

The Malayan Streptaxidae of the Genera Discartemon and Oophana

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Introduction

AS A CONTINUATION to my two former monographs of families of land molluscs from limestone hills in Malaya¹, Mr. M. W. F. Tweedie, Director of the Raffles Museum, Singapore, submitted to me for identification and reporting the Streptaxidae collected by him and his collaborators in these hills.

The "Synopsis of the genus *Streptaxis* and its allies" by G. K. Gude (1902, Proc. Malac. Soc. London, Vol. 5, p. 201-244, pl. 4 and 1903, Ibid. Vol. 5, p. 322-327, pl. 12) provides a convenient starting point on which to base an account of the classification and the distribution of the species of *Streptaxis* s.l. from Malaya and adjoining regions. From later publications this basic list has been supplemented and corrected. The species of *Huttonella* and *Sinoennea* were not included in Gude's Synopsis.

According to the form and sculpture of the shell three groups of species can be distinguished in Malaya: 1. the discoid, rather regular species, 2. the helicoid, irregular species and 3. the pupoid species². Their characters are briefly summarized below.

1. Discoid species. Genus *Discartemon* L. Pfeiffer, 1856. Genotype *D. discus* (L. Pfeiffer, 1851). Type locality unknown.
 1. Wide umbilicus.
 2. Spire very low conical, flat or concave.
 3. Almost regularly coiled (not or hardly eccentric).
 4. With one parietal lamella and (occasionally) 1-3 palatal teeth.

1. The Malayan species of *Boysidia*, *Paraboysidia*, *Hypselostoma*, *Gylittrachela*, etc. (1950, Bull. Raffles Mus. 21, p. 5-47) and the Malayan species of *Opisthostoma*, etc. (1952, Bull. Raffles Mus. 24, p. 5-62).

2. The deflection of the whorls in Streptaxids is really an adult character. In young shells the whorls are regular.

2. Helicoid species. Genus *Oophana* Ancey, 1884. Genotype *O. bulbulus* (Morelet, 1862). Type locality Pulo Condor, off the Cochin China coast.
 1. Narrow umbilicus.
 2. Spire conical, globular or low-turreted.
 3. Oblique to very eccentric.
 4. With 1-2 parietal lamellae (not in subgenus *Stremmatopsis*) and (occasionally) one or more teeth at columellar and palatal side.
3. Pupoid species. Genus *Sinoennea* Kobelt, 1904. Genotype *S. strophiodes* (Gredler, 1881). Type locality Hunan, China. Genus *Huttonella* L. Pfeiffer, 1855. Genotype *H. bicolor* (Hutton, 1834). Type locality Mirzapur, India.
 1. Narrow umbilicus.
 2. Pupiform or high cylindrical shell.
 3. Almost regularly coiled (not or hardly eccentric).
 4. Aperture generally with several teeth and lamellae.

It must be emphasized that the above classification is based on shell characters only, no anatomical details, not even a radula, being available.

In the following pages only the discoid and helicoid species will be treated. The pupoid species are reserved for a future paper.

For the loan of specimens, in some cases even the holotypes and paratypes, the author is very much indebted to the Raffles Museum, Singapore, to the Senckenberg Museum, Frankfurt am Main, to the British Museum (Natural History), to the Zoological Museum of the University of Cambridge and to Mr. F. F. Laidlaw, Ventnor, Isle of Wight.

The holotypes of all the new species described in this paper are preserved in the Amsterdam Zoological Museum. Of those species of which sufficiently large series are available, paratypes will be deposited in the Raffles Museum, Singapore, and in the British Museum (Natural History), London.

Measurements throughout are in millimetres; all dimensions include the peristome. In the very eccentric, oblique species, especially of the subgenus *Haploptychius* of *Oophana*, measurements can only be given approximately.

The only anatomical description of a Streptaxid is that of *Streptaxis obtusus* Stoliczka from Moulmein, by Stoliczka (1871, Journ. As. Soc. Bengal, Vol. 40, p. 161). It was almost verbally repeated by Blanford & Godwin Austen (1908, Fauna of British India, p. 2-4).

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The colour of the animals has been reported as either wholly or partly bright yellow, pink or red. Compared with the usual greyish-brown to brownish-grey colour of most other snails, the Streptaxidae thus make a very pretty impression.

The animals are said to be carnivorous, "eating other slugs and Mollusca", a statement which originates from Gray (1860, Ann. Mag. Nat. Hist. (3) Vol. 6, p. 268). There are almost no exact later observations.

Neither has the mode of reproduction been adequately investigated. Stoliczka (l.c. p. 160) supposed them all to be oviparous. Crosse & Fischer (1863, Journ. de Conch. Vol. 11, p. 356 and 357), on the contrary, quoting a letter from Michau, reported *Streptaxis bulbulus* and *Str. michau* to be viviparous, producing only one young at a time.

In species of *Oophana*, *Haploptychius* and *Discartemon* no temporary apertural armature is formed during the growth of the shell. The immature shells of these genera are always edentate (cf. also Crosse & Fischer, 1863, l.c. p. 356). As we shall see later the pupoid species of the genera *Sinoennea* and *Huttonella* produce quite a system of teeth and lamellae in the aperture of the immature shells. During further development this mouth armature is resorbed again. At the final peristome the definite teeth and lamellae are formed anew.

Even on the habitat of the Streptaxidae observations are scanty. Some species live in moist places, on the ground, or in the superficial ground layer among earth, dead leaves, under stones, decaying wood and low herbs. Others are reported to live on limestone rocks, either on the exterior surface of the rocks, or in crevices and caves. In Malaya the Streptaxids have only been found on limestone hills.

The family Streptaxidae ranges over Asia, Africa and South America, chiefly in the tropics. In Asia the tropical regions of India, Burma, Southern China, French Indo-China, Siam, Malaya and the Philippines are rich in species. The Malay Archipelago, on the contrary, has only yielded three species in Celebes and one in Borneo¹. Neither from Sumatra or Java, nor from any other island has any species been recorded with the exception of *Huttonella bicolor* (Hutt.) which has been recorded from Malaya, the Philippines and several Malaysian islands.

As the total amount of species in Malaya is small in comparison with the entire Asiatic fauna of Streptaxidae I have refrained from adding to the systematic part of the present report a catalogue of all the

1. The very imperfect record by Martens (1867, Ostas. Landschn. p. 387) of a possibly immature Streptaxid shell found by him in Borneo, is left out of account here.

species hitherto described, as I did when revising the Vertiginidae and the *Opisthostoma* of the Malay Peninsula. The Synopsis of Gude, mentioned above, is a satisfactory base for further information¹.

The following lists give an account, firstly, of the limestone hills and the species of *Discartemon* and *Oophana* subg. *Haploptychius* found on them, and, secondly of the discoid and helicoid Streptaxidae and their distribution on the various hills (Fig. 1).

List of Localities and Species

Perlis

1. Kaki Bukit (6° 39' N, 100° 12' E): *D. stenostomus*.
2. Bukit Chuping (6° 30' N, 100° 16' E): *D. hypocrites*.

Kedah

3. Gunong Keriang (6° 11' N, 100° 20' E): *D. roebeleni*.
4. Bukit Baling (5° 41' N, 100° 55' E): *O. (H.) balingensis*.

Perak

5. Mount Tchehel (4° 55' N, 101° 11' E): *D. plussensis*.
6. Sungei Siput (4° 52' N, 101° 7' 30" E): *D. plussensis*.
7. Kramat Pulai (near Gunong Rapat): *D. leptoglyphus*.
8. Gunong Rapat (4° 34' N, 101° 7' E): *D. leptoglyphus*.
9. Gunong Kroh (near Gunong Rapat): *D. leptoglyphus*.

Kelantan and Peninsular Siam

10. Tale Sap: *D. nummus*.
11. Biserat: *D. sykesi*.
12. Belimbing: *O. (H.) striatula*.
13. Batu Tongkat (4° 51' 30" N, 101° 58' E): *D. collingei*.
14. Gua Nenek (4° 50' N, 102° E): *D. collingei*, *D. platymorphus*.

Pahang

15. Gua Sai (4° 13' N, 101° 59' E): *D. collingei*.
16. Gua Tinggi (4° 11' N, 102° 11' 30" E): *O. (H.) thamnophila*.
17. Kota Tongkat (3° 53' N, 102° 29' E): *O. (H.) atopospira*.
18. Bukit Serdam (3° 51' N, 101° 55' E): *O. (H.) diaphanopepla*.
19. Bukit Chintamani (3° 27' N, 102° 5' E): *O. (H.) eutropha*.

¹ *Streptaxis conoides* Pfeiffer, 1854, although recorded from "Malacca" by Pfeiffer (1868, Mon. Helic. Vol. 5, p. 440) and from "Perak" by Tenison Woods (1888, Proc. Linn. Soc. N.S.W. (2) Vol. 3, p. 1009) is not a Malayan species, but a native of Venezuela (Gude, 1902, Proc. Malac. Soc. London, Vol. 5, p. 230).

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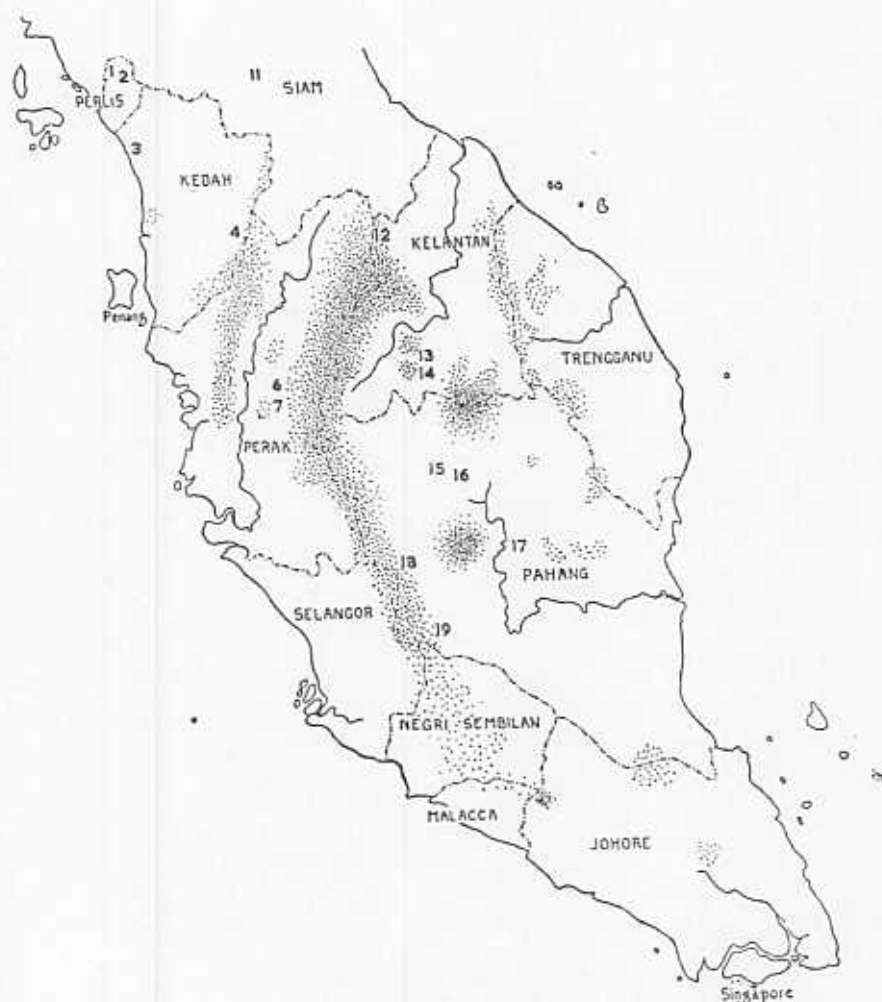


Fig. 1. Map of the Malay Peninsula showing localities of limestone hills where shells were collected. Stippling indicates mountainous areas. Numbering follows the list of localities in the text, but 6 stands for 5 and 6 (Mount Techehel and Sungei Siput) and 7 stands for 7, 8 and 9 (Kramat Pulai, Gunong Rapat and Gunong Kroh). The Tale Sap (10) is north of the area shown on the map.

