the upper row. Length 49.2 mm. Width 27.5 mm. Ap. height 24.1, width 19.8 (All measurements including the peristome). The expanded outer lip measures 3 mm. *)

* Type in the Amsterdam Museum. Paratypes in the Museum Zoologicum Bogoriense, The Leiden Museum, Senckenberg Museum at Franckfort a.M., Mus. of Comp. Zool. Cambridge. U.S.A.

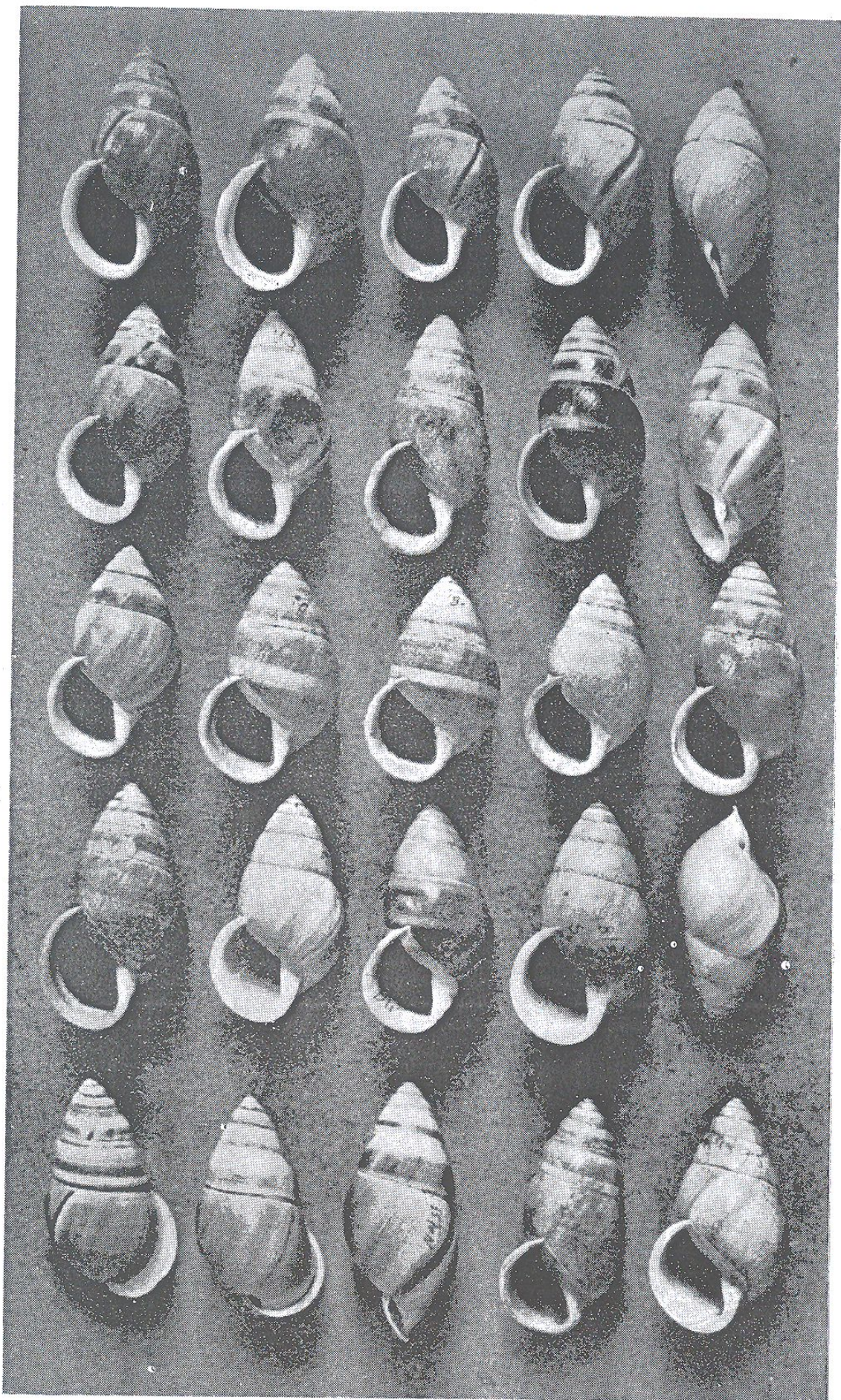


Plate V. *Amphidromus banksi* n. sp. Series of shells. No. 1 of the upper row is the holotype.

