

**Notes on the non-marine molluscs of the island of Borneo 5. The genus *Diplommatina* (Gastropoda Prosobranchia: Diplommatinidae)**

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The species of the genus *Diplommatina* (Diplommatinidae) occurring on Borneo are revised. Fifty species and two subspecies have been found; twenty four species and both subspecies are new. Most species are endemic to Borneo. It is argued that, for the time being, the genus *Diplommatina* is best not split up in smaller genera. As a whole it is probably monophyletic.

Key words: Gastropoda, Prosobranchia, Diplommatinidae, *Diplommatina*, taxonomy, Malaysia, Indonesia, Borneo.

The genus *Diplommatina* includes hundreds of species, occurring widespread throughout Southeast Asia. Until recently, twenty five species were recorded from Borneo. Collecting activities of the author, as well as the inspection of a large number of samples stored in the Florida Museum of Natural History, Gainesville (UF), have increased this number to fifty. This makes *Diplommatina* the largest genus of the terrestrial malacofauna of Borneo.

Among the Diplommatinidae, the genus *Diplommatina* is characterized by the following set: 'tuba not inverted; constriction with teeth; columellaris present, usually visible in the aperture'. The first character denotes an assumedly primitive absence of a character (which is a synapomorphy for the genera *Opisthostoma* and *Plectostoma*); the second character is a synapomorphy shared with *Opisthostoma*. The third character is unique within the Diplommatinidae, because the tooth visible in the same position in some species of *Opisthostoma* is a parietalis. In this circumscription, *Diplommatina* may therefore be a monophyletic genus.

However, *Diplommatina* includes series of distinctly aberrant species. This has tempted several authors to split off smaller genera. However, the sets of characters attributed to these satellite are usually heavily polythetic: few species occur which show the complete set, most species show only a few characters of the set. Such species can be regarded as morphological intermediates between the satellite genus and *Diplommatina* in a stricter sense. Besides, the characterizing sets are often such that the satellite genera include species of which it may be assumed that they are of various phylogenetic affinity; incidental species of the satellite genus share characters with species of *Diplommatina* s.s. Examples of both can also be found among the Bornean species.

— Subgenus *Diploptychia* Von Moellendorff, 1895. Type: *D. heliscus* Von Moellendorff, 1895 (Philippines). Shell dextral, conical. Aperture distinctly oblique with regard to the coiling axis. Constriction with two columellares and two palatales.

*D. asynaimos* is similar to the species attributed to *Diploptychia*, but has one columellaris and one palatalis.

— Genus *Gastroptychia* Kobelt & Von Moellendorff, 1900 (= genus *Paxillus* H. & A. Adams, 1851). Type: *D. adversa* (H. & A. Adams, 1851) (Borneo). Shell usually sinistral, fusiform. Constriction with two or more longitudinal palatales.

*D. adversa*, *D. electa*, *D. moluensis*, and *D. rubicunda* fit into this group. However, many other species which otherwise look similar, do not fit: *D. rubra*, *D. subglaber*, *D. centralis*, *D. subisensis*, *D. sulphurea* all have only one longitudinal palatalis. Dextral species with two or more palatales also occur, *D. aurisdiaboli*, *D. bicornata* (both part of the group with tubular projections on the radial ribs), and *D. laevis* (part of the group with a 'teardrop' near the columellar side of the peristome).

— Genus *Moussonia* Semper, 1865. Type: *Moussonia typica* Semper, 1865, is *D. problematica* (Mousson, 1865) (Samoa). Shell dextral. Spiral striation particularly prominent around the periphery of the whorls, whorls often carinate (not so in the type species). Aperture distinctly tilted with regard to the coiling axis. Columellar side of the peristome often sharply folded where the columellaris touches the peristome. Constriction with two parietales, the outer almost touching the very high columellaris (checked in *D. papuana* (Tapp. Canefri, 1883, not E.A. Smith, 1897), and *D. aff. hirsuta* Zilch, 1953).

*D. asynaimos* shows a number of characters of *Moussonia*, but lacks the sharp folding of the columellar peristome and has a single parietalis only. It can be regarded as an intermediate between *Moussonia* and *Diplommatina* s.s.

— Genus *Diancta*, sect. *Paradiancta* Von Moellendorff, 1895. Syntypes: *D. everetti*, *D. excentrica* (both from Borneo), *D. philippinica* Quadras & Von Moellendorff, 1895 (Philippines). Shell dextral. Tuba 1 1/2-2 whorls.

*D. calvula* and *D. madaiensis* could also be included. Except for the long tuba, the species are similar to the genus *Diplommatina* s.s., particularly to the subgenus *Sinica* Von Moellendorff, 1885. They are linked to this genus by species as *D. sykesi*, *D. lygipleura*, *D. stibara*, and *D. calcarata*, all with a tuba of 1-1 1/4 whorl.

The diagnoses of the above mentioned supraspecific taxa have been taken mainly from Kobelt (1902). They are not literal translations of the original diagnoses, but have been assembled on account of the species included in the taxon by various authors.

Because of the observations given above, the satellite genera and subgenera have not been used in this revision. *Diplommatina* is not subdivided here.

References to material present in the collection of the present author are abbreviated as V, followed by a collection number. The holotype specimens of the species described here will be deposited in the Nationaal Natuurhistorisch Museum (RMNH). If available, paratypes from the type locality will be distributed to other institutes. Eventually all other material will be deposited at RMNH.

A few other abbreviations are used in the geographical references in the text, mainly derived from the Indonesian language: B. = batu (rock); Bt. = bukit (hill); G. = gunung (mountain); Kpg. = kampung (village); P. = Pulau (island).

After each reference to material seen by the author the number of specimens is given after a slash: /.

The drawings were made by the author, with a Wild M8 stereo microscope with camera lucida device.

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geologist G.E. Wilford. Mr. S.P. Dance must have spent years to pick the shells from all these samples. More material was kindly made available by the British Museum (Natural History), London (BMNH), the Museo Civico di Storia Naturale "G. Doria", Genova (MCSNG), the National Museum of Wales, Cardiff (NMW), the Senckenberg Museum, Frankfurt (SMF), the Zoologisch Museum, Amsterdam (ZMA), and the Zoologisches Museum, Berlin (ZMB).

## SYSTEMATIC PART

### Genus *Diplommatina* Benson, 1849

Shell white to corneous or orange, usually slightly translucent when fresh, dextral or sinistral, last whorl not inverted; spire usually fusiform, sometimes conical or cylindrical. Whorls 4  $1/4$ -9  $1/8$ ; top whorls usually not oblique, smooth, usually elevated. Other whorls usually with radial ribs, often crossed by a fine spiral striation. About 5/8-2 whorls previous to the aperture a constriction is present, the narrowest part of which is usually provided with a transversal lamella on the palatal side. In the part immediately beyond the constriction (in the direction of the aperture) more longitudinal teeth are usually present. The whorl(s) beyond the constriction, here called *tuba*, have the same direction of coiling as the rest of the shell. Aperture circular to more or less angular, usually with a columellaris. Peristome usually double, the outer rim often flaring. Operculum corneous, ovate or circular, paucispiral. Shell 1.3-8 mm high.

Ecology. — Most species occur restricted to primary forest on limestone. So far, only *D. whiteheadi* and *D. rubicunda* have also been found in forest on sandstone and shale. More species may prove to occur in these habitats, but in much smaller numbers than in limestone areas. Apparently such species avoid podzolic forest, the so-called 'kerangas', low and open forests on leached, waterlogged sandy soils. *D. recta*, *D. plecta*, *D. electa*, and *D. rubra* occur in the montane forests of Mt. Kinabalu, on granodiorite and possibly on ultrabasic rock. The response of most species to forest fires and clear felling, two major hazards to the Bornean primary forests, is immediate and in many cases irreversible: they die out. Mature secondary forest may be colonized again by some *Diplommatina* species. Only *D. electa* has been found on the cleared banks of a road, in everwet montane conditions, on granodiorite scree with grass and small shrubs.

Distribution. — Widespread in Southeast Asia, from India to Japan, SE.-wards to N. Australia and the Pacific.

Notes. — 1. Out of the 52 taxa of *Diplommatina* now recorded from Borneo, no less than 46 are endemic to this island. Only six taxa occur also elsewhere, viz. *D. adversa* (W. Malaysia, Singapore, Natuna Islands), *D. calcarata* (Java), *D. canaliculata* (W. Malaysia, Sumatra, Pulau Panaitan), *D. concinna* (Natuna Islands), *D. maduana maduana* (W. Malaysia), and *D. recta* (Balabac). Borneo does not share any taxa with Sulawesi, nor with the Philippines (if the occurrence of *D. recta* on Balabac, a small island immediately N. of Borneo, is not counted). *D. serempakensis*, *D. tiara*, and *D. miraculumdei* share a number of unique features with *D. pagodula* Bavay & Dautzenberg, 1908, from the N. part of Vietnam. These four species may constitute a monophyletic group. The genus *Eostrobilops* (Strobilopsidae) shows a similar pattern of distribution, with *E. triptychus* Vermeulen, 1992, in SE. Borneo, and seven more extant species in continental SE. Asia and Japan. Together, they suggest a yet unexplained biogeographical relationship between SE. Borneo and continental SE. Asia.

2. On Borneo, only *D. rubicunda* (fig. 51d) and *D. adversa* occur widespread. *D. maduana* (fig. 51b), *D. toretos*, *D. concinna* (fig. 51c), and *D. onyx* have a somewhat smaller range, covering most of Sarawak. *D. soror* (fig. 51c) and *D. asynaimos* occur on scattered localities throughout Sabah, as well as the E. part of Sarawak. All other species are endemic to a small part of the island.

It is obvious that the fauna of the Meratus Mountains in SE. Kalimantan is very different from the fauna occurring in Sabah and Sarawak. However, more areas of endemism can be recognized. The most important are:

— Sarawak, 1st Div., limestone ranges S. of Kuching. *D. spinosa* (fig. 51a) and *D. busanensis* are endemic here.

— Sarawak, 4th Div., isolated limestone hills in the Tatau Valley, and possibly including limestone ranges in the Ulu Kakus. *D. ferrumequinum* (fig. 51a) and *D. evexa* are endemic here.

— Sarawak, 4th Div., G. Subis (Niah Caves). *D. niahensis*, *D. strongyla*, and *D. subisensis* (fig. 51d) are endemic here.

— Sarawak, 4th Div., G. Mulu. *D. lygipleura*, *D. excentrica*, *D. moluensis*, and *D. sulphurea* (fig. 51d) are endemic here.

— Sarawak, 5th Div., isolated limestone hills in the Limbang Valley, and Sabah, Interior Zone, isolated limestone hills. *D. antheae* (fig. 51b), *D. cyrtorhitis* (fig. 51c), *D. oedogaster*, and *D. centralis* (fig. 51d) are endemic here.

— Sabah, West Coast and Interior Zone, G. Kinabalu. *D. plecta*, *D. electa*, and *D. rubra* (fig. 51d) are endemic here.

— Sabah, Sandakan and Tatau Zones, the E. coast. *D. gomantongensis* (fig. 51b), *D. madaïensis*, *D. sykesi*, *D. calvula*, and *D. cacuminulus* are endemic here.

— Kalimantan, K. Selatan and K. Timur, Meratus Mountains, and possibly including the limestone areas of the Sankulirang Peninsula in K. Timur. *D. aurisdiaboli*, *D. bicoronata*, *D. serempakensis* (fig. 51a), *D. miraculumdei*, *D. tiara* (fig. 51a), *D. lacrimans*, *D. laevis*, *D. welzeni*, *D. meratusensis*, and *D. subglaber* (fig. 51d) are endemic here.

Next to these, a few minor areas of endemism exist, viz. Pulau Banggi off the N. coast of Borneo, including the Northernmost point of Borneo (with *D. tenuilabiata*, fig. 51b); as well as the limestone hills along the upper Baram River in Sarawak, 4th Div. (with *D. maduana nefrens*, fig. 51b).

3. For a proper use of the key the following is important:

— The *constriction*: a narrow part present at 5/8-2 whorls previous to the aperture. It may be level with the parietal side of the peristome, with the angular edge of the peristome, or it may be situated beyond the angular edge, in the direction of the *top* of the shell.

— The *tuba*: the whorl(s) beyond the constriction, in the direction of the aperture of the shell.

— The whorl count includes the tuba.

— If insufficient material is available to break a shell, the observation of the palatal teeth in the constriction is easiest if the shell is made temporarily transparent by wetting it with a droplet of gasoline.

— The peristome may be *sinuous*, meaning here: undulating, going alternately up and down.

— The *angular edge* of the peristome: the edge between the parietal and the palatal sides.



— The *basal edge* of the peristome: the edge between the basal and the columellar sides.

— The *palatal lip* of the peristome: the thickening of the inner peristome on the palatal and basal sides.

— The shell width is measured over the widest whorl. If this happens to be the last whorl, the flaring peristome is excluded.

— The size of the aperture is given as the size of the actual opening. The peristome is excluded.

4. The species are arranged in the order in which they appear in the key.

Key to the Bornean species of *Diplommatina*  
(Check as large series of specimens as possible)

- 1 a - Shell dextral ..... 2
- b - Shell sinistral ..... 48
- 2 a - Radial ribs present, with a tubular to distinctly trough-shaped projection half way, which leaves a semicircular to almost entirely circular loop to the right in the scar of the radial rib when abraded ..... 3
- b - Radial ribs present, without a projection half way, or with a flat or only slightly concave projection, straight or slightly sinuous, at most with a slight loop to the right half-way; or radial ribs absent ..... 10
- 3 a - Spiral striation entirely absent on the widest whorl (check with a 25 x magnification) ..... 4
- b - Spiral striation present on the widest whorl, usually most conspicuously so below the periphery, sinuous, distorted ..... 8
- 4 a - Constriction with 2-3 longitudinal palatales ..... 5
- b - Constriction with 1 longitudinal palatalis ..... 7
- 5 a - Angular edge of peristome pointedly drawn out over the constriction, (almost) touching to the previous whorl ..... *D. aurisdiaboli* (1)
- b - Angular edge of peristome rounded, not touching the previous whorl .... 6
- 6 a - Tuba usually rounded, entirely without tubular projections ..... *D. bicoronata bicoronata* (2a)
- b - Tuba often somewhat angular, usually with (the scars of) tubular projections, sometimes only with a row of small, irregular swellings .. *D. bicoronata praetervisa* (2b)
- 7 a - Shell fusiform, or shell almost conical, but then the aperture distinctly moved inwards. Longitudinal palatalis not covered by the peristome on the outer surface of the shell ..... *D. spinosa* (3)
- b - Shell conical, aperture not or only slightly moved inwards. Longitudinal palatalis covered by the peristome on the outer surface of the shell ..... *D. ferrumequinum* (4)
- 8 a - (3) Constriction with 2 parietales. Outer peristome not or hardly expanding beyond the inner in frontal view. Inner peristome with a lip on the palatal and basal sides ..... *D. serempakensis* (5)
- b - Constriction with 1 parietalis. Outer peristome widely expanding beyond the inner in frontal view. Inner peristome without a lip on the palatal and basal sides ..... 9

- 9 a - Aperture tilted about 45° with regard to the coiling axis of the shell. Tubular projections longitudinally striated on all sides ..... *D. miraculumdei* (6)  
 b - Aperture tilted up to 35° with regard to the coiling axis of the shell. Tubular projections more or less transversely striated on the right side ..... *D. tiara* (7)
- 10 a - (2) Tuba with a sharply delineated, small swelling in the shell wall, close to the columellar side of the peristome ..... 11  
 b - Tuba without a sharply delineated swelling close to the columellar side of the peristome; or tuba entirely swollen at that level ..... 12
- 11 a - Constriction with 1 longitudinal palatalis. Shell height 2.7-3.7 mm ..... *D. lacrimans* (8)  
 b - Constriction with 2 longitudinal palatales. Shell height 4.2-5.0 mm *D. laevis* (9)
- 12 a - Columellaris not visible in the aperture when the shell is observed in front view ..... 13  
 b - Columellaris visible, though sometimes inconspicuous, in the aperture when the shell is observed in front view ..... 17
- 13 a - Constriction without longitudinal palatalis ..... 14  
 b - Constriction with longitudinal palatalis ..... 16
- 14 a - Shell 2.5-3.2 mm high. Penultimate whorl with 3-5 ribs/0.5 mm ..... *D. gomantongensis* (10)  
 b - Shell 1.4-2.1 mm high. Penultimate whorl with 7-13 ribs/0.5 mm ..... 15
- 15 a - Shell 1.6-2.1 mm high. Number of whorls 5 3/4-6 5/8. Sides of spire flat ... *D. anthaeae* (11)  
 b - Shell 1.4-1.6 mm high. Number of whorls 5-5 1/2. Sides of spire convex ... *D. maduana nefrens* (12.2)
- 16 a - Shell 1.3-1.7 mm high. Umbilicus closed ..... *D. maduana maduana* (12.1)  
 b - Shell 2.4-3.3 mm high. Umbilicus open, partly covered by the peristome ... *D. toretos* (13)
- 17 a - (12) Whorls carinate. Aperture tilted about 60° with regard to the coiling axis ..... *D. asynaimos* (14)  
 b - Whorls rounded. Aperture only slightly tilted with regard to the coiling axis ..... 18
- 18 a - Radial ribs present. At least part of the ribs on the top whorls and/or the penultimate whorl slightly sinuous ..... 19  
 b - Radial ribs present, but then straight, those on the tuba sometimes excepted; or radial ribs absent ..... 25
- 19 a - Tuba 3/4-7/8 whorl long (constriction level with the parietal side of the peristome, well away from the angular edge) ..... 20  
 b - Tuba 1 1/8-2 whorls long (constriction situated beyond the angular edge, in the direction of the top of the shell) ..... 22
- 20 a - Radial ribs with a wide, well-rounded arc to the right, strongly sinuous ... *D. cyrtorhitis* (15)  
 b - Radial ribs with at most slight edge to the right, only slightly sinuous ..... 2
- 21 a - Spire usually decollate. Radial ribs usually slightly sinuous on the penultimate whorl. Aperture with the columellaris visible. Constriction with longitudinal palatalis ..... *D. concinna* (16)  
 b - Spire not decollate. Radial ribs not or hardly sinuous on the penultimate whorl. Aperture with the columellaris inconspicuous. Constriction with or without longitudinal palatalis ..... *D. soror* (17)

- 22 a - Tuba 1 1/8-1 1/4 whorl long ..... 23  
 b - Tuba 1 3/8-2 whorls long ..... 24
- 23 a - Last half-whorl rounded. Penultimate whorl with 4-5 radial ribs/0.5 mm ....  
 ..... *D. lygipleura* (18)  
 b - Last half-whorl obtusely angular. Penultimate whorl with 2-4 radial ribs/0.5  
 mm ..... *D. stibara* (19)
- 24 a - Tuba 1 3/4-2 whorls long. Shell 1.4-1.6 mm wide ..... *D. everetti* (20)  
 b - Tuba 1 3/8-1 1/2 whorl long. Shell 1.1-1.2 mm wide ..... *D. excentrica* (21)
- 25 a - (18) Constriction about 1/4 whorl or more beyond (in the direction of the top of  
 the shell) the level marked by the angular edge of the peristome and the palatalis  
 situated entirely beyond this point ..... 26  
 b - Either constriction about level with the parietal side, or with the angular edge of  
 the peristome; or constriction situated up to 1/4 whorl beyond the angular edge of  
 the peristome (in the direction of the top of the shell), but then the lower palatalis  
 crossing this point ..... 28
- 26 a - Tuba about 2 whorls long. Radial ribs present over the entire shell .....  
 ..... *D. madaensis* (22)  
 b - Tuba 1 1/4-1 1/2 whorl long. Radial ribs absent, or present on the top whorls  
 only ..... 27
- 27 a - Radial ribs on the top whorls only. Penultimate whorl not bulging to the right in  
 frontal view ..... *D. sykesi* (23)  
 b - Radial ribs entirely absent. Penultimate whorl slightly bulging to the right in  
 frontal view ..... *D. calvula* (24)
- 28 a - Constriction without a longitudinal palatalis ..... 29  
 b - Constriction with 1-2 longitudinal palatales ..... 32
- 29 a - Umbilicus open ..... *D. toretos* (13)  
 b - Umbilicus closed ..... 30
- 30 a - Shell 2.6-3.0 mm high. Penultimate whorl with 3-4 radial ribs/0.5 mm .....  
 ..... *D. welzeni* (25)  
 b - Shell 1.4-1.6 mm high. Penultimate whorl with 7-13 radial ribs/0.5 mm 31
- 31 a - Shell about cylindrical, with a rounded top ..... *D. evexa* (26)  
 b - Shell fusiform, tapering towards the top ..... *D. maduana nefrens* (12.2)
- 32 a - (28) Constriction level with the angular edge of the peristome (where the  
 peristome detaches itself from the shell wall); or constriction slightly beyond this  
 point, in the direction of the top of the shell ..... 33  
 b - Constriction level with the parietal side of the peristome, well away from the  
 angular edge ..... 40
- 33 a - Shell 3.0-4.2 mm high, 1.5-2.0 mm wide ..... 34  
 b - Shell 1.8-3.0 mm high, 0.8-1.5 mm wide ..... 35
- 34 a - Palatal side of peristome not or hardly sinuous, without edge *D. oedogaster* (27)  
 b - Palatal side of peristome distinctly sinuous, with a slight to distinct edge ....  
 ..... *D. niahensis* (28)
- 35 a - Peristome between the edge on the palatal side and the basal edge with 1 or 2  
 more small protrusions. Peristome double ..... *D. calcarata* (29)  
 b - Peristome between the edge on the palatal side and the basal edge without  
 protrusions, or with 1 small protrusion, but then peristome simple ..... 36
- 36 a - Shell 1.8-2.5 mm high. Radial ribs about equally distinct over the entire shell,  
 densely placed (7-10 ribs/0.5 mm on the penultimate whorl) ..... 37

- b - Shell 2.2-3.0 mm high. Radial ribs *either* fading or absent on the penultimate whorl or towards the constriction, *or* radial ribs continuing up to the peristome, but then widely spaced (2-4 ribs/0.5 mm on the penultimate whorl) ..... 38
- 37 a - Number of whorls 5 1/8-6 3/8. Basal edge of peristome sinuous ..... *D. strongyla* (30)
- b - Number of whorls 6 5/8-7 1/2. Basal edge of peristome not or hardly sinuous ..... *D. cacuminulus* (36)
- 38 a - Radial ribs on the penultimate whorl high and thin, usually with the crest irregularly eroded ..... *D. baritensis* (31)
- b - Radial ribs on the penultimate whorl low and rather wide, always with entire crest ..... 39
- 39 a - Peristome double, divided in an outer and an inner (take care to check adult specimens). Palatal side of the peristome distinctly sinuous, basal side without a slight edge ..... *D. onyx* (32)
- b - Peristome simple. Palatal side of the peristome not or hardly sinuous, basal side usually with a slight edge ..... *D. tenuilabiata* (33)
- 40 a - (32) Palatal side of the peristome distinctly sinuous ..... 41
- b - Palatal side of the peristome not or slightly sinuous ..... 43
- 41 a - Basal edge of peristome not or slightly sinuous ..... *D. meratusensis* (34)
- b - Basal edge of peristome distinctly sinuous ..... 42
- 42 a - Radial ribs 7-10/0.5 mm on the penultimate whorl ..... *D. strongyla* (30)
- b - Radial ribs 2-4/0.5 mm on the penultimate whorl ..... *D. baritensis* (31)
- 43 a - Shell 3.2-4.2 mm long ..... 44
- b - Shell 1.3-2.9 mm long ..... 45
- 44 a - Radial ribs entirely absent ..... *D. oedogaster* (27)
- b - Radial ribs present, very distinct ..... *D. canaliculata* (35)
- 45 a - Number of whorls 5-5 5/8. Sides of spire convex ..... *D. maduana maduana* (12.1)
- b - Number of whorls 6 1/8-7 1/2. Sides of spire flat or concave ..... 46
- 46 a - Shell 1.8-2.3 mm high, 0.8-1.1 mm wide ..... *D. cacuminulus* (36)
- b - Shell 2.7-2.9 mm high, 1.3-1.5 mm wide ..... 47
- 47 a - Basal edge rounded. Shell almost conical ..... *D. recta* (37)
- b - Basal edge slightly protruding. Shell fusiform ..... *D. plecta* (38)
- 48 a - (1) Shell 1.3-3.1 mm high ..... 49
- b - Shell 4.5-8 mm high ..... 50
- 49 a - Shell 1.3-1.5 mm high, about cylindrical ..... *D. whiteheadi* (39)
- b - Shell 2.5-3.1 mm high, conical with the last whorl moved inwards ..... *D. busanensis* (40)
- 50 a - Shell strictly conical, with the last whorl not at all moved inwards ..... *D. isseli* (41)
- b - Shell fusiform, or shell more or less conical, but then with the last whorl moved inwards ..... 51
- 51 a - Peristome on the parietal side distinctly expanding, reaching the suture of the previous whorl ..... *D. adversa* (42)
- b - Peristome on the parietal side hardly to moderately expanding, not reaching the suture of the previous whorl ..... 52
- 52 a - Constriction with a longitudinal palatalis close to, and parallel with, the suture; *or* constriction without a longitudinal palatalis close to the suture ..... 53
- b - Constriction with an distinctly oblique longitudinal palatalis close to the suture ..... 57

- 53 a - Radial ribs absent, or radial ribs present but densely placed (5-10 ribs/0.5 mm on the penultimate whorl) ..... 54  
 b - Radial ribs present, widely spaced (2-4 ribs/0.5 mm on the penultimate whorl) ..... 56
- 54 a - Shell 4.5-5.3 mm high ..... *D. subisensis* (43)  
 b - Shell 6.0-8.0 mm high ..... 55
- 55 a - All whorls about equally convex. Radial ribs fine, but rather distinct, present over the entire shell ..... *D. electa* (44)  
 b - Top whorls convex, next whorls almost flat, body whorls slightly convex. Radial ribs absent, or present but inconspicuous, on part of the shell only ..... *D. rubicunda* (45)
- 56 a - Radial ribs low and wide, not sinuous ..... *D. centralis* (46)  
 b - Radial ribs high and rather thin, sinuous ..... *D. moluensis* (47)
- 57 a - (52) Peristome simple (make sure to check adult specimens) *D. sulphurea* (48)  
 b - Peristome double ..... 58
- 58 a - Radial ribs fine, but distinct, present over the entire shell ..... *D. rubra* (49)  
 b - Radial ribs absent, or present but inconspicuous, on part of the shell only 59
- 59 a - Shell 4.2-5.3 mm high. Longitudinal palatalis only slightly oblique ..... *D. subisensis* (43)  
 b - Shell 5.5-7.0 mm long. Longitudinal palatalis distinctly oblique ..... *D. subglaber* (50)

1 - **Diplommatina aurisdiaboli** spec. nov.  
 fig. 1

Material seen. — KALIMANTAN. Kalimantan Selatan: Jaro near Muara Uja, limestone escarpment W. of the village (V 3194/10, incl. HOLOTYPE RMNH 56707); G. Halat, near border Kalimantan Timur along main road Banjarmasin-Balikpapan (V 2794/10). Kalimantan Timur: G. Melihat, foot of S-facing slope, between river and main road Banjarmasin-Balikpapan (V 2928/10).