List of Species, referred to the numbered Stations in the previous List

Genus *Discartemon*.

- plussensis*: 5, 6.
roebeleni: 3.
collingei: 13, 14, 15.
stenostomus: 1.
sykesi: 11.
nummus: 10.
platymorphus: 14.
leptoglyphus: 7, 8, 9.
hypocrites: 2.

Genus *Oophana*.

Subgenus *Haploptychius*.

- eutropha*: 19.
thamnophila: 16.
striatula: 12.
balingensis: 4.
atopospira: 17.
diaphanopepla: 18.

Of the 15 Malayan species discussed in this paper most species occur on one mountain only. The localities Mount Tchehel and Sungei Siput (No. 5 and 6), and the localities Kramat Pulai, Gunong Rapat and G. Kroh (No. 7, 8 and 9) in both cases lie so close to each other that they each form one mountain complex. Hence their snail population may be taken together.

The only species which has been recorded from hills lying at a considerable distance from each other is *Discartemon collingei*. In this case the localities Batu Tongkat and Gua Nenek (No. 13 and 14) form one mountain massif, but Gua Sai (No. 15) is a quite different one, some 45 miles to the south.

Mr. Tweedie has suggested an explanation for this anomalous distribution of *D. collingei*. He writes: "Both Gua Nenek and Gua Sai are situated on the East Coast Railway. Material from the limestone hills is quite often carried as freight, both bat guano from the caves and limestone for use as metal on roads and the railway track; at Gua Sai there is a limestone quarry. It seems to me quite likely that *D. collingei* has been artificially brought to Gua Sai. This would explain its presence at this place, away from its home in Kelantan, and also its absence from Gua Bama, which is quite close to Gua Sai (and has a fauna largely in common), but is further from the railway".

Discartemon collingei and *D. platymorphus* were collected on the same hill: Gua Nenek (No. 14). All the other hills are inhabited by one species only.

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From the foregoing lists it is evident that the species of Streptaxidae dealt with in this paper are extremely local, most species being confined to one mountain or mountain group. In this way they resemble the families treated earlier (Van Benthem Jutting, 1950, Bull. Raffles Mus., 21, p. 5-47 and Id., 1952, Ibid., 24, p. 5-62; Laidlaw, 1949, Bull. Raffles Mus. 19, p. 199-215), the Vertiginidae, the genus *Opisthostoma* and the genus *Diplommatina*.

In this connection it may be interesting to relate that De Morgan (1885, Bull. Soc. Zool. France, vol. 10, p. 359) already mentioned this peculiar dispersal of land snails in Perak (Malaya):—

"Ces formations [of isolated limestone rocks] sont très favorables au développement des Mollusques, aussi ai-je rencontré, sur tous les points où le calcaire affleurerait, de très grandes quantités de coquilles, mais, fait très curieux, les espèces varient à l'infini avec le changement de localité. Dans des milieux semblables réunissant toutes ces conditions désirables pour le développement des Helicidae et des Cyclophoridae j'ai été surpris par la grande variété des espèces, . . . Il serait intéressant d'explorer l'une après l'autre toutes les collines calcaires du pays."

The large number of species, each inhabiting its own isolated area, may be explained as the result of speciation due to geographical isolation. This process of species forming must have set in at the time when the limestone hills became isolated.

According to the geologists (vide Reed, Geology of the British Empire, second edition, 1949, p. 526-528) "the Malay Peninsula consists of a main composite granitic axis traceable from Tavoy in the north down to Kedah, and south and south-eastwards into Negri Sembilan and thence to the coast of Malacca. The granite, which is late Mesozoic, . . . forms now a series of more or less parallel ridges On the west of the main axis there are hills in Perak and Selangor composed chiefly of quartzites with some conglomerates and shales On the east of the main range in Pahang there is first a chain of hills composed of the same series of quartzites, conglomerates and shales, flanking the granite and running north into Kelantan and south into Negri Sembilan"

Apart from these granitic and quartzitic ranges there are numerous isolated limestone hills¹ in Kedah, Perak and Pahang, which are conspicuous on account of their precipitous sides, and probably owe their

1. These "isolated limestone hills" are precisely the localities where the land snails dealt with in the present report and in the above mentioned three papers have been collected.

shape and position to faulting which seems to have happened in connection with the intrusion of the granitic masses".

As this intrusion took place in the late Mesozoic, causing the limestone region to become upheaved and broken into large blocks, the isolation of the limestone hills consequently could only start from this time onward, i.e. the late Mesozoic. At any rate it is evident that the limestone, composing these hills, is older than Mesozoic. It belongs to the Raub Series, a series of unfossiliferous masses generally considered to be of Carboniferous age, which form the lower division of the Pahang Volcanic Series.

The Reed Handbook then continues: "The origin of these isolated limestone hills has been a matter of discussion, and Cameron would reject the theory of block-faulting and explain them as the result of unequal denudation of a strongly-jointed and comparatively gently flexured limestone lying on a floor of older heavily folded and sheared beds. It is possible, however, that they are residual fragments of a nappe of beds overthrust from the east and resting on a thrust-plane, as may be suggested by Cameron's view that overthrust together with block-faulting and erosion are sufficient to account for the origin of the peculiar isolated hills".

If we may suppose that a rather uniform population of Streptaxidae (the ancestors of the Recent species) lived in the calcareous area during the time when this limestone region formed a continuous layer, this primary population was separated into numerous small, secondary, "insular" populations as soon as the hills became isolated. From this moment onwards no migration of land snails from one hill to another could take place any longer, because the lowlands between the hills are unsuitable for these snails. Not only is the distance between the various hills too great (from 10 to 25 miles) for little snails to cross, but, besides, there is the deficiency in lime (the soil of the lowlands being chiefly composed of the weathered products of the granitic and quartzitic rocks) which makes the valleys and plains an unhealthy and inappropriate barrier for these slow-moving creatures which are lovers of a good amount of lime.

Consequently, through this geographical isolation the fauna of each hill was forced to develop independently from that of the other hills. Thus each hill became an independent centre of evolution, a procedure which, in the course of ages has given rise to a multitude of different species, each tied to its own limestone hill.

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Although we do not know how long this speciation has lasted, so much is certain that it cannot have started earlier than in the late Mesozoic. Of intermediate forms, occurring between that era and the present time, not the slightest evidence is left.

Systematic Part

Genus *Discartemon* L. Pfeiffer, 1856

Of the Oriental species of *Discartemon* which occur outside the Malay Peninsula, only three are found in territories close enough to necessitate their being considered in an account of the Malayan species. These are: *lemyrei* Morlet, 1883, from Cambodia; *planus* Fulton, 1899, from Celebes; and *paradiscus* Moellendorff, 1900, from Annam.

The following five species have been described previously from the Malay Peninsula or from neighbouring islands: *plussensis* De Morgan, 1885, from Perak; *roebeleni* Moellendorff, 1894, from the Samui Islands; *collingei* Sykes, 1902, from Kelantan; *sykesi* Collinge, 1902, from Jalor; and *nummus* Laidlaw, 1929, from Singgora. These, together with four new Malayan species, are dealt with below.

Discartemon plussensis (De Morgan, 1885). Fig. 2

- 1885 De Morgan, Le Naturaliste, Vol. 7, no. 9, p. 68 (*Streptaxis*) (Mont Tchéhél, dans la vallée de la rivière Pluss).
- 1885 De Morgan, Bull. Soc. Zool. France, Vol. 10, p. 371, pl. 5, fig. 1 (*Streptaxis*) (Mont Tchéhél, dans la vallée de la rivière Pluss).
- 1885 Tryon, Man. of Conch. (2) Vol. 1, p. 251 (*Streptaxis*) (Malay Peninsula).
- 1886 Moellendorff, Journ. As. Soc. Bengal, Vol. 55, p. 299 (*Streptaxis*) (Mt Tchéhél, in the valley of the river Pluss).
- 1888 Tenison Woods, Proc. Linn. Soc. N.S.W. (2) Vol. 3, p. 1009 (*Streptaxis*) (Mt Chekel, River Pluss, Perak, Malay Peninsula).
- 1891 Moellendorff, Proc. Zool. Soc. London, p. 330 (*Streptaxis*) (Mt Tchéhél, Pluss Valley).
- 1902 Gude, Proc. Malac. Soc. London, Vol. 5, p. 226 (*Streptaxis*) (Perak: Pluss Valley, Mt Tchéhél).
- 1905 Kobelt, in: Martini-Chernitz, N. Syst. Conch. Cab. Vol. 1, Pt. 12 BII, p. 99, pl. 54, fig. 12-14 (*Odontartemon* (*Discartemon*)) (Berg Tshéhél, im Thale des Pluss, Perak).
- 1933 Laidlaw, Journ. Mal. Branch Roy. As. Soc. Vol. 11, p. 233 (*Streptaxis*) (Perak).

Habitat: Hill 5 miles N.E. of Sungei Siput, Perak.

De Morgan's Gunong Tchéhél, the type locality of *D. plussensis* is near the junction of the rivers Korbu and Perlop, another 4 miles to the N.E.

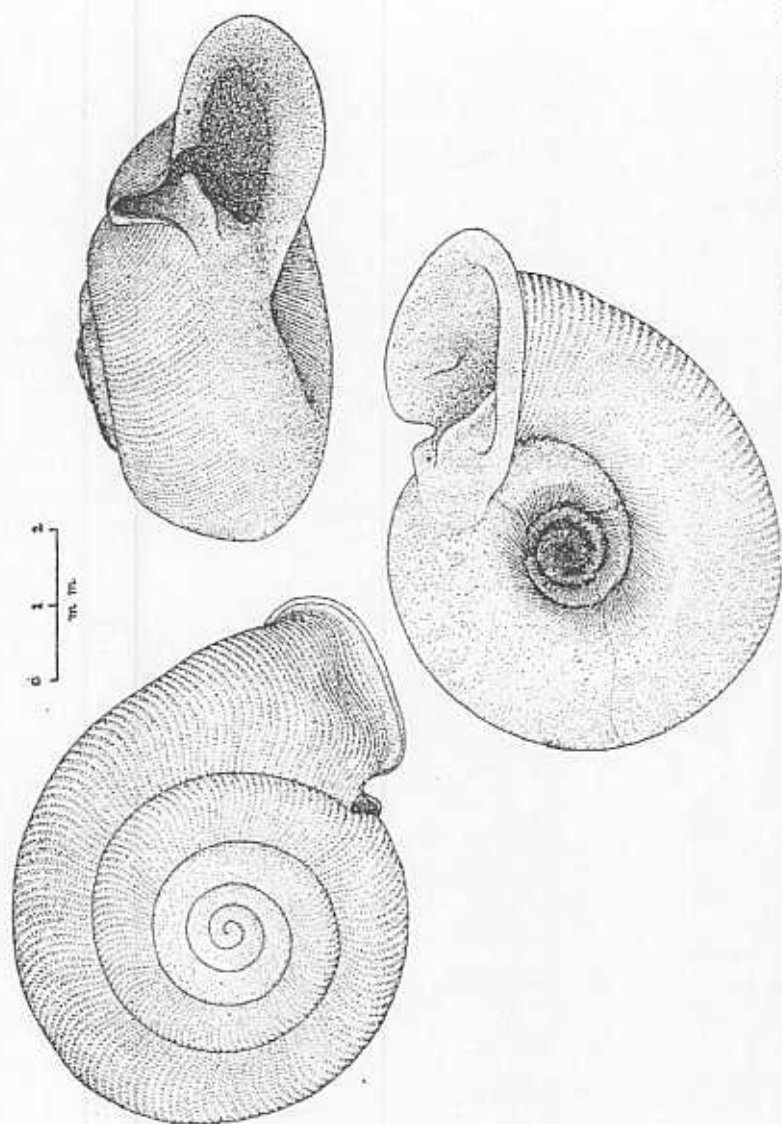


Fig. 2. *Discartemon plusensis* (De Morgan). Sungai Siput, Perak, 1936. Shell from top, side and base. K. M. Foong del.

