The Malayan Species of Diplommatina (Cyclophoridae)

By F. F. LAIDLAW, M.A.

The large collection of shells included rather vaguely in the genus *Diplommatina*, which Mr. Tweedie has very kindly sent to me for a report, contains with three exceptions, all the species hitherto recorded from Malaya, as well as several that have not been described.

I must first thank Mr. Tweedie very warmly for allowing me to deal with such fine material, as well as for the very full notes he has given me along with other help. The material had been fully sorted out by him before he passed it to me, making work on it much easier.

The genus is very large, approximately 300 species have been named. It certainly requires revision and subdivision, but in these notes I have not been able to follow the sub-genera used by Kobelt in his Monograph (Cyclophoridae. 1902), though in other respects I have found his work very helpful.

Very roughly I define the genus as including small or minute Cyclophoridae, with ovate or acuminate shells, usually ribbed, and with a definite columellar tooth. They may be dextral or sinistral, but this character is constant within any given species. Very large forms may have a length of 7 mm. the smallest of 1.5 mm.

In nearly all species the shell reaches its greatest diameter at the penultimate whorl, increasing regularly to that level.

(The term penultimate requires some amplification. Actually the greatest width of the shell is the side to side diameter measured across the front of the shell on the second whorl above the mouth opening. As a matter of convenience I call this the penultimate whorl though strictly it includes part of the ante-penultimate whorl also).

The peristome is often expanded to make a wide margin round the mouth opening. In all Cyclophoridae the animal reinforces the peristome with a layer of shelly material laid down inside it; this does not coincide with the peristome margin, but makes a sort of secondary mouth. In these notes I call this the metastome. In some Cyclophorids this metastome is developed in an extraordinary way (e.g. *Alycaeus jousseaumei* de Morgan) but in *Diplommatina* is not specially remarkable. The columellar process or tooth, projects inward from the columellar margin of the mouth, and is clearly seen in all Malayan species. The ribs (or costulation) seem to mark growth stages of the shell, to be in fact immature peristomes.

Nearly all the species that I have examined show, under high magnification (2/3 mm. objective) and in good light, very fine spiral striation. This disappears in shells that have become at all mineralized. The protoconch (of about 1½ whorls) is invariably smooth.

Diplommatina has a wide range, over the whole of tropical Asia, (excluding Ceylon) the Philippine Islands and Malaysia, nearly but not completely bounded by Wallace's line to the East. Beyond the line it is replaced by an allied, equally large genus *Palaina*, which in turn just crosses Wallace's Line to the West, with one or two species in Java. To the East *Palaina* reaches New Caledonia and the Fiji Islands.

Nothing is known of the life-history, ecology, or physiology of *Diplommatina*, it is obvious that there is a great deal to be found out about them. These small creatures, along with many other tiny snails which make up a 'microfauna', must play a big part in the economy of their special habitats. The whole of Mr. Tweedie's material was collected on the hills of late Palaeozoic limestone which occur in the central and northern part of the Malay Peninsula. The unlimited availability of calcium carbonate on these hills leads to a remarkable proliferation of terrestrial mollusca, Cyclophorids, including the present genus and others such as *Opisthostoma* and *Alycaeus;* Streptaxids, Vertiginids, and many other small Pulmonates, occur in great profusion. There appears to be a considerable degree of regional differentiation among the hills, the faunas of the more isolated ones often including forms endemic to them.

It is scarcely necessary to call attention to the great beauty of many of the species, or to the curiously close resemblance some of them bear to much larger marine shells.

I have arranged the species in 'groups'. These are not all of equivalent value, members of one group may all be local races of a single species, of another they may be quite distinct species in the Linnean sense. Or the group may even have generic value. But until someone is bold enough to revise the whole genus, grouping of this sort is the most satisfactory treatment.

I have as a matter of convenience given notes on all known Malayan species, and have indicated a few relationships with forms in nearby territory.

Malayan species of "*Diplommatina*".

A. Dextral species.

i. Group *nevilli*.

D. nevilli Crosse.
canaliculata Mlldff.
ventriculus Mlldff.

ii. Group *crosseana*.
D. crosseana crosseana Godwin-Austen.
crosseana siputana Tomlin.
streptophora sp.n.
pentaechma sp.n.

iii. Group *seimundi*.
D. seimundi Laidlaw.
de morgani sp.n.
maduana sp.n.

B. Sinistral species.

iv. Group *superba*.
D. superba superba Godwin-Austen.
superba brevior n.
lenggongensis Tomlin.
parabates sp.n.
attenuata sp.n.

v. Group *diminuta*.
D. acme sp.n.
diminuta Mlldff.
sinistra Tomlin.

vi. Group *laidlawi*.
D. laidlawi Sykes.
tweediei sp.n.

vii. Group *'Gastroptychia'*.
G. skeati Sykes.
adversa H. & A. Adams.

A. Dextral species.

i. Group *nevilli*.

With acuminate spire, and more or less prominent beak, recalling that of many marine shells. Rather large species, from about 2·75–5 mm. Last whorl descending regularly, not so wide as penultimate. Mouth rather ear-shaped, outer margin of peristome rounded or showing some tendency to be angled. Ribs well developed.