Shell dextral, conical to fusiform, last two whorls widest; sides flat. Whorls 6 3/4-7 7/8; top whorls convex, others convex or obtusely angular. Suture impressed. Constriction level with the angular edge of the peristome or slightly beyond this point, with 2 parietales, 2-3 longitudinal palatales, 1 transversal palatalis, 1 columellaris. Tuba (slightly over) 1 whorl. Radial ribs continuing up to the peristome, hardly visible but half-way the whorl with an almost tubular projection, in adults often abraded to an almost circular or elliptic scar. Spiral striation on the top whorls only. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, slightly directed downwards. Peristome double, moderately expanding; palatal side somewhat sinuous or not, without edge; basal side without edge; basal edge not sinuous, rounded; inner peristome somewhat expanding beyond the outer, with a palatal lip, free and erect on the columellar side, expanding (almost) up to the suture of the previous whorl at the angular edge. Height 3.5-5.0 mm; width 2.2-2.6 mm; index 1.6-2.0. Height aperture 0.8-1.2 mm; width 0.8-1.3 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, N. part of the Meratus Mountains.

Note. — Differs from *D. bicoronata* and *D. spinosa* by the peristome which is expanded over the constriction at the angular edge. The peristome as a whole is shaped like a pointed ear, hence the name '*aurisdiaboli*', 'devil's ear'.

2.1 - *Diplommatina bicoronata bicoronata* Von Martens, 1884  
fig. 2.1

*Diplommatina bicoronata* Von Martens, 1884: 199; syntypes ("Berge Radjang Klewang, Südost Borneo") ZMB/2.

Material seen. — KALIMANTAN. Kalimantan Selatan: Beramban, approximately 13 km E. of Rantau (V 3759/10); Telaga Langsat, approximately 18 km SSW. of Barabai (V 3432/10); Bt. Pagat, limestone hill 8 km SE. of Barabai (V 3804/10); Nateh near Batu Tangga, approximately 18 km E. of Barabai (V 3007/10); G. Siamang near Desah Liu, 30 km E. of Tandjung (V 3091/10); Jaro near Muara Uja, limestone escarpment W. of the village (V 3193/10). Kalimantan Timur: Batu Butuk, near Muara Komang along main road Banjarmasin-Balikpapan (V 3525/6); G. Melihat, foot of S.-facing slope, between river and main road Banjarmasin-Balikpapan (V 3342/10). "Berge Radjang Klewang, Südost Borneo": probably Batu Apoh, approximately 35 km NE. of Martapura, or a nearby locality (ZMB/2, see above).

Shell dextral, fusiform, last or penultimate whorl widest; sides flat. Whorls 7 1/8-8 3/4, (moderately) convex. Suture impressed, crenulated or not. Constriction level with the parietal side of the peristome, with 2 parietales, 2-3 longitudinal palatales, 1 transversal palatalis, 1 columellaris. Tuba 7/8-1 whorl, usually rounded. Radial ribs on the top whorls only, or at most continuing up to the constriction, widely spaced, hardly visible but half-way the whorl with an almost tubular projection, in adults abraded to a semi-circular scar. Spiral striation inconspicuous, on the top whorls only. Umbilicus closed or open, narrow. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; inner peristome expanding beyond the outer, with a palatal lip, free and erect on the columellar side, expanding on the parietal side. Height 4.8-6.8 mm; width 2.6-3.1 mm; index 1.7-2.2. Height aperture 1.2-1.6 mm; width 1.1-1.5 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, W. flank of the Meratus Mountains.

Notes. — 1. *D. spinosa* has one longitudinal palatalis only.

2. Variable in size as well as index of the shell.

2.2 - *Diplommatina bicoronata praetervisa* subsp. nov.  
fig. 2.2

Material seen. — KALIMANTAN. Kalimantan Selatan: G. Siamang near Desah Liu, 30 km E. of Tandjung (V 3343/13); G. Buleh, 4 km E. of Muara Uja (V 3478/10); limestone escarpments along road Benualawas-Limbangan (V 2849/11). Kalimantan Timur: Batu Butuk, near Muara Komang along main road Banjarmasin-Balikpapan (V 3562/5); G. Melihat, foot of S.-facing slope, between river and main road Banjarmasin-Balikpapan (V 2927/11, incl. HOLOTYPE RMNH 56708).

As the type subspecies, but the last half whorl of the tuba somewhat angular. Tubular projections on the radial ribs continuing up to the peristome, on the tuba sometimes present as a row of swellings only. Height 4.5-6.0 mm; width 2.5-3.3 mm; index 1.7-2.1. Height aperture 1.0-1.4 mm; width 1.0-1.5 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, Meratus Mountains.

Notes. — The name refers to the fact that this subspecies was only recognized when the manuscript for this paper was almost finished: '*praetervisus*', 'overlooked'.

3 - *Diplommatina spinosa* Godwin Austen, 1889  
fig. 3, 51a

*Diplommatina spinosa* Godwin Austen, 1889: 349; type ("Cave exploration A") leg. Everett, BMNH 1889.12.7.58.

Material seen. — SARAWAK. 1st Div.: quarry km 31.6 road Kuching-Bau (leg. Auffenberg, UF 183964/1);

G. Doya 2 miles SE. of Bau (leg. Wilford, UF 193485/2); G. Wah S. of Braang, 23 miles S. of Kuching (leg. Wilford, UF 193468/8); 7.5 km WNW. of Kpg. Piching, near Serian (V 1927/10). "Cave exploration A" (BMNH/1, see above); "North Borneo" (NMW/2).

Shell dextral, fusiform or conical, if conical with the tuba distinctly moved inwards, last or penultimate whorl widest; sides flat. Whorls  $7\frac{1}{4}$ - $8\frac{1}{8}$ , convex. Suture impressed. Constriction about level with the edge between the parietal and columellar side of the peristome, with 2 parietales, 1 longitudinal palatalis which is not covered by the peristome on the outer surface of the shell, 1 transversal palatalis, 1 columellaris. Tuba  $3\frac{3}{4}$ - $7\frac{7}{8}$  whorl. Radial ribs continuing up to the peristome, widely spaced, hardly visible but half-way the whorl with an almost tubular projection, in adults sometimes abraded to a semi-circular scar. Spiral striation absent. Umbilicus open, narrow. Aperture tilted up to  $40^\circ$  with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side hardly sinuous, without edge; basal side without edge; basal edge hardly sinuous, rounded; inner peristome somewhat expanding beyond the outer, with a palatal lip, free and erect on the columellar side, expanding on the parietal side. Height 4.9-6.0 mm; width 2.5-3.3 mm; index 1.8-2.1. Height aperture 1.0-1.3 mm; width 1.1-1.3 mm.

Distribution. — Borneo: Sarawak, 1st Div., limestone ranges S. of Kuching.

Notes. — The differences from *D. ferrumequinum* are given below.

#### 4 - *Diplommatina ferrumequinum* spec. nov.

fig. 4, 51a

Material seen. — SARAWAK. 4th Div.: Bt. Sarang, Tatau Valley (leg. Bong, UF 193449/9; do. 193451/10, incl. HOLOTYPE; 193453/5).

Shell dextral, strictly conical with the aperture not or hardly moved inwards, sides flat. Whorls  $8\frac{1}{4}$ -9, convex. Suture impressed. Constriction level with the angular edge or the parietal side of the peristome, with 2 parietales, 1 longitudinal palatalis which is covered by the peristome on the outer surface of the shell, 1 transversal palatalis, 1 columellaris. Tuba  $7\frac{7}{8}$ -1 whorl. Radial ribs continuing up to the peristome, widely spaced, inconspicuous but half-way the whorl with an almost tubular projection, in adults often abraded to a semi-circular scar. Spiral striation absent. Umbilicus closed or open, narrow. Aperture tilted up to  $30^\circ$  with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side hardly to moderately sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; inner peristome expanding beyond the outer, with a palatal lip, free and erect on the columellar side, expanding on the parietal side. Height 4.9-5.8 mm; width 2.2-2.5 mm; index 2.1-2.7. Height aperture 1.0-1.2 mm; width 1.0-1.3 mm.

Distribution. — Borneo: Sarawak, 4th Div., Tatau River basin.

Notes. — 1. *Diplommatina spinosa* (see above) does not have a strictly conical shell, and has the longitudinal palatalis not covered by the peristome on the outer surface of the shell.

2. The name, a noun in apposition, refers to the shape of the scars of the radial ribs: '*ferrumequinum*', 'horse-shoe'.

#### 5 - *Diplommatina serempakensis* spec. nov.

fig. 5, 51a

Material seen. — KALIMANTAN. Kalimantan Selatan: G. Buleh, 4 km E. of Muara Uja (V 3698/1); Jaro near Muara Uja, limestone escarpment W. of the village (V 3191/19, incl. HOLOTYPE RMNH 56709); G. Halat, near border Kalimantan Timur along main road Banjarmasin-Balikpapan (V 2790/1).

Shell dextral, conical, sides flat. Whorls 7 1/8-8 1/8, convex or slightly angular. Suture impressed. Constriction level with the angular edge or the parietal side of the peristome, with 2 parietales, 2 longitudinal palatales, 1 transversal palatalis, 1 columellaris. Tuba 7/8-1 whorl. Radial ribs near the top low, rather densely placed, elsewhere widely spaced, usually absent around the constriction, rather distinct, half-way the whorl with a straight, trough-shaped projection which is longitudinally striated on all sides, in adults sometimes abraded to a semi-circular scar. Spiral striation over the entire shell, sinuous, distorted. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather inconspicuous, not directed downwards. Peristome double, expanding; palatal side not or hardly sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; outer peristome not or hardly expanding beyond the inner; inner peristome with a palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 4.0-4.9 mm; width 1.7-2.1 mm; index 2.3-2.5. Height and width aperture 0.8-1 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, N. part of the Meratus Mountains.

Notes. — 1. Both *D. miraculumdei* and *D. tiara* have only a single parietalis, and a single palatalis; both also lack a palatal lip, and have tubular, not trough-shaped projections on the radial ribs.

2. The name refers to the G. Serempaka, at the foot of which the species has been found.

#### 6 - *Diplommatina miraculumdei* spec. nov.

fig. 6

Material seen. — KALIMANTAN. Kalimantan Selatan: Nateh near Batu Tangga, approximately 18 km E. of Barabai (V 3011/10); Jaro near Muara Uja, limestone escarpment W. of the village (V 3196/10); Batu Tangga near Sarungga, W. of road Batulicin-Benualawas (V 3266/10, incl. HOLOTYPE RMNH 56710); limestone escarpment W. of km 6 road Benualawas-Batulicin (V 3363/10); limestone escarpments along road Benualawas-Limbangan (V 2854/10).

Shell dextral, conical, sides concave. Whorls 7-9 1/8, convex or slightly angular. Suture deeply impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs near the top low, rather densely placed, elsewhere widely spaced but usually more densely placed around the constriction, rather distinct, in the lower half of the whorl with a somewhat bent upwards, (almost) tubular projection which is widened towards the tip, longitudinally striated on all sides, in adults sometimes abraded to a semi-circular scar. Spiral striation over the entire shell, sinuous, distorted. Umbilicus closed. Aperture tilted around 45° with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; outer peristome expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 2.1-4.1 mm; width 1.2-1.6 mm; index 1.7-2.6. Height aperture 0.4-0.8 mm; width 0.4-0.7 mm.

Distribution. — Borneo: Kalimantan, K. Selatan, Meratus Mountains.

Notes. — 1. The tubular projections on the radial ribs are widened and bowl-shaped at the tip in undamaged specimens. These, however, are rare; even in living specimens the tubular projections are usually damaged.



2. *D. pagodula* Bavay & Dautzenberg, 1908, from N. Vietnam, has a slit from base to tip in the tubular projections (rarely occurring in small specimens of *D. miraculumdei*), and an inconspicuous columellaris. *D. tiara* has a less tilted aperture, as well as tubular projections which are transversely ribbed on the right side.

3. Distinctly variable in size. A sample from the E. flank of the Meratus Mountains (V 2854) contains very large specimens next to very small ones. Otherwise these shells are slightly aberrant in having the tubular projections relatively densely placed.

4. The name refers to the beauty of this species.

### 7 - *Diplommatina tiara* spec. nov.

fig. 7, 51a

Material seen. — KALIMANTAN. Kalimantan Selatan: Batu Apoh, approximately 35 km NE. of Martapura (leg. Lamb & Mackinnon, V 2459/10; V 3333/10); Beramban, approximately 13 km E. of Rantau (V 3760/10); Telaga Langsat, approximately 18 km SSW. of Barabai (V 3427/10); Bt. Pagat, limestone hill 8 km SE. of Barabai (V 3801/10); Nateh near Batu Tangga, approximately 18 km E. of Barabai (V 3009/10); Jaro near Muara Uja, limestone escarpment W. of the village (V 3198/10); G. Halat, near border Kalimantan Timur along main road Banjarmasin-Balikpapan (V 2791/10, incl. HOLOTYPE RMNH 56711); Batu Tunga near Sarungga, W. of road Batulicin-Benualawas (V 3268/10); limestone escarpment W. of km 6 road Benualawas-Batulicin (V 3367/10); limestone escarpments along road Benualawas-Limbungan (V 2853/10). Kalimantan Timur: Batu Butuk, near Muara Komang along main road Banjarmasin-Balikpapan (V 3523/10); G. Melihat, foot of S.-facing slope, between river and main road Banjarmasin-Balikpapan (V 2931/10).

Shell dextral, fusiform to conical, last two whorls widest; sides about flat to slightly concave. Top often decollate. Whorls  $7\frac{1}{4}$ - $8\frac{3}{8}$ , convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba  $3/4$ - $7/8$  whorl. Radial ribs on the first whorl straight, low, densely placed, elsewhere spaced, usually more densely placed around the constriction, inconspicuous but half-way the whorl with an about straight (those near the peristome slightly curved), tubular projection which is transversely ribbed on the right side, in adults sometimes abraded to a semi-circular scar. Spiral striation over the entire shell, sinuous, distorted. Umbilicus closed. Aperture hardly tilted up to  $35^\circ$  with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side (hardly) sinuous, sometimes with a slight edge; basal side sometimes with a slight edge; basal edge not sinuous, rounded to somewhat angular; outer peristome expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 2.2-3.3 mm; width 0.9-1.6 mm; index 2.0-2.6. Height and width aperture 0.4-0.7 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, Meratus Mountains.

Notes. — 1. Similar to *D. miraculumdei*; the differences between the two are given under that species.

2. Very rarely (approximately 1 out of 1000 specimens) a sinistral specimen is found.

3. Particularly variable in the size of the shell.

4. The name refers to the resemblance of the shell with a papal tiara.

### 8 - *Diplommatina lacrimans* spec. nov.

fig. 8

Material seen. — KALIMANTAN. Kalimantan Selatan: Bt. Pagat, limestone hill 8 km SE. of Barabai (V 3806/6); Telaga Langsat, approximately 18 km SSW. of Barabai (V 3429/10); G. Siamang near Desah Liu, 30

km E. of Tandjung (V 3092/4); Jaro near Muara Uja, limestone escarpment W. of the village (V 3195/10, incl. HOLOTYPE RMNH 56712); G. Halat, near border Kalimantan Timur along main road Banjarmasin-Balikpapan (V 2792/5); limestone escarpments along road Benualawas-Limbungan (V 2851/8). Kalimantan Timur: Batu Butuk, near Muara Komang along main road Banjarmasin-Balikpapan (V 3521/1); G. Melihat, foot of S-facing slope, between river and main road Banjarmasin-Balikpapan (V 2930/10).

Shell dextral, fusiform, penultimate whorl widest; sides concave. Whorls 6  $1/8$ -7  $1/8$ , moderately convex. Suture moderately impressed. Constriction level with the parietal side of the peristome, well away from the palatal side, with 1 parietalis, 1 longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 7/8-1 whorl, with a sharply delineated swelling close to the columellar side of the peristome. Radial ribs absent, or on the first  $1/4$  whorl of the tuba only, straight, inconspicuous, low, rather wide, densely placed. Spiral striation absent, or inconspicuous, on the top whorls only. Umbilicus closed. Aperture tilted up to  $25^\circ$  with regard to the coiling axis; columellaris distinct, directed downwards. Peristome simple or double, expanding; palatal side hardly to moderately sinuous, without edge; basal side without edge; basal edge sinuous, rather sharp; when outer peristome double, hardly to moderately expanding beyond the inner; inner peristome convex or with a moderate palatal lip, expanding over the shell on the columellar side, somewhat expanding on the parietal side. Height 2.7-3.7 mm; width 1.5-1.8 mm; index 1.7-2.1. Height aperture 0.6-0.8 mm; width 0.6-0.9 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, Meratus Mountains.

Notes. — 1. *D. laevis* is larger, with two longitudinal palatales.

2. Variable in some aspects. Populations occur which differ from the type in having a more slender spire, a single peristome and/or a lip on the palatal and basal side of the peristome (see fig. 8d). These characters occur in all possible combinations; it is therefore not possible to distinguish subspecies.

3. The name refers to the swelling in the tuba, which in fresh specimens often looks like a drop of water: '*lacrimans*', 'crying'.

### 9 - *Diplommantina laevis* Fulton 1899

fig. 9

*Diplommantina (Paxillus) laevis* Fulton, 1899: 217; syntypes ("Pulo Laut, S.E. Borneo") BMNH 98.12.3.411-414/4).

Material seen. — KALIMANTAN. Kalimantan Selatan: limestone escarpment W. of km 6 road Benualawas-Batulicin (V 3364/10); limestone escarpments along road Benualawas-Limbungan (V 2850/10); Pulau Laut (BMNH/4, see above; NMW/2).

Shell dextral, fusiform, penultimate whorl widest; sides concave. Whorls 6  $1/2$ -7  $1/2$ , slightly convex. Suture moderately impressed. Constriction level with the parietal side of the peristome, well away from the palatal side, with 1 parietalis, 2 longitudinal palatales, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl, with a sharply delineated swelling close to the columellar side of the peristome. Radial ribs on the first  $1/4$  whorl of the tuba only, straight, rather inconspicuous, low, rather wide, densely placed. Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, usually directed downwards. Peristome double, expanding; palatal side not or hardly sinuous, without edge; basal side without edge; basal edge rather sinuous, rather sharp; outer peristome slightly expanding beyond the inner; inner peristome with a moderate palatal lip, expanding over the shell on the columellar side, moderately expanding on the parietal side. Height 4.2-5.0 mm; width 2.1-2.4 mm; index 1.8-2.1. Height aperture 1.0-1.3 mm; width 1.0-1.2 mm.

Distribution. — Borneo: Kalimantan, K. Selatan, karst areas E. of the Meratus Mountains, P. Laut.

10 - *Diplommatina gomantongensis* E.A. Smith 1894  
fig. 10, 51b

*Diplommatina gomantongensis* E.A. Smith, 1894: 464.

*Diplommatina symmetrica* E.A. Smith, 1893: 349 (not Hedley, 1891); holotype ("Gomanton Hill, N. Borneo") leg. Everett, BMNH 92.7.20.119.

Material seen. — SABAH. Interior Zone: Batu Punggol SE. of Sepulut (V 1894/6). Sandakan Zone: Batu Putih near road Lahad Datu-Sandakan, near Kinabatangan R. (V 1474/10); Batu Laab near road Lahad Datu-Sandakan, near Kinabatangan R. (leg. Wilford, UF 193500/10); Bt. Gomantong, 30 km S. of Sandakan (BMNH/1, see above; NMW/2; NMW/5; SMF 192544/4; leg. Wilford, UF 193492/1; do. 193493/8; V 1588/4); Batu Tumanggong Besar, 1 mile downstream Sukau, along Kinabatangan R. (leg. Wilford, UF 193494/1); limestone escarpment along S. Tabin, lower Segama Valley (leg. Wilford, UF 193502/2; do. 193504/3). Tawau Zone: NW. of road Lahad Datu-Sandakan crossing with Segama R. (V 1671/10); 'Kirk's Cave', 8 km N. of Lahad Datu (V 1213/10); G. Madai, 40 km SSW. of Lahad Datu (V 1703/10); G. Baturong, 50 km WSW. of Lahad Datu (V 1833/10); Bt. Pababola, Segarong Hills 25 km ESE. of Kunak (V 1758/10); Batu Tenggar, Segarong Hills 25 km ESE. of Kunak (V 1804/10); small limestone outcrop 15 miles NNW. of Kalabakan (leg. Wilford, UF 193501/1). "North Borneo": probably Bt. Gomantong, 30 km S. of Sandakan (RMNH/1; UF 132838/3; UF 132981/3; ZMA/1).

Shell dextral, fusiform, penultimate whorl widest; sides flat. Whorls  $6 \frac{1}{4}$ - $7 \frac{5}{8}$ , convex. Suture impressed. Constriction level with the parietal side of the peristome, well away from the palatal side, with 1 transversal palatalis; a very inconspicuous columellaris is present half-way the tuba. Tuba  $3 \frac{3}{4}$ - $7 \frac{7}{8}$  whorl. Radial ribs straight, distinct, high, rather thin, rather widely spaced to rather densely placed (3-5 ribs/0.5 mm on the penultimate whorl). Spiral striation usually present. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris not visible. Peristome double, expanding; palatal side moderately sinuous, with a moderate edge; basal side with or without a slight edge; basal edge not or slightly sinuous, sharp or somewhat protruding; outer peristome expanding beyond the inner or not; inner peristome with a palatal lip, usually free and slightly erect on the columellar side, somewhat expanding on the parietal side. Height 2.5-3.5 mm; width 1.2-1.6 mm; index 1.9-2.4. Height and width aperture 0.5-0.6 mm.