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Discartemon roebeleni (Moellendorff, 1894). Fig. 3

1894 Moellendorff, Proc. Zool. Soc. London, p. 147, pl. 16, fig. 3-4 (*Streptaxis*) (Ko-Samui).

1902 Gude, Proc. Malac. Soc. London, Vol. 5, p. 226 (*Streptaxis*) (Id. of Samui, Gulf of Siam).

1905 Kobelt, in: Martini-Chemnitz, N. Syst. Conch. Cab. Vol. 1, Pt 12 BII, p. 99, pl. 54, fig. 10, 11 (*Odontartemon* (*Discartemon*)) (Samui Inseln, Golf von Siam).

1933 Laidlaw, Journ. Mal. Branch Roy. As. Soc. Vol. 11, p. 233 (*Streptaxis roebeleni* sic!) (Samui Islands).

Habitat: Gunong Keriang near Alor Star, Kedah, April 1939.

As in so many species of *Discartemon* the upper surface of *D. roebeleni* is much more striated than the lower one.

I was able to compare with this material eight lots from the Samui Islands. These samples belong to the Senckenberg Museum of Frankfurt. Among them are the lectotype, and shells of the forma *major* and the forma *minor*.

Measurements of shells from G. Keriang, Kedah.

| | | | | | | | | | | | | | |
|--------------------|----|------|------|------|------|------|------|------|------|------|------|------|------|
| Width | .. | 8.65 | 8.50 | 8.35 | 8.25 | 8.25 | 8.25 | 8.— | 8.— | 8.— | 7.65 | 7.65 | 7.60 |
| Height | .. | 4.— | 4.15 | 4.10 | 4.05 | 4.05 | 3.95 | 3.95 | 3.90 | 3.85 | 3.80 | 3.65 | 3.85 |
| Height of aperture | .. | 2.9 | 2.9 | 2.9 | 2.9 | 2.8 | 2.9 | 2.8 | 2.9 | 2.8 | 2.8 | 2.9 | 2.7 |

| | | Width | Height | Height of aperture |
|-------------------------------------|----|-------|--------|--------------------|
| Lectotype (SMF No. 108526) | .. | 8.35 | 4.25 | 3.— |
| Forma <i>major</i> (SMF No. 108531) | .. | 10.10 | 4.90 | 3.1 |
| Forma <i>minor</i> (SMF No. 108533) | .. | 7.60 | 3.25 | 2.8 |

This is the first time that *Discartemon roebeleni* has been recorded outside the Ko-Samui (= Samui Islands). Geologically speaking the Samui Islands form a north-eastern outpost of the central mountain range of the Malay Peninsula, and they were connected with the continent before the sea transgressed the lower valleys. Therefore it may be concluded that *Discartemon roebeleni* is an old inhabitant of the Samui Islands, dating from the time when the islands were connected with the mainland. This is an example of how faunal isolation took place. Although in other, similar, cases the snails of the disconnected areas may develop differently, such divergence did not occur in *D. roebeleni* which is still specifically identical in the Peninsula and in the Samui Islands.

Moellendorff (1894, Proc. Zool. Soc. London, p. 146) has already drawn attention to the fact that "the fauna of the Samui group is essentially Malaccan, several species being common to the adjoining mainland, and most of the forms peculiar to the group having their nearest relatives among the species of Siam, Tenasserim, and Perak".

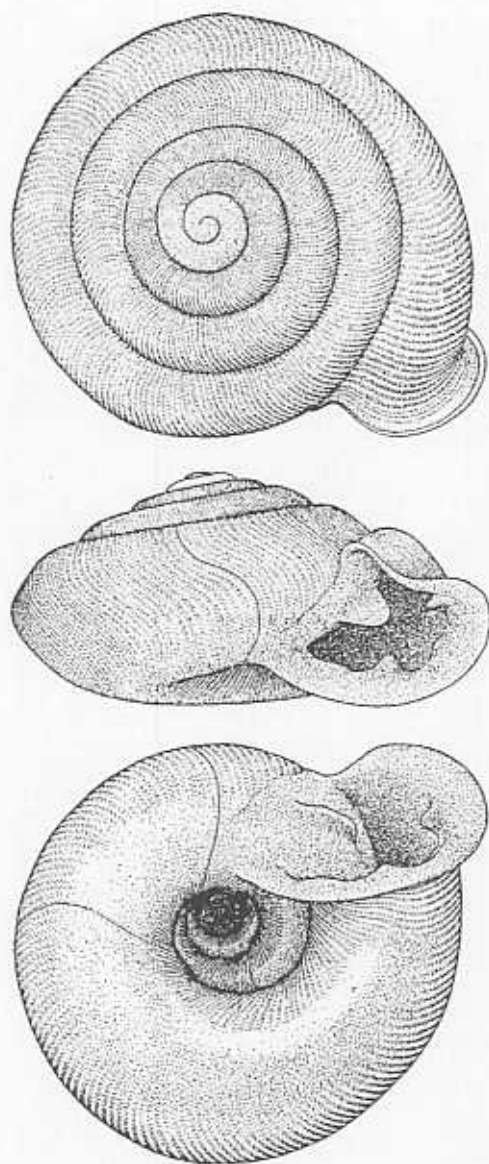


Fig. 3. *Discartemon roebeleni* (Moellendorff). Gunong Keriang, near Alor Star, Kedah, April 1939. K. M. Foong del.

Discartemon collingei (Sykes, 1902). Fig. 4

- 1902 Sykes, Journ. Malac. Vol. 9, p. 22 and 60, pl. 3, fig. 8-10 (*Streptaxis*) (Kelantan).
 1902 Moellendorff, Nachr. Blatt, Vol. 34, p. 136 (*Streptaxis* (*Discartemon*)) (Kelantan).
 1902 Gude, Proc. Malac. Soc. London, Vol. 5, p. 214 (*Streptaxis*) (Kelantan).
 1933 Laidlaw, Journ. Mal. Branch Roy. As. Soc. Vol. 11, p. 233 (*Streptaxis*).

Habitat: Gua Sai, near Padang Tengku, Pahang, 1947, leg. H. Service; Gua Nenek, Kelantan, July, 1939; Batu Tongkat, between Gua Madu and Pulau, Kelantan, Aug. 1939.

Among the shells from Batu Tongkat there are a few specimens of unusually small size (the smallest shell is high 4.70 and wide 7.25 mm). The largest shell in the collection, from Gua Nenek, is high 6.20 and wide 9.90 mm. In the original description Sykes mentioned the altitude as 5 mm. and the maximal diameter as 9 mm. The small shells referred to above do not show any other differences and I think there is no need to separate them under an infraspecific name.

D. collingei has been found at localities in Kelantan and also at Gua Sai, a wholly separate limestone hill 45 miles to the south in the State of Pahang. This distribution forms a conspicuous exception among those of the other Malayan discoid and helicoid Streptaxids, and an explanation of it is suggested in the introduction to this paper.

Discartemon stenostomus n.sp. Fig. 5

Shell low-conical, glassy-white. First 2½ whorls smooth, the following ones on their upper side with fine, regular, close-set, somewhat wavy transverse ribs. These ribs fade away on the basal side of the shell. On the last whorl, near the peristome, there are about 8-9 ribs to the mm. No spiral striation. Fresh shells shining and transparent. Whorls 5½-6½, well rounded. All normally coiled. The last whorl not, or only slightly descending towards the aperture, and a little inflated and expanded.

Basal part of the last whorl also inflated. Suture distinct. Periphery rounded. Top little projecting, base convex. Umbilicus moderately wide. On the umbilical side the last whorl is bluntly angulate.

Aperture trigonal or arrow-shaped. Very oblique. Peristome not continuous, thickened and reflected. Upper lip expanded and projecting, inflected in the middle so as to form a distinct tooth which corresponds with a groove on the exterior side behind the peristome. At the upper parietal corner the upper lip forms a sinuous ridge, joining the parietal lamella. Lower lip receding, armed with two distinct teeth. Parietal side

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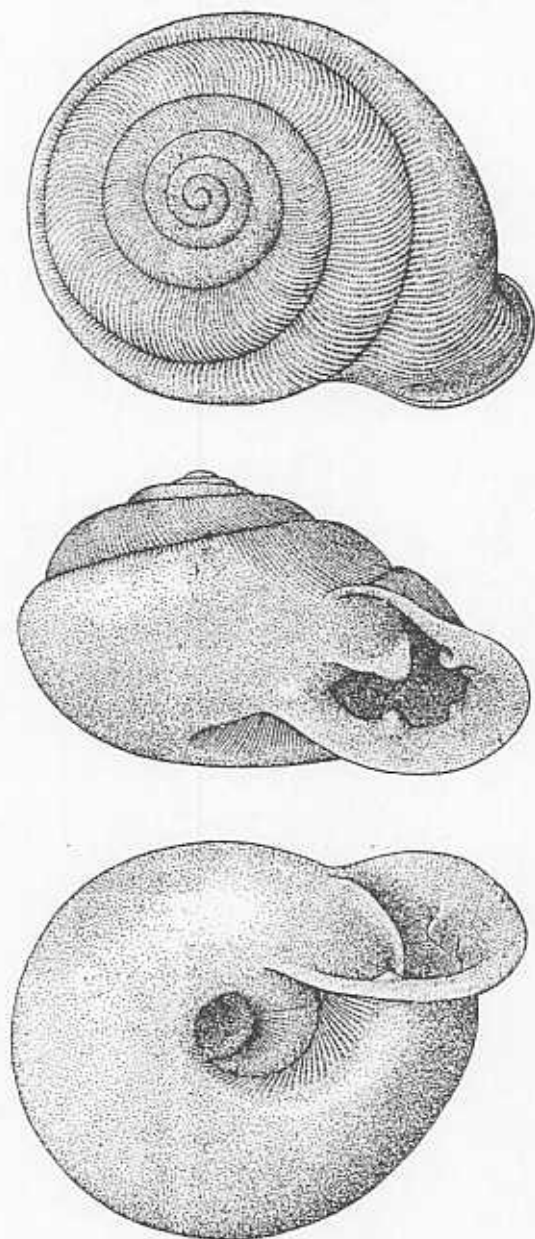


Fig. 4. *Discartemon collingei* (Sykes). Gua Sai, near Padang Tengku, Pahang, 1947. Shell from top, side and base. K. M. Foong del.