The Malayan species are widely spread in the Peninsula and vary somewhat according to locality. They are very similar in appearance, especially *nevilli* and *canaliculata*. These two appear to be mutually exclusive, differing mostly in size.

Borneo has one species definitely belonging to this group, *viz. D. schmidti* Thiele 1908. Other Bornean and Javanese species show relationship.

D. nevilli Crosse 1879. Fig. 2.

Shell long, fusiform, of about 7 whorls. Beak prominent, margin of peristome rounded or showing trace of angulation. About 12 ribs per millimetre on penultimate whorl. Columellar tooth prominent.

Type locality, Gunong Pondok. Widely spread in the Peninsula. Size varies from locality to locality but is constant for each.

Mr. Tweedie has sent me the following.

Gunong Pondok, Perak. 40 specimens (topotypes).
Length 2·75 mm. Breadth max. 1·35 mm.
Lenggong, Perak. 26 specimens.
Length 2·9 mm. Breadth max. 1·4 mm.
Gunong Rapat, near Ipoh, Perak. 50 specimens.
Length 2·5 mm. Breadth max. 1·25.
Baling, Kedah. 20 specimens.
Length 2·75 mm. Breadth max. 1·35 mm.
Kaki Bukit, Perlis. 6 specimens.
Length 2·75 mm. Breadth max. 1·3 mm.
Gua Bama, Pahang. 32 specimens.
Length 2·2 mm. Breadth max. 1·1 mm.

The last form is perhaps deserving of a geographical name. On inspection it appears to be not only the smallest form, but also like the large form from Lenggong more slender relatively than the others. From measurement in the case of these very small objects it is difficult to feel sure of this.

C. D. mirabilis Godwin-Austen 1879.

A deformed or possibly an immature specimen of *nevilli*. The type in the Indian Museum, is unique. It is from Gunong Pondok. Length 1·5 mm. Breadth max. 0·8 mm.).

D. canaliculata v. Möllendorff 1886. Fig. 2.

Mr. Tweedie has pointed out to me that apart from size there is very little to distinguish this species from the last. In both the size of adult individuals is constant within very narrow limits in any given community, but the communities show marked differences from one another in this respect. *Canaliculata* communities also show some variability in the spacing of the ribs.

As a matter of convenience I put all forms which measure 3·75 mm. and upwards in length in *canaliculata*, and those less than 3·25 mm. in length in *nevilli*. At present the gap is not bridged, of course further finds may narrow or abolish it.

On the whole *canaliculata* seems to have bolder ribbing than *nevilli*, and the peristome in some cases is more strongly angled than it is in the latter. Also it may have as many as 9 whorls whilst *nevilli* has only 7½.

Mr. Tweedie has sent me examples from the following localities.

Batu Caves, Selangor. 15 specimens.
Length 3·9 mm. Breadth max. 1·75 mm.
Kramat Pulai, Perak. 20 specimens.
Length 4 mm. Breadth max. 1·75 mm.
Gua Musang, Kelantan. 40 specimens.
Length 4·9 mm. Breadth max. 2·0 mm.

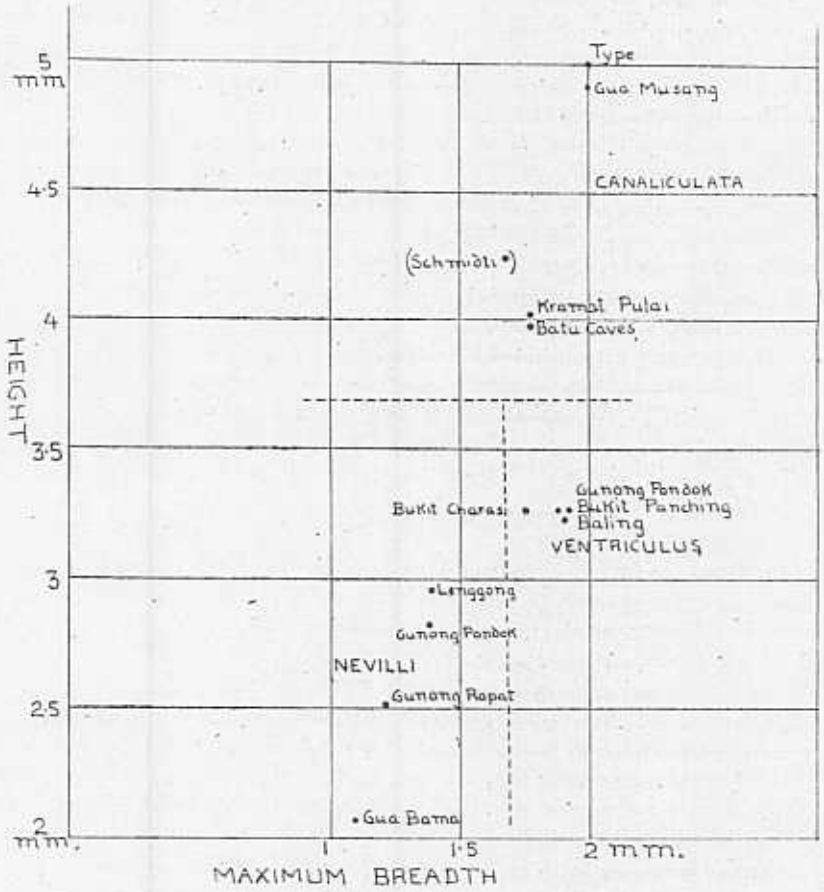

Fig. 1.