Distribution. — Borneo: Sabah, mainly E. coast. An isolated record in the interior Zone.

11 - *Diplommatina antheae* spec. nov.  
fig. 11, 51b

Material seen. — SABAH. Interior Zone: Lian (Laying) Cave 12 km N. of Keningau (V 1099/10, incl. HOLOTYPE RMNH 56713; leg. Saul, NMW 1968.92/5; do., ZMA/10); Batu Urun near Sepulut, from soil deposited at Tenom Agricultural Station (V 1145/10); Batu Punggol SE. of Sepulut (V 1895/10); Pun Batu approximately 30 km W. of Sepulut (V 1293/10). Sandakan Zone: Bt. Kolop, 4 miles WSW. of Latangan (leg. Wilford, UF 193497/2).

Shell dextral, fusiform, penultimate whorl widest; sides flat. Whorls  $5 \frac{3}{4}$ - $6 \frac{5}{8}$ , convex. Suture impressed. Constriction level with the parietal side of the peristome, well away from the palatal side, with 1 transversal palatalis; a very inconspicuous columellaris is present half-way the tuba. Tuba  $3 \frac{3}{4}$ - $7 \frac{7}{8}$  whorl. Radial ribs straight, rather distinct, rather low and thin, densely placed (7-13 ribs/0.5 mm on the penultimate

whorl). Spiral striation inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris not visible. Peristome double, expanding; palatal side not or hardly sinuous, usually without edge; basal side without edge; basal edge not sinuous, rather sharp; outer peristome expanding beyond the inner; inner peristome with a slight palatal lip, expanding over the shell on the columellar side, little expanding on the parietal side. Height 1.6-2.1 mm; width 0.8-1.0 mm; index 1.8-2.2. Height and width aperture 0.3-0.4 mm.

Distribution. — Borneo: Sabah, Interior Zone and E. part of Sandakan Zone

Notes. — 1. *D. gomantongensis* is larger, has more widely spaced ribs, and a slight edge along the palatal side of the peristome. However, a number of specimens of *D. antheae* from B. Punggol (V 1895, occurring there together with *D. gomantongensis*) also have such an edge but otherwise fit into *D. antheae*. *D. maduana nefrens* has a smaller number of whorls, as well as a wider spire. *D. ventriculus* Laidlaw, 1949, from W. Malaysia and Sumatra has a longitudinal palatalis.

2. Named after Mrs. Anthea Lamb, Tenom, Sabah.

### 12.1 - *Diplommatina maduana maduana* Laidlaw, 1949

fig. 12.1, 51b

*Diplommatina maduana* Laidlaw, 1949: 209; holotype (W. Malaysia: "Gua Madu, Kelantan"), BMNH (not seen).

Material seen. — SARAWAK. 1st Div.: small gorge 1 mile S. of Bau (leg. Wilford, UF 193447/10); G. Doya 2 miles SE. of Bau (leg. Wilford, UF 193487/10); G. Kapur 6 km SE. of Bau (V 2238/10); SE. end Bau limestone escarpment (leg. Wilford, UF 193433/3); G. Jambusan 4 km SE. of Bau (V 2187/9); Kpg. Beratok along road Kuching-Serian (leg. Auffenberg, UF 184046/3); G. Wah S. of Braang, 23 miles S. of Kuching (leg. Wilford, UF 193466/7); G. Gayu 23 miles S. of Kuching (leg. Wilford, UF 193472/10; do. 193475/10; do. 193476/2); limestone hill 1 mile NE. of Penkalan Ampat, 0.5 mile E. of Temarag (leg. Wilford, UF 193462/10); G. Lelat 1 mile SW. of Nyabet, 24 miles SSE. of Kuching (leg. Wilford, UF 193478/10); G. Mas 0.5 mile W. of Nyabet, 24 miles SSE. of Kuching (leg. Wilford, UF 193480/1); G. Sibow, 0.5 mile NW. of Nyabet, 24 miles SSE. of Kuching (UF 193482/7); 7.5 km WNW. of Kpg. Piching, near Serian (V 1930/10); G. Selabor, W. of Kpg. Lobang Batu, 12.5 km S. of Tebakang (V 2101/10). 4th Div.: G. Mulu, lower Tutoh Valley (leg. Wilford, UF 193422/2; do. 193424/10; do. 193425/10; do. 193429/10).

Shell dextral, fusiform, last two whorls widest; sides convex. Whorls 5-5 5/8, convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs straight, rather distinct, rather low, rather thin, densely placed (7-12 ribs/0.5 mm on the penultimate whorl), often wider spaced on the tuba. Spiral striation inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris not or hardly visible. Peristome double, expanding; palatal side not or hardly sinuous, usually with a slight edge; basal side without edge; basal edge not sinuous, rather sharp or slightly protruding; outer peristome (slightly) expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, little expanding on the parietal side. Height 1.3-1.7 mm; width 0.7-0.9 mm; index 1.7-2.0. Height and width aperture 0.3-0.4 mm.

Distribution. — Borneo: Sarawak, 1st Div., limestone ranges S. of Kuching; 4th Div., G. Mulu area. Also in W. Malaysia.

### 12.2 - *Diplommatina maduana nefrens* subsp. nov.

fig. 12.2, 51b

Material seen. — SARAWAK. 4th Div.: Bt. Gading, Baram Valley, N. of Long Lama (leg. Wilford, UF

193420/10, incl. HOLOTYPE); Bt. Besungai, Baram Valley, 4 miles NE. of Long Lama, 0.5 mile SW. of Bt. Gading (leg. Stevens, UF 193455/2; do. 193454/1).

As the type subspecies, but constriction with often an inconspicuous parietalis, 1 transversal palatalis; a very inconspicuous columellaris is present half-way the tuba. Height 1.4-1.6 mm; width 0.7-0.9 mm; index 1.7-2.0. Height aperture 0.3 mm; width 0.3-0.4 mm.

Distribution. — Borneo: Sarawak, 4th Div., Baram basin.

Notes. — 1. At first sight similar to *D. antheae*; the differences are given under that species.

2. The name refers to the absence of several teeth in the constriction, compared to the type subspecies: '*nefrens*', meaning 'toothless'.

### 13 - *Diplommatina toretos* spec. nov.

fig. 13

Material seen. SARAWAK. 1st Div.: G. Pangga 3 km ENE. of Bau (V 2138/11, incl. HOLOTYPE RMNH 56714); G. Kapur 6 km SE. of Bau (V 2235/1); mile 18.5 road Kuching-Serian (leg. Wilford, UF 193413/2); mile 21 road Kuching-Serian (leg. Wilford, UF 193417/1); G. Braang, NW. foot, 22 miles S. of Kuching (leg. Wilford, UF 193437/1); G. Gayu 23 miles S. of Kuching (leg. Wilford, UF 193476/2); G. Saak 1 mile W. of Begu, 24 miles S. of Kuching (leg. Wilford, UF 193471/3); limestone hill 1 mile NE. of Penkalan Ampat, 0.5 mile E. of Temarag (leg. Wilford, UF 193463/3); Kpg. Segur Benuk, mile 21 Penrissen Road (leg. De Vogel, V 3339/1); G. Mas 0.5 mile W. of Nyabet, 24 miles SSE. of Kuching (leg. Wilford, UF 193481/1); 7.5 km WNW. of Kpg. Piching, near Serian (V 3341/2). 4th Div.: Bt. Vrong, Beluru area SW of Marudi (leg. Wilford, UF 193432/1).

Shell dextral, conical, last two whorls widest; sides concave. Whorls 6  $1/8$ -7  $1/2$ , convex. Suture impressed. Constriction about level with the edge between the parietal and the columellar side of the peristome, with 1 parietalis, usually 1 longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba  $3/4$  whorl. Radial ribs usually sinuous, distinct, rather high, rather wide, rather widely spaced to rather densely placed (2-5 ribs/0.5 mm on the penultimate whorl). Spiral striation present. Umbilicus open, deep, narrow. Aperture hardly tilted with regard to the coiling axis; columellaris usually not visible. Peristome double, expanding; palatal side not to slightly sinuous, with a moderate edge; basal side with or without a slight edge; basal edge sinuous, rather sharp; outer peristome usually expanding beyond the inner; inner peristome convex but usually without palatal lip, expanding, free and sinuous on the columellar side, little expanding on the parietal side. Height 2.4-3.3 mm; width 1.2-1.4 mm; index 1.8-2.5. Height and width aperture 0.5-0.6 mm.

Ecology. — Usually found in small numbers, together with *D. concinna*, once with *D. soror*.

Distribution. — Borneo: Sarawak, 1st Div., limestone ranges S. of Kuching; 4th Div., Beluru area.

Notes. — 1. Immediately recognizable among the Bornean *Diplommatina* by its open and deep umbilicus, which is partly covered by the widely expanding, sinuous peristome (the name refers to this character: '*toretos*', meaning 'pierced').

2. Particularly the spire, as well as the radial ribs, are much like those in *D. concinna*. Only the aperture is different. It always occurs together with *D. concinna*, or, in a single case, with *D. soror*, which is probably the sister species of *D. concinna*. Specimens occurring together with *D. concinna* always have a longitudinal palatalis, as in *D. concinna*;

but a single shell found together with *D. soror* does not show this, as the sympatric specimens of *D. soror*. This may indicate that *D. toretos* is not a good species, but perhaps a series of parasite-infected specimens of the two species mentioned.

#### 14 - *Diplommatina asynaimos* spec. nov.

fig. 14

Material seen. — SARAWAK. 5th Div.: Limbang Valley, 2 miles NE. of junction Medalan R. and Limbang R. (leg. Wilford, UF 193489/2, incl. HOLOTYPE). SABAH. Sandakan Zone: Bt. Kolop, 4 miles WSW. of Latangan (leg. Wilford, UF 193496/3, defect); Bt. Gomantong, 30 km S. of Sandakan (UF 193491/1); limestone escarpment along S. Tabin, lower Segama Valley (leg. Wilford, UF 193503/3, defect).

Shell dextral, strictly conical, sides slightly concave. Whorls 7  $1/8$ -7  $5/8$ , top whorls convex, others obtusely carinate at the periphery. Suture impressed. Constriction about level with the edge between the parietal and columellar side of the peristome, with 1 parietalis, 1 longitudinal palatalis, 1 columellaris. Tuba  $5/8$ - $3/4$  whorl. Radial ribs straight, rather distinct, low, rather wide, very densely placed (10-12 ribs/0.5 mm on the penultimate whorl). Spiral striation inconspicuous. Umbilicus closed. Aperture tilted about  $60^\circ$  with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, hardly expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; outer peristome hardly expanding at all; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 2.3-2.5 mm; width 1.2-1.3 mm; index 1.9-2.1. Height aperture 0.4 mm; width 0.5 mm.

Distribution. — Borneo: Sarawak, 5th Div.; Sabah, Kinabatangan basin. From scattered localities, always in small numbers.

Notes. — 1. Well characterized among the Bornean species by the carinate whorls. Similar to some species of a group which is sometimes regarded as a separate genus (*Moussonina* Semper, 1865); e.g. *D. papuana* Tapparone Canefri, 1883, from New Guinea (= not *D. papuana* E.A. Smith, 1897), which differs in having two parietales.

2. Name derived from the Greek '*asynaimos*', meaning 'not of the same blood'. The name refers to the fact that this is an odd species among the Bornean *Diplommatina*.

#### 15 - *Diplommatina cyrtorhitis* spec. nov.

fig. 15, 51c

Material seen. — SABAH. Interior Zone: Batu Urun near Sepulot, from soil deposited at Tenom Agricultural Station (V 1172/6, incl. HOLOTYPE RMNH 56715).

Shell dextral, about conical, last (two) whorls widest; sides concave. Whorls 6  $3/8$ -7  $3/8$ , convex. Suture impressed. Constriction about level with the edge between the parietal and columellar side of the peristome, with 1 parietalis, 1 transversal palatalis, 1 columellaris. Tuba  $3/4$  whorl. Radial ribs strongly sinuous, with a wide, well-rounded arc to the right, rather distinct, rather high, rather wide, rather densely placed (4-5 ribs/0.5 mm on the penultimate whorl). Spiral striation present, usually inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather inconspicuous. Peristome double, expanding; palatal side not to slightly sinuous, with a slight edge; basal side with or without edge; basal edge hardly sinuous, protruding; outer peristome expanding beyond the inner; inner peristome with or without palatal lip, expanding over the shell on the columellar side, little expanding on the

parietal side. Height 2.3-2.7 mm; width 1.1-1.3 mm; index 1.9-2.3. Height and width aperture 0.5-0.6 mm.

Distribution. — Borneo: Sabah, Interior Zone

Notes. — Differs from *D. soror* in having distinctly sinuous radial ribs, with a wide, arc to the right (hence the name, from the Greek '*kyrtos*', 'curved', and '*rhis*', 'fold').

16 - *Diplommatina concinna* H. Adams, 1872  
fig. 16, 51c

*Diplommatina concinna* H. Adams, 1872: 13; holotype ("Borneo") leg. Adams, BMNH 78.1.28.266.

*Diplommatina congener* E.A. Smith, 1894: 464; syntypes ("Bunguran") leg. Everett, BMNH 94.2.1.61-62 & 94.2.2.18.19/4.

Material seen. — SARAWAK. 1st Div.: Busau (SMF 192577/4; UF 141756/2); G. Rabong (NMW/2); quarry km 31.6 road Kuching-Bau (leg. Auffenberg, UF 183963/1; do. 183980/10); G. Pangga 3 km ENE. of Bau (V 3338/10); small gorge 1 mile S. of Bau (leg. Wilford, UF 193445/1); hill S. of Bau goldmine, 2.1 km S. of Bau (leg. Auffenberg, UF 183852/10; do. 183859/1); G. Doya 2 miles SE. of Bau (leg. Wilford, UF 193484/6); G. Kapur 6 km SE. of Bau (leg. Wilford, UF 193419/1; leg. De Vogel, V 2606/3; V 3340/10); SE. end Bau limestone escarpment (leg. Wilford, UF 193434/10; do. 193435/10); Lobang Angin 2 km SW. of Bau (V 2296/4); G. Jambusan 4 km SE. of Bau (V 2186/10; V 2453/5); G. Muan near kpg. Peninjau Lama, 22.5 km SW. of Kuching (leg. Auffenberg, UF 183830/1); Kpg. Beratok along road Kuching-Serian (leg. Auffenberg, UF 184008/2; do. 184016/10; do. 184033/5; do. 184045/4; V 2027/10); mile 18.5 road Kuching-Serian (leg. Wilford, UF 193413/10; do. 193414/10); mile 21 road Kuching-Serian (leg. Wilford, UF 193415/10; do. 193416/1; do. 193417/10); Kpg. Tiang Bekap 10 km SSW. of Kpg. Beratok (leg. Wilford, UF 193418/10); leg. De Vogel, V 2571/10); G. Braang, NW. foot, 22 miles S. of Kuching (leg. Wilford, UF 193456/5; do. 193457/6; do. 193458/10); G. Wah S. of Braang, 23 miles S. of Kuching (leg. Wilford, UF 193465/10; do. 193467/10); G. Gayu 23 miles S. of Kuching (leg. Wilford, UF 193473/10; do. 193474/1; do. 193476/10; do. 193477/10); G. Saak 1 mile W. of Begu, 24 miles S. of Kuching (leg. Wilford, UF 193469/10; do. 193471/10); limestone hill 1 mile NE. of Penkalan Ampat, 0.5 mile E. of Temarag (leg. Wilford, UF 193463/10); Kpg. Segur Benuk, mile 21 Penrissen Road (leg. De Vogel, V 2542/10); G. Lelat 1 mile SW. of Nyabet, 24 miles SSE. of Kuching (leg. Wilford, UF 193479/10); G. Mas 0.5 miles W. of Nyabet, 24 miles SSE. of Kuching (leg. Wilford, UF 193481/10); G. Sibow, 0.5 mile NW. of Nyabet, 24 miles SSE. of Kuching (UF 193483/10); 7.5 km WNW. of Kpg. Piching, near Serian (V 1929/10); G. Selabor, W. of Kpg. Lobang Batu, 12.5 km S. of Tebakang (leg. Wilford, UF 193437/10; do. 193438/10; do. 193439/10; do. 193440/3; do. 193441/1; do. 193442/10; do. 193443/10; do. 193444/10; V 2100/10). 4th Div.: G. Subis (Batu Niah) (leg. Wall, UF 193406/1; do. 193409/1; V 1523/10). "Borneo" (BMNH/1, see above). "North Borneo" (RMNH/3; SMF 192582/1). Material seen from elsewhere: Natuna Islands, Bunguran (BMNH/4, see above).

Shell dextral, conical to fusiform, last (two) whorls widest; sides flat to concave. Top usually decollate. Whorls (complete specimens) 6 5/8-8 1/8, convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs about all slightly sinuous, with a slight edge to the right, rather distinct, rather high, rather wide, rather widely spaced to rather densely placed (3-6 ribs/0.5 mm on the penultimate whorl). Spiral striation present. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards or not. Peristome double, expanding; palatal side not or slightly sinuous, with or without edge; basal side with or without edge; basal edge sinuous or not, protruding; outer peristome expanding beyond the inner; inner peristome with or without palatal lip, expanding over the shell on the columellar side, little expanding on the parietal side. Height 2.4-3.5 mm (when complete, when decollate 1.8-3.2 mm); width 1.2-1.6 mm; index (when complete) 1.9-2.2. Height and width aperture 0.4-0.7 mm.

Distribution. — Borneo: Sarawak, 1st Div., widespread; 4th Div.: G. Subis. Also on the Natuna Islands.

Notes. — 1. Variable in size as well as shape of the aperture: the palatal and basal sides of the peristome may be angular or rounded, the basal edge is always protruding, but much more curved upwards in some specimens than in others. In most localities the entire range of variability can be found. On G. Subis (V 1929), however, only large specimens occur, with the basal edge distinctly curved upwards.

2. The delimitation of *D. concinna* against *D. soror* is problematical; see the notes under the latter.

3. *D. toretos* may represent a series of parasite-infected specimens of *D. concinna*; see the notes under *D. toretos*.

### 17 - *Diplommatina soror* spec. nov.

fig. 17, 51c

Material seen. — SARAWAK. 4th Div.: near Bt. Kudi, Beluru area SW. of Marudi (leg. Wilford, UF 193431/1); Bt. Vrong, Beluru area SW. of Marudi (leg. Wilford, UF 193432/10, incl. HOLOTYPE); G. Mulu, lower Tutoh Valley (leg. Wilford, UF 193426/2). SABAH. Sandakan Zone: limestone hill 7 miles E. of Lamag, 3 miles NNW. of Laab, near road Lahad Datu-Sandakan, near Kinabatangan R. (leg. Wilford, UF 193498/3).

Shell fusiform, last (two) whorls widest; sides concave. Whorls 5 7/8-7 3/8, convex. Suture impressed. Constriction about level with the edge between the parietal and columellar side of the peristome, with 1 parietalis, sometimes 1 longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 3/4 whorl. Radial ribs on the top whorls slightly sinuous, those on the widest whorl not or hardly so; rather distinct, rather high, rather wide, rather densely placed (4-6 ribs/0.5 mm on the penultimate whorl). Spiral striation present. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather inconspicuous. Peristome double, expanding; palatal side slightly to moderately sinuous, with a slight edge; basal side with or without a slight edge; basal edge slightly sinuous, protruding; outer peristome expanding beyond the inner; inner peristome with palatal lip, expanding over the shell, free on the columellar side, little expanding on the parietal side. Height 1.9-2.6 mm; width 0.9-1.3 mm; index 2.0-2.2. Height and width aperture 0.4-0.5 mm.

Distribution. — Borneo: Sarawak, 4th Div., lower Baram basin; Sabah, Sandakan Zone, lower Kinabatangan basin.

Notes. — 1. Differs from *D. concinna* in the shell never being decollate, the radial ribs which are not or hardly sinuous on the penultimate whorl, as well as in the inconspicuous columellaris in the aperture. The population living closest to the range of *D. concinna*, in Sarawak, also differs in lacking the longitudinal palatalis in the constriction (one specimen with a small tooth excepted). However, all three specimens available from E. Sabah do have a longitudinal palatalis. When more material comes available, the status of *D. soror* as a species next to *D. concinna* will have to be reconsidered, as well as the possibility to regard the Sabah material as a separate taxon.

2. The name '*soror*', Latin for sister, refers to the assumption that this species is closely related to *D. concinna*.

### 18 - *Diplommatina lygipleura* spec. nov.

fig. 18

Material seen. — SARAWAK. 4th Div.: G. Mulu, lower Tutoh Valley (leg. Wilford, UF 193421/2, incl. HOLOTYPE).



Shell dextral, fusiform, penultimate whorl widest; sides flat or slightly concave. Whorls 5  $7/8$ -6  $1/4$ , convex. Suture impressed. Constriction  $1/8$  whorl beyond the angular edge of the peristome, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1  $1/8$  whorl, rounded. Radial ribs sinuous, with a slight edge to the left on the upper half of the whorls, distinct, rather high, rather wide, rather densely placed (4-5 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, not directed downwards. Peristome double, expanding; palatal side sinuous, with an edge; basal side without edge; basal edge sinuous, sharp or slightly protruding; outer peristome expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, somewhat expanding on the parietal side. Height 2.6 mm; width 1.4 mm; index 1.8-1.9. Height aperture 0.6 mm; width 0.5-0.6 mm.

Distribution. — Borneo: Sarawak, 4th Div., possibly endemic to the G. Mulu area.

Notes. — Differs from *D. baritensis* and *D. onyx* in having sinuous ribs (hence the name: the Greek 'lygizo', to bend, and 'pleuron', rib). The differences from *D. stibara* are given below.

#### 19 - *Diplommatina stibara* spec. nov.

fig. 19

Material seen. — SARAWAK. G. Mulu, lower Tutoh Valley (leg. Wilford, UF 193427/3). 5th Div.: Limbang Valley, 2 miles NE. of junction Medalan R. and Limbang R. (leg. Wilford, UF 193490/13, incl. HOLOTYPE).

Shell dextral, fusiform, penultimate whorl widest; sides flat or slightly concave. Whorls 5  $5/8$ -6  $1/8$ , convex. Suture impressed. Constriction  $1/8$ - $1/4$  whorl beyond the angular edge of the peristome, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1  $1/8$ -1  $1/4$  whorl, last half-whorl obtusely angular at the periphery. Radial ribs sinuous, with a slight edge to the left on the upper half of the whorls, distinct, rather high, rather wide, widely spaced (2-4 ribs/0.5 mm on the penultimate whorl). Spiral striation absent or inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards or not. Peristome double, expanding; palatal side sinuous, with a protrusion; basal side without edge; basal edge sinuous, sharp or slightly protruding; outer peristome slightly expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, moderately expanding on the parietal side. Height 2.1-2.5 mm; width 1.2-1.3 mm; index 1.7-2.1. Height and width aperture 0.4-0.6 mm.

Distribution. — Borneo: Sarawak, 4th and 5th Div.

Notes. — 1. *D. lygipleura* has the tuba rounded at the periphery, and more densely placed radial ribs.

2. The name has been derived from the Greek 'stibaros', sturdy, and refers to the general appearance of the shell.

#### 20 - *Diplommatina everetti* E.A. Smith, 1893

fig. 20

*Diplommatina everetti* E.A. Smith, 1893: 349; syntypes ("Barit Mountain, N.W. Borneo") leg. Everett, BMNH 92.7.20.115 & 92.7.23.17-18/5.

Material seen. — SARAWAK. 4th Div.: "Barit Mountain": either along S. Barit, S. part Tatau Valley; or in G. Mulu area (leg. Everett, BMNH/5, see above; NMW/2).