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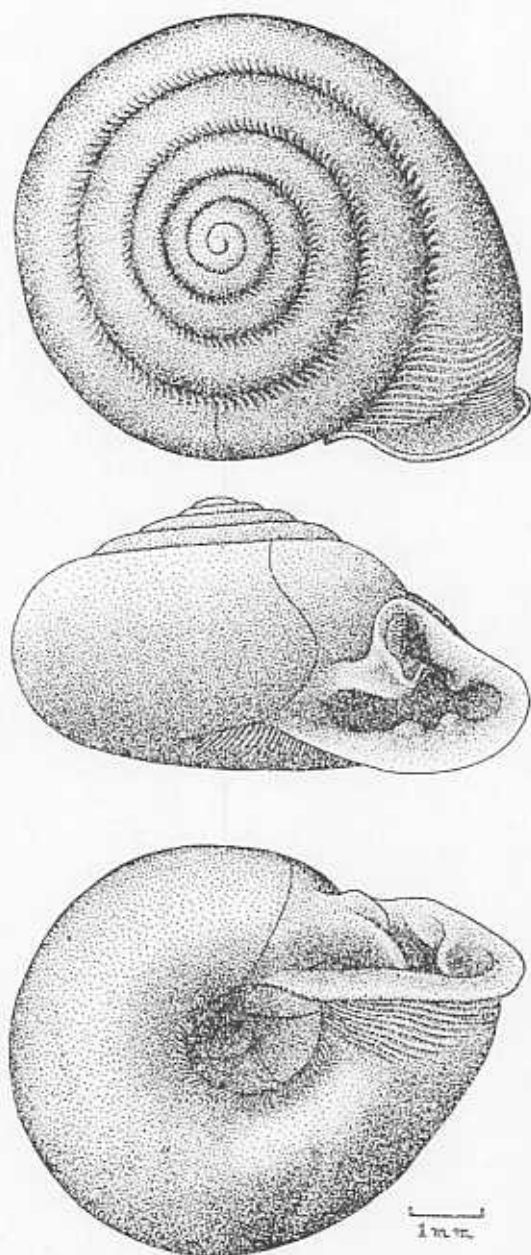


Fig. 5. *Discartemon stenostomus* n.sp. Kaki Bukit, Perlis, December 1938. Shell from top, side and base. K. M. Foong del.

with a strong lamella. At its exterior point of attachment is a triangular callosity. The inner portion of the lamella is thinner, and wavy. Its entire length is 2-3 mm.

| Dimensions | | Holotype | Paratypes | | | | | | | | | | |
|-----------------------|------|----------|-----------|------|------|------|------|------|------|------|------|------|--|
| Width | 8.14 | 8.10 | 8.05 | 8.- | 7.95 | 7.90 | 7.85 | 7.80 | 7.75 | 7.70 | 7.65 | 7.60 | |
| Height | 3.85 | 3.85 | 3.75 | 3.85 | 3.75 | 3.80 | 3.90 | 3.80 | 3.80 | 3.65 | 3.70 | 3.65 | |
| Height of aperture .. | 2.- | 2.2 | 2.1 | 2.30 | 2.1 | 2.1 | 2.1 | 2.- | 2.- | 2.1 | 2.1 | 2.- | |

Habitat: Kaki Bukit, Perlis, December 1938.

Compared with the other *Discartemon* of the region *D. stenostomus* has the following distinctive characters:—

1. It is higher conical than *sykesi*, *nummus*, *leptoglyphus*, *hypocrites* and *platymorphus*.
2. From the somewhat elevated species *D. plussensis*, *D. roebeleni* and *D. collingei* it differs by the development of a strong triangular callosity at the exterior extremity of the parietal lamella.

Discartemon sykesi (Collinge, 1902)

1902 Collinge, Journ. Malac. Vol. 9, p. 72, pl. 4, fig. 1-2 (*Streptaxis*) (Biserat, State of Jalor).

1905 Kobelt, in: Martini-Chemnitz, N. Syst. Conch. Cab. Vol. 1, Pt 12 BII, p. 100, pl. 55, fig. 1-2 (*Odontartemon* (*Discartemon*)) (bei Biserat, im Staat Jalor).

1933 Laidlaw, Journ. Mal. Branch Roy. As. Soc. Vol. 11, p. 233 (*Streptaxis*) (Biserat).

Of Collinge's original lot two shells are preserved in the Zoological Museum of the University of Cambridge and one in the British Museum (Natural History). All three are labelled: Biserat, Jalor, State of Patani, 1899 and were collected during the Skcat Expedition.

The author did not mark a type specimen. Therefore I now designate as the lectotype the larger of the two shells in the Cambridge Museum. The size of this shell agrees with the dimensions and the figure in Collinge's publication. The other Cambridge shell and the shell in the British Museum are the paratypes.

Their measurements are:—

| | | lectotype Cambridge | paratype Cambridge | paratype London |
|------------|----|------------------------|-----------------------|--------------------|
| Max. diam. | .. | 11.50 | 10.50 | 9.40 |
| Min. diam. | .. | 8.50 | 8 | 8.50 |
| Height | .. | 3 | 3 | 3 |
| No. whorls | .. | 5½ | 5½ | 5½ |

The lectotype is finely striated on the upper and lower side. At the base, close to the umbilicus, the striation is somewhat stronger, so as to appear rib-like. The umbilicus is very wide, about 4 mm. diam. In the aperture there is only one parietal lamella of about 2 mm. length. The parieto-palatal sinus is high and narrow.

Discartemon nummus (Laidlaw, 1929)

1929 Laidlaw, Proc. Malac. Soc. London, Vol. 18, p. 259-263, fig. 1 (*Odontartemon* (*Discartemon*)) (Tale Sap, Singgora).

1933 Laidlaw, Journ. Mal. Branch Roy. As. Soc. Vol. 11, p. 234 (*Streptaxis*) (Singgora).

I was able to examine a paratype from the collection of Mr. Laidlaw.

According to Mr. Laidlaw the holotype was preserved in the Indian Museum at Calcutta. When the collections of this Institute were removed to Benares during the war years the greater part, and among them the holotype of *Discartemon nummus*, was destroyed during a catastrophic flood of the River Ganges.

Laidlaw compared his n.sp. with *Discartemon collingei*, but the umbilicus of this species is narrower. Moreover *D. collingei* is more conical and the long axis of the aperture stands obliquely to the vertical axis of the shell, whereas in *D. nummus* and *D. plussensis* the long axis of the aperture stands rectangularly to the vertical shell-axis.

Laidlaw compared *D. nummus* also with *D. planus*, but this species is much smaller, quite flat at the base (like some species of *Planorbis* or *Segmentina*) and has an entirely different aperture.

From the other Malayan species *Discartemon nummus* differs in the following features:—

D. roebeleni is more distinctly ribbed, has a more elevated spire, with the last part of the ultimate whorl not so wide, and the upper lip not so deflected. *D. roebeleni* has also more teeth along the outer lip of the aperture.

D. sykesi is larger and has a wider umbilicus. The peristome is not provided with teeth along the outer margin. The last whorl of *D. sykesi* is more trumpet-shaped.

D. leptoglyphus is much smaller than *D. nummus*, with stronger costulation on the upper and lower sides of the shell, and with the periphery not or only faintly angulated. The upper margin of the peristome is less deflected than in *D. nummus*.

D. stenostomus has a higher spire and a narrower umbilicus. Its aperture is provided with more teeth. The shell has a strong callus at the junction of parietal lamella and sinus. The parietal lamella is more undulating than in *D. nummus*.

D. hypocrites is smaller, and shows no angulation along the periphery (or a very faint one). It has three distinct knobs along the peristome. Its last whorl is not so wide in relation to previous ones as in *D. nummus*.

D. platymorphus is not carinated along the periphery. The upper margin of its peristome is not so much deflected and protruding. There is no strong callus at the junction of the parietal lamella and the sinus.

Compared with *D. plussensis* the present species is flatter, its spire more sunken and its suture deeper. *D. nummus* is hardly or not transversely ribbed, and distinctly angulate (Laidlaw described it as carinate). The point of attachment of the sinus to the exterior end of the parietal lamella is much better developed than in *D. plussensis*, forming a more or less triangular callus.

***Discartemon platymorphus* n.sp. Fig. 6**

Shell almost discoidal, with very low spire, although not quite so low as in *D. leptoglyphus*. Glassy white. First $2\frac{1}{2}$ whorls smooth, subsequent ones with fine, regular, close-set, somewhat wavy transverse ribs. On the last whorl, near the peristome, there are about 8-9 ribs to the mm. On the upper side of each whorl the ribs are better developed than on the basal part. No spiral striation. Fresh shells shining and transparent.

Whorls 6, convex. All normally coiled and regularly increasing in size. The terminal part of the ultimate whorl descends to the aperture. This part is also somewhat widened, but not quite so expanded as in *D. leptoglyphus*.

Suture distinct, periphery rounded. Top little elevated, somewhat more than in *D. leptoglyphus*. Base broad and little convex (but not quite flat). Umbilicus rather wide, although not so wide as in *D. leptoglyphus*, showing all previous whorls. On the umbilical side the last whorl is bluntly angulate.

Aperture trigonal or arrow-shaped. Very oblique. Peristome not continuous, thickened and reflected. Upper lip expanded and projecting, inflated in the middle, so as to form a distinct tooth. Lower lip receding, toothless, but with a hardly palpable callosity in the middle. Parietal

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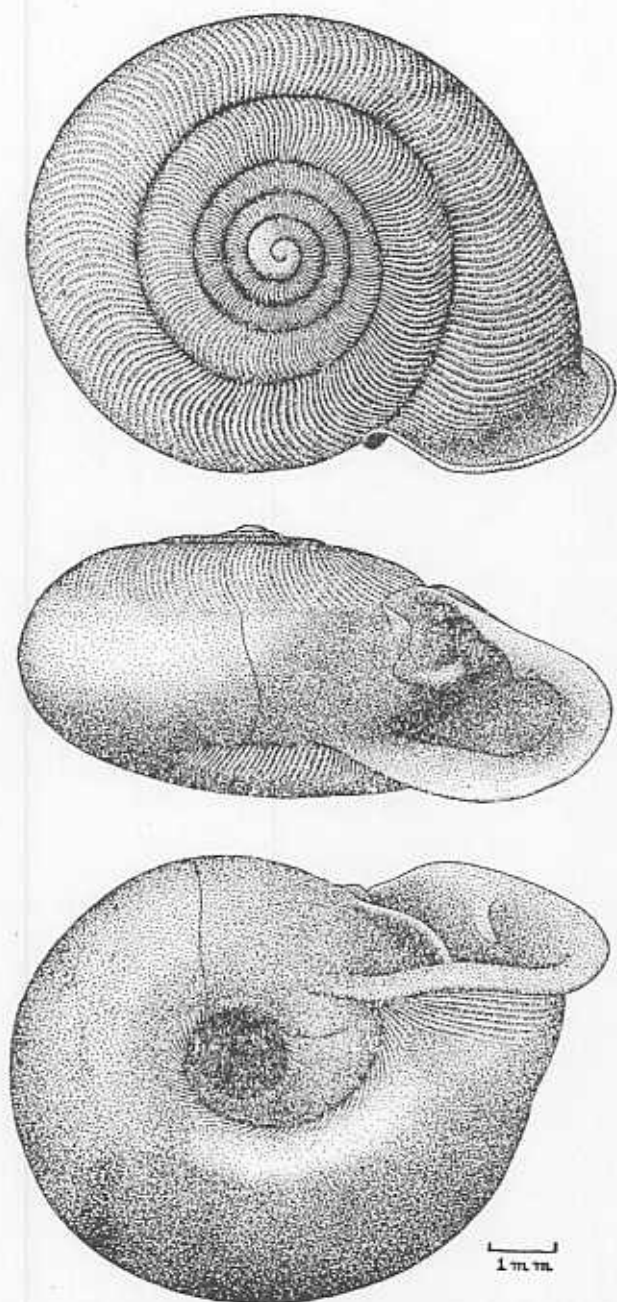


Fig. 6. *Discartemon platymorphus* n.sp. Gua Nenek, Kelantan, July 1939. Shell from top, side and base. K. M. Foong del.

side with an almost horizontal sinuous lamella, entering 2-3 mm. within the aperture. At the upper parietal corner the upper lip forms a sinuous ridge, joining the parietal lamella.

| Dimensions | | | | Holotype | Paratypes | |
|--------------------|----|----|----|----------|-----------|------|
| Width | .. | .. | .. | 10.10 | 10.- | 9.60 |
| Height | .. | .. | .. | 3.8 | 3.75 | 3.65 |
| Height of aperture | .. | .. | .. | 3.- | 3.- | 3.- |

Habitat: Gua Nenek, Kelantan, July 1939.