The Gua Musang form is more variable than the others in regard to the ribbing. About 4% of the specimens therefrom have the penultimate whorl almost entirely smooth, or with very few ribs. In some cases the ribs on the last whorl are very close set, in others they agree in spacing with those of the penultimate whorl. Some of these specimens too are a trifle broader than the majority, by about 0·1 mm.

(*D. schmidti* Thiele, 1908. Kari Orang, Borneo. Judging from Thiele's figure this is a local race of *canaliculata*. It has a length of 4·2 mm. and breadth of 1·7 mm.).

The type of *canaliculata* is said by v. Mollendorff to be from Bukit Pondong in Perak. Mr. Tweedie tells me (*in litt.*) that this is the same as the present day Gunong Pondok. *Nevilli* occurs in abundance as I have noted in my list above, but Mr. Tweedie further tells me that he has never found there any *Diplommatina* that he could regard as *canaliculata*. I believe it to be improbable that the two species should live side by side; it is possible that v. Mollendorff had material from more than one locality, and that this was not indicated clearly by the collector. The type is said by its author to have a length of 5 mm. and a breadth of 2 mm., agreeing fairly closely with examples from Gua Musang.

The accompanying diagram (Fig. 1) shows the relative dimensions of *nevilli* and *canaliculata* and also of *ventriculus* the third member of the group.

D. ventriculus v. Möllendorff 1891. Fig. 2.

Very similar to *nevilli* and *canaliculata* but relatively more ovate in shape than either of them. Intermediate in length, with the beak rather less prominent, and the columellar tooth not so strongly developed. The margin of the peristome shows slight angling.

Mr. Tweedie's material is as follows:

Gunong Pondok, Perak.	1	specimen (topotype).
Baling, Kedah.	20	"
Bukit Panching, Pahang.	2	"
Batu Caves, Selangor.	1	"
Bukit Charas, Pahang.	12	"

The Kedah specimens are exactly like the topotype. They all have about 20 ribs on the penultimate whorl. Those from Bukit Panching and the Batu Caves have the ribs on that whorl more widely spaced, about 12 or 15 in all. The specimens from Bukit Charas are the most distinct from the type, for whilst specimens from all localities are of about the same length (3·3 mm.) the Bukit Charas material is less inflated than the rest, and has the greatest breadth of about 1·75 mm., against a breadth of about 1·85 mm. in all the others.

ii. Group *crosseana*.

Small species (1·5–2·5 mm. in length), rather fusiform, whorls 6½, moderately inflated, the penultimate the widest. The last whorl tends to run horizontally, and consequently in a side view of the shell, the penultimate whorl appears to be compressed especially near the mouth of the shell. Ribs moderately developed. Peristome in the larger forms may be strongly angled, in smaller species this may not occur except for the presence of the 'beak'. (The horizontal course of the last whorl is shared with a number of species from Indo-China and Burma. cf. *D. austeni* Blanford 1868).

D. crosseana crosseana Godwin-Austen 1879.

I have been able to examine 6 topotype specimens of this form from Gunong Pondok, sent me by Mr. Tweedie, all in poor condition. They show the character well brought out in Godwin-Austen's figure, of the horizontal, or even slightly ascending last whorl. Length 1·5 mm. Breadth max. 0·5 mm.

D. crosseana siputana Tomlin 1938.

Of this form I have about 25 specimens from Mr. Tweedie all from the type locality. I find it difficult to separate them from the Gunong Pondok form. Tomlin uses the shape of the mouth as a distinction, the true *crosseana* has the mouth "angular at the base, and the columellar margin is perfectly straight". But topotypes of *siputana* certainly show an approach to this condition. For the present *siputama* may be treated as a local form of the same stock as *crosseana*, and the topical name used to indicate this as a trinomial.

D. streptophora sp.n. (Streptophoros = collared) Fig. 2.

Shell ovate-acuminate, whorls 6½, inflated and increasing regularly to the end of the penultimate, which is the largest, the last notably less so, giving the shell a collared appearance. Ribs about 10 to the millimetre on the penultimate whorl, in the type the ribs are rather more distant on the earlier whorls. The last whorl tends to run horizontally. Suture well impressed. Mouth vertical, margin of peristome rather pentagonal, not so markedly so as in *pentaechma* (sp.n. infra). Length 2·5 mm. Breadth max. 1·4 mm.