It has been named after Sir JOSEPH BANKS, who was the first to collect shells on P. Panaitan.

***Pseudopartula arborascens* n.sp. (fig. 30 a-c, 31, 32).**

Shell sinistral, perforate, thin, transparent, milky white and glassy; pyramidal trochiform with a little more than five whorls; whorls only little rounded, nearly flat, the last whorl taking the greater part of the height of the shell. Angulate at the periphery, sometimes faintly carinate. Base rounded. Aperture irregularly oval, very oblique, peristome very much flatly expanded, white, not thickened, not reflected or recurved. The base runs at right angles on the line from top to periphery at the

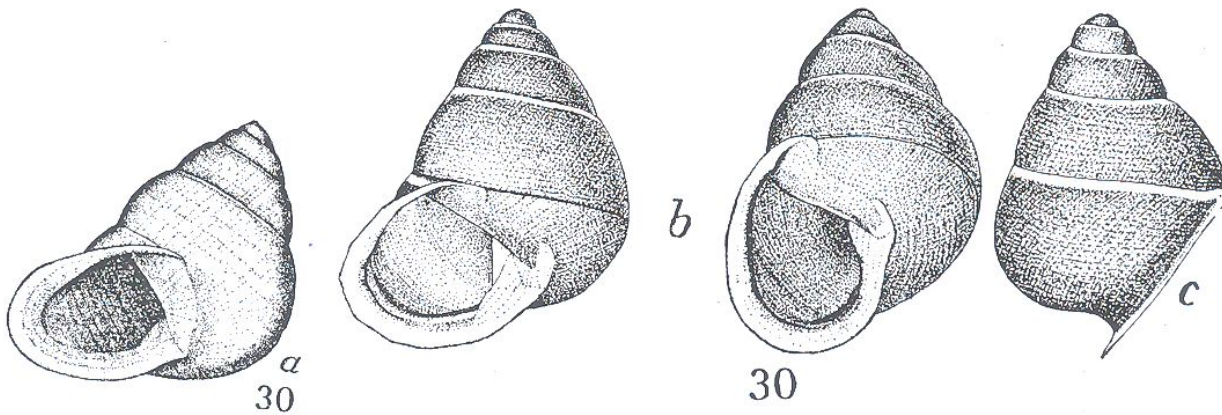
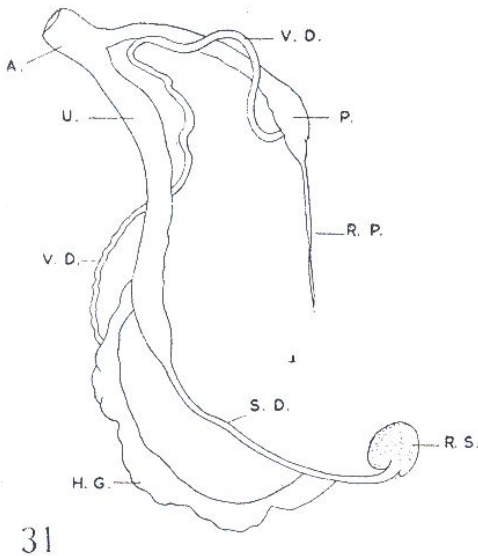


Fig. 30. *Pseudopartula arborascens* n. sp.
 a. R. Harashas region. Holotype
 b. var. *rosea* n. var.
 c. Holotype of the new variety