Compared with the other species of *Discartemon* of Malaya *D. platymorphus* is characterised as follows:—

The spire is lower than in *Discartemon collingei*, *D. plussensis*, *D. roebeleni* and *D. stenostomus*, and the umbilicus is wider than in any of these.

From *D. hypocrites* it differs in the mouth armature, the greater size and the flatter spire.

It has a higher spire and a narrower umbilicus than *D. leptoglyphus*. The last part of the ultimate whorl is not so wide and expanded as in *D. leptoglyphus*.

From *D. nummus* it differs in not being angulate at the periphery, and in lacking the reinforced callus at the junction of parietal lamella and sinus. Finally the upper margin of the peristome is not so deflected and protruded as in *D. nummus*.

Discartemon sykesi is wider and flatter, with more open umbilicus.

Discartemon leptoglyphus n.sp. Fig. 7

Shell almost discoidal, with very low spire, creamy white. First 2-2½ whorls smooth, following ones with fine, regular, close-set, somewhat wavy transverse ribs on both upper and lower side of the shell. On the last whorl, near the peristome, there are about 8-9 ribs to the mm. No spiral striation. Fresh shells shining and glassy transparent. Whorls 5-5½, well rounded. The first 4-4½ normally coiled and regularly increasing in diameter, the last whorl somewhat inflated and expanded, partly overlapping the preceding one on the dorsal side. Towards the aperture the last whorl first ascends, then descends.

Suture distinct. Periphery bluntly angulate; in full-grown shells the angulation disappears in the last whorl, so that the periphery is rounded. Top very little projecting, base broad and little convex, but not quite flat. Umbilicus very wide, showing all previous whorls. On the umbilical side the last whorl is bluntly angular.

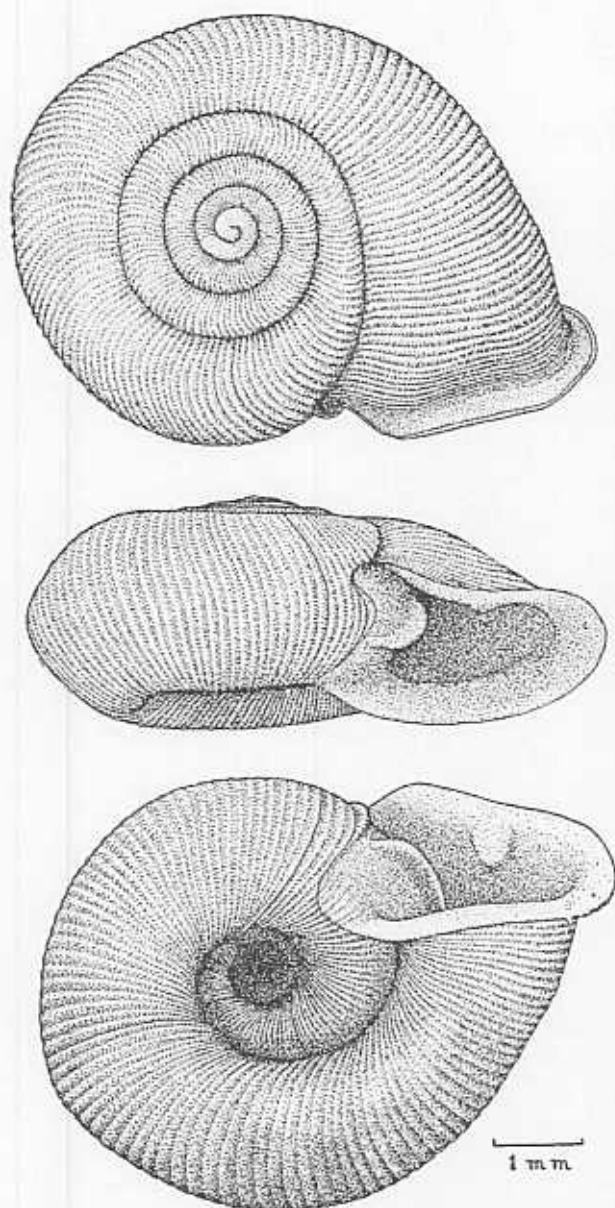


Fig. 7. *Discartemon leptoglyphus* n.sp. Gunong Rapat, near Ipoh, Perak, March 1937. Shell from top, side and base. K. M. Foong del.

Aperture trigonal or arrow-shaped, very oblique. Peristome not continuous, thickened and reflected, towards the outer corner somewhat rising like an upturned nose. Upper lip expanded and projecting, inflected in the middle so as to form a low, indistinct, tooth-like protuberance. At the upper parietal corner the upper margin forms a sinuous ridge, joining the parietal lamella. Lower lip receding, parallel to the upper one. Parietal side with an almost horizontally placed lamella, entering into the aperture 2-3 mm.

| Dimensions | Holotype Kramat Pulai | PARATYPES | | | | | | | |
|--------------------|-----------------------------|-----------|------|------|------|------|------|--|---------|
| | | G. Rapat | | | | | | | G. Kroh |
| Width .. | 7.50 | 7.- | 6.85 | 6.50 | 6.40 | 6.15 | 6.10 | | 8.70 |
| Height .. | 2.90 | 2.70 | 2.65 | 2.45 | 2.60 | 2.40 | 2.40 | | 3.10 |
| Height of aperture | 2.- | 2.- | 2.- | 2.- | 1.9 | 2.- | 1.8 | | 2.2 |

Habitat: Kramat Pulai, Kinta Valley, Perak, March 1939; Gunong Rapat, Kinta Valley, near Ipoh, Perak, March 1937; Gunong Kroh, Kinta Valley, Simpang, Perak, July 1946.

Together with *Discartemon sykesi*, *D. nummus*, *D. hypocrites* and *D. platymorphus* the present species belongs to the discoidal *Discartemon*.

Compared with *D. hypocrites* it has a wider umbilicus, a wider and more expanded last whorl, which is not pinched. Aperture with only one tooth (instead of 3-4 as in *D. hypocrites*) on the peristome.

Compared with *D. platymorphus* it differs in the smaller size, and the somewhat upturned outer corner of the peristome. The tooth in the aperture is less distinct than in *D. platymorphus*.

Compared with *D. nummus* it differs in the absence of a peripheral keel, and in the presence of transverse costulation on both upper and lower side of the shell. The upper margin of the peristome is less deflected and protruding than in *D. nummus*.

Compared with *D. sykesi* it differs in the smaller size, the well developed transverse striae above and below, and the less deflected and protruding upper peristomal margin.

Discartemon hypocrites n.sp. Fig. 8

Shell almost discoidal, with low spire, glassy white. The first 2-2½ whorls smooth, the following ones with fine, regular, close-set, somewhat wavy transverse ribs. On the upper part of each whorl the ribs are better developed than on the basal side. On the last whorl, close to the peristome, there are about 8-9 ribs to the mm. No spiral striation. Fresh shells shining and transparent.

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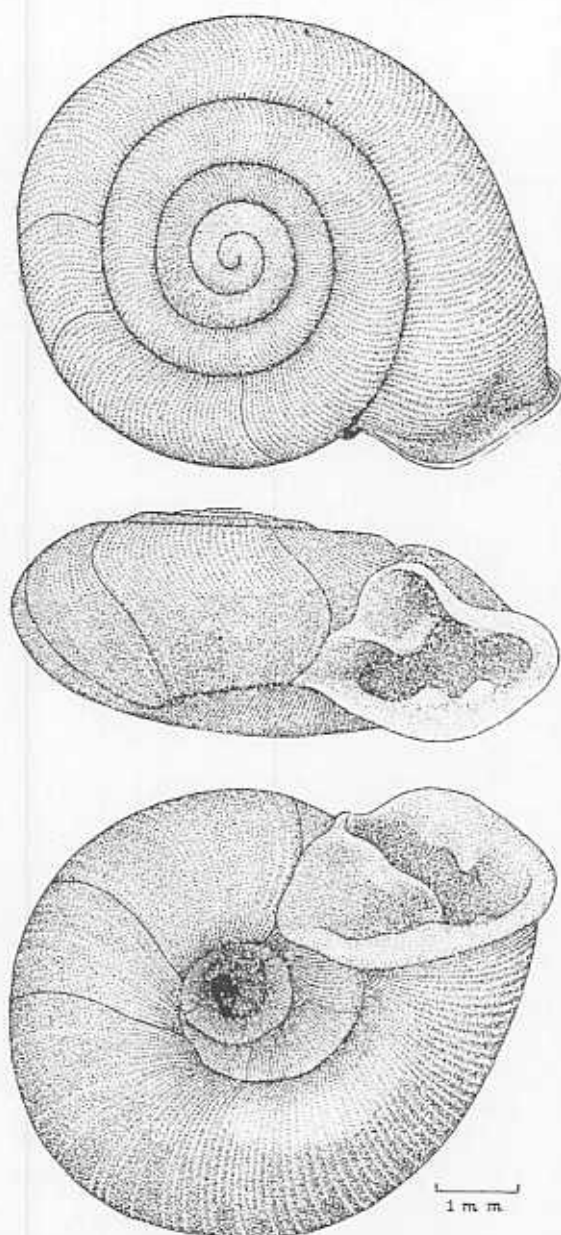


Fig. 8. *Discartemon hypocrites* n.sp. Bukit Chuping, Perlis, April 1937. Shell from top, side and base. K. M. Foong del.

Whorls about 5, convex. Those of the spire normally coiled and regularly increasing in size. Last whorl somewhat irregular, at one time compressed, at another expanded. This irregularity is more evident in the paratypes than in the holotype. The terminal part of the ultimate whorl descends towards the aperture. Behind the peristome this last part is somewhat inflated, then pinched.

Suture distinct, periphery rounded. Top little elevated, although somewhat more than in *D. leptoglyphus*. Base broad and little convex, but not quite flat. Umbilicus wide, although not so wide as in *D. leptoglyphus*, showing all previous whorls. On the umbilical side the last whorl is bluntly angulate.