2 specimens from Kramat Pulai, Perak. One of these is the type, to be deposited in the British Museum.[1]

1. Unfortunately the type, from which the figure was drawn, was broken in transit to the British Museum. The other specimen, designated lectotype, has been deposited in its place. *Ed.*

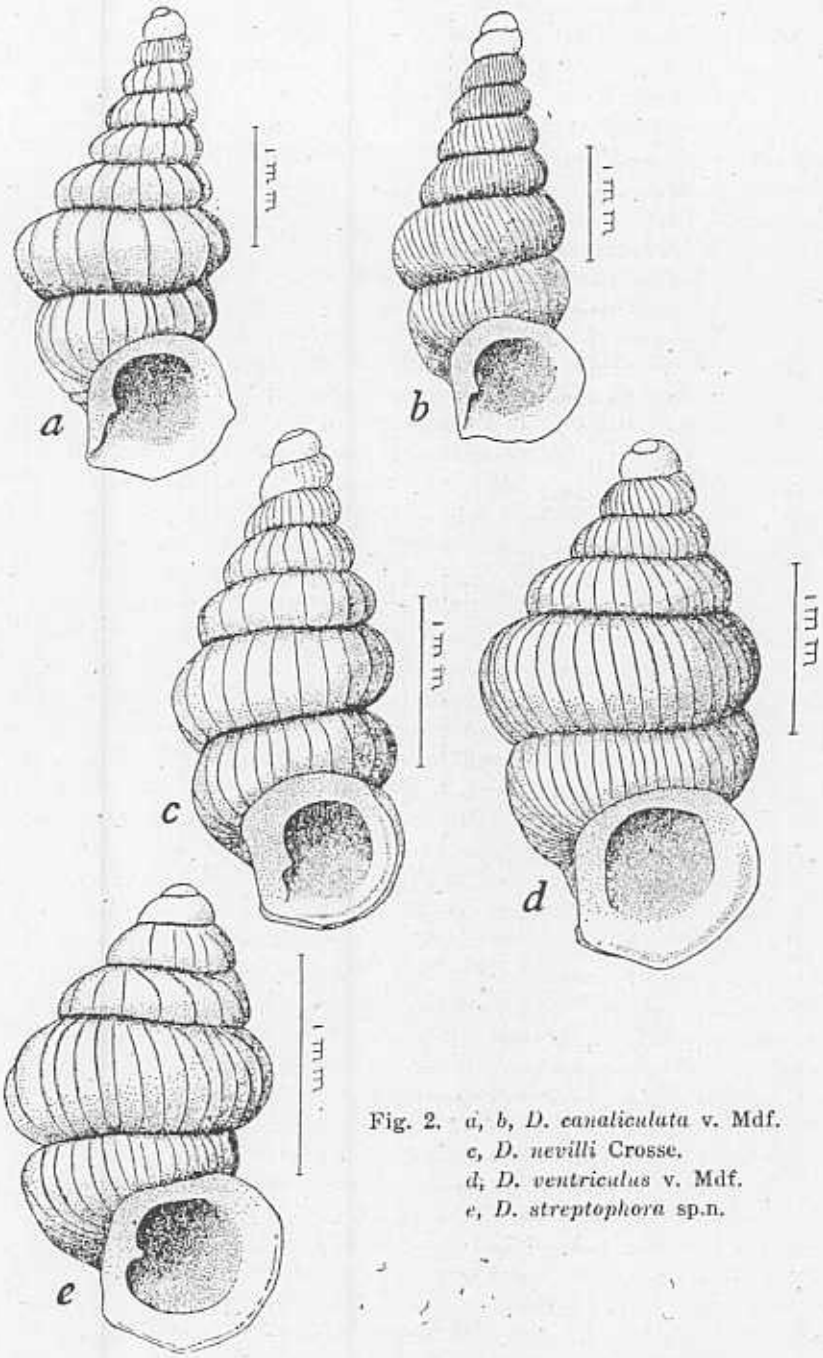

Fig. 2. *a*, *b*, *D. canaliculata* v. Mdf.
c, *D. nevilli* Crosse.
d, *D. ventriculus* v. Mdf.
e, *D. streptophora* sp.n.

D. pentaechma sp.n. (pentaichmos = five pointed. The angle above the columellar side of the peristome supplies the fifth point.) Fig. 3.

Shell ovate, with rather blunt spire, whorls about 6, ribbing not strong, variable in frequency. In the type about 16 ribs on the penultimate whorl which is slightly more inflated than the last. Suture not deep. Mouth vertical, roughly circular. Outer margin of peristome pentagonal, with four small, toothlike processes, between which the margin is slightly concave in front view, and also from side to side. Last whorl tends to be horizontal near mouth. Length 2·4 mm. Breadth max. 1·3 mm.

9 examples from Gua Musang, Kelantan. One of these is the type, to be deposited in the British Museum.

D. levigata Godwin-Austen 1876, from the Dafla Hills, Assam, shows similar processes on the peristome, and they occur as already noted, but to a much less striking extent in other Malayan species. The position of the species is doubtful, referred here for the present.

iii. Group *seimundi*.

Small species (1·7–2·5 mm. in length) ovate, or ovate-fusiform, of 6½–7 whorls which descend regularly. Penultimate whorl slightly wider than the last. Ribs close set. Mouth rounded or with inconspicuous beak, peristome not angled.