Shell dextral, fusiform, last but two whorl widest; penultimate whorl narrow; sides slightly concave. Whorls 6 7/8-7 1/2, convex. Suture impressed. Constriction 3/4-1 whorl beyond the angular edge of the peristome, with (only observed through shell wall) 1 (?) parietalis, 1 longitudinal palatalis entirely beyond the angular edge of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1 3/4-2 whorls. Radial ribs half-way with a slight loop to the right, rather inconspicuous, low, thin, widely spaced, fading towards the constriction (1-2 ribs/0.5 mm on the widest whorl), absent on the whorl after the constriction. Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, not directed downwards. Peristome double, expanding; palatal side sinuous, with an edge; basal side without edge; basal edge sinuous, slightly protruding; outer peristome expanding beyond the inner; inner peristome with a moderate palatal lip, expanding over the shell on the columellar side, moderately expanding on the parietal side. Height 3.3-3.4 mm; width 1.4-1.6 mm; index 2.1-2.4. Height and width aperture 0.6-0.7 mm.

Distribution. — Borneo: Sarawak, 4th Div. Not found again in recent years.

21 - *Diplommatina excentrica* E.A. Smith, 1893  
fig. 21

*Diplommatina excentrica* E.A. Smith, 1893: 349; syntypes ("Molu or Mulu Mountain, N. Borneo") leg. Everett, BMNH 92.7.20.118 & 92.7.23.15-16/3.

*Diancta (Paradiancta) excentrica* (E.A. Smith, 1893) Zilch, 1953: 18.

Material seen. — SARAWAK. 4th Div.: G. Mulu area (leg. Everett, BMNH/3, see above; NMW/4; SMF 104918/3).

Shell dextral, fusiform, penultimate whorl widest, bulging to the right in frontal view; sides flat. Whorls 6 5/8-7 1/8, convex. Suture impressed. Constriction 3/8-1/2 whorl beyond the angular edge of the peristome, with 1 parietalis, 1 longitudinal palatalis entirely beyond the angular edge of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1 3/8-1 1/2 whorl. Radial ribs half-way the whorl with a slight loop to the right, (rather) distinct, high (particularly half-way the whorl), thin, widely spaced, absent on the whorl after the constriction (2-3 ribs/0.5 mm on the widest whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather inconspicuous, not or hardly directed downwards. Peristome double, expanding; palatal side sinuous, with a protrusion; basal side without edge; basal edge sinuous, protruding; outer peristome expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, moderately expanding on the parietal side. Height 2.8-3.2 mm; width 1.1-1.2 mm; index 2.8-3.3. Height and width aperture 0.5-0.6 mm.

Distribution. — Borneo: Sarawak, 4th Div., G. Mulu area, probably endemic. Not found again in recent years.

22 - *Diplommatina madaiensis* spec. nov.  
fig. 22

Material seen. — SABAH. Tawau Zone: G. Madai, 40 km SSW. of Lahad Datu (V 1704/1, HOLOTYPE RMNH 56716).

Shell dextral, fusiform, lowermost but two whorl widest; penultimate whorl bulging to the right in frontal view; sides concave. Whorls  $8 \frac{3}{8}$ , convex. Suture impressed. Constriction 1 whorl beyond the angular edge of the peristome, with (only observed through shell wall) 1 (?) parietalis, 1 longitudinal palatalis entirely beyond the angular edge of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 2 whorls. Radial ribs over the entire shell, straight, rather distinct, low, rather wide, rather spaced (5 ribs/0.5 mm on the penultimate whorl). Spiral striation inconspicuous, on the top whorls only. Umbilicus closed. Aperture tilted up to  $25^\circ$  with regard to the coiling axis; columellaris distinct, not directed downwards. Peristome double, expanding; palatal side somewhat sinuous, without edge; basal side without edge; basal edge hardly sinuous, slightly protruding; outer peristome not expanding beyond the inner; inner peristome with a palatal lip, free and erect on the columellar side, moderately expanding on the parietal side. Height 3.1 mm; width 1.3 mm; index 2.4. Height and width aperture 0.5 mm.

Distribution. — Borneo: Sabah, Tawau Zone, possibly endemic to G. Madai.

Notes. — 1. *D. madaiensis*, *D. sykesi* and *D. calvula* mainly differ in the length of the tuba (which, in frontal view, make the shells look very different), as well as in the presence and the extension over the shell of the radial ribs.

2. *D. madaiensis* differs from the other two above mentioned species in having a very long tuba, as well as radial ribs continuing over the entire shell.

3. The species has been named after the type locality, G. Madai.

### 23 - *Diplommatina sykesi* Fulton, 1901

fig. 23

*Diplommatina sykesi* Fulton, 1901: 244; syntypes ("Gomanton, N. Borneo") BMNH 1901.12.13.1-4/4; do 1901.12.9.104/1.

Material seen. — SABAH. Sandakan Zone: limestone hill 7 miles E. of Lamag, 3 miles NNW. of Laab, near road Lahad Datu-Sandakan, near Kinabatangan R. (leg. Wilford, UF 193499/1); Bt. Gomantong, 30 km S. of Sandakan (BMNH/5, see above; NMW/2; RMNH/2; SMF 105254/2; ZMA/1). "North Borneo": presumably Bt. Gomantong (SMF 192580/4; do. 204044/2; ZMA/2).

Shell dextral, fusiform, penultimate whorl widest; sides flat to slightly concave. Whorls  $7 \frac{1}{4}$ - $8 \frac{1}{4}$ , convex. Suture impressed. Constriction  $1 \frac{1}{4}$ - $1 \frac{1}{2}$  whorl beyond the angular edge of the peristome, with (only observed through shell wall) 1 parietalis, 1 longitudinal palatalis entirely beyond the angular edge of the peristome, 1 transversal palatalis, 1 columellaris. Tuba  $1 \frac{1}{4}$ - $1 \frac{1}{2}$  whorl. Radial ribs on the top whorls only, straight, rather distinct, low, rather wide, rather densely placed near the top, rather widely spaced on the next whorls. Spiral striation absent or inconspicuous, on the top whorls only. Umbilicus closed. Aperture tilted up to  $25^\circ$  with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not or hardly sinuous, without edge; basal side without edge; basal edge not or hardly sinuous, sharp or protruding; outer peristome hardly to moderately expanding beyond the inner; inner peristome with a palatal lip, free and erect on the columellar side, moderately expanding on the parietal side. Height 2.9-3.2 mm; width 1.1-1.4 mm; index 2.1-2.5. Height and width aperture 0.5-0.6 mm.

Distribution. — Borneo: Sabah, lower Kinabatangan valley.

Notes. — Similar to *D. calvula* as well as *D. madaiensis*; see note 1 under the latter.

24 - **Diplommatina calvula** spec. nov.

fig. 24

Material seen. — SABAH. Sandakan Zone: "North Borneo": presumably (because found in an old sample of *D. sykesi*, which for a long time was only known from this locality) Bt. Gomantong, 30 km S. of Sandakan (SMF 192580/2, incl. HOLOTYPE).

Shell dextral, fusiform, penultimate whorl widest and bulging to the right in frontal view; sides slightly concave. Whorls  $7 \frac{1}{4}$ - $7 \frac{1}{2}$ , convex. Suture impressed. Constriction  $\frac{1}{2}$  whorl beyond the angular edge of the peristome, with (only observed through the shell wall) 1 (?) parietalis, 1 longitudinal palatalis entirely beyond the angular edge of the peristome, 1 transversal palatalis, 1 columellaris. Tuba  $1 \frac{1}{2}$  whorl. Radial ribs absent. Spiral striation absent. Umbilicus closed. Aperture tilted up to  $25^\circ$  with regard to the coiling axis; columellaris distinct, slightly directed downwards. Peristome double, expanding; palatal side somewhat sinuous, with or without a slight edge; basal side without edge; basal edge not sinuous, slightly protruding; outer peristome hardly to moderately expanding beyond the inner; inner peristome with a palatal lip, free and erect on the columellar side, moderately expanding on the parietal side. Height 2.7-2.8 mm; width 1.1 mm; index 2.4-2.6. Height and width aperture 0.5-0.6 mm.

Distribution. — Borneo: Sabah, Sandakan Zone, lower Kinabatangan valley. Not found again in recent years.

Notes. — Similar to *D. sykesi* as well as *D. madaiensis*; see note 1 under the latter. *D. calvula* has the length of the tuba intermediate between these two species, and differs from both in the absence of any radial ribs (hence the name, '*calvus*' meaning: 'bald').

25 - **Diplommatina welzeni** spec. nov.

fig. 25

Material seen. — KALIMANTAN. Kalimantan Selatan: Bt. Pagat, limestone hill 8 km SE. of Barabai (V 3800/10); Telaga Langsat, approximately 18 km SSW. of Barabai (V 3430/10); Nateh near Batu Tangga, approximately 18 km E. of Barabai (V 3012/10, incl. HOLOTYPE RMNH 56717); Jaro near Muara Uja, limestone escarpment W. of the village (V 3345/1). Kalimantan Timur: Batu Butuk, near Muara Komang along main road Banjarmasin-Balikpapan (V 3522/10); G. Melihat, foot of S.-facing slope, between river and main road Banjarmasin-Balikpapan (V 2932/10).

Shell dextral, fusiform, penultimate whorl widest; sides flat. Whorls  $6 \frac{3}{4}$ - $7 \frac{1}{8}$ , convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 transversal palatalis; columellaris inconspicuous, close to the peristome. Tuba  $3 \frac{3}{4}$ - $7 \frac{7}{8}$  whorl. Radial ribs straight, distinct, rather high, rather thin, rather widely spaced to rather densely placed, often densely placed towards the constriction (3-4 ribs/0.5 mm on the penultimate whorl). Spiral striation fine, inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris inconspicuous. Peristome double, expanding; palatal side not or slightly sinuous, with a (slight) edge; basal side with a slight edge; basal edge slightly sinuous, protruding; outer peristome expanding beyond the inner or not; inner peristome with a palatal lip, expanding but partly free on the columellar side, somewhat expanding on the parietal side. Height 2.6-3.0 mm; width 1.2-1.4 mm; index 2.0-2.3. Height and width of aperture 0.5-0.6 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, Meratus Mountains.

Notes. — 1. Differs from *D. gomantongensis* in the columellaris which is just visible in the aperture.

2. Named after Dr. P.C. van Welzen, the author's companion on the trip on which this species was first collected.

**26 - *Diplommatina evexa* spec. nov.**

fig. 26

Material seen. — SARAWAK. 4th Div.: Bt. Sarang, Tatau Valley (leg. Bong, UF 193450/2; do. 193452/3, incl. HOLOTYPE).

Shell dextral, more or less cylindrical, last two whorls widest. Whorls 5-5 5/8, convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs straight, rather distinct, rather low, rather thin, densely placed, somewhat wider spaced on the last 1 1/2 whorl (11-13 ribs/0.5 mm on the penultimate whorl). Spiral striation inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather inconspicuous, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge, basal side without edge; basal edge not sinuous, rounded; outer peristome somewhat expanding beyond the inner; inner peristome with a palatal lip, free and slightly erect on the columellar side, somewhat expanding on the parietal side. Height 1.4-1.6 mm; width 0.8-0.9 mm; index 1.6-1.8. Height and width aperture 0.3 mm.

Distribution. — Borneo: Sarawak, 4th Div., Tatau basin.

Notes. — Well characterized by the almost cylindrical shape of the shell, with a rounded top (hence the name: from the Latin '*evexus*', 'rounded at the top').

**27 - *Diplommatina oedogaster* spec. nov.**

fig. 27

Material seen. — SABAH. Interior Zone: Pun Batu approximately 30 km W. of Sepulot (V 1291/1, HOLOTYPE RMNH 56718).

Shell dextral, fusiform, penultimate whorl widest; sides concave. Whorls 7 7/8; top whorls convex, next whorls almost flat, body whorl convex. Suture slightly impressed, well impressed at the body whorl. Constriction about level with the angular edge of the peristome, with (only observed through the shell wall) 1 (?) parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1 whorl. Radial ribs absent. Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge hardly sinuous, rather sharp; outer peristome expanding beyond the inner; inner peristome with a palatal lip, free and slightly erect on the columellar side, moderately expanding on the parietal side. Height 3.5 mm; width 1.7 mm; index 2.0-2.1. Height aperture 0.8 mm; width 0.6 mm.

Distribution. — Borneo: Sabah, Interior Zone. So far found on Pun Batu only.

Notes. — *D. niahensis* has a sinuous palatal side of the peristome. Differs from *D. sykesi* and *D. calvula* in being wider (hence the name '*oedogaster*', 'thick-bellied'), as well as having a shorter tuba.

28 - *Diplommatina niahensis* Godwin Austen, 1889  
fig. 28

*Diplommatina niahensis* Godwin Austen, 1889: 349; type ("Niah Hills") leg. Everett, BMNH 1889.12.7.55.

*Diplommatina niahensis* Gredler, 1902: 59; holotype ("Niah im Distrikte von Sarawak") leg. Hose, SMF 191642.

Material seen. — SARAWAK. 4th Div.: G. Subis (Batu Niah) (BMNH/1, see above; NMW/1; SMF/1, see above; leg. Wall, UF 193400/10; do. 193401/10; do. 193405/10; do. 193407/10; do. 193408/10; leg. Holzmark, UF 24839/1; V 1525/10).

Shell dextral, fusiform, penultimate whorl widest; sides concave. Whorls  $6\frac{1}{2}$ - $7\frac{3}{4}$ ; top whorls (almost) flat, others convex. Suture rather impressed. Constriction about level with the angular edge of the peristome, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1 whorl. Radial ribs straight, inconspicuous, low, rather thin, densely placed, on the top whorls only, or continuing up to the penultimate whorl (there 6-9 ribs/0.5 mm). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, not or hardly directed downwards. Peristome double, expanding; palatal side sinuous, with a slight to distinct edge; basal side without edge; basal edge sinuous, sharp; outer peristome somewhat expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, somewhat expanding on the parietal side. Height 3.0-4.2 mm; width 1.5-2.0 mm; index 1.7-2.3. Height aperture 0.7-1.1 mm; width 0.7-1.0 mm.

Distribution. — Borneo: Sarawak, 4th Div., probably endemic to G. Subis (Batu Niah).

Notes. — Mainly variable in the size and the index of the shell, as well as in the extension of the ribs over the whorls.

29 - *Diplommatina calcarata* Von Moellendorff, 1897  
fig. 29

*Diplommatina calcarata* Von Moellendorff, 1897: 94; lectotype ("Java") leg. Frühstorfer, SMF 105207.

Material seen. — KALIMANTAN. Kalimantan Selatan: Jaro near Muara Uja, limestone escarpment W. of the village (V 3346/7). Material seen from elsewhere: Java (SMF/1, see above).

Shell dextral, fusiform, penultimate whorl widest; sides flat or slightly concave. Whorls  $5\frac{3}{4}$ - $6\frac{1}{4}$ , convex. Suture impressed. Constriction level with the angular edge of the peristome or slightly beyond this point, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1- $1\frac{1}{8}$  whorl. Radial ribs straight, rather distinct, rather low, rather thin, densely placed near the top, moderately spaced to rather densely placed (4-6 ribs/0.5 mm on the penultimate whorl) elsewhere. Spiral striation present. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, not or slightly directed downwards. Peristome double, expanding; palatal side moderately sinuous or not, with a rather distinct edge; basal side with two more edges which are sometimes fused to a single; basal edge not sinuous, rather sharp to slightly protruding; outer peristome somewhat expanding beyond the inner or not; inner peristome usually with a palatal lip, expanding but partly free on the columellar side, somewhat expanding on the parietal side. Height 2.1-2.4 mm; width 1.2-1.3 mm; index 1.7-2. Height and width aperture 0.5 mm.

Distribution. — Borneo: Kalimantan, K. Selatan, Meratus Mountains. Also on Java.

Notes. — 1. *D. pentaechma* Laidlaw, 1949 (W. Malaysia) has a more obtuse spire. *D. streptophora* Laidlaw, 1949 (W. Malaysia) and *D. sinulabris* Von Moellendorff, 1902 (W. Malaysia and Sumatra), have a wider tuba. All three have small edges along the peristome, between the edge on the palatal side and the basal edge, similar to those in *D. calcarata*. The Bornean *D. onyx* and *D. baritensis* do not have such edges, but are otherwise similar.

2. The Bornean material differs slightly from the type from Java in having more concave sides. As a result, the widest whorl is more bulging. More material may show that two different taxa are involved.

**30 - *Diplommatina strongyla* spec. nov.**  
fig. 30

Material seen. — SARAWAK. 4th Div.: G. Subis (Batu Niah) (leg. Wall, UF 193402/10; do. 193403/4; do. 193404/5; do. 193410/10; do. 193411/2; V 1522/10, incl. HOLOTYPE RMNH 56719).

Shell dextral, fusiform, penultimate whorl widest; sides flat. Whorls 5  $1/8$ -6  $3/8$ , convex. Suture impressed. Constriction level with the angular edge of the peristome or slightly beyond this point, sometimes level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1 whorl. Radial ribs straight (or slightly sinuous on the lowermost whorl), rather distinct, rather low, rather thin, densely placed (7-10 ribs/0.5 mm on the penultimate whorl). Spiral striation absent or inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather distinct, directed downwards. Peristome double, moderately expanding; palatal side sinuous, without edge; basal side without edge; basal edge sinuous, rather sharp; outer peristome hardly expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, little expanding on the parietal side. Height 1.8-2.5 mm; width 1.0-1.2 mm; index 1.6-2.1. Height aperture 0.5-0.6 mm; width 0.4-0.5 mm.

Distribution. — Borneo: Sarawak, 4th Div., probably endemic to G. Subis (Batu Niah).

Notes. - 1. Differs from *D. baritensis* and *D. onyx* by its smaller size and less projecting peristome (hence the name: the Greek '*strongylos*', 'rounded').

2. Some specimens have a distinctly higher spire than the one depicted.

**31 - *Diplommatina baritensis* E.A. Smith, 1893**  
fig. 31

*Diplommatina baritensis* E.A. Smith, 1893: 350; holotype ("Barit Mountain") leg. Everett, BMNH 92.7.23.48.

Material seen. — SARAWAK. 4th Div.: "Barit Mountain": either along S. Barit, S. part Tatau Valley; or in G. Mulu area (BMNH/3, see above); G. Mulu, lower Tutoh Valley (leg. Wilford, UF 193423/8; do. 193430/10). "N. Borneo": probably same as "Barit Mountain" (NMW/5; SMF 105267/3; UF 141717/2; UF 141718/3); "Brunei": now included in Sarawak, Mulu Area (SMF 192542/6; 201164/6; ZMA/2).

Shell dextral, fusiform, penultimate whorl widest; sides slightly concave. Whorls 6  $1/2$ -7  $1/4$ , convex. Suture impressed. Constriction level with the parietal side, or with the angular edge of the peristome or slightly beyond this point, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 7/8-1  $1/8$  whorl. Radial ribs straight, distinct, high, thin, widely spaced to densely placed near the top, widely spaced on the other whorls (2-4 ribs/0.5 mm on the penultimate whorl). Spiral striation absent or inconspicuous, on the top whorls only.

Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, not or slightly directed downwards. Peristome double, expanding; palatal side sinuous, with a protrusion; basal side without edge; basal edge sinuous, protruding; outer peristome hardly to distinctly expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, somewhat expanding on the parietal side. Height 2.4-3.0 mm; width 1.2-1.5 mm; index 2.0-2.3. Height and width aperture 0.5-0.7 mm.

Distribution. — Borneo: Sarawak, 4th Div., possibly endemic to the G. Mulu area.

Notes. - 1. This species includes two forms, one with densely placed ribs on the top whorls, and a second one with widely spaced ribs. The latter form often (not always) has the outer peristome only slightly expanding beyond the inner.

2. *D. onyx* has lower, more densely placed ribs. In *D. baritensis* the ribs on the widest whorl always have eroded, irregular crests. In *D. onyx* the ribs never have eroded crests.

### 32 - *Diplommantina onyx* Fulton, 1901 fig. 32

*Diplommantina onyx* Fulton, 1901: 244; holotype ("Busau, N. Borneo") leg. Everett, BMNH 1901.12.9.93.

Material seen. — SARAWAK. 1st Div.: Busau (Busan) (BMNH/1, see above; NMW/2; SMF 105253/2; do. 192579/3; ZMA/1); quarry km 31.6 road Kuching-Bau (leg. Auffenberg, UF 183979/10); G. Pangga 3 km ENE. of Bau (V 2139/10); 3 km SW of Taiton goldmine, near Bau (leg. Auffenberg, UF 183928/10); small gorge 1 mile S. of Bau (leg. Wilford, UF 193448/10); G. Doya 2 miles SE. of Bau (leg. Wilford, UF 193484/2); G. Kapur 6 km SE. of Bau (leg. De Vogel, V 2603/8; V 2239/10); Lobang Angin 2 km SW. of Bau (V 2295/2); G. Jambusan 4 km SE. of Bau (V 2178/10); mile 18.5 road Kuching-Serian (leg. Wilford, UF 193412/4); Kpg. Tiang Bekap 10 km SSW. of Kpg. Beratok (leg. De Vogel, V 2589/6); G. Braang, NW. foot, 22 miles S. of Kuching (leg. Wilford, UF 193457/6; do. 193459/10; do. 193460/10); G. Wah S. of Braang, 23 miles S. of Kuching (leg. Wilford, UF 193467/10); G. Gayu 23 miles S. of Kuching (leg. Wilford, UF 193473/2; do. 193476/10; do. 193477/10); G. Saak 1 mile W. of Begu, 24 miles S. of Kuching (leg. Wilford, UF 193469/10; do. 193470/10); limestone hill 1 mile NE. of Penkalan Ampat, 0.5 mile E. of Temarag (leg. Wilford, UF 193463/10); Kpg. Segur Benuk, mile 21 Penrissen Road (leg. De Vogel, V 2544/2). 4th Div.: G. Labang Tukeng near Kejin Trib, Baram Valley, 4 miles NE. of Long Lama (leg. Stevenson, UF 193436/5); G. Mulu, near Nat. Park entrance (leg. Ball, V 2667/10); G. Mulu, lower Tutoh Valley (leg. Wilford, UF 193428/10; do. 193423/1).

Shell dextral, fusiform, penultimate whorl widest; sides flat to concave. Whorls 6 1/8-7; top whorls convex, next whorls (slightly) convex, body whorls convex. Suture (rather) impressed. Constriction level with the angular edge of the peristome or slightly beyond this point, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1 whorl. Radial ribs straight, inconspicuous to rather distinct, low, rather wide, often densely placed near the top, moderately spaced to densely placed elsewhere, inconspicuous or almost absent on the penultimate whorl or towards the constriction (4-7 ribs/0.5 mm on the penultimate whorl). Spiral striation absent or inconspicuous, on the top whorls only. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, not or slightly directed downwards. Peristome double, expanding; palatal side sinuous, with an edge; basal side without edge; basal edge slightly to distinctly sinuous, sharp or protruding; outer peristome not or hardly expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, moderately expanding on the parietal side. Height 2.2-3.0 mm; width 1.1-1.5 mm; index 1.9-2.2. Height and width aperture 0.5-0.7 mm.



Distribution. — Borneo: Sarawak, widespread in the 1st Div., isolated populations elsewhere.

Note. - Variable. Some populations from the Penrissen Valley, S. of Kuching, differ from the type because they tend to have a comparatively short and wide shell, with a less distinctly concave spire. Often they also have more distinct ribs which, however, never have eroded crests as in *D. baritensis*. Populations from the Mulu area differ from the type in having a smaller aperture, which usually is circular (rather than ovate) because the basal edge is less distinctly drawn out. Often, the ribs are less distinct. Both forms are connected to the typical form by series of intermediates (the Mulu form by a small series of specimens collected in the Baram Valley), so that it is impossible to distinguish subspecies.

33 - *Diplommatina tenuilabiata* Fulton, 1901  
fig. 33, 51b

*Diplommatina tenuilabiata* Fulton, 1901: 245; holotype ("Banguey Island") leg. Everett, BMNH 1901.12.9.107.

Material seen. — SABAH. Kudat Zone: limestone hill 5 miles W. of Kudat (leg. Wilford, UF 193488/1); Pulau Banggi (BMNH/1, see above; NMW/3; SMF 105167/2; do. 105257/2; do. 192545/4; ZMA/1). "Sarawak": probably wrong location, originally identified as *D. niahensis* from Sarawak (SMF 142578/5).