Aperture trigonal or arrow-shaped. Very oblique. Peristome not continuous, thickened and reflected. Upper lip expanded and projecting, inflected in the middle so as to form a distinct tooth. This tooth corresponds with a small groove on the exterior of the last whorl behind the peristome. At the upper parietal corner the upper margin of the aperture forms a sinuous ridge joining the parietal lamella. Lower lip receding, with 3-4 knob-like teeth. Parietal side with an almost horizontal sinuous lamella, entering 2-3 mm. into the aperture.

| Dimensions | | | Holotype | Paratypes | | | | | |
|--------------------|----|----|----------|-----------|------|------|------|------|------|
| Width | .. | .. | 7.20 | 6.75 | 6.70 | 6.70 | 6.60 | 6.60 | 6.60 |
| Height | .. | .. | 3.10 | 2.65 | 2.75 | 2.60 | 2.90 | 2.65 | 2.60 |
| Height of aperture | .. | .. | 2.- | 2.- | 1.9 | 2.- | 2.- | 2.- | 2.- |

Habitat: Bukit Chuping, Perlis, Malaya, April 1939.

Compared with the other species of *Discartemon* of Malaya *D. hypocrites* is distinguished by the following features:—

It has a higher spire and a narrower umbilicus than either *D. leptoglyphus* or *D. platymorphus* and an aperture provided with more teeth.

Compared with *D. sykesi* it has a higher spire and better developed costulation. Besides the mouth armament is more elaborate.

The new species is smaller than *D. nummus* and has a more developed costulation. There is no peripheral carina.

The spire of *D. hypocrites* is lower than in *D. collingei*, *D. plusensis*, *D. roebeleni* and *D. stenostomus*, and the umbilicus is wider than in any of these.

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Genus *Oophana* Ancey, 1884

In 1946 Forcart (Journ. of Conch. Vol. 22, p. 215) pointed out that the name *Odontartemon*, introduced by L. Pfeiffer in 1856, had been differently employed by Kobelt (1880, Illustr. Conchyl. Buch, p. 209 and 1905, in: Mart.-Chemn. N. Syst. Conch. Cab. Vol. I, Pt. 12B¹¹, p. 90). Therefore *Odontartemon* Kobelt has to be replaced by *Oophana* Ancey, 1884, with *Ennea bulbulus* Morelet, 1862 as the genotype. For the subgeneric name *Odontartemon* Kobelt Forcart proposed *Indoartemon* with *Streptaxis eburnea* L. Pfr., 1861 as the genotype.

The following is a classification of *Oophana*:—

Genus *Oophana* Ancey, 1884. Genotype *O. bulbulus* (Morelet, 1862). Type locality Pulu Condor.

Subgenus *Oophana* Ancey (see above).

Subgenus *Stremmatopsis* Mabilie, 1887. Type of subgenus *O. (S.) poirieri* (Mabilie, 1887). Type locality Tonkin.

Subgenus *Haploptychius* Kobelt, 1905. Type of subgenus *O. (H.) sinensis* (Gould, 1859). Type locality Hong Kong.

Subgenus *Perrottetia* Kobelt, 1905. Type of subgenus *O. (P.) peroteti* (Petit, 1841) Type locality Nilgherries, India.

Subgenus *Indoartemon* Forcart, 1946. Type of subgenus *O. (I.) eburnea* (L. Pfeiffer, 1861). Type locality Cochin China.

Tentative Key to distinguish the subgenera of *Oophana*:—

1. Aperture toothless *Stremmatopsis*.
Aperture with teeth 2.
2. Only a parietal lamella present *Haploptychius*.
Other lamellae present, besides the parietal 3.
3. Ultimate whorl scrobiculate behind the peristome. The grooves or pits correspond with knobs in the interior of the last whorl. Generally two parietal lamellae and several palatal teeth *Perrottetia*.
No interior knobs 4.
4. With one parietal and one palatal tooth, and sometimes a columellar tooth *Indoartemon*.
With two parietal (sometimes only one) lamellae and three or more other teeth *Oophana* s. str.

Of *Stremmatopsis* and *Perrottetia* no representatives have been found in Malaya or adjoining territories so far. The nearest districts where these two subgenera occur are Tonkin and India respectively.

Of the various species of *Oophana* s. str. only the following have been recorded from areas close to the Malay Peninsula:—

- elisa* Gould, 1856. Mergui Archipelago.
bulbulus Morelet, 1862. Pulu Condor and Samui Islands.
mouhoti var. *johswichi* Martens, 1864. Siam.
strangulata Moellendorff, 1894. Samui Islands.
siamensis Pfeiffer, 1862. Siam.
siamensis var. *depressa* Moellendorff, 1894. Samui Islands.
subbulbulus Moellendorff, 1902. Siam.
subglobosa Moellendorff, 1902. Siam.

In Malaya proper, however, no species have been found.

The same can be said of the subgenus *Indoartemon*. So far we know only of *Oophana* (*Indoartemon*) *prestoni* (Gude, 1903) occurring in Siam, but no representatives seem to inhabit Malaya.

Only the fifth subgenus *Haploptychius* has been recorded in Malaya and Peninsular Siam. The following is a list of the species occurring in Malaya and its vicinity:—

- andamanicus* Benson, 1860. Andaman Islands.
pellucens Pfeiffer, 1862. Cambodia, Siam.
porrectus Pfeiffer, 1862. Cambodia, Siam.
michau Crosse & Fischer, 1863. Pulu Condor.
blanfordi Theobald, 1865. Burma, Andaman Islands.
pfeifferi Zelebor, 1867. Andaman and Nicobar Islands.
mirificus Moellendorff, 1894. Samui Islands.
nautilus Sarasin & Sarasin, 1899. North Celebes.
celebicus Sarasin & Sarasin, 1899. North Celebes.
striatulus Collinge, 1902. State of Lige, Peninsular Siam.
balingensis Tomlin, 1948. Kedah, Malaya.

All these have been considered when identifying the material sent to me by Mr. Tweedie, and in every case I have had specimens for comparison, in some cases even the types and paratypes. Of these eleven species of the subgenus *Haploptychius* only two are recorded from the Malay Peninsula, *striatulus* from Peninsular Siam and *balingensis* from Kedah. These, together with four new species in the present collection, will be dealt with below.

Subgenus *Haploptychius* Kobelt, 1905

Oophana (*Haploptychius*) *eutropha* n.sp. Fig. 9

Shell short cylindrical-globular, creamy white. Probably transparent in live specimens, but the type and paratype, which comprise the available series, are opaque. Somewhat shining, especially on the basal side.

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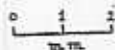
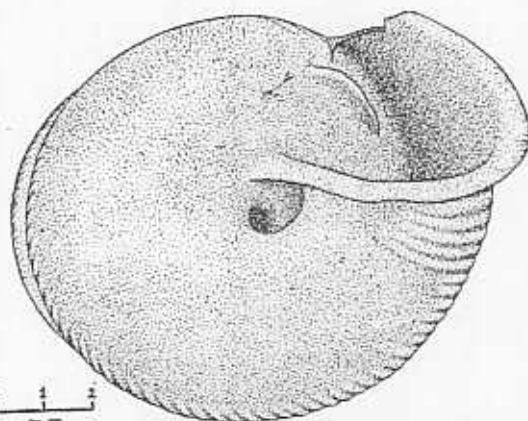
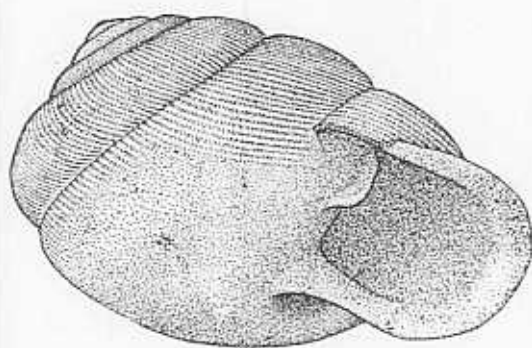
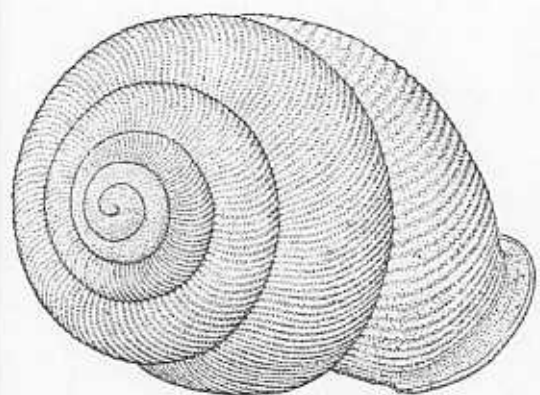


Fig. 9. *Oophana eutropha* n.sp. Bukit Chintamani, near Bentong, Pahang, August 1935. Shell from top, side and base. K. M. Foong del.

Mus. 25, 1954.

Whorls 6-6½. First 2½ whorls smooth, the following ones ornamented on their upper side with transverse ribs, about 4 to the mm. on the last whorl near the aperture, and about twice as much on the preceding ones. On the base of the shell the ribs fade away.

All whorls evenly rounded, the two last somewhat more convex than the preceding ones. About four whorls are regularly built, but the 2-2½ last whorls are obliquely pressed to the right so that the fourth whorl bulges out somewhat in the shell profile, and the entire shell gets a slightly eccentric aspect. Suture distinct, but not deep.

Top somewhat projecting, but not sharp. Base rather inflated. Umbilicus narrow.

Aperture oblique, rounded-trigonal to oval. Peristome not continuous, thickened and reflected, without teeth. In the upper peristomal margin the region closest to the shell protrudes somewhat. Parietal lamella almost straight, entering the aperture for about 2 mm.

| Dimensions | | | | | Holotype | Paratype |
|--------------------|----|----|----|----|----------|----------|
| Height | .. | .. | .. | .. | 11. | 9.2 |
| Width | .. | .. | .. | .. | 9.6 | 8.9 |
| Height of aperture | .. | .. | .. | .. | 6.- | 5.- |
| Greatest diam. | .. | .. | .. | .. | 11.3 | 10.2 |

Habitat: Bukit Chintamani, near Bentong, Pahang, August 1935.

The new species is related to *Oophana* (*Haploptychius*) *pellucens* (Pfr.) and to *O. (H.) michauxi* (Crosse & Fischer), but has coarser ribs than either of these, much coarser than *O. (H.) pellucens*. The spire is more like that of *O. (H.) michauxi*, and is not so pointed as in *O. (H.) pellucens*. The parietal lamella is about twice as long as in *O. (H.) pellucens* and *O. (H.) michauxi*.

***Oophana* (*Haploptychius*) *thamnophila* n.sp. Fig. 10**

Shell obliquely conical, creamy white, transparent. First 2½ whorls smooth. In the following ones the upper surface is beset with numerous delicate transverse ribs, about 8 to 10 to the mm. On the last whorl the ribs are placed wider apart, about 5 to the mm. On the basal side the ribs fade away. Here the shell is much more polished than on the upper side.

Whorls 5½-6, the first 3-4 regularly coiled, the fifth and sixth pressed obliquely to the right, so that the fourth whorl bulges out at the left side of the shell profile. This overhanging part is slightly flattened, but never compressed or pinched, and never angular. Top pointed, but not acute, base oblique, inflated. Umbilicus open, but not wide, about 1 mm. diameter at the entrance.