D. seimundi Laidlaw 1932.

Ovate shell of about 6 whorls. Mouth circular. Ribs well-developed and close-set. All the specimens that I have seen are white in colour. Most *Diplommatinas* when alive have the shell of a yellow or orange colour, most marked at the apex. Some of my specimens look quite fresh, I do not know if they live in the dark part of the caves.

Batu Caves, Selangor. 8 specimens.

Length 2·25 mm. Breadth max. 1·25 mm.

D. de morgani sp.n. Fig. 3.

Shell ovate acuminate, whorls 6, increasing regularly to the penultimate, a little shouldered. The last whorl is of about the same diameter as the penultimate which has about 40 fine, close-set ribs. Mouth rather auriform, with an inconspicuous beak, peristome not much expanded. Colour white. Length 2 mm. Breadth max. 1 mm.

Kota Gelanggi, Pahang. 20 examples. One of these is the type, which is to be deposited in the British Museum.

Near *seimundi* but smaller, narrower, with the suture more deeply incised, and with the mouth beaked.

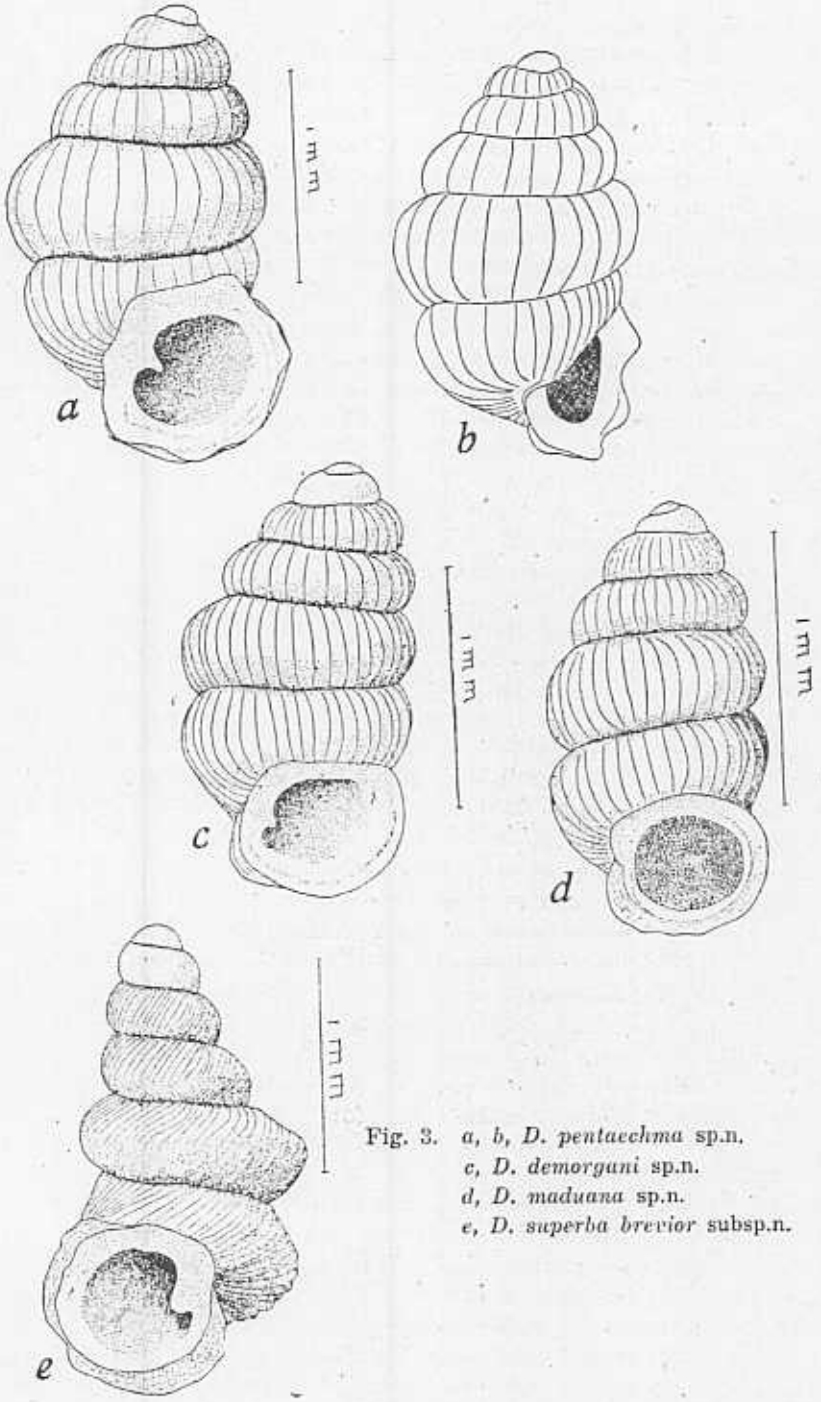

Fig. 3. *a, b, D. pentaechma* sp.n.
c, D. demorgani sp.n.
d, D. maduana sp.n.
e, D. superba brevior subsp.n.