31
 Fig. 31. *Pseudopartula arborascens*,
 genitalia.

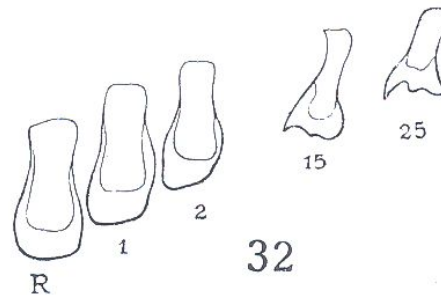


Fig. 32. *Pseudopartula arborascens*
 — radula-elements.

opposite side of the aperture. Columella very oblique, columellar lip recurved, hiding part of the umbilicus. Lips connected by a very thin but clearly marked shining callus. Umbilicus deep and narrow.

Suture impressed, not deep, beneath bordered by a white line. Spire small with a blunt apex, first whorls nearly smooth with fine longitudinal lines, next whorls showing irregular lines of growth which are crossed by a regular, clearly visible spiral sculpture. No dark band in the aperture, shell not black topped. The greater diameter is always larger than the total height of the shell. Variable in height and breadth, but the height-breadth ratio is about constant. There occurs a colour variety for which I propose the name *rosea*, n.var. It is of a red brown colour all over, sometimes this reddish colour is only present in the younger part of the last whorl. The shell remains transparent and the white peristome and the white line around the suture are very conspicuous.

Type: the largest of three shells collected Sept. 3rd from type locality: P. Panaitan, Tjiharashas region. Type of the variety: the only reddish shell collected on P. Panaitan Sept. 5th., same locality as the type. The holotype will be preserved in the Amsterdam Museum. Paratypes in the Museum Zoologicum Bogoriense, the Amsterdam and Leiden Museums, Senckenberg Museum and the Mus. of Comp. Zool.

Its nearest relative is *Pseudopartula galericulum* from Java, from which it differs in the more transparent shell and the stouter form, being conoid-pyramidal instead of high conical or elongate. Only three specimens were collected alive. Thirty-two found dead on the ground, two of them juveniles. Mrs VAN DER FEEN-VAN BENTHEM JUTTING dissected a specimen and made a drawing of the genitalia and radula. The spermatheca duct is very long, longer than is shown in the drawing. The receptaculum seminis is very different from that of *Draparnaudia sinistrorsa*. I could not find a description of the anatomy of *Pseudopartula*. The radula (fig 32) does not differ much from the radula of *Ps. galericulum* as figured by RENSCH.

1-2.ix.1951. 3 exx. alive. On foliage and the stem of a tree.

2.ix.1951. 9 exx. dead, two of them var. *rosea*.

3.ix.1951. 3 exx. dead, Tjiharashas region, the largest, type of the new species (fig. 30a).

4.ix.1951. 2 exx. dead, the bigger one is of a fine red brown colour (fig. 30b), the smaller is pale and shows the colouring on the younger part of the last whorl. 1 juv. shell.

5.ix.1951. 1 ex. type of the var. *rosea* fig. 30c. There are no other differences with the type than the colour only; 2 ex. white, dead.

8.ix.1951. 1 ex. dead, west coast region.

10.ix.1951. 6 exx. dead.

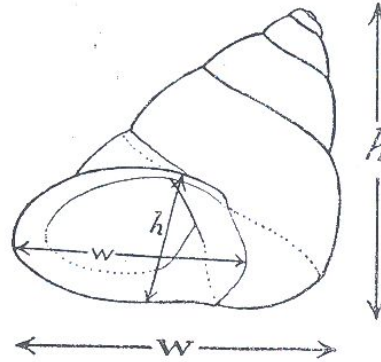
11.ix.1951. 3 exx. dead from Mt Putri.

18.ix.1951. 1 ex. dead, N.W. part of the island; 1 ex. juvenile.

20.ix.1951. 2 exx. dead.