Shell dextral, fusiform, the penultimate whorl widest; sides slightly concave. Whorls 6 3/4-7 1/8, rather convex. Suture impressed. Constriction level with the angular edge of the peristome or slightly beyond this point, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 1 whorl. Radial ribs straight, rather inconspicuous, low, rather wide, rather densely placed, fading on the penultimate whorl (where 5-9 ribs/0.5 mm). Spiral striation absent or inconspicuous, on the top whorls only. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather inconspicuous to rather distinct, not or hardly directed downwards. Peristome simple, expanding; palatal side not or hardly sinuous, with a slight edge; basal side usually with a slight edge; basal edge slightly to rather sinuous, sharp to slightly protruding; peristome with a slight to moderate palatal lip, expanding over the shell on the columellar side, little expanding on the parietal side. Height 2.7-3.0 mm; width 1.3-1.5 mm; index 1.9-2.2. Height aperture 0.7-0.8 mm; width 0.6-0.7 mm.

Distribution. — Borneo: Sabah, Kudat Zone. P. Banggi and a single locality near Kudat. Extinct or threatened with extinction due to habitat destruction.

Note. - The single specimen available from the Kudat area has a slightly thicker peristome, as well as an inconspicuous spiral striation over the entire shell.

34 - *Diplommatina meratusensis* spec. nov.  
fig. 34

Material seen. — KALIMANTAN. Kalimantan Selatan: G. Siamang near Desah Liu, 30 km E. of Tandjung (V 3093/10); G. Buleh, 4 km E. of Muara Uja (V 3479/10); Jaro near Muara Uja, limestone escarpment W. of the village (V 3197/10, incl. HOLOTYPE RMNH 56720).

Shell dextral, fusiform, penultimate whorl widest; sides flat or slightly concave. Whorls 6 1/2-7 1/8, convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs straight, distinct, rather high, rather thin, rather densely placed (5-7 ribs/0.5 mm on the penultimate

whorl). Spiral striation present. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side sinuous, with an edge; basal side without edge; basal edge not or slightly sinuous, rather sharp to protruding; outer peristome not or hardly expanding beyond the inner; inner peristome with palatal lip, expanding but partly free on the columellar side, moderately expanding on the parietal side. Height 2.4-2.7 mm; width 1.2-1.4 mm; index 1.7-2.1. Height and width aperture 0.5-0.6 mm.

Distribution. — Borneo: Kalimantan, K. Selatan, Meratus Mountains.

Notes. — 1. Some specimens are shorter and wider than the one depicted.

2. *D. plecta* has a simple peristome, of which the palatal side is either sinuous or not, as well as radial ribs which fade over the constriction. *D. auriculata* Von Moellendorff, 1897, from Java, is larger, and has a less sinuous palatal side of the peristome.

3. The name refers to the mountain chain where the species occurs.

### 35 - *Diplommantina canaliculata* Von Moellendorff, 1886 fig. 35

*Diplommantina canaliculata* Von Moellendorff, 1886: 312; lectotype (W. Malaysia: "Buket Pondong") leg. Hungerford, SMF 105394, paratypes SMF 105395/5.

(?) *Diplommantina aldrichi* Godwin Austen, 1890: 246; type ("Kusan or Penggiron districts, S.E. Borneo") leg. Doherty (not seen).

*Diplommantina schmidtii* Von Martens, 1908: 279; syntypes ("Kari Orang") ZMB/3.

Material seen. — KALIMANTAN. Kalimantan Selatan: Batu Apoh, approximately 35 km NE. of Martapura (V 3332/10); Telaga Langsat, approximately 18 km SSW. of Barabai (V 4328/9); Bt. Pagat, limestone hill 8 km SE. of Barabai (V 3802/10); Nateh near Batu Tangga, approximately 18 km E. of Barabai (V 3010/10); G. Halat, near border Kalimantan Timur along main road Banjarmasin-Balikpapan (V 2789/10); approximately 7 km N. of Kintap (V 3680/5); Batu Tangga near Sarungga, W. of road Batulicin-Benualawas (V 3267/10); limestone escarpment W. of km 6 road Benualawas-Batulicin (V 3366/10); limestone escarpments along road Benualawas-Limbungan (V 2852/10). Kalimantan Timur: Kari Orang (ZMB/3, see above). Material seen from elsewhere. W. Malaysia: Perak, Bt. Pondong (SMF 105394/1; do. 105395/5, both see above); Selangor, Templer Park (leg. Lieftinck 1799, RMNH/10). Indonesia: Sumatra, 40 km N. of Berastagi (leg. Clark, RMNH/6); Pulau Panaitan off the W. coast of Java (leg. Whitten, V 3620/6).

Shell dextral, fusiform, last two or penultimate whorl widest; sides concave. Whorls 7-9 1/8, convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs straight, distinct, high, rather thin, rather widely spaced to rather densely placed (3-5 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side slightly sinuous, usually with an edge; basal side usually with an edge; basal edge not or slightly sinuous, sharp or protruding; outer peristome expanding beyond the inner; inner peristome with a palatal lip, expanding over the shell on the columellar side, somewhat expanding on the parietal side. Height 3.2-4.2 mm; width 1.3-1.6 mm; index 2.3-2.9. Height aperture 0.6-0.7 mm; width 0.5-0.7 mm.

Distribution. — Borneo: Kalimantan, K. Selatan, Meratus Mountains. Also in W. Malaysia, Sumatra, as well as on Pulau Panaitan, a small island off the W. coast of Java.

Notes. — 1. The Bornean material shows less variability than the W. Malaysian specimens (see Laidlaw, 1949), but fits well into this species.

2. The type of *D. aldrichi* was not available for comparison. Its identity and whereabouts remain somewhat doubtful.

**36 - *Diplommatina cacuminulus* spec. nov.**  
fig. 36

Material seen. — SABAH. Tawau Zone: G. Baturong, 50 km WSW. of Lahad Datu (V 1832/10, incl. HOLOTYPE RMNH 56721).

Shell dextral, fusiform, penultimate whorl widest; sides flat or slightly concave. Whorls 6 5/8-7 1/2, convex. Suture impressed. Constriction level with the parietal side of the peristome, sometimes close to the angular edge, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 7/8-1 whorl. Radial ribs straight, rather distinct, rather low, rather wide, densely placed (7-10 ribs/0.5 mm on the penultimate whorl). Spiral striation present. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not or hardly sinuous, with or without a slight edge; basal side without edge; basal edge not to hardly sinuous; outer peristome somewhat expanding beyond the inner; inner peristome with or without a palatal lip, free and slightly erect on the columellar side, somewhat expanding on the parietal side. Height 1.8-2.3 mm; width 0.8-1.1 mm; index 2.0-2.5. Height and width aperture 0.3-0.4 mm.

Distribution. — Borneo: Sabah, Tawau Zone, G. Baturong only.

Notes. — 1. *D. nevillei* Crosse, 1870, from W. Malaysia, has an incision in the basal edge of the peristome.

2. The name refers to the slender outline of this species: '*cacuminulus*', 'a small needle'.

**37 - *Diplommatina recta* E.A. Smith, 1895**  
fig. 37

*Diplommatina recta* E.A. Smith, 1895: 122; syntypes ("Kina Balu") leg. Everett, BMNH 94.7.20.79-80 & 94.7.21.74-5/4.

Material seen. — SABAH. West Coast Zone/Interior Zone: G. Kinabalu (BMNH/4, see above).

Shell dextral, more or less conical, last whorl moved inwards but still widest; sides flat. Whorls 6 1/8-6 3/4, convex. Suture impressed. Constriction level with the edge between the parietal and columellar side of the peristome, with (?) 1 parietalis (observed through the shell wall only), 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 3/4 whorl. Radial ribs straight, rather distinct, rather low, rather thin, densely placed (6-7 ribs/0.5 mm on the penultimate whorl). Spiral striation fine, inconspicuous. Umbilicus closed. Aperture slightly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not or hardly sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; outer peristome (hardly) expanding beyond the inner; inner peristome with a palatal lip, free and erect on the columellar side, little expanding on the parietal side. Height 2.7-2.9 mm; width 1.4-1.5 mm; index 1.8-2.1. Height aperture 0.6 mm; width 0.6-0.7 mm.

Distribution. — Borneo: Sabah, G. Kinabalu. Also reported from Balabac, a small island off the N. coast of Borneo. Not found again in recent years.

38 - *Diplommatina plecta* Fulton, 1901  
fig. 38

*Diplommatina plecta* Fulton, 1901: 244; holotype ("Kina Balu, N. Borneo") leg. Everett, BMNH 1901.12.9.106.

Material seen. — SABAH. West Coast Zone/Interior Zone: G. Kinabalu (BMNH/1, see above; NMW/1; SMF 105252/1).

Shell dextral, fusiform, penultimate whorl widest; sides flat or slightly concave. Whorls 6 5/8-6 7/8, convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 longitudinal palatalis at the level of the peristome, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs straight, rather distinct, low, rather thin, rather densely placed, fading or absent towards the constriction and over (the first part of) the tuba (5-6 ribs/0.5 mm on the penultimate whorl). Spiral striation absent or fine, inconspicuous. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome simple, expanding; palatal side not or hardly sinuous, with an edge; basal side with an edge; basal edge moderately sinuous, slightly protruding; peristome with a palatal lip, expanding over the shell on the columellar side, little expanding on the parietal side. Height 2.7-2.8 mm; width 1.3-1.4 mm; index 1.9-2.1. Height aperture 0.5-0.7 mm; width 0.5-0.6 mm.

Distribution. — Borneo: Sabah, G. Kinabalu only. Not found again in recent years.

Notes. — The differences from *D. meratusensis* are given under that species.

39 - *Diplommatina whiteheadi* E.A. Smith, 1898  
fig. 39

*Diplommatina whiteheadi* E.A. Smith, 1898: 34; syntypes ("Kina Balu, North Borneo") leg. Gerrard, BMNH 95.12.5.28-31/4.

Material seen. — SABAH. West Coast Zone: G. Kinabalu (BMNH/4, see above; NMW/1). Interior Zone: km 59 road Kota Kinabalu-Tambunan (V 1184/2). Sandakan Zone: Bt. Kolop, 4 miles WSW. of Latangan (leg. Wilford, UF 193495/2).

Shell sinistral, about cylindrical, penultimate whorl widest; sides convex. Whorls 4 1/4-4 5/8, convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs straight, distinct, rather high, rather thin, densely placed (9-12 ribs/0.5 mm on the penultimate whorl). Spiral striation distinct. Umbilicus open, narrow. Aperture slightly tilted with regard to the coiling axis; columellaris rather distinct, not directed downwards. Peristome double or triple, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not or hardly sinuous, rounded or slightly angular; outer peristome expanding beyond the inner; inner peristome without palatal lip, expanding over the shell on the columellar side, little expanding on the parietal side. Height 1.3-1.5 mm; width 0.7-0.8 mm; index 1.6-1.9. Height and width aperture 0.3-0.4 mm.

Ecology. — In lowland forest as well as in montane forest up to 1800 m a.s.l.

Distribution. — Borneo: Sabah, G. Kinabalu, Crocker Range, and Kinabatangan basin.

40 - *Diplommatina busanensis* Godwin Austen, 1889  
fig. 40

*Diplommatina busanensis* Godwin Austen, 1889: 348; holotype ("Busan Hills") leg. Everett, BMNH 1889.12.7.56.

Material seen. — SARAWAK. 1st Div.: Bau area (coll. Tweedie, ZMA/3); small gorge 1 mile S. of Bau (leg. Wilford, UF 193446/4); G. Doya 2 miles SE. of Bau (leg. Wilford, UF 193486/10); G. Kapur 6 km SE. of Bau (V 2236/10); Busau (leg. Everett, BMNH/1, see above); G. Wah S. of Braang, 23 miles S. of Kuching (leg. Wilford, UF 193464/7); limestone hill 1 mile NE. of Penkalan Ampat, 0.5 mile E. of Temarung (leg. Wilford, UF 193461/11). "North Borneo" (NMW/2; RMNH/2; SMF 192543/2; UF 141735/1; ZMA/2).

Shell sinistral, conical with the last whorl moved inwards but still widest; sides flat. Whorls 5 1/2-6 1/8, convex. Suture impressed. Constriction about level with the edge between the parietal and columellar side of the peristome, with 1 parietalis, 1 transversal palatalis, 1 columellaris. Tuba 3/4 whorl. Radial ribs not sinuous, distinct, rather high, rather thin, rather widely spaced (3-4 ribs/0.5 mm on the penultimate whorl). Spiral striation often present. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris rather inconspicuous. Peristome simple, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge hardly sinuous, protruding; outer peristome slightly expanding beyond the inner; inner peristome with a palatal lip, free and slightly erect on the columellar side, somewhat expanding on the parietal side. Height 2.5-3.1 mm; width 1.3-1.5 mm; index 1.8-2.1. Height and width aperture 0.5-0.7 mm.

Distribution. — Borneo: Sarawak, 1st Div., limestone ranges S. of Kuching.

Notes. — *D. laidlawi* Sykes, 1903, from W. Malaysia, is smaller and wider, has a thinner peristome, and a distinctly sinuous basal edge.

41 - *Diplommatina isseli* Godwin Austen, 1889  
fig. 41

*Diplommatina isseli* Godwin Austen, 1889: 348; syntypes ("Sarawak proper") leg. Everett, ex coll. Woodward, BMNH 93.5.16.1/2.

Material seen. — SARAWAK. "Sarawak proper", presumably 1st Div. (BMNH/2, see above). SABAH. Interior Zone: Batu Urun near Sepulot, from soil deposited at Tenom Agricultural Station (V 1149/1, 2 defect).

Shell sinistral, strictly conical, sides flat. Whorls 6 7/8-8 1/4, convex. Suture impressed. Constriction level with the columellar side of the peristome, with 1 very short oblique palatalis close to the suture, 1 transversal palatalis, 1 columellaris. Tuba 5/8 whorl. Radial ribs not sinuous, distinct, rather low, rather thin, densely placed (4-5 ribs/0.5 mm on the penultimate whorl). Spiral striation present or not. Umbilicus open, narrow. Aperture tilted about 45° with regard to the coiling axis; columellaris distinct, not directed downwards. Peristome simple or double, moderately expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; outer peristome hardly expanding beyond the inner; inner peristome without palatal lip, expanding but free on the columellar side, little expanding on the parietal side. Height 4-5.1 mm; width 2.2-2.5 mm; index 1.9-2.1. Height and width aperture 0.9-1 mm.

Distribution. — Borneo: Sarawak, probably 1st Div.; Sabah, Interior Zone.

Notes. — The single entire Sabah specimen available is shorter, and has about a whorl less, than the syntypes from Sarawak. Otherwise it is not different.

42 - *Diplommatina adversa* (H. & A. Adams, 1851)  
fig. 42

*Paxillus adversus* H. & A. Adams, 1851: 63; type ("Singapore") (not seen).

*Paxillus beccarii* Issel, 1874: 78; type ("Territorio di Sarawak") leg. O. Beccari, MCSNG/4.

*Diplommatina adversa* (H. & A. Adams, 1851) Godwin Austen, 1889: 348.

*Diplommatina beccarii* (Issel, 1874) Godwin Austen, 1889: 348.

*Diplommatina adversa* (H. & A. Adams, 1851) var. *naturensis* E.A. Smith, 1894: 463; syntypes ("Natuna Islands") BMNH 1894.2.1.32-36/10.

*Gastroptychia adversa* (H. & A. Adams, 1851) Laidlaw, 1949: 214.

Material seen. — SARAWAK. 1st Div.: Bau (col. Venmans 5162/8; do. 5543/2, both RMNH); G. Pangga 3 km ENE. of Bau (V 2140/10); G. Kapur 6 km SE. of Bau (leg. De Vogel, V 2610/10; V 2237/10); Lobang Angin 2 km SW. of Bau (V 2294/9); G. Jambusan 4 km SE. of Bau (V 2188/10); Busau (leg. Everett, BMNH 1889.12.35-44/10); Kpg. Segur Benuk, mile 21 Penrissen Road (leg. De Vogel, V 2550/1); G. Selabor, W. of Kpg. Lobang Batu, 12.5 km S. of Tebakang (V 2099/10). "Sarawak" (RMNH/4); "Territorio di Sarawak" (MCSNG/4, see above). SABAH. Tawau Zone: 'Kirk's Cave', 8 km N. of Lahad Datu (V 2452/1). Material seen from elsewhere: Natuna Islands (BMNH/10, see above).

Shell sinistral, fusiform, last two whorls widest; sides slightly concave. Whorls 6 1/8-7 3/8, slightly convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 3 longitudinal palatales, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs absent or inconspicuous, not sinuous, low, thin, densely placed (6-10 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome simple, palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; peristome with a palatal lip, expanding but free and slightly erect on the columellar side, expanding up to the suture of the previous whorl on the parietal side. Height 4.5-7.5 mm; width 2.1-3.3 mm; index 2.0-2.3. Height aperture 1.3-1.8 mm; width 1.4-1.8 mm.

Distribution. — Borneo: Sarawak, 1st Div., limestone ranges S. of Kuching. Sabah, Tawau Zone, lower Segama basin. Also in W. Malaysia, Singapore and on the Natuna Islands.

Notes. — The syntypes of *D. adversa* var. *naturensis*, and in particular the syntypes of *D. beccarii* are smaller than all other material seen, but otherwise not different.

43 - *Diplommatina subisensis* spec. nov.  
fig. 43, 51d

Material seen. — SARAWAK. 4th Div.: G. Subis (Batu Niah) (V 1524/15, incl. HOLOTYPE RMNH 56722).

Shell sinistral, fusiform, last whorl widest; sides flat or slightly concave. Whorls 6 1/2-7 1/8, top whorls convex, next whorls flat, body whorls slightly convex. Suture slightly impressed. Constriction level with the parietal side of the peristome, with sometimes 1 parietalis, sometimes 1 slightly oblique longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs absent or inconspicuous, not sinuous, low, wide, densely placed (7-9 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture slightly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, somewhat angular; outer peristome expanding beyond the inner; inner peristome without

palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 4.5-5.3 mm; width 2.4-2.7 mm; index 1.8-2.1. Height aperture 1.0-1.2 mm; width 1.1-1.3 mm.

Distribution. — Borneo: Sarawak, 4th Div., G. Subis, probably endemic.

Notes. — 1. *D. rubicunda* differs in being consistently larger, and always having at least one longitudinal palatalis.

2. The name refers to the name of the type locality.

44 - *Diplommatina electa* Fulton, 1905  
fig. 44

*Diplommatina (Gastroptychia) electa* Fulton, 1905: 94; holotype ("N. Borneo") leg. Waterstradt, BMNH 1901.4.14.3.

Material seen. — SABAH. West Coast Zone: G. Kinabalu (V 1194/6). "N. Borneo", probably (near) G. Kinabalu (BMNH/1, see above; NMW/2; RMNH/2; RMNH/2).

Shell sinistral, almost conical, with the last whorls slightly moved inwards but still widest; sides flat. Whorls 7 3/8-7 7/8, slightly convex. Suture slightly impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 2 longitudinal palatales, the upper parallel to the suture, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs not sinuous, rather distinct, low, thin, densely placed (5-10 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rather sharp; outer peristome expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 6.0-6.8 mm; width 2.8-3.1 mm; index 2.0-2.3. Height aperture 1.4-1.5 mm; width 1.3-1.5 mm.

Ecology. — Found in grassy roadside among diorite scree, at 1800 m a.s.l.

Distribution. — Borneo: Sabah, West Coast Zone, G. Kinabalu, probably endemic.

Notes. — *D. rubra* is wider, and has an oblique upper longitudinal palatalis. The differences from *D. rubicunda* are given under that species.

45 - *Diplommatina rubicunda* (Von Martens, 1864)  
fig. 45, 51d

*Paxillus rubicundus* Von Martens, 1864: 119; holotype ("Benkajang and Singkawang, W. Borneo") ZMB.

*Diplommatina rubicunda* (Von Martens, 1864) E.A. Smith, 1894: 463.

Material seen. — SARAWAK. 1st Div.: Kpg. Tiang Bekap 10 km SSW. of Kpg. Beratok (leg. De Vogel, V 2560/1, 3 defect); 7.5 km WNW. of Kpg. Piching, near Serian (V 1928/2). 4th Div.: Bt. Sarang, Tatau Valley (leg. Bong, UF 193451/1). SABAH. Sandakan Zone: Batu Putih near road Lahad Datu-Sandakan, near Kinabatangan R. (V 1471/11). Tawau Zone: NW. of road Lahad Datu-Sandakan crossing with Segama R. (V 1672/15); 'Kirk's Cave', 8 km N. of Lahad Datu (V 1211/3); Danum Valley Forest Reserve, area near Research Station (V 1201/3); Bt. Pababola, Segarong Hills 25 km ESE. of Kunak (V 1756/1, defect) KALIMANTAN. K. Barat: Benkajang and Singkawang (ZMB/1, see above).

Shell sinistral, fusiform to almost conical, with the last whorl slightly moved inwards, last two whorls widest; sides slightly concave. Whorls 6 7/8-7 7/8; top whorls convex, next whorls almost flat, body whorls slightly convex. Suture slightly impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1-2 longitudinal palatales, the upper parallel to the suture, 1 transversal palatalis, 1 columellaris. Tuba

7/8 whorl. Radial ribs not sinuous, inconspicuous, low, wide, densely placed (5-9 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rather sharp; outer peristome expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 6.2-8.0 mm; width 3.0-3.5 mm; index 1.9-2.3. Height aperture 1.3-1.9 mm; width 1.2-1.8 mm.

Distribution. — Borneo: Sarawak, 1st and 4th Div.; Sabah, E. part; Kalimantan, K. Barat.

Notes. — *D. electa* has more prominent ribs, more or less flat sides of the spire, and all whorls are about equally convex. The differences from *D. subglaber* and *D. subisensis* are given under these species.

#### 46 - *Diplommatina centralis* spec. nov.

fig. 46, 51d

Material seen. — SABAH. Interior Zone: Lian Cave 12 km N. of Keningau (V 1101/10); Batu Urun near Sepulot, from soil deposited at Tenom Agricultural Station (V 1170/10); Batu Punggol SE. of Sepulot (V 1893/6, incl. HOLOTYPE RMNH 56723).

Shell sinistral, fusiform to almost conical, last (two) whorls widest; sides flat or slightly concave. Whorls 6 7/8-7 1/2, slightly convex. Suture slightly impressed. Constriction about level with the parietal side of the peristome, with sometimes 1 longitudinal palatalis parallel to the suture, 1 transversal palatalis, 1 columellaris. Tuba 3/4-7/8 whorl. Radial ribs not sinuous, rather inconspicuous, low, wide, widely spaced (2-4 ribs/0.5 mm on the penultimate whorl), often densely placed on the tuba. Spiral striation absent. Umbilicus closed. Aperture slightly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge slightly sinuous, rather sharp; outer peristome expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 4.7-5.7 mm; width 2.3-2.8 mm; index 1.8-2.1. Height aperture 1.1-1.3 mm; width 1.0-1.3 mm.

Distribution. — Borneo: Sabah, Interior Zone.

Notes. — 1. *D. moluensis* has more prominent radial ribs, and two longitudinal palatales in the constriction. *D. clausilioides* Bavay & Dautzenberg, 1912, from N. Vietnam, is larger and has the parietal side of the peristome well rounded.

2. The name refers to the fact that the species occurs in the interior part of Sabah; '*centralis*' meaning 'from the centre'.

#### 47 - *Diplommatina moluensis* E.A. Smith, 1893

fig. 47

*Diplommatina moluensis* E.A. Smith, 1893: 348; syntypes ("Molu or Mulu Mountain, N. Borneo") leg. Everett, BMNH 92.7.20.117 & 92.7.23.19-20/3.

Material seen. — SARAWAK. 4th Div.: G. Mulu area (BMNH/1, see above).