D. maduana sp.n. Fig. 3.

Small, fusiform shell of about 6½ whorls, not much inflated, descending regularly. Penultimate whorl only slightly wider than the last, and with about 30 fine ribs. Mouth a litttle angled at the junction of the labial and columellar limbs of the peristome which otherwise is rounded and scarcely expanded. Length 1·7 mm. Breadth max. 0·9 mm.

Gua Madu, Kelantan. 2 specimens (rather worn). One of these is the type which is to be deposited in the British Museum.

At first sight very like *crosseana*, and about the same size, but the last whorl descends and is of about the same diameter as the penultimate. Consequently the labial margin does not approach the suture between the two whorls so closely as it does in *crosseana* . Its place in this group is provisional.

B. Sinistral forms.

iv. Group *superba*.

Long, acuminate shells, with slender spire. Whorls 6½–9, lower whorls more or less angled, suture deeply incised. Ribs prominent, often wavy, and where the whorl is strongly angled the ribs are in some species scabrous, or even produced to form short spines where they cross the keel. Penultimate whorl widest. Aperture markedly oblique, peristome well expanded. Metastome fairly regularly rounded, as is the actual aperture. Columellar process prominent.

In addition to the Malayan species, one member of the group is recorded from Borneo. This is *D. isseli* Godwin-Austen 1889. Like all the Malayan forms this is sinistral. The group however includes dextral forms, e.g. *pagodula* Bavay and Dautzenberg, from Tonkin.

D. superba superba Godwin-Austen 1879.

Shell elongate-pyramidal, spire pointed, whorls 7½, the last two strongly angled, the penultimate wider than the last. Ribs wavy, close-set, scabrous on the last two whorls. Peristome well expanded, especially on the labial side. Length 2·6 mm. Breadth max. 1·2 mm.

I have been able to examine two specimens, obtained many years ago from Mr. H. C. Fulton, the locality of these is given as Perak; they are probably from Gunong Pondok the type locality, and agree well with Godwin-Austen's description and figures.

D. superba brevior n. Fig. 3.

Shell elongate pyramidal, spire pointed, whorls about 7, penultimate the widest. Last two whorls angled, not quite so strongly as in the typical race. Ribbing fine and regular, oblique but not so wavy as in Godwin-Austen's form. About 45 ribs on penultimate whorl. Mouth rounded oblique, peristome moderately expanded. Length 2·5 mm. Breadth max. 1·3 mm.

Sungei Siput, Perak. 2 examples. One of these is the type, which is to be deposited in the British Museum.

Differs from typical *superba* chiefly in its rather more stumpy shape and finer ribbing.

D. attenuata sp. n. Fig. 4.

Elongated shell, with very slender spire, of about 7½ whorls. The first four have almost parallel sides, 5 and 6 increase rapidly, the latter, the penultimate is the widest, and is a little excentric. The three last whorls strongly keeled. On whorls 3–5 there is fine ribbing, on 6 the ribs become prominent, very wavy, and sharply angled where they cross the keel, the angle shows as a small spine-like point. Near the mouth the ribs become less prominent. There are about 26 on the penultimate whorl. Aperture very oblique, peristome expanded especially on the labial side. Length 2·5 mm. Breadth max. 1 mm.

Gua Bama, Pahang. 12 specimens. One of these is the type, which will be deposited in the British Museum.

Slenderer and more sharply angled on the last three whorls than the other Malayan species. The excentricity of the penultimate whorl is very plainly seen when the shell is viewed from behind. *Superba* shows to a much lesser degree the same peculiarity.

D. lengonggensis Tomlin 1941. Fig. 4.

"Shell yellowish, elongate, almost scalarescent, consisting of about nine whorls separated by an extremely deep suture, the protoconch of two whorls is smooth, the next two have fine, close axial costulae, the remaining five have distant, wavy, axial costulae at right angles to the whorl; the last four whorls are distinctly keeled and the penultimate one is smaller than the antepenultimate. Aperture almost circular with a tubercle on the columella." "Long. 3·25 mm.; diam. max. 1·6 mm. Hab. Lenggong, Perak."

The longest and largest of the Malayan species.

D. parabates sp.n. (parabates = one who stands beside) Fig. 4.

Shell elongate, acuminate of about 7½ whorls. These are rounded and increase regularly to the penultimate which is the widest. In profile the lower whorls are a little shouldered, and

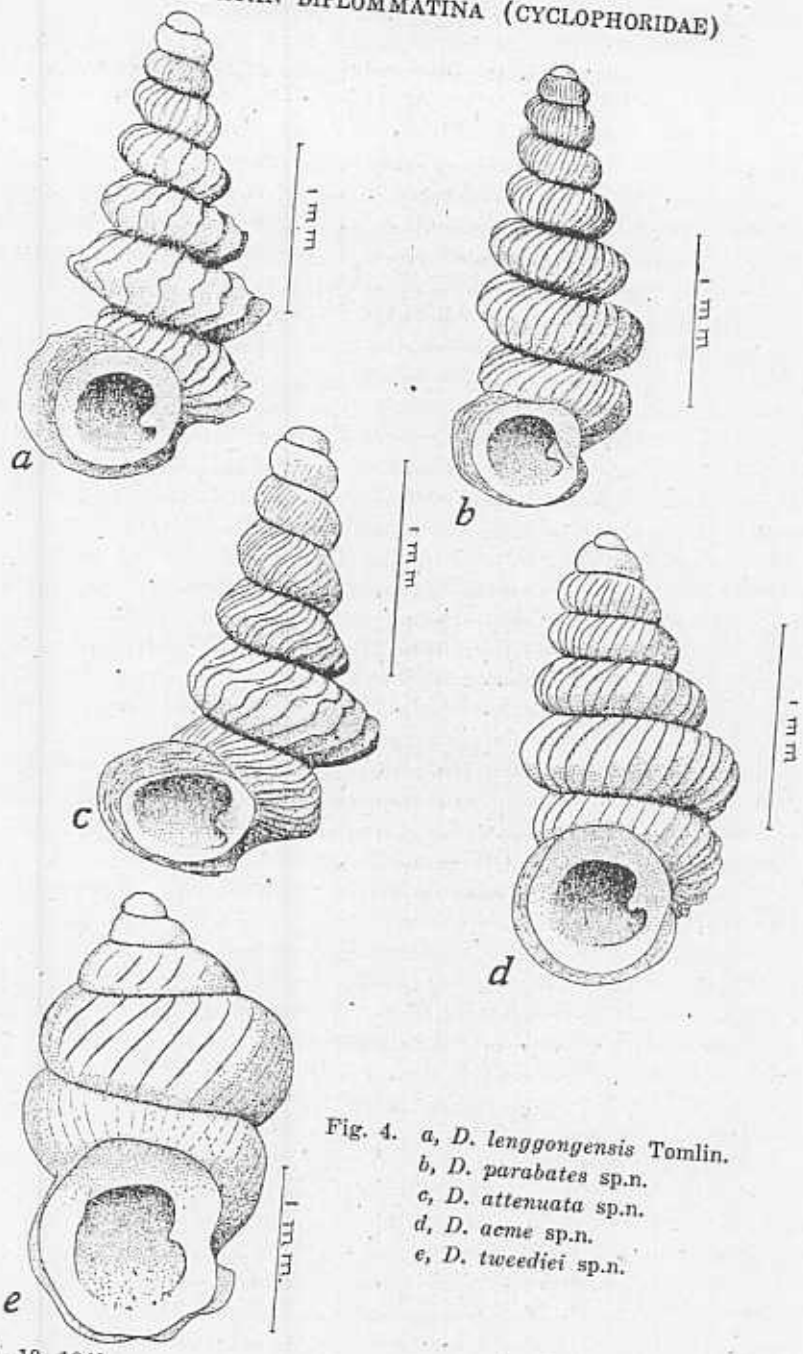

Fig. 4. *a*, *D. lenggongensis* Tomlin.
b, *D. parabates* sp.n.
c, *D. attenuata* sp.n.
d, *D. acme* sp.n.
e, *D. tweediei* sp.n.

the suture deeply incised, the last whorl is angled behind the mouth. Ribs oblique, but not wavy, on the penultimate whorl they number about 25. Peristome not much expanded. Length 3 mm. Breadth max. 1·3 mm.

Lenggong, Perak. 3 specimens. One of these is the type, which will be deposited in the British Museum.

Obviously distinct from *lenggongensis* though living apparently in the same habitat. It is shorter than that species, with differently shaped whorls, and different ribbing. Mr. Tweedie has more specimens of *parabates*, so I understand, in the Raffles Museum.

v. Group *diminuta*.

Small or very small species, with regularly spindle-shaped shells, ribbing not so prominent as in the *superba* series, and mouth more nearly vertical. About 7½ whorls, the penultimate the widest.

D. acme sp.n. Fig. 4.

Long, fusiform shell, whorls about 7½, rounded, increasing regularly to the penultimate which is the widest, ribs well-marked, about 26 on the penultimate. Suture well impressed. Aperture somewhat oblique, mouth rounded, peristome not much expanded. Columellar tooth small. Length 2·2 mm. Breadth max. 1 mm.

Kaki Bukit, Perlis. 25 specimens. One of these is the type, which will be deposited in the British Museum.

Intermediate between the *superba* and *diminuta* groups. Smaller than any of the former, and larger than such species as *diminuta* or *sinistra* it resembles these latter in having more regularly rounded whorls, less prominent ribs, and a less expanded peristome.

D. diminuta v. Möllendorff 1891.

Shell fusiform, of about 7½ whorls, the penultimate rather broader and more inflated than the last. About 24 ribs on the penultimate whorl. Mouth nearly vertical, rounded, but the columellar limb less strongly curved than the rest. Peristome very little expanded; columellar tooth prominent. Length 2 mm. Breadth max. 0·95 mm.

Mr. Tweedie has sent me a single specimen from Gunong Pondok, Perak, the type locality.

D. sinistra Tomlin 1938.

Very similar to *diminuta*. According to Tomlin the "aperture in *sinistra* irregularly rounded except that on the right-hand side the peristome is almost straight from its junction

with the body whorl, forming a chord to the irregular arc of the rest of the peristome". He also regards the ribbing in *sinistra* as more widely spaced. Length 1·9 mm. Breadth max. 1 mm.

This may well be a local race of the same stock as *diminuta*, just appreciably shorter and stouter, with a slight difference in the shape of the mouth. So far as I can judge the ribbing is very similar.

I have been able to examine about 30 individuals of *sinistra* from Sungei Siput in Perak, the type locality.

vi. Group *laidlawi*.

Shell ovate-pyramidal, of about 5½–6 whorls which increase rapidly to the penultimate, are rather inflated, and with the suture not deeply impressed; with fine, usually rather distant ribs. Aperture vertical, approximately circular, peristome expanded, and *with a definite, rather rectangular process on the outer columellar margin.*

Besides the two Malayan species *busauensis* Godwin-Austen 1889, belongs here, as does *gibberosa* Godwin-Austen 1892, from Assam. *javana* v. Möllendorff 1897, differs from these in having quite dense ribbing, but is similar in other respects.

D. laidlawi Sykes 1903.

Shell ovately fusiform, of 5½ whorls, increasing slowly and regularly to the last whorl, which narrows a little before the mouth. Fine distant ribs, about 14 on the penultimate whorl. Mouth quadrato-circular, peristome with rectangular prominence to the outer side of the columellar margin. Columellar tooth small. Length 2· mm. Breadth max. 1 mm.

Found under fallen leaves on the forest floor on Gunong Inas, North Perak, about 3,500 feet above sea level.

D. tweediei sp.n. Fig. 4.

Shell ovate, of about 5 whorls, the upper ones unsymmetrically pyramidal, increasing very rapidly, the last two about equal in diameter, round and inflated; suture very little incised. Below the protoconch the whorls carry very fine, distant ribs, most marked near the sutural line; about 14 on the penultimate whorl. Mouth rather rounded, peristome well expanded, with an outward process, irregularly rectangular, on the columellar side. Length 3· mm. Breadth max. 1·8 mm.

3 examples (all rather worn) Gua Musang, Kelantan. One of these is the type, which will be deposited in the British Museum.

Larger than *laidlawi*, relatively stouter, and more nearly pyramidal.

vii. Group *Gastroptychia.*

Relatively large species (3–8 mm. in length), ovate-acuminate. Whorls 6½–8 increasing regularly, with delicate close-set ribbing, scarcely detectable in some species. Mouth vertical, columellar margin nearly or quite straight; peristome not much expanded, and at the upper part of it the two limbs do not meet, but in the fully adult shell the deficiency is made good by the metastome. In some species (e.g. *adversa* H. & A. Adams) this overflows the palatal part of the lip, and spreads as a flat glazed surface up to or even beyond the sutural line between the last two whorls on the front of the shell.

The name *Gastroptychia* was suggested by Kobelt and v. Möllendorff (1900) for *Paxillus* H. and A. Adams (1851) nom. praeocc. It will probably rank as a genus in any full revision of *Diplommatina*, and I include it here for the sake of completeness. Some of the species at present listed in it are not properly placed, and in my opinion it is no more distinctly characterized than (say) my group *superba* or *laidlawi*.

G. **skeati** Sykes 1903.

A small species about 3·1 mm. long. Whorls moderately inflated, with close ribbing. Metastome not much developed.

The smallest species of the genus. I found it on the summit of Gunong Inas, in North Perak, about 5,500 feet about sea-level under overhanging rock.

G. **adversa** H. and A. Adams 1851.

The most specialized form of the genus. Found in North Borneo and in the Natuna Islands. Recorded by Issel (1872) for Singapore and 'near Malacca'. Appears to be a lowland or coastal species.

FIGURES.

In figs. 2, 3 and 4 the shells are not drawn to a uniform scale, that of each being shown by a millimetre line placed beside it.

Fig. 1. Diagram showing relative dimensions of *D. nevilli*, *D. canaliculata* and *D. ventriculus* from different localities.

Fig. 2. *a, b, D. canaliculata* v. Mdf. from Gua Musang, Kelantan, specimens chosen to show extremes of variation in ribbing; *c, D. nevilli* Crosse, Gunong Pondok, Perak; *d, D. ventriculus* v. Mdf. Bukit Baling, Kedah; *e, D. streptophora* sp.n., Kramat Pulai, Perak, type.

Fig. 3. *a, D. pentaechma* sp.n., Gua Musang, Kelantan, type; *b, D. pentaechma,* mounted to show peristomial margin in profile; *c, D. demorgani* sp.n., Kota Gelanggi, Pahang, type; *d, D. maduana,* sp.n., Gua Madu, Kelantan, type (the aperture is blocked with earth); *e, D. superba brevior* subsp.n., Sungei Siput, Perak, type.

Fig. 4. *a, D. lenggongensis* Tomlin, Lenggong, Perak; *b, D. parabates* sp.n., Lenggong, Perak, type; *c, D. attenuata* sp.n., Gua Bama, Pahang, type; *d, D. acme* sp.n., Kaki Bukit, Perlis, type; *e, D. tweediei* sp.n., Gua Musang, Kelantan, type.

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