Its nearest relative, *Pseudopartula galericulum*, is known from Java. A subspecies, *Pseudopartula galericulum gedeana*, is known from Java and Sumatra. It is curious that a new species of a typical *Pseudopartula* turn up in P. Panaitan. The other species of this genus are *Namina dohertyi* ALDRICH and *Helix nasuta* METCALFE.

Dimension of the measurable shells in millimeters (measured as indicate in fig. 33)



33

Fig. 33. *Pseudopartula arborascens* showing what measures have been taken.

Date	Shell		Aperture			
	Height	Width	Height	Width		
Sept. 1951	2	14	13	7	8	
		14	13	8	8	
1-7	13	12.5	7	7		
2	13.0	14.5	8	9		
	12.2	13.4	7.5	8.9		
	13.0	14.0	7.8	9		
	12.4	13.6	7.5	9		
	11.0	13.2	7.2	9		
	12.1	13.5	7.3	9		
	12.0	—	—	—	—	
	11.7	13	7.3	8.7		var. <i>rosea</i>
—	15.0	8.7	9.4		var. <i>rosea</i>	
3	13.0	14.1	8.0	9.6		
	11.8	13.0	7.9	8.5		
	13.7	15.2	8.5	10.0		type n. sp.
4	13.2	14.1	8.1	9.0		
	11.2	13.1	7.4	8.7		
5	12.0	13.5	8.0	9.0		type var. <i>rosea</i>
	11.5	13.4	7.7	8.7		
	12.0	13.8	7.8	8.9		
8	11.5	13.6	7.6	8.7		

Date	Shell		Aperture	
	Height	Width	Height	Width
Sept. 1951 10	11.8	14.1	8.0	9.0
	12.5	14.1	8.2	9.1
	13.0	14.5	8.2	9.2
	10.2	12.5	7.1	8.0
	12.0	15.1	8.6	9.7
	13.6	15.4	8.9	10.0
11	—	14.4	8.8	9.4
	12.5	13.2	7.7	9.0
	13.5	14.7	8.6	9.8
18	11.7	14.0	8.0	8.5
20	13.3	14.5	8.4	9.2
	12.6	14.2	8.3	9.2

Distribution of the species.

	Java	Sum.	
<i>Polymesoda bengalensis</i> (LAM.)	—	—	entire Indo-Austr. Region
• „ <i>erosa</i> (SOL.)	—	—	„
„ <i>expansa</i> (MOUSS.)	—	—	„
<i>Neritodryas dubia</i> (GMEL.)	—	—	„
„ <i>subsulcata</i> (SOW.)	—	—	„
<i>Nerita planospira</i> ANTON	—	—	„
<i>Theodoxus diadema</i> (RECL.)	—	—	„
„ <i>oualaniensis</i> (LESS.)	—	—	„
<i>Neritina aculeata</i> (RECL.)	—	—	Borneo, Singapore
„ <i>auriculata</i> LAM.	—	—	entire Indo-Austr. Region
„ <i>communis</i> (Q. & G.)	—	—	„
„ <i>pulligera</i> (L.)	—	—	„
„ <i>sulculosa</i> MARTS	—	—	Celebes, Buton, Flores
„ <i>turrita</i> (GMEL.)	—	—	entire Indo-Austr. Region
„ <i>variegata</i> LESS.	—	—	„
• „ <i>violacea</i> (GMEL.)	—	—	„
„ <i>zigzag</i> LAM.	—	—	„
<i>Septaria suborbicularis</i> (SOW.)	—	—	„
„ <i>tessellata</i> (LAM.)	—	—	„
<i>Neritilia rubida</i> (PSE)	—	—	Celebes, Obi
<i>Cyclophorus perdix perdix</i> (BROD. & SOW.)	—	—	Madura, Bali N. Kambangan, Krakatau
<i>Lagochilus ciliferum</i> (MOUSS.)	—	—	
„ <i>ciliocintum</i> (MRTS)	—	—	Java, N. Kambangan, Bawean, N. Baron (Bali ssp.)
„ <i>obliquistriatum</i> BULLEN	—	—	
<i>Leptopoma altum</i> MLLDFF	—	—	N. Kambangan, P. Weh
„ <i>perlucidum</i> (GRAT.)	—	—	Sebesi, Trouwers I., Klapper I., Meeuwen I., N. Kambangan, Moluc- cas, Sumatra