Shell sinistral, almost conical, with the last whorl slightly moved inwards but still widest; sides flat. Whorls 7, convex. Suture impressed. Constriction level with the parietal side of the peristome, with (? , only observed through shell wall) 1 parietalis, 2



longitudinal palatalis, the upper parallel with the suture, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs sinuous, distinct, high, rather wide, widely spaced (2 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture slightly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, with a wing; basal side without edge; basal edge moderately sinuous, rather sharp; outer peristome expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 5.0 mm; width 2.5 mm; index 2.0. Height and width aperture 1.1 mm.

Distribution. — Borneo: Sarawak, 4th Div., G. Mulu area. Possibly endemic. Not found again in recent years.

Notes. — Shares the widely spaced ribs with *D. centralis*; the differences are given under that species.

48 - *Diplommatina sulphurea* E.A. Smith, 1893  
fig. 48, 51d

*Diplommatina sulphurea* E.A. Smith, 1893: 348; holotype ("Molu or Mulu Mountain") leg. Everett, BMNH 92.7.23.48.

Material seen. — SARAWAK. 4th Div.: G. Mulu area (BMNH/1, see above; leg. Ball, V 2666/6).

Shell sinistral, fusiform to almost conical, with the last whorl slightly moved inwards but still widest; sides flat. Whorls 8-8 1/4, moderately convex. Suture impressed. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 oblique longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs absent or inconspicuous, not sinuous, low, wide, densely placed (6-9 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture somewhat tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome simple, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rounded; peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 5.9-6.6 mm; width 2.7-3.0 mm; index 2.1-2.3. Height aperture 1.3-1.5 mm; width 1.4-1.5 mm.

Distribution. — Borneo: Sarawak, 4th Div., G. Mulu area, probably endemic.

49 - *Diplommatina rubra* Godwin Austen, 1889  
fig. 49, 51d

*Diplommatina rubra* Godwin Austen, 1889: 349; type ("Niah Hills") BMNH (not seen).

*Gastroptychia rubra* (Godwin Austen, 1889) Laidlaw, 1937: 188.

Material seen. — SABAH. West Coast Zone: G. Kinabalu (V 1194/1). SARAWAK. "Niah Hills", possibly wrongly labeled because the species has not been found again there (BMNH, see above).

Shell sinistral, fusiform to almost conical, with the last whorl slightly moved inwards but still widest; sides flat or slightly convex. Whorls 7 3/8, slightly convex. Suture slightly impressed. Constriction level with the parietal side of the peristome, with (? , only observed through shell wall) 1 parietalis, 1 oblique longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs not sinuous, distinct, low, rather thin, densely placed (8 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, somewhat

angular; outer peristome somewhat expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 7.2 mm; width 3.5 mm; index 2.0-2.1. Height aperture 1.5 mm; width 1.7 mm.

Ecology. — Recorded from *Dacrydium-Leptospermum* forest on diorite soil, at 3000 m a.s.l.

Distribution. — Borneo: Sabah, West Coast Zone, possibly endemic to G. Kinabalu.

Notes. — 1. Similar to *D. electa*; the differences are given under that species.

2. The type of *D. rubra* was not available. Godwin Austen's illustration of the type (1889: plate 38, fig. 7), however, leaves little doubt about its identity. Its occurrence in Niah, Sarawak is doubtful, the species has not been found there again.

### 50 - *Diplommatina subglaber* spec. nov.

fig. 50, 51d

Material seen. — KALIMANTAN. Kalimantan Selatan: Telaga Langsat, approximately 18 km SSW. of Barabai (V 3431/1); Bt. Pagat, limestone hill 8 km SE. of Barabai (V 3805/1); Natch near Batu Tangga, approximately 18 km E. of Barabai (V 3008/1); G. Siamang near Desah Liu, 30 km E. of Tandjung (V 3090/7, incl. HOLOTYPE RMNH 56724); Jaro near Muara Uja, limestone escarpment W. of the village (V 3192/13); G. Halat, near border Kalimantan Timur along main road Banjarmasin-Balikpapan (V 2793/1); limestone escarpment W. of km 6 road Benualawas-Batulicin (V 3365/2); Kalimantan Timur: Batu Butuk, near Muara Komang along main road Banjarmasin-Balikpapan (V 3534/6); G. Melihat, foot of S.-facing slope, between river and main road Banjarmasin-Balikpapan (V 2929/4).

Shell sinistral, fusiform to almost conical, with the last whorl slightly moved inwards but still widest; sides flat or slightly concave. Whorls 7 1/8-7 7/8; top whorls convex, next whorls almost flat, body whorls slightly convex. Suture slightly impressed, well impressed between the body whorls. Constriction level with the parietal side of the peristome, with 1 parietalis, 1 oblique longitudinal palatalis, 1 transversal palatalis, 1 columellaris. Tuba 7/8 whorl. Radial ribs absent or inconspicuous, not sinuous, low, wide, densely placed (3-6 ribs/0.5 mm on the penultimate whorl). Spiral striation absent. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis; columellaris distinct, directed downwards. Peristome double, expanding; palatal side not sinuous, without edge; basal side without edge; basal edge not sinuous, rather sharp; outer peristome expanding beyond the inner; inner peristome without palatal lip, free and erect on the columellar side, somewhat expanding on the parietal side. Height 5.5-7.0 mm; width 2.6-3.1 mm; index 2.0-2.5. Height aperture 1.2-1.6 mm; width 1.2-1.5 mm.

Distribution. — Borneo: Kalimantan, K. Selatan and K. Timur, Meratus Mountains.

Notes. — 1. *D. rubicunda* is usually slightly wider, and has the upper longitudinal palatalis parallel to the suture.

2. The name refers to the fact that most specimens are almost glabrous.

### EXCLUDED SPECIES

#### *Diplommatina exigua* A. Adams, 1867

*Diplommatina exigua* A. Adams, 1867: 314; type ("Tsu-Sima", Japan) leg. A. Adams (not seen).

Material seen. — "Borneo", presumably wrongly labelled (NMW/3).

Notes. — Next to the cited material (labeled "D. exigua Ad. Borneo") this species has never been found again on Borneo. The type of this species originates from Japan, and it

is very unlikely that it is part of the Bornean malacofauna. It is assumed here that the sample in NMW is wrongly labeled.

*Diplommatina pseudopomatias* Gredler, 1902

*Diplommatina pseudopomatias* Gredler, 1902: 60; type ("Niah") (not seen).

Material seen. — SARAWAK. 4th Div.: G. Subis (Batu Niah) (V 1509/10).

Notes. — The completely missing columellaris, the lack of teeth in the constriction, as well as the shape of the aperture indicate that this is an *Arinia* species with a conical spire (which is unusual in that genus), rather than a *Diplommatina*.

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## Plate captions:

Fig. 1. a, *Diplommatina aurisdiaboli* spec. nov., holotype specimen, Kalimantan: Jaro near Muara Uja (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 2.1. a, *Diplommatina bicoronata bicoronata* Von Martens, Kalimantan: Natch near Batu Tangga (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view.

Fig. 2.2. a, *Diplommatina bicoronata praetervisa* subspec. nov., holotype specimen, Kalimantan: G. Melihat (RMNH), front view with position of teeth indicated with shading; b, do., right lateral view; c, paratype specimen, Kalimantan, G. Buleh near Muara Uja, front view with position of teeth indicated with shading. Fig. 3. a, *Diplommatina spinosa* Godwin Austen, Sarawak: 7.5 km WNW. of Kpg. Piching (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view.

Fig. 4. a, *Diplommatina ferrumequinum* spec. nov., holotype specimen, Sarawak: Bt. Sarang, Tatau Valley (UF), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 5. a, *Diplommatina serempakensis* spec. nov., holotype specimen, Kalimantan: Jaro near Muara Uja (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view.

Fig. 6. a, *Diplommatina miraculumdei* spec. nov., holotype specimen, Kalimantan: Batu Tungga near Sarungga (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, paratype specimen, Kalimantan: near Benualawas (V), oblique back view, position in which living specimens are found on a substratum.

Fig. 7. a, *Diplommatina tiara* spec. nov., holotype specimen, Kalimantan: G. Halat (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 8. a, *Diplommatina lacrimans* spec. nov., holotype specimen, Kalimantan: Jaro near Muara Uja (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, paratype specimen, Kalimantan: G. Siamang near Desa Liu (V), front view with position of teeth indicated with shading.

Fig. 9. a, *Diplommatina laevis* Fulton, Kalimantan: road Benualawas-Limbangan (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 10. a, *Diplommatina gomantongensis* E.A. Smith, Sabah: G. Baturong (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view.

Fig. 11. a, *Diplommatina antheae* spec. nov., holotype specimen, Sabah: Lian Cave near Keningau (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, other shell from the same locality, back view with part of the shell removed to show columella. Fig. 12.1. a, *Diplommatina maduana maduana* Laidlaw, Sarawak, Kpg. Piching near Serian (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, other shell from the same locality, back view with part of the shell removed to show columella. Fig. 12.2. a, *Diplommatina maduana nefrens* subspec. nov., holotype specimen, Sarawak: Bt. Gading (UF), front view with position of teeth indicated with shading; b, other shell from the same locality, back view with part of the shell removed to show columella.

Fig. 13. a, *Diplommatina toretos* spec. nov., holotype specimen, Sarawak: G. Pangga near Bau (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., left lateral view; d, Sarawak: Kpg. Piching near Serian (V), back view with part of the shell removed to show columella. Fig. 14. a, *Diplommatina asynaimos* spec. nov., holotype specimen, Sarawak: Limbang Valley (UF), front view; b, do., back view with position of teeth indicated with shading; c, do., right lateral view.

Fig. 15. a, *Diplommatina cyrtorhitis* spec. nov., holotype specimen, Sabah: Batu Urun (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 16. a, *Diplommatina concinna* H. Adams, Sarawak: Kpg. Piching, near Serian (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, Sarawak, G. Subis (V), front view; e, do. with position of teeth indicated with shading; f, do., right lateral view.

Fig. 17. a, *Diplommatina soror* spec. nov., holotype specimen, Sarawak: Bt. Vrong near Beluru (UF), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 18. a, *Diplommatina lygipleura* spec. nov., holotype specimen, Sarawak: G. Mulu area (UF), front view; b, do., right lateral view with position of teeth indicated with shading. Fig. 19. a, *Diplommatina stibara* spec. nov., holotype specimen, Sarawak: G. Mulu area (UF), front view; b, do., right lateral view with position of teeth indicated with shading.

Fig. 20. a, *Diplommatina everetti* E.A. Smith, syntype specimen, Sarawak: Barit Mt. (BMNH), front view; b, do., right lateral view with position of teeth indicated with shading. Fig. 21. a, *Diplommatina excentrica* E.A. Smith, syntype specimen, Sarawak: G. Mulu area (BMNH), front view; b, other syntype specimen, right lateral view; c, other syntype specimen, left lateral view with position of teeth indicated with shading.

Fig. 22. a, *Diplommatina madaiensis* spec. nov., holotype specimen, Sabah: G. Madai (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 23. a, *Diplommatina sykesi* Fulton, Sabah: Bt. Gomantong (RMNH), front view; b, do., right left lateral view. Fig. 24. a, *Diplommatina calvula* spec. nov., holotype specimen, Sabah: presumably Bt. Gomantong (SMF), front view; b, do., right lateral view; c, do., left lateral view with position of teeth indicated with shading.

Fig. 25. a, *Diplommatina welzeni* spec. nov., holotype specimen Kalimantan: Natch near Batu Tangga (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 26. a, *Diplommatina evexa* spec. nov., holotype specimen Sarawak: Bt. Sarang near Tatau (UF), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view.

Fig. 27. a, *Diplommatina oedogaster* spec. nov., holotype specimen Sabah: Pun Batu (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 28. a, *Diplommatina niahensis* Godwin Austen, Sarawak: G. Subis (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, other shell from the same locality, front view.

Fig. 29. a, *Diplommatina calcarata* Von Moellendorff, Kalimantan: Jaro near Muara Uja (RMNH), front view; b, do., right lateral view with position of teeth indicated with shading. Fig. 30. a, *Diplommatina strongyla* spec. nov., holotype specimen, Sarawak: G. Subis (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 31. a, *Diplommatina baritensis* E.A. Smith, syntype specimen, Sarawak: Barit Mt. (BMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, Sarawak, G. Mulu area (UF), front view with position of teeth indicated with shading.

Fig. 32. a, *Diplommatina onyx* Fulton, Sarawak: G. Kapur near Bau (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view; d, Sarawak: G. Saak near Begu (UF), front view; e, Sarawak: Baram Valley, Bt. Gading (UF), front view; f, Sarawak: G. Mulu area (V), front view; g, do. with position of teeth indicated with shading; h, do., right lateral view.

Fig. 33. a, *Diplommatina tenuilabiata* Fulton, Sabah: Pulau Banggi (SMF), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 34. a, *Diplommatina meratusensis* spec. nov., holotype specimen, Kalimantan: Jaro near Muara Uja (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 35. a, *Diplommatina canaliculata* Von Moellendorff, Kalimantan: along road Benualawas-Limbangan (V), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view.

Fig. 36. a, *Diplommatina cacuminulus* spec. nov., holotype specimen, Sabah: G. Baturong (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 37. a, *Diplommatina recta* E.A. Smith, syntype specimen, Sabah: G. Kinabalu (BMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view. Fig. 38. a, *Diplommatina plecta* Fulton, holotype specimen, Sabah: G. Kinabalu (BMNH), front view; b, do. with position of teeth indicated with shading; c, do., right lateral view.

Fig. 39. a, *Diplommatina whiteheadi* E.A. Smith, Sabah: km 59 road Kota Kinabalu-Tambunan (V), front view; b, do., left lateral view. Fig. 40. a, *Diplommatina busanensis* Godwin Austen, Sarawak: G. Kapur near Bau (V), front view; b,

do. with position of teeth indicated with shading; c, do., left lateral view. Fig. 41. a, *Diplommatina isseli* Godwin Austen, Sabah: Batu Urun (V), front view; b, right lateral view with position of teeth indicated with shading; c, left lateral view.

Fig. 42. a, *Diplommatina adversa* (H. & A. Adams), Sarawak: G. Kapur near Bau (V), front view; b, do. with position of teeth indicated with shading; c, do., left lateral view. Fig. 43. a, *Diplommatina subisensis* spec. nov., Sarawak: G. Subis (V), front view; b, do. with position of teeth indicated with shading; c, left lateral view.

Fig. 44. a, *Diplommatina electa* Fulton, Sabah: G. Kinabalu (V), front view; b, do. with position of teeth indicated with shading; c, do., left lateral view. Fig. 45. a, *Diplommatina rubicunda* (Von Martens), Sabah: near crossing with S. Segama of road Lahad Datu-Sandakan (V), front view; b, do. with position of teeth indicated with shading; c, do., left lateral view.

Fig. 46. a, *Diplommatina centralis* spec. nov., holotype specimen, Sabah: Batu Punggol (RMNH), front view; b, do. with position of teeth indicated with shading; c, do., left lateral view. Fig. 47. a, *Diplommatina moluensis* E.A. Smith, holotype specimen, Sarawak: Mulu area (BMNH), front view; b, do. with position of teeth indicated with shading; c, do., left lateral view.

Fig. 48. a, *Diplommatina sulphurea* E.A. Smith, Sarawak: Mulu area (V), front view; b, with position of teeth indicated with shading; c, do., left lateral view. Fig. 49. a, *Diplommatina rubra* Godwin Austen, Sabah: G. Kinabalu (V), front view; b, do. with position of teeth indicated with shading; c, do., left lateral view.

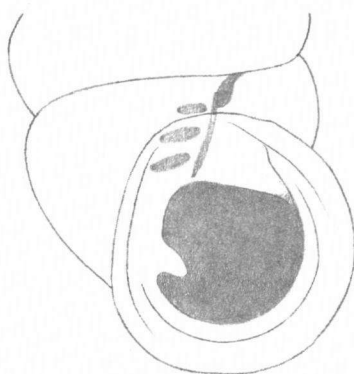
Fig. 50. a, *Diplommatina subglaber* spec. nov., holotype specimen, Kalimantan: G. Siamang near Desah Liu (RMNH), front view; b, do., left lateral view; c, Kalimantan: G. Melihat (V), front view; d, do. with position of teeth indicated with shading; e, do., left lateral view.

Fig. 51. Maps of Borneo, with the distribution of: a, *Diplommatina tiara* spec. nov. (broken line), *Diplommatina serempakensis* spec. nov. (stars), *Diplommatina spinosa* Godwin Austen (dots), *Diplommatina ferrumequinum* spec. nov. (triangle); b, *Diplommatina gomantongensis* E.A. Smith (dots), *Diplommatina antheae* spec. nov. (squares), *Diplommatina maduana maduana* Laidlaw (triangles), *Diplommatina maduana nefrens* subspec. nov. (inverted triangle), *Diplommatina tenuilabiata* Fulton (stars); c, *Diplommatina soror* spec. nov. (dots), *Diplommatina cyrtorhitis* spec. nov. (star), *Diplommatina concinna* H. Adams (broken line and triangles); d, *Diplommatina rubicunda* (Von Martens) (dots), *Diplommatina rubra* Godwin Austen (square), *Diplommatina subglaber* spec. nov. (triangles), *Diplommatina centralis* spec. nov. (inverted triangles), *Diplommatina subisensis* spec. nov. (open triangle), *Diplommatina sulphurea* E.A. Smith (star).

1a



2.1b

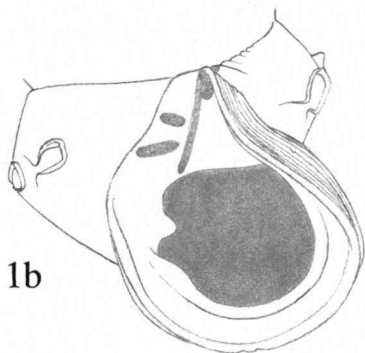


2.1c



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1b



1c



1 mm

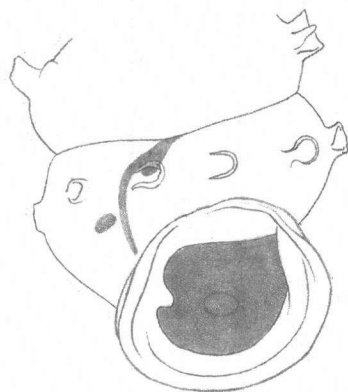
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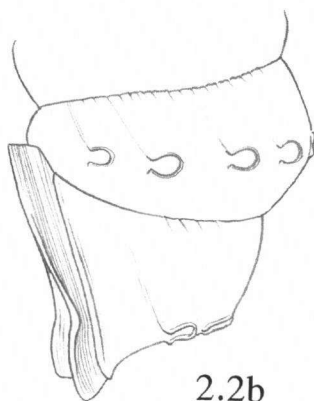


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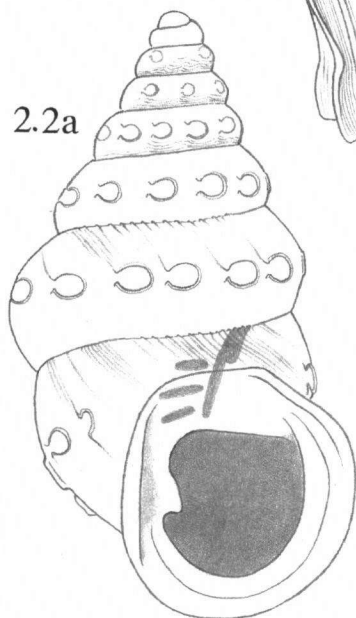
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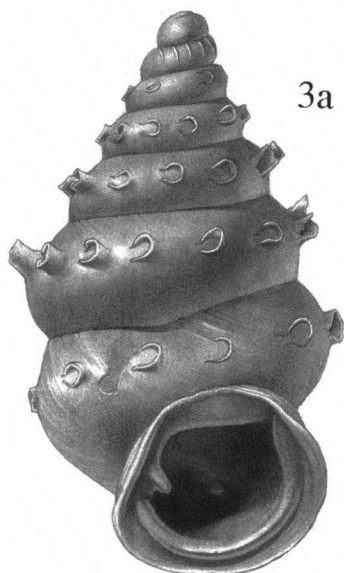
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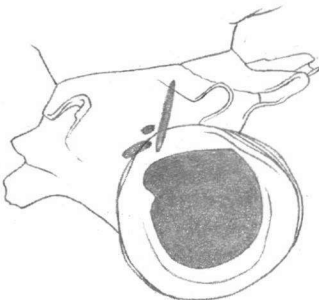
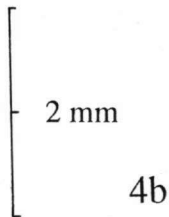
2.2a



3a







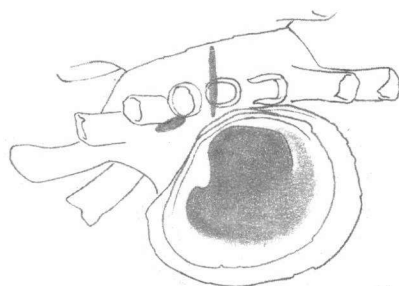
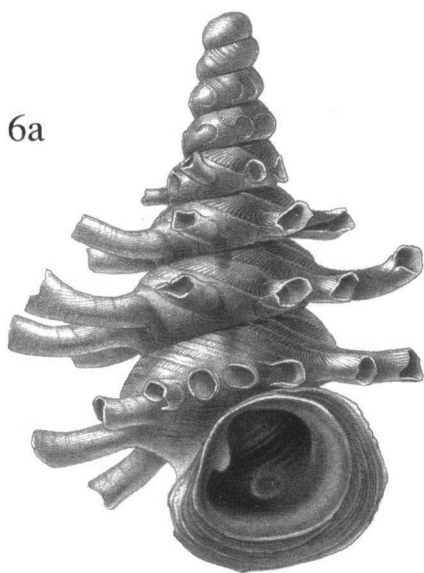
6c