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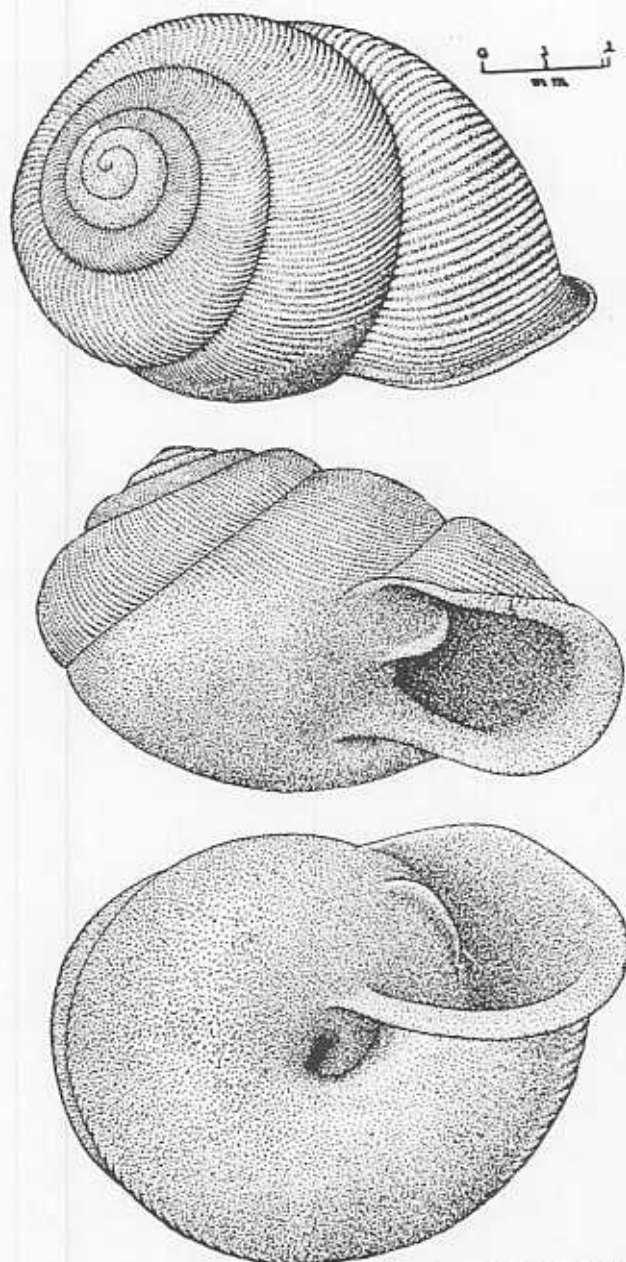


Fig. 10. *Oophana thamnophila* n.sp. Gua Tinggi, Lipis area, Pahang, 1948. Shell from top, side and base. K. M. Foong del.

Mus. 25, 1954.

Aperture oval, or quadrangular with rounded angles. Very oblique. Peristome not continuous; thickened and reflected, without teeth. On the parietal side of the aperture is an oblique lamella which enters about 1-2 mm. into the shell.

| Dimensions | | Holotype | Paratypes | | | |
|--------------------|----|----------|-----------|-----|-----|-------------|
| | | | | | | |
| Height | .. | 7.8 | 7.8 | 7.5 | 7.- | top damaged |
| Width | .. | 8.4 | 8.- | 8.5 | 8.- | 9.- |
| Height of aperture | .. | 4.- | 3.7 | 4.- | 3.7 | 4.- |
| Greatest diam. | .. | 9.- | 9.- | 9.- | 8.8 | 9.7 |

Habitat: Gua Tinggi, Lipis area, Pahang, 1948, coll. H. Service.

The new species has some affinity with *Oophana* (*Haploptychius*) *porrecta* (Pfr.) from Siam, and to *O. (H.) pfeifferi* (Zeilebor) from the Nicobar Islands. From the first it differs in the following respects: *O. (H.) thamnophila* is more obliquely deformed than *O. (H.) porrecta*, with a lower spire and a wider umbilicus. The shell surface is more ribbed. The aperture is wider (i.e. more elongate) and the last whorl more inflated than in *O. (H.) porrecta*.

From *O. (H.) pfeifferi* it can be distinguished by the greater height, which is especially conspicuous in the last whorl, by the wider (i.e. more elongate) aperture, the absence of spiral striation and the more oblique shape. The ultimate whorl of *O. (H.) thamnophila* is generally less inflated than the corresponding part of *O. (H.) pfeifferi*, the fourth whorl projects more in the shell profile, and, finally, the parietal lamella is better developed in the new species than in *O. (H.) pfeifferi*.

It has also some likeness to *O. (H.) andamanica* (Bens.), but the latter is more obliquely deformed with a flatter spire and a narrower (less round) aperture.

***Oophana* (*Haploptychius*) *striatula* (Collinge, 1902)**

1902 Collinge, Journ. Malac. Vol. 9, p. 73, pl. 4, fig. 3-4 (*Streptaxis*) (Belimbing, State of Ligei).

1905 Kobelt, in: Mart-Chemn. N. Syst. Conch. Cab. Vol. I, Pt 12 BII, p. 141, pl. 55, fig. 3-4 (*Haploptychius*) (bei Belimbing, Staat Ligei).

The unique specimen is preserved in the Zoological Museum of the University of Cambridge where I was able to examine it. It is marked: Type, and labelled Belimbing, Ligei, State of Patani, 28 May, 1899, and was collected during the Skeat Expedition.

The following notes are supplementary to the original description: The first 2½ whorls are smooth, the following ones coarsely ribbed, about 5 ribs to the mm. close to the aperture. The ribs continue on the base of the shell, although they are somewhat less prominent there.

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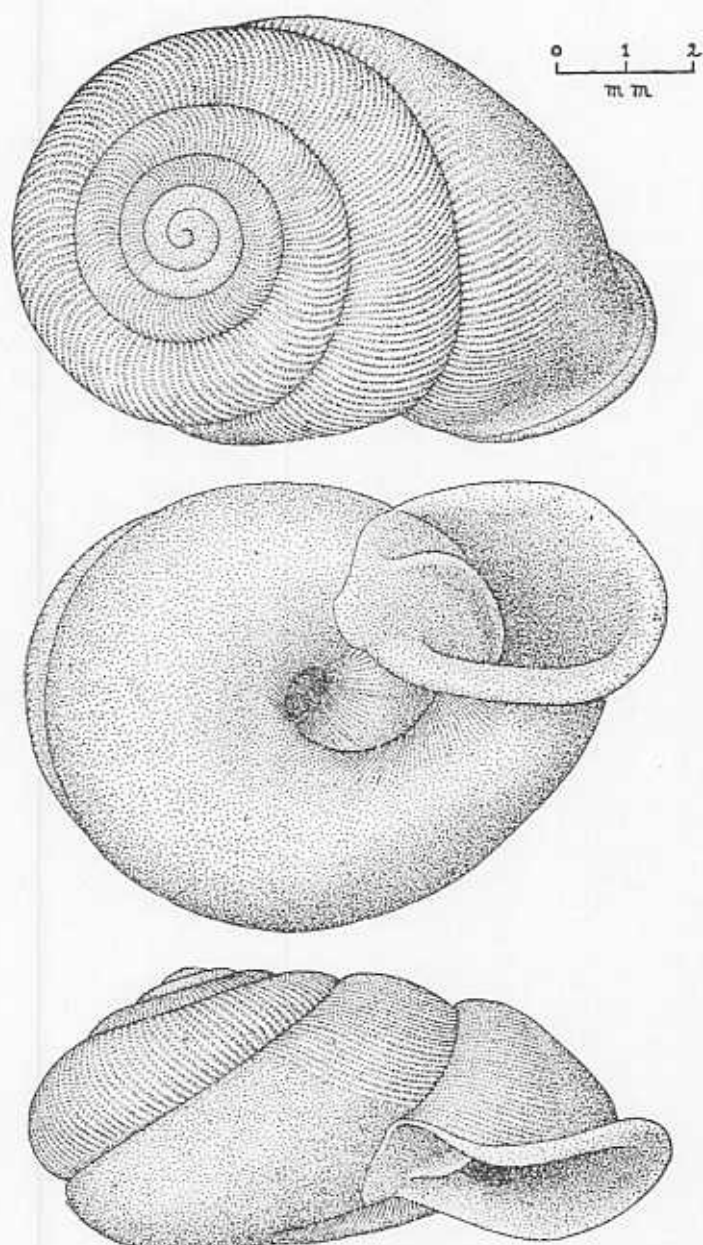


Fig. 11. *Oophana balingensis* (Tomlin). Bukit Baling, Kedah. Shell from top, side and base. K. M. Foong del.

Parietal lamella undulating, entering about 2½ mm. into the last whorl. Upper and lower margins of the peristome almost parallel. Exterior margin evenly rounded. No palatal teeth. Peristome not forming an angle between palatal and parietal sides of the margin.

Oophana (Haploptychius) balingensis (Tomlin, 1948). Fig. 11

1948 Tomlin, Proc. Malac. Soc. London, Vol. 27, p. 224, pl. 11, fig. 1 (*Odontartemon*) (Bukit Baling, Kedah).

I was able to study four paratypes. The original diagnosis is clear and correct. No new material has been collected.

Oophana (Haploptychius) atopospira n.sp. Fig. 12

Shell depressed-conical, glassy-white, shining and transparent. Upper surface transversely ribbed with delicate, curved ribs, about 9–10 to the mm. on the last whorl. Towards the base these riblets fade away.

Whorls 6. First 2½ whorls smooth. The spire is regular for about four whorls. In the fifth, however, the axis of the shell is pressed obliquely sideways, causing part of the fourth whorl to overlap the following whorls. This overhanging part is sharply keeled (although not so sharp as in *O. (H.) mirifica* (Moellendorff) or *O. (H.) hanleyana* (Stoliczka). The rest of the shell, even the last whorl, is not carinate.

Before reaching the peristome the last whorl is transversely constricted, then widens again. Between this widened zone and the peristome there is another constriction, this time divided into an upper and a lower part by a short, elevated, longitudinal ridge, coinciding with the periphery. Top very little projecting, nearly flat. Base rounded. Umbilicus wide and eccentric. The basal part of the last whorl is not keeled or angular along the umbilicus. The side facing the umbilicus is distantly ribbed.