	Java	Sum.	
<i>Alycaeus crenilabris</i> MLLDF	—	—	
<i>Pila conica</i> (GRAY)	—	—	Borneo, Celebes, Lesser Sunda Is.
<i>Viviparus javanicus</i> (BUSCH)	—	—	Borneo, Celebes, Lesser Sunda Is.
<i>Truncatella guerini</i> (VILLA)	—	—	entire Indo-Austr. Region
<i>Omphalotropis columellaris</i> QUADR. & MLLDF	—	—	Noordwachter, Klein Kombuis, Djakarta Bay Is. Philippines
<i>Stenothyra ventricosa</i> (Q. & G.)	—	—	Krakatau, Celebes, Sumatra, Sumba
<i>Faunus ater</i> (L.)	—	—	entire Indo-Austr. Region
<i>Brotia testudinaria</i> (BUSCH)	—	—	Bawean, N. Kambangan
<i>Thiara riquetii</i> (GRAT.)	—	—	Celebes, Borneo, Lombok
„ <i>scabra</i> (MULLER)	—	—	entire Indo-Austr. Region
<i>Melanoides clavus</i> (LAM.)	—	—	entire Indo-Austr. Region
„ <i>punctata</i> (LAM.)	—	—	entire Indo-Austr. Region
„ <i>plicaria</i> (BORN)	—	—	entire Indo-Austr. Region
„ <i>tuberculata truncatula</i> (LAM.)	—	—	entire Indo-Austr. Region
<i>Telescopium telescopium</i> (L.)	—	—	entire Indo-Austr. Region
„ <i>mauritsi</i> BUTOT	—	—	
<i>Siphonaria laciniosa</i> (L.)	—	—	entire Indo-Austr. Region
„ <i>pisangensis</i> HUBEND.	—	—	Nw. Guinea
„ <i>atra</i> Q. & G.	—	—	entire Indo-Austr. Region
<i>Lymnaea rubiginosa</i> MICHELIN	—	—	entire Indo-Austr. Region
<i>Anisus convexiusculus</i> (HUTT.)	—	—	entire Indo-Austr. Region
<i>Hippeuthis thienemanni</i> RENSCH	—	—	
<i>Segmentina calathus</i> (RENSCH)	—	—	Aroe Is.
<i>Ferissia javana</i> (MARTS)	—	—	Celebes
<i>Filicaulis bleekeri</i> (KEFERST.)	—	—	Borneo, Sebesi, Lesser Sunda Is., Moluccas
<i>Succinea minuta</i> MRTS	—	—	Krakatau, Bali, Lombok, Sumba
<i>Nesopupa malayana</i> (ISSEL)	—	—	Borneo, Djakarta-bay Is., Timor, Sumba, Philippines
<i>Gastrocopta euryomphala</i> PILS.	—	—	Philippines, Djakarta-bay
<i>Prosopas achatinaceum</i> (PFR.)	—	—	entire Indo-Austr. Region
<i>Opeas clavulinum</i> (POT. & MICH.)	—	—	entire Indo-Austr. Region
„ <i>gracile</i> (HUTT.)	—	—	entire Indo-Austr. Region
<i>Charopa microdiscus</i> v. B.J.	—	—	Celebes, Ambon
<i>Trochomorpha planorbis</i> (LESS.)	—	—	Entire Indo-Austr. Region
„ <i>cfr timorensis</i> MARTS	—	—	Malaya, Timor
<i>Coneuplecta bandongensis</i> (BTG)	—	—	Borneo, Celebes, Bali, Sumbawa, Moluccas
<i>Liardetia indifferens</i> (BTG.)	—	—	Bali, Sumba, Timor, Kalao, Moluccas
„ <i>doliolum</i> (PFR.)	—	—	Ambon, Banda, Celebes, Philipines, Marianen, Carolines
<i>Helicarion albellus</i> MRTS	—	—	Bali, Lombok, Celebes, N. Kam- bangan
<i>Elaphroconcha bataviana</i> (BUSCH)	—	—	Meeuwen I., Bawean, Madura, N. Kambangan, Krakatau
<i>Hemiplecta humphreysiana</i> (LEA)	—	—	Satellite Is. of Java; Borneo