6d

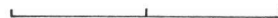


6a

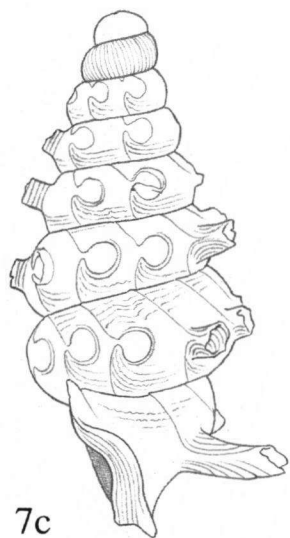


6b

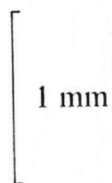
2 mm



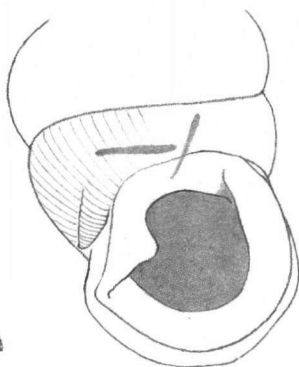
7a



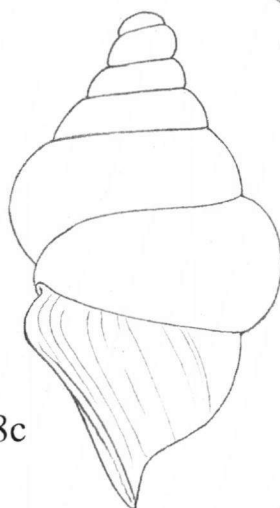
7c



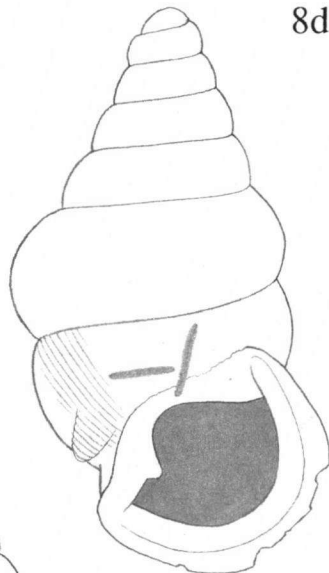
7b



8b



8c



8d



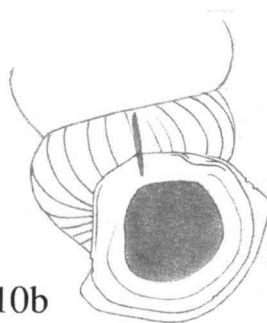
8a

1 mm

9a

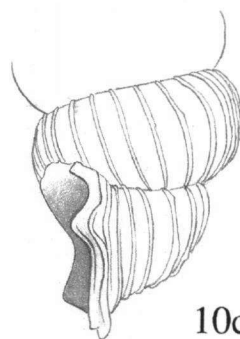


10b



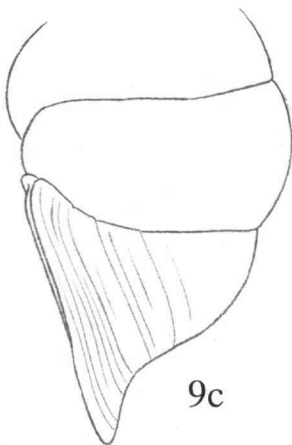
1 mm

10c

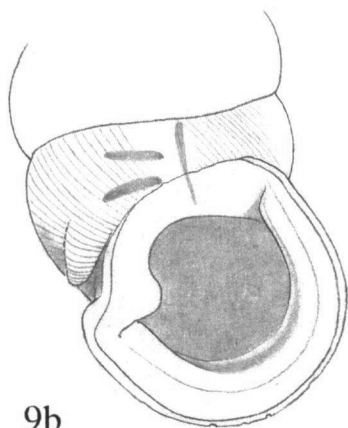


1 mm

9c

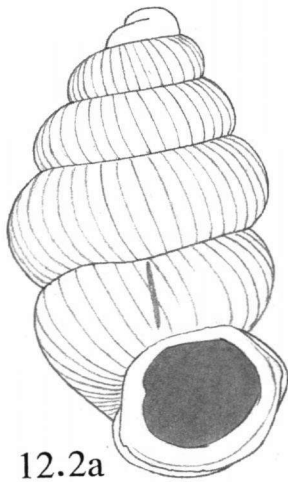
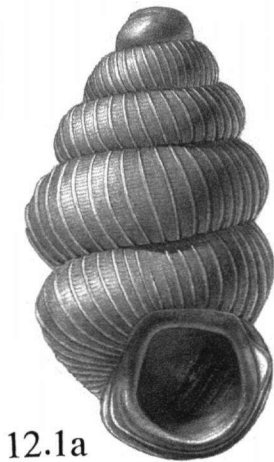
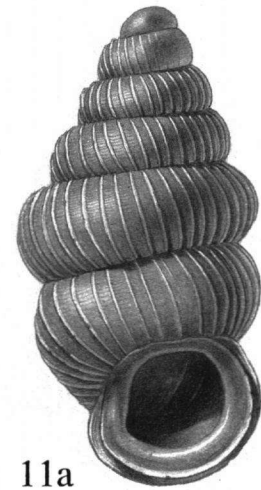
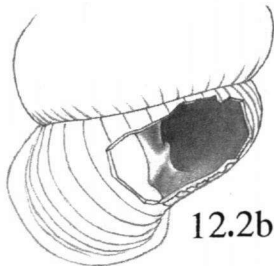
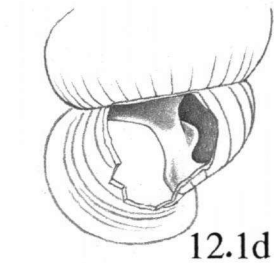
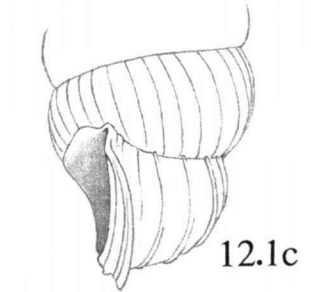
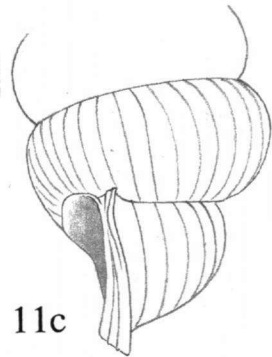
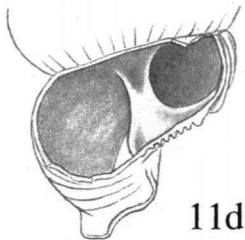
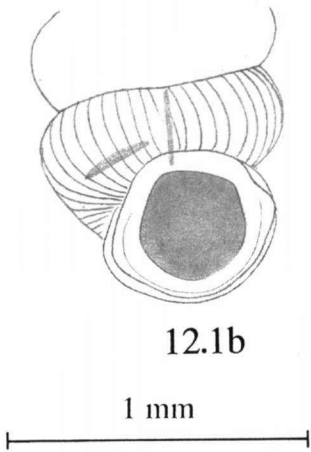
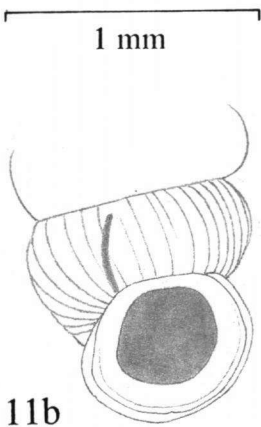


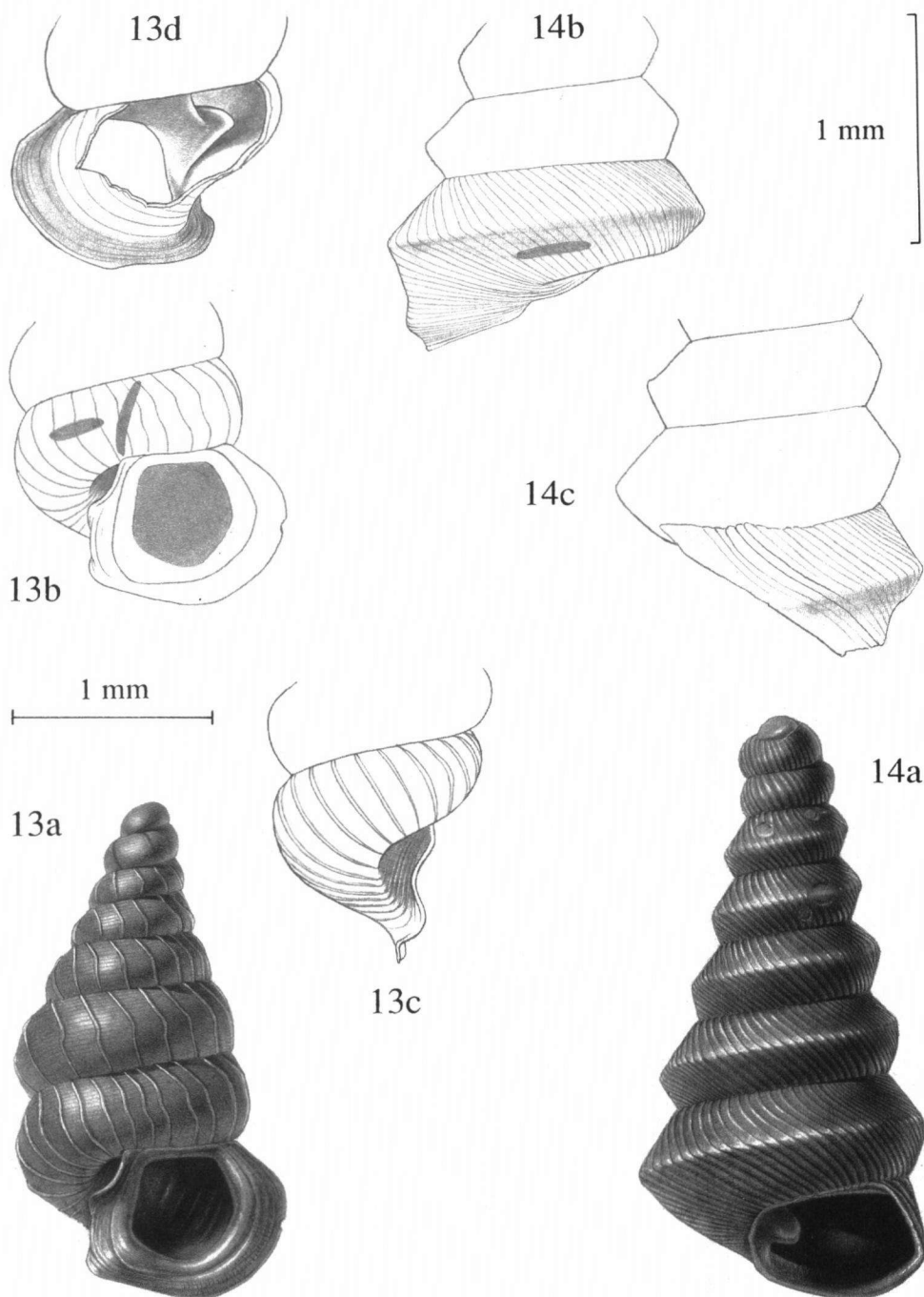
9b

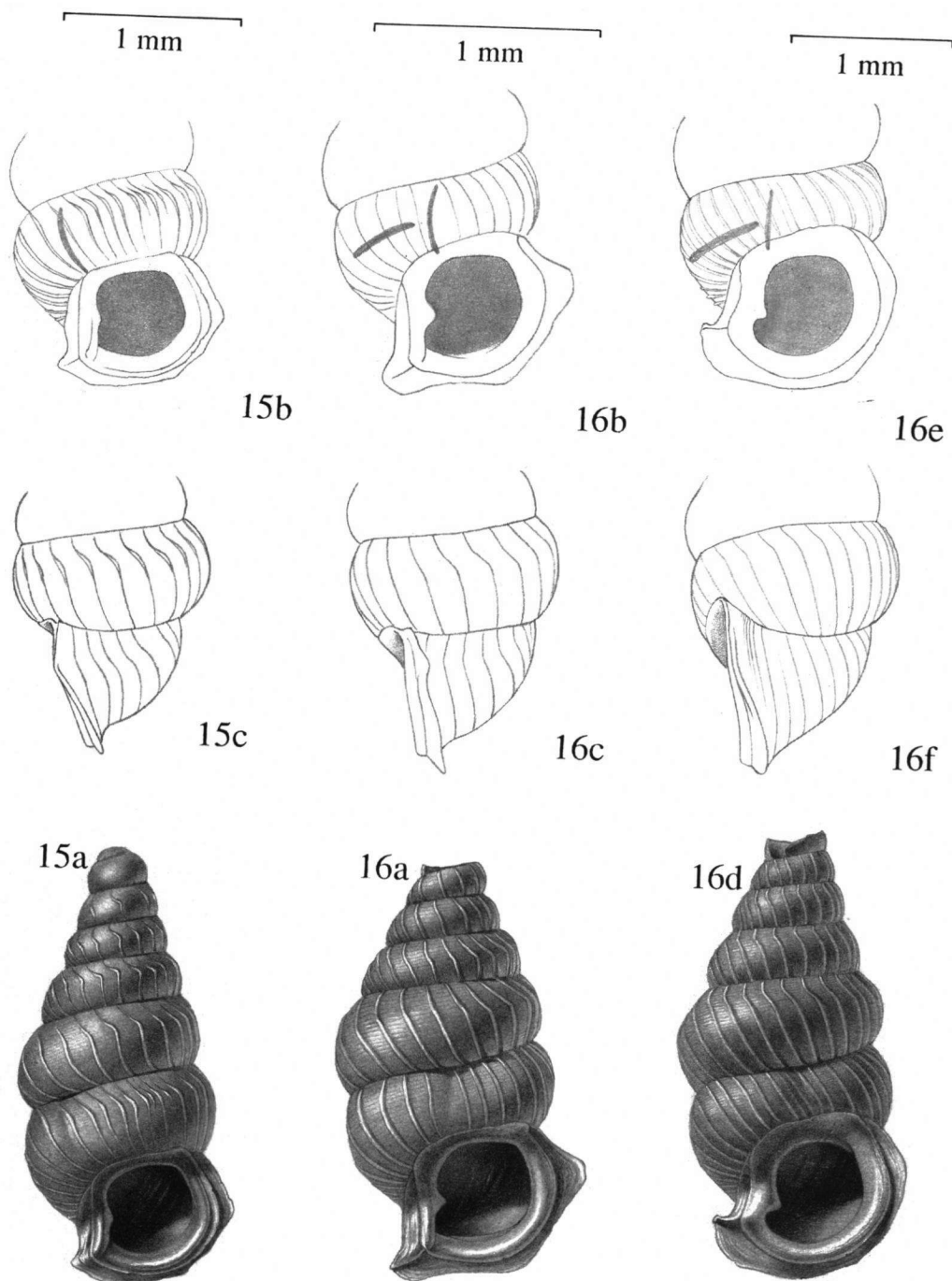


10a



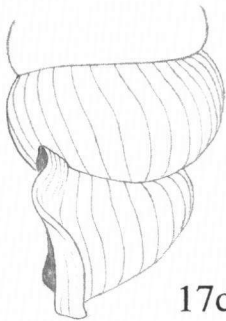
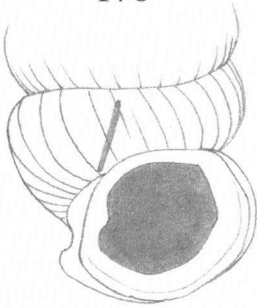






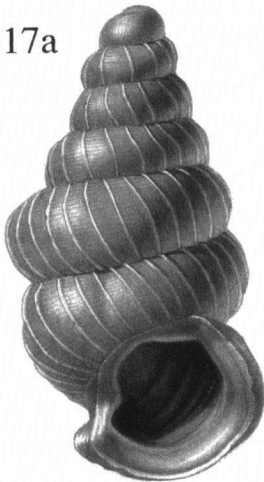
1 mm

17b



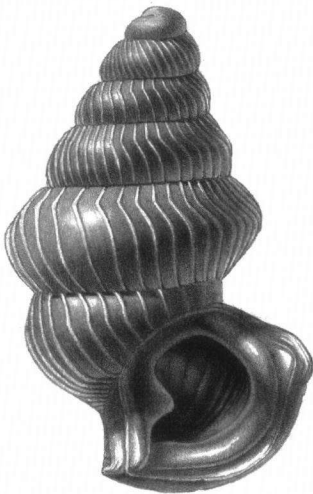
17c

17a

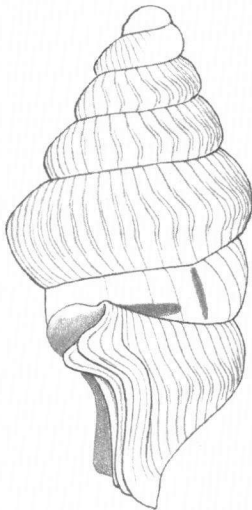


1 mm

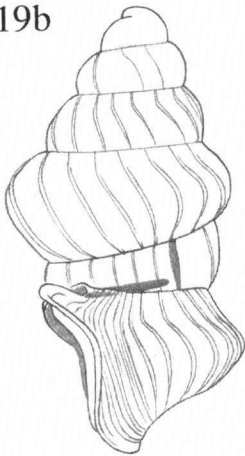
18a



18b



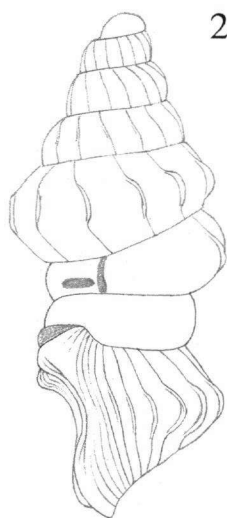
19b



19a

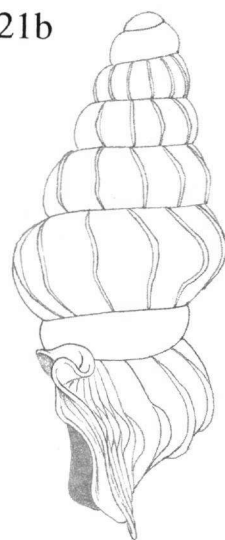
1 mm



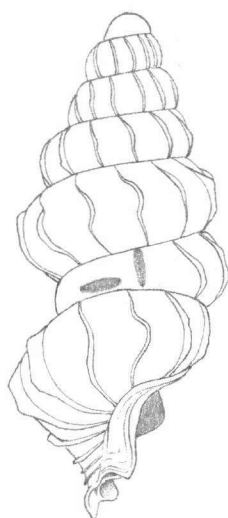


20b

21b



21c



1 mm

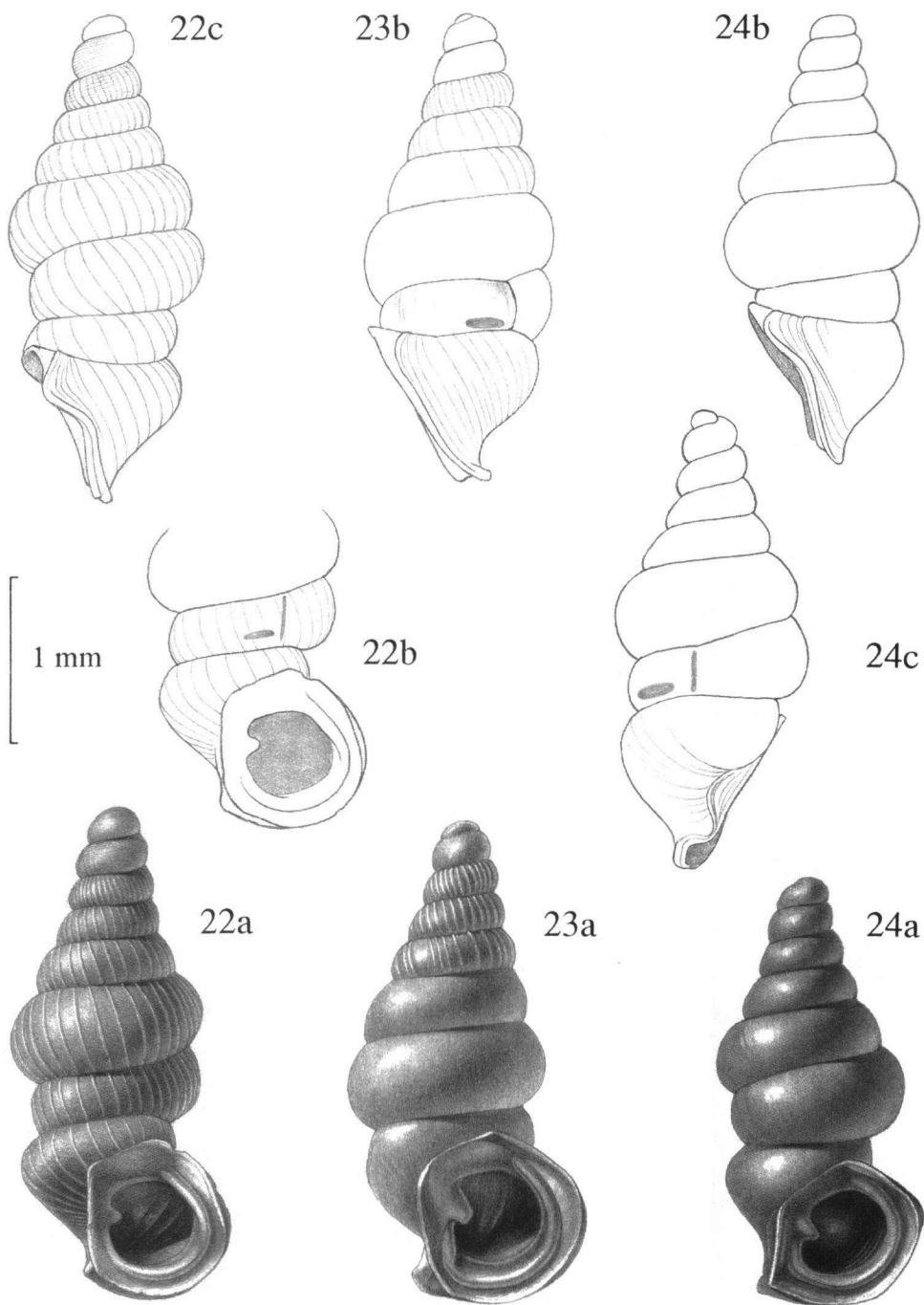
1 mm

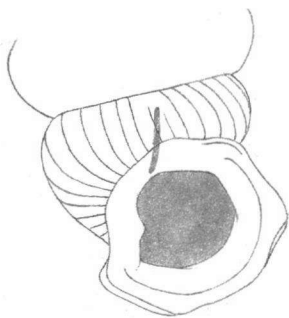


20a

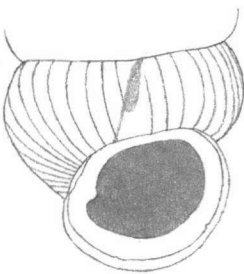
21a



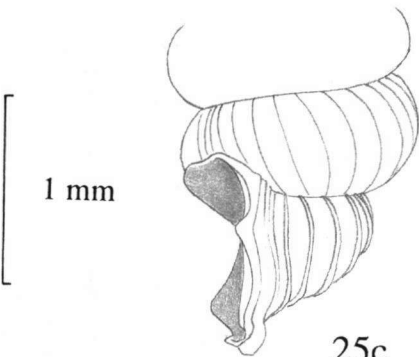




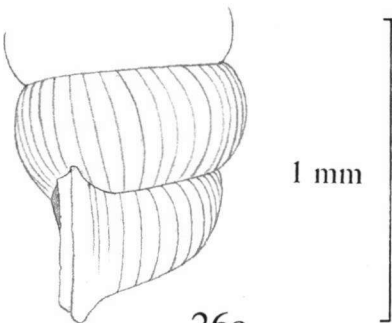
25b



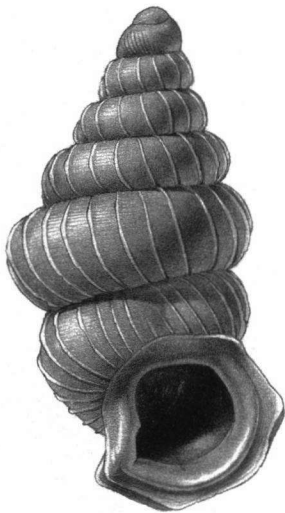
26b



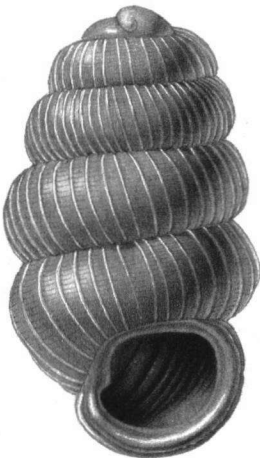
25c



26c



25a



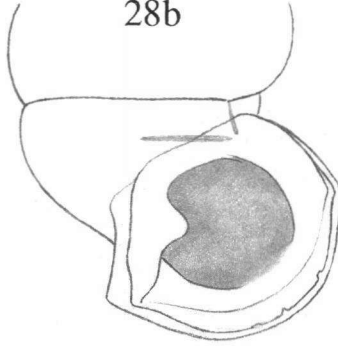
26a

27a

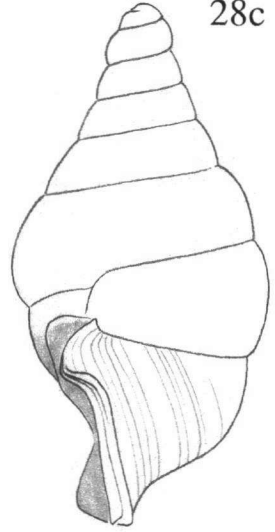


1 mm

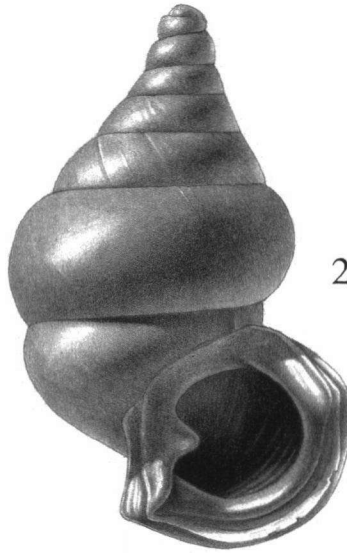
28b



28c

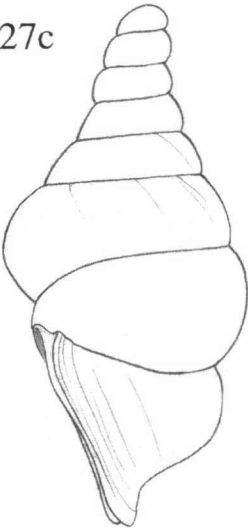


28a

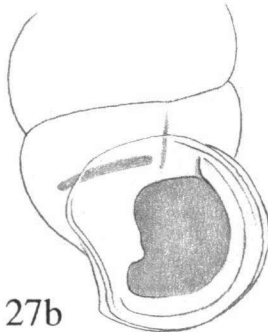


1 mm

27c

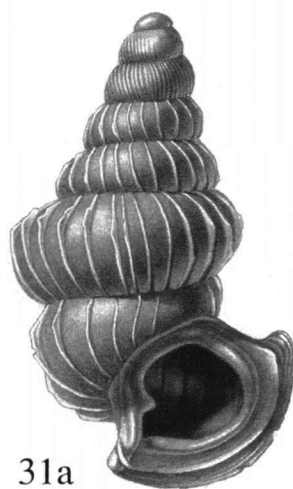
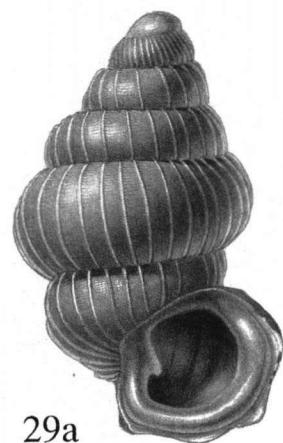
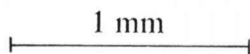
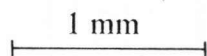
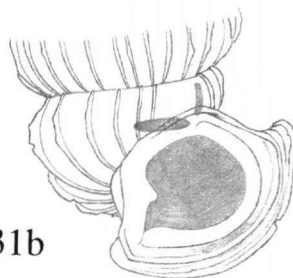
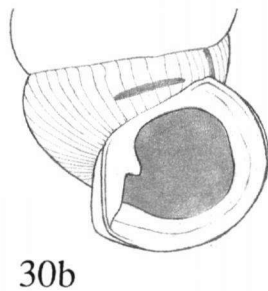
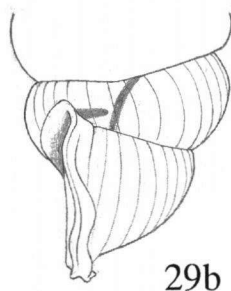
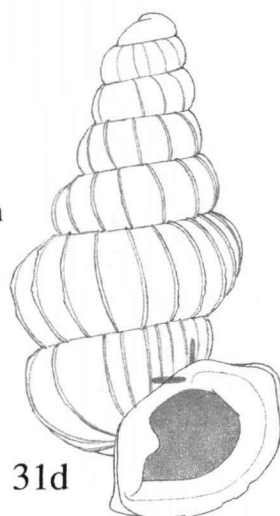
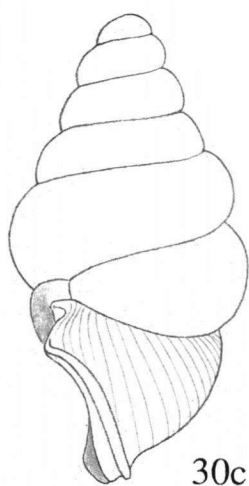