Aperture narrow, spout-shaped, very oblique in vertical and horizontal directions. Entrance partly obstructed by the thickened peristome and by a well developed parietal lamella. Peristome not continuous. Margin reflexed and thickened, especially at the points opposite the upper and lower constrictions mentioned above. The resulting callosities look like broad teeth. Parietal lamella strong, undulating, entering about 4 mm. into the aperture. The exterior point of attachment forms a bifid or trigonal callosity. At the upper parietal corner the lamella forms a sinuous ridge joining the upper margin of the aperture.

| Dimensions | | Holotype | Paratypes | | | | | | | | | |
|--------------------|----|----------|-----------|------|------|------|------|-----|-----|------|------|------|
| | | | | | | | | | | | | |
| Greatest diam. | .. | 10.- | 10.25 | 10.- | 9.75 | 9.75 | 9.75 | 9.7 | 9.4 | 9.35 | 9.15 | 9.05 |
| Height | .. | 3.9 | 4.25 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.7 | 3.9 | 3.7 |
| Length of aperture | .. | 4.- | 4.5 | 4.5 | 4.- | 4.- | 4.- | 4.- | 4.- | 4.- | 4.- | 4.- |

MALAYAN STREPTAXIDAE

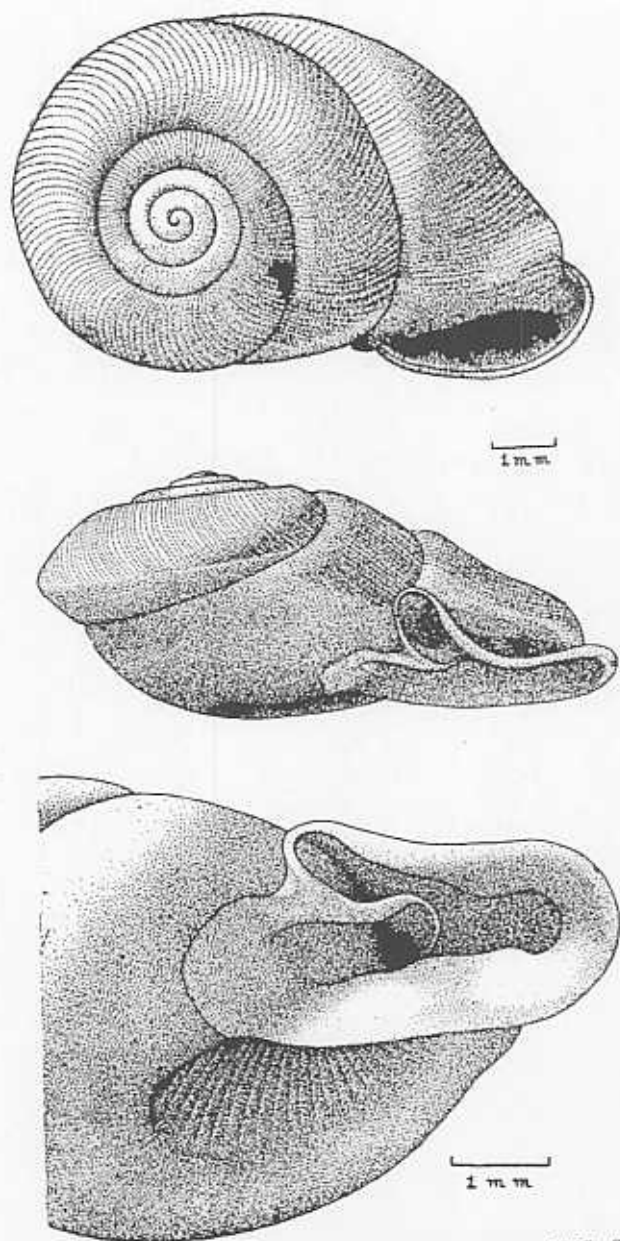


Fig. 12. *Oophana atopospira* n.sp. Kota Tongkat, Pahang, 1947. Shell from top and side. Aperture more enlarged. K. M. Foong del.

Mus. 25, 1954.

As has already been said in the Introduction measurements of such oblique shells as the present cannot be expressed in the usual values of height, width and height of aperture.

Habitat: Kota Tongkat, Pahang, 1947.

The new species differs from the undoubtedly very closely related *O. (H.) mirifica* in the following points: *O. (H.) atopospira* is larger and has a slightly projecting apex (in *mirifica* the top is flat). It is not so oblique as *mirifica*, the overhanging part of the fourth whorl being about half as broad as in *mirifica* and the carination not so sharp. While our new species is ribbed on the upper side of the whorls *O. (H.) mirifica* is entirely smooth, only the growth lines being visible. The base of the last whorl in *mirifica* is flatter, even somewhat concave, and the umbilicus narrower. Along the umbilicus the terminal part of the last whorl is angular in *O. (H.) mirifica*, but evenly rounded in *O. (H.) atopospira*. The constrictions in the last whorl close to the peristome are more developed in *atopospira* than in *mirifica*. Finally the aperture of *mirifica* is narrower than in the new species because the upper and lower margins are closer together.

O. (H.) atopospira differs still more obviously from *O. (H.) hanleyana*. This Burmese species is very distinctly ribbed on both upper and lower sides of the whorls, has a more elevated apex and a more overhanging part of the fourth whorl. The aperture of *O. (H.) hanleyana* is not spout-shaped and lacks the constrictions just behind the peristome.

From *O. (H.) striatula*, *andamanica* and *blanfordi* the new species differs in having a spout-shaped aperture and constrictions behind the peristome. *O. (H.) striatula* has, moreover, costulations on the upper and lower side of the whorls, and all three have a higher spire.

Oophana (Haploptychius) diaphanopepla n.sp. Fig. 13

Shell globular-conical, white or cream coloured, glassy-transparent, shining. Whorls about 6, the first 2½ smooth. The following ones have their upper surface transversely ribbed with delicate, curved ribs, about 16 to the mm. on the last whorl. Towards the base these ribs fade away. The spire is regular for about four whorls. The fifth whorl deviates abruptly, continuing obliquely sideways under the top whorls. Consequently the fourth whorl is more exposed and slightly overhangs the following ones. The periphery of this overhanging part is not keeled or angular. As in the preceding species the last whorl, before reaching the peristome, is transversely constricted, then inflated, and after this—just behind the peristome—constricted again. This last constriction is divided into an upper and a lower part by a short, longitudinal ridge, coinciding with the periphery.

MALAYAN STREPTAXIDAE

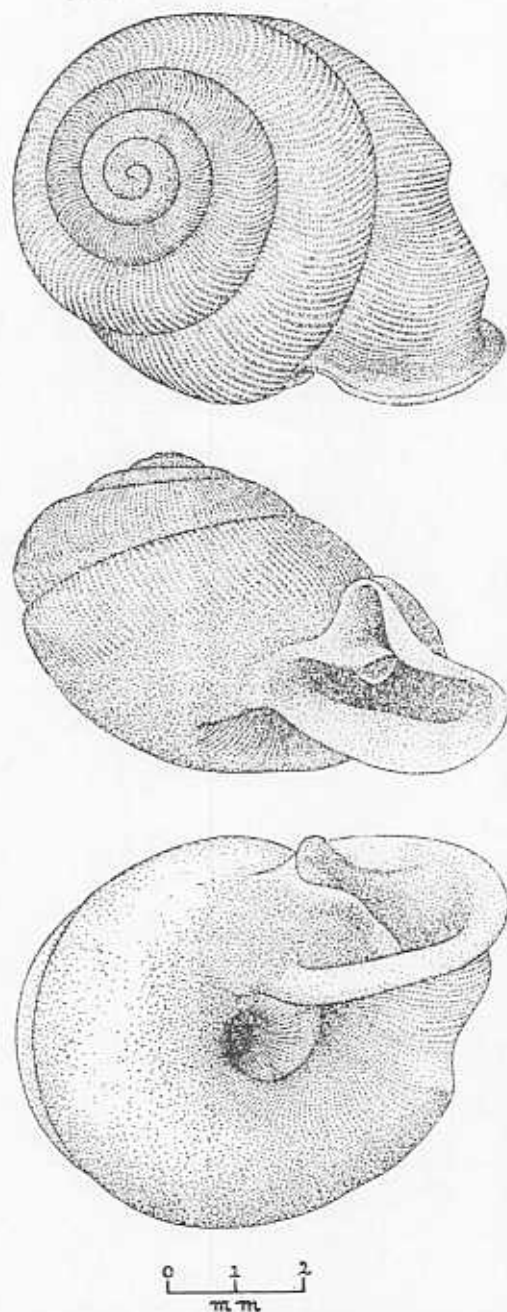


Fig. 13. *Oophana diaphanopepla* n.sp. Bukit Serdam, near Raub, Pahang. September 1950. Shell from top, side and base. K. M. Foong del.

Top elevated, obtuse. Base rounded. Umbilicus open and somewhat eccentric, but not quite so much as in *O. (H.) atopospira*. Along the umbilicus the base of the last whorl is angular. The side facing the umbilicus is coarsely ribbed.

Aperture narrow, spout-shaped, very oblique in the vertical and in the horizontal line. Entrance narrow, more or less arrow-shaped through obstruction by parietal lamella and thickened peristome. Peristome not continuous. Margin reflexed and thickened, especially at the points where the upper and lower constrictions, mentioned above, are situated. The resulting callosities look like broad teeth.

Parietal lamella strong, undulating, entering the aperture for about 3 mm. The exterior point of attachment forms a bifid or triangular callosity. At the upper parietal corner the lamella forms a sinuous ridge, joining the upper margin of the aperture.

| Dimensions | | | Holotype | Paratypes | | | | | | |
|--------------------------|----|----|----------|-----------|-----|-----|-----|-----|-----|-----|
| Height | .. | .. | 5.- | 5.5 | 5.2 | 5.- | 5.- | 5.- | 5.- | 5.- |
| Width | .. | .. | 7.5 | 7.4 | 6.8 | 7.2 | 7.- | 7.- | 6.8 | 6.8 |
| Longest axis of aperture | | | 3.- | 3.- | 3.- | 3.- | 3.- | 3.- | 3.- | 3.- |

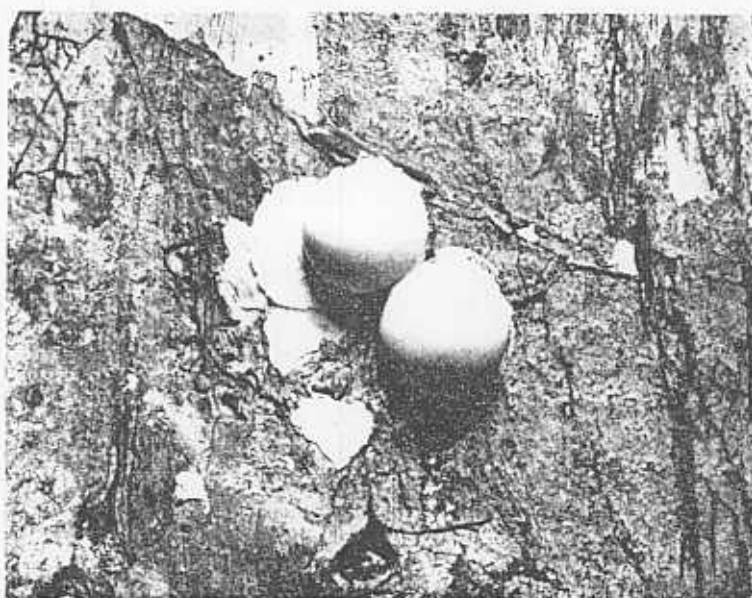
| Dimensions | | | Paratypes | | | | | | | | |
|--------------------------|----|-----|-----------|-----|-----|-----|-----|-----|-----|-----|-----|
| Height | .. | 5.- | 4.7 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.5 | 4.- |
| Width | .. | 6.8 | 6.9 | 7.5 | 7.3 | 7.- | 7.- | 7.- | 6.9 | 6.8 | 6.4 |
| Longest axis of aperture | .. | 3.- | 3.- | 3.- | 3.5 | 3.- | 3.- | 3.- | 3.- | 3.- | 3.- |

Two shells were too defective to measure.

Habitat: Bukit Serdam, near Raub, Pahang, September 1950, coll. P.D.R. Williams-Hunt.

Compared with the preceding species *O. (H.) diaphanopepla* is smaller and of more regular shape. Its top is more projecting and its costulation finer. The overhanging part of the last whorl is moderate, not keeled. Finally it has a narrower and less eccentric umbilicus.

From *O. (H.) striatula*, *andamanica* and *blanfordi* it differs in having a spout-shaped aperture. The constrictions in the last part of the ultimate whorl are also lacking in these three species. From *O. (H.) striatula* it further differs in having the costulation confined to the upper surface.



Ptychozoon kuhli, eggs and young lizard (M. W. F. Tweedie).