	Java	Sum.	
<i>Microcystina gratilla</i> v. B.J.	—		Bali, Flores
<i>Landouria rotatoria</i> (BUSCH)	—	—	Lesser Sunda Is., Philippines
„ <i>winteriana</i> (PFR.)	—		Borneo, Lesser Sunda Is., Celebes, Moluccas, Philippines
<i>Chloritis helicinoides</i> (MOUSS.)	—		Satellite Is. of Java
<i>Amphiromus banksi</i> n.sp.	?	?	P. Panaitan
<i>Pseudopartula arborascens</i> n.sp.	?	?	P. Panaitan

CONCLUSIONS

As the mollusc fauna of south Sumatra and west Java is not well known at the moment conclusions will be hazardous and cannot be definitive. The following remarks must therefore be regarded as provisional.

Seventy two species are dealt with in this paper, three of which, *Telescopium mauritsi*, *Amphidromus banksi* and *Pseudopartula arborascens* are new to science. Together with the rather aberrant *Lagochilus obliquistriatum* these species indicate that the fauna of P. Panaitan was not completely destroyed by the Krakatau disaster of 1883, as they appear to be endemic and have lived there for a considerable time. The three *Polymesoda* species have a wide distribution and P. Panaitan shares these shells with Sumatra and Java. The species of the genera *Nerita*, *Neritodryas*, *Theodoxus*, *Neritina*, *Septaria* and *Neritilia* do not give sufficient information about the origin of the fauna of this island. They are partly widely distributed throughout the archipelago, or are marine or semi marine species.

As far as I know, *Neritina sulculosa*, *Neritilia rubida*, and *Siphonaria pisangensis* are new records for this region. I cannot accept them as new arrivals, and in my opinion their presence supports the view that the Krakatau disaster has not been fatal to the original fauna of P. Panaitan. The other recorded shells of this group are known from Sumatra, Java, and many other islands, except *Neritina aculeata* which is recorded for Borneo, Sumatra and Singapore only. Other marine or semi marine species are *Truncatella guerini*, *Faunus ater*, *Telescopium telescopium*, *T. mauritsi*, *Siphonaria laciniosa*, *S. pisangensis* and *S. atra*. The Auriculidae will be treated in another paper together with the marine fauna. The remaining forty five species consist of thirty land molluscs and fifteen freshwater forms. Four of the fifteen freshwater shells are not known from Sumatra: *Stenothyra ventricosa*, *Brotia testudinaria*, *Thiara riqueti* and *Ferissia javana*, but they are likely to turn up there in the course of time. Purely Sumatran freshwater shells have not been met with on the

island. Of the thirty species of land molluscs, fourteen have been recorded for Sumatra and Java or have a still wider distribution.

Three species: *Nesopupa malayana*, *Gastrocopta euryomphala* and *Trochomorpha timorensis* are not known from Java or Sumatra. *Tr. timorensis* is recorded for Timor and Malaya; *Nesopupa malayana* and *Gastrocopta euryomphala* are known from the Philippines and the former also from Borneo, Timor and Sumba. Both these latter species are common on nearly all the coral islands of Djakarta Bay. I always found them in numbers in samples of soil from these small islands. The remaining thirteen species do afford information on the origin of the mollusc fauna of P. Panaitan. Two of them are new to science and may occur also in south Sumatra and west Java, while the other species are purely javanese. Not a single purely sumatran element has so far been found and we may safely assume the mollusc fauna of P. Panaitan to be of javanese origin.