27b

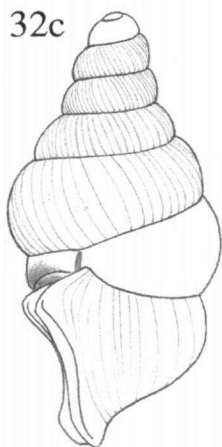


28d

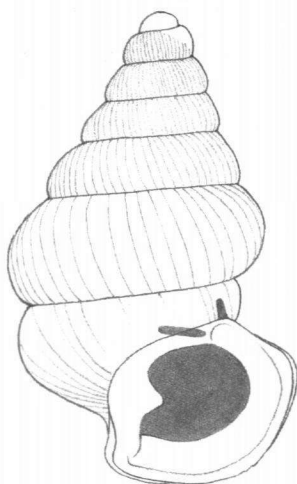




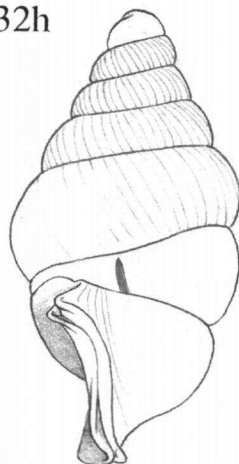
32c



32e

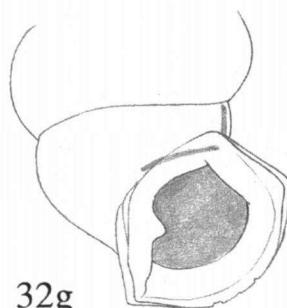


32h



32b

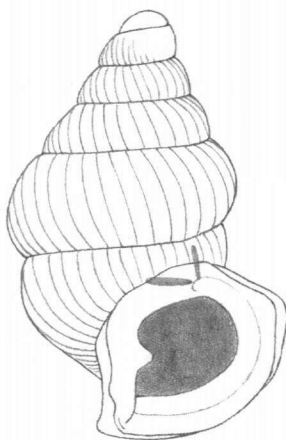
1 mm



32g



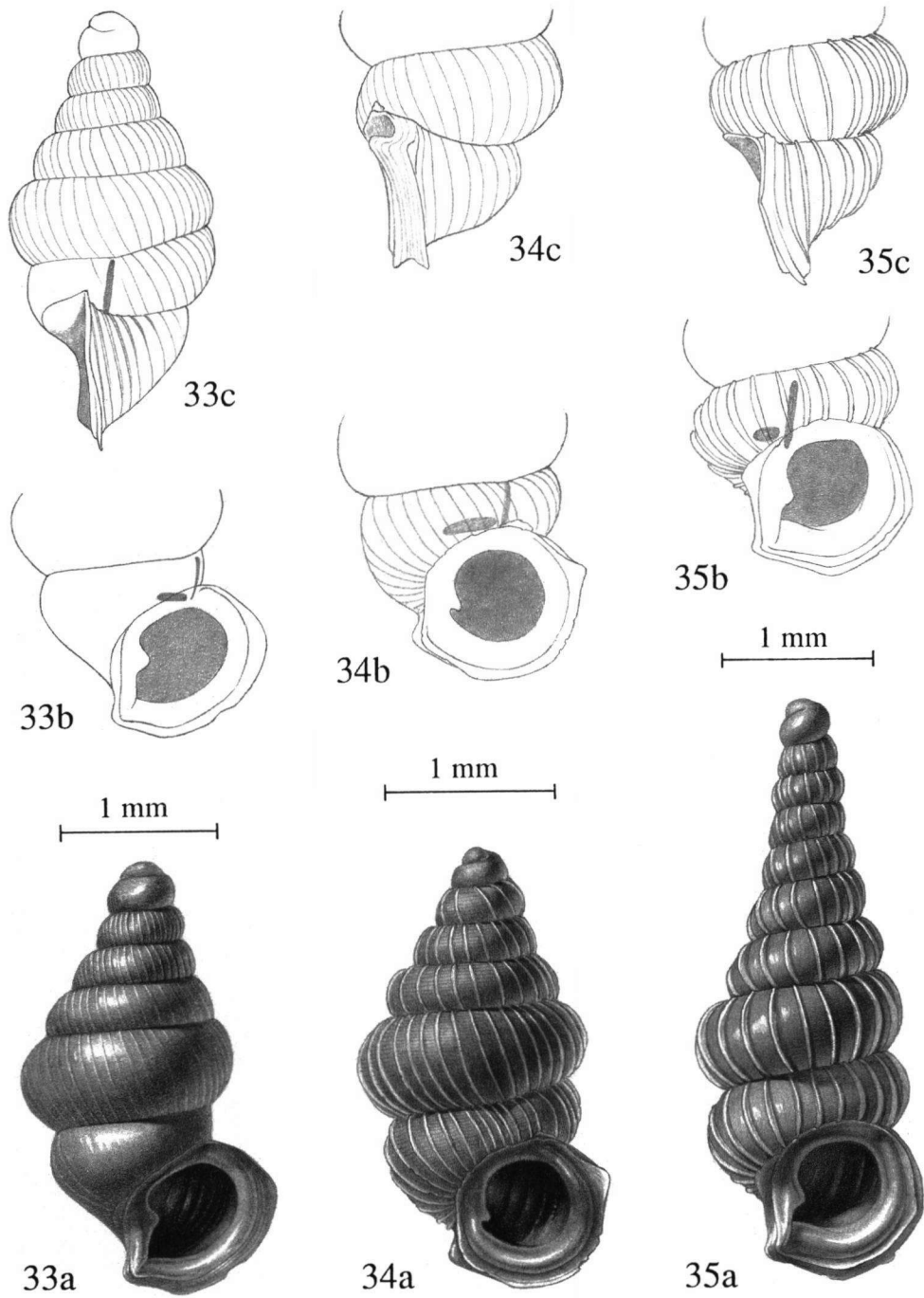
32a

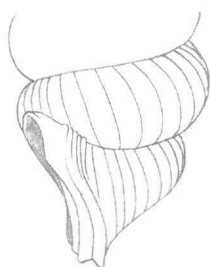


32d

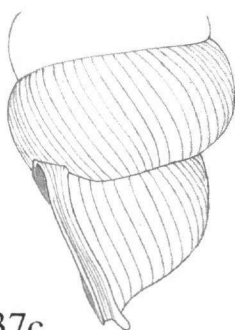


32f

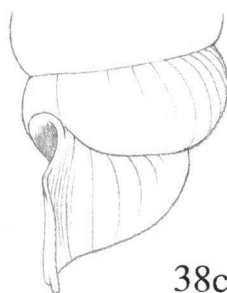




36c



37c

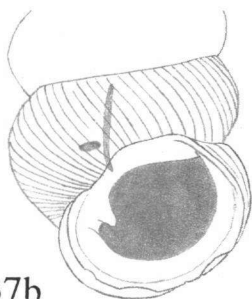


38c

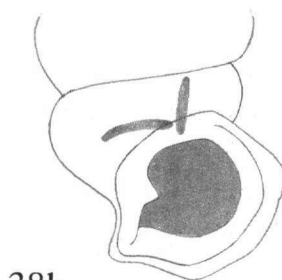
1 mm

36b

1 mm

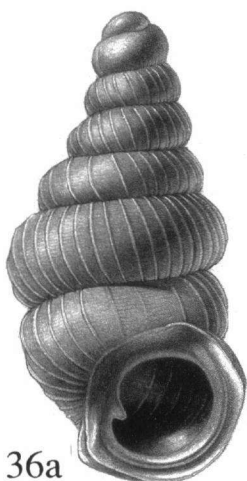


37b

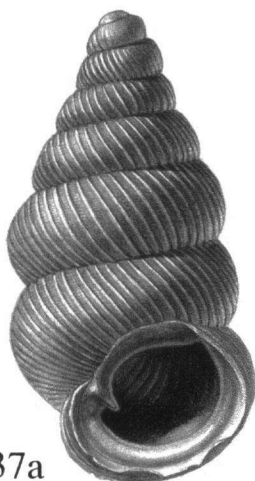


38b

1 mm



36a

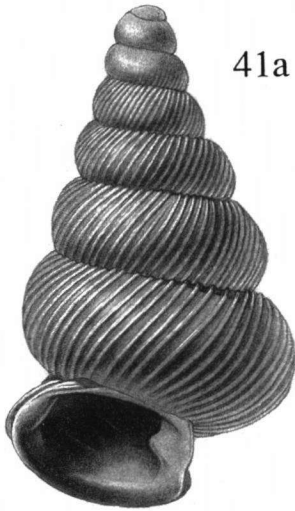
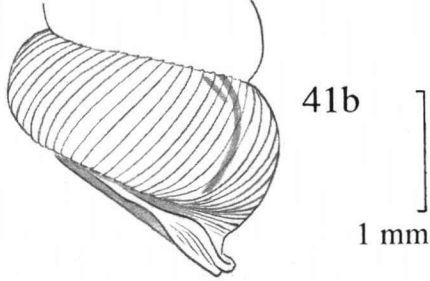
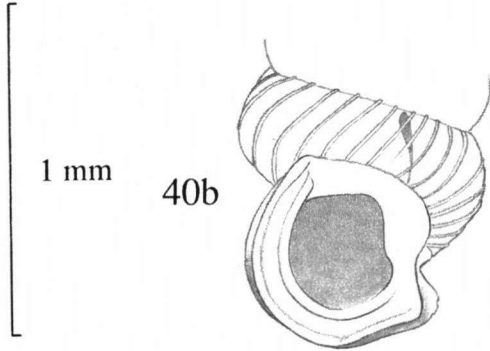
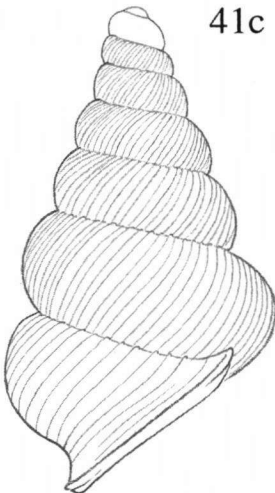
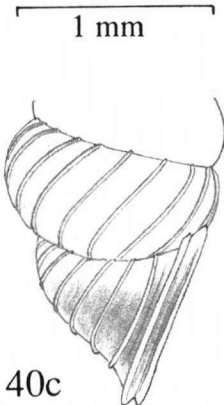
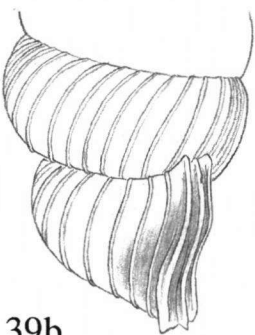


37a



38a

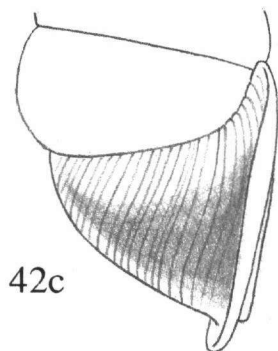




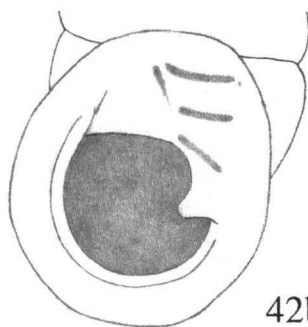
42a



2 mm

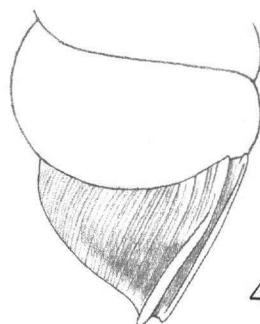
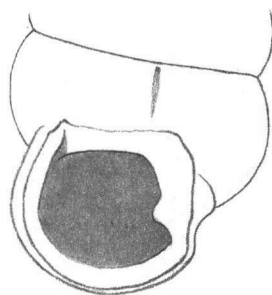


42c



42b

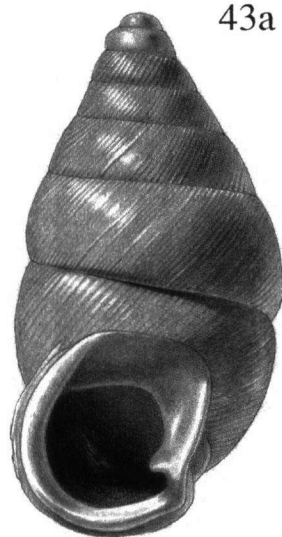
43b



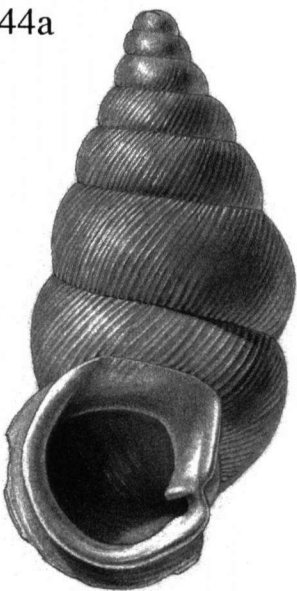
43c

2 mm

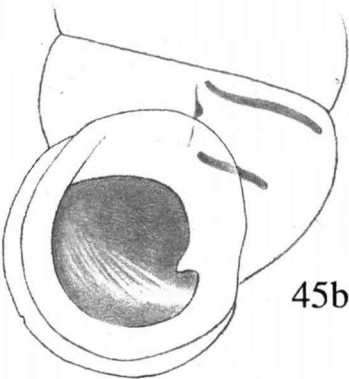
43a



44a



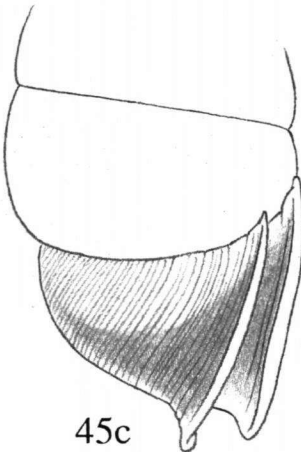
45b



2 mm



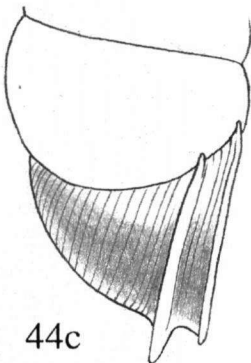
45c



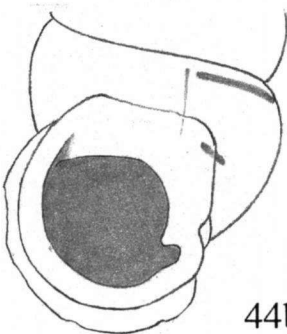
2 mm



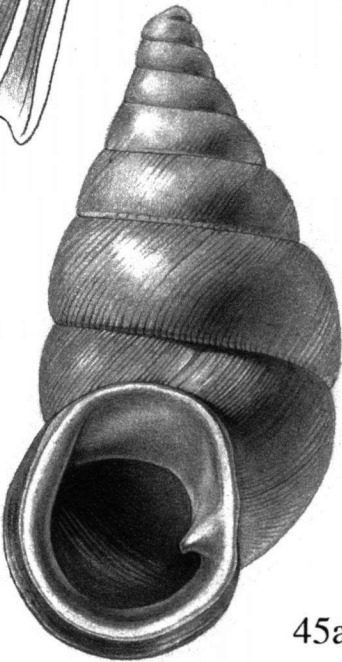
44c



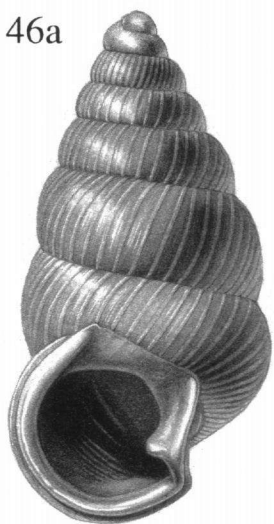
44b



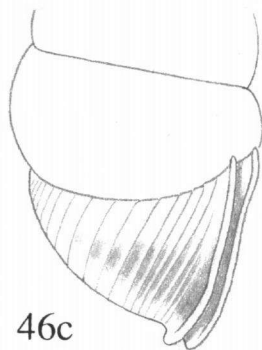
45a



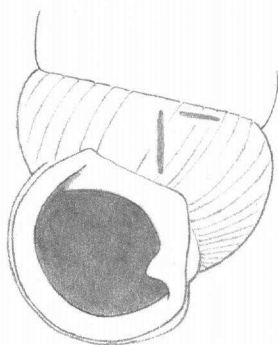
46a



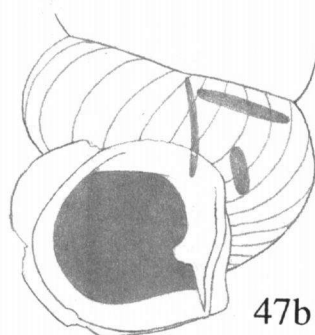
2 mm



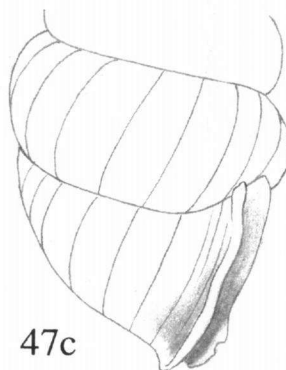
46c



46b



47b



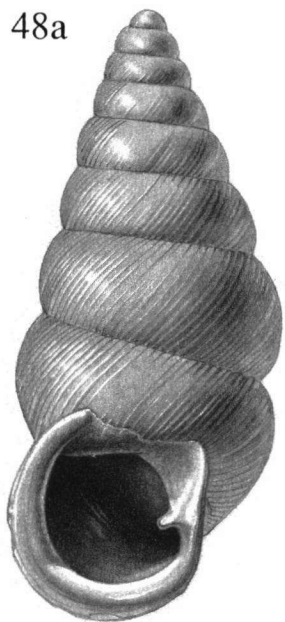
47c

2 mm

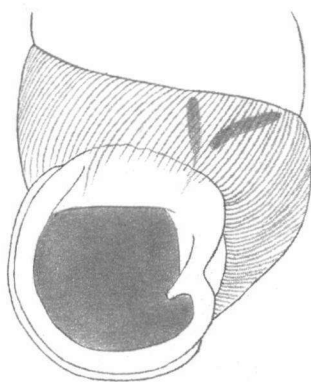


47a

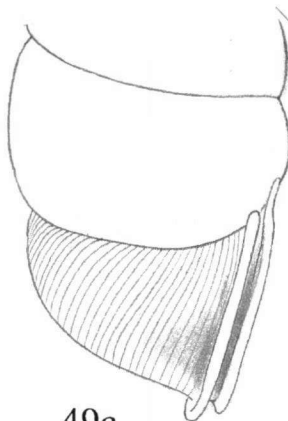
48a



49b

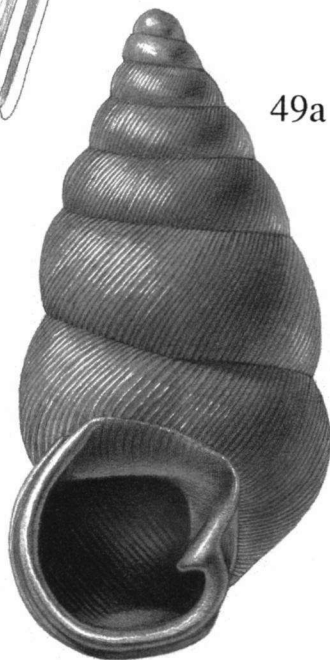


2 mm

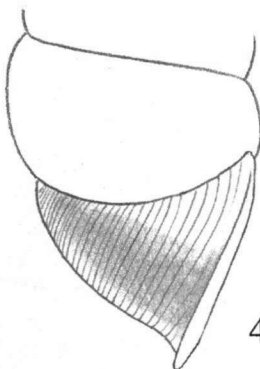


49c

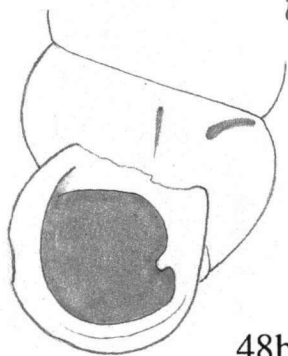
49a



2 mm



48c

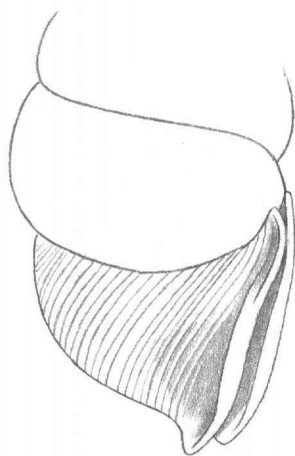


48b

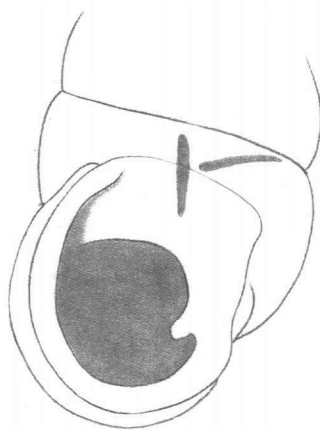
50c



50b



50d



2 mm

50a



50e

