

Remarks on the Diplommatinidae from Sumatra, Indonesia,
with descriptions of eleven new species (Gastropoda, Prosobranchia)

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This paper deals with the systematics of the Diplommatinidae of Sumatra. Eleven species are described as new to science: *Diplommatina abundans*, *D. carinaspinosa*, *D. gadutensis*, *D. karoensis*, *D. vanderblommi*, *D. wilhelminae*, *Palaina reederi*, *Plectostoma kitteli*, *Opisthostoma banki*, *O. clerxi*, *O. secretum*. New records for Sumatra are given for *Diplommatina nevillei* Crosse, 1879, and *Opisthostoma platycephalum* Van Benthem Jutting, 1952.

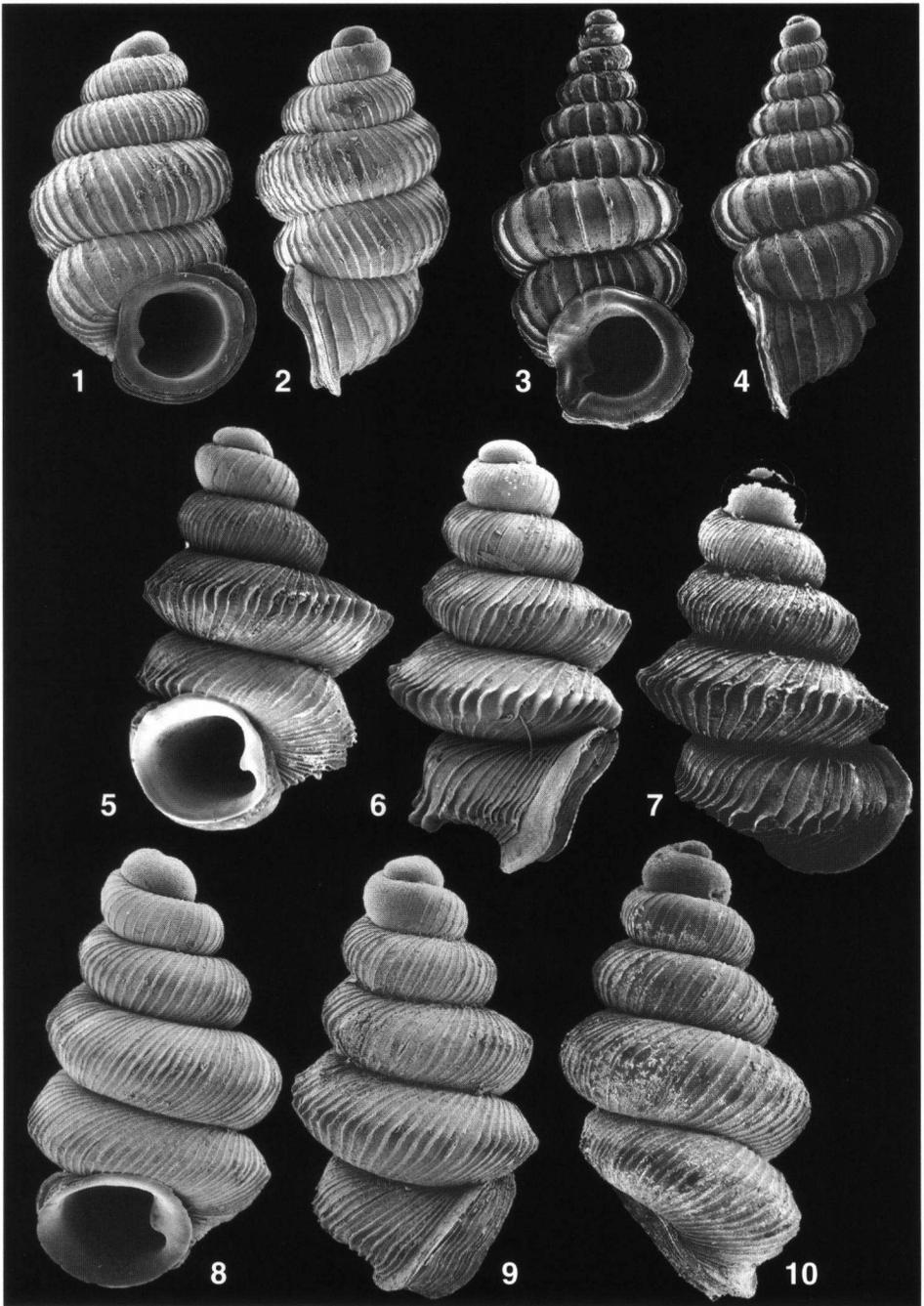
Key words: Gastropoda, Prosobranchia, Diplommatinidae, *Palaina*, *Opisthostoma*, *Diplommatina*, *Plectostoma*, taxonomy, Indonesia, Sumatra.

INTRODUCTION

During various excursions of the author to Sumatra, Indonesia, material representing a fairly large number of species of land molluscs was collected. Several new species were encountered. This is the fourth paper on this material. It deals with the family Diplommatinidae. While trying to identify this material, and some samples collected by Mr. K. Kittel, especially the lack of useful figures was a serious problem. Those given with the original descriptions are mostly rather poor. This paper gives figures of all Sumatran species and a somewhat simplified key to identify them. For the terminology used, see Gittenberger (1995) and Vermeulen (1996).

Up to now (Van Benthem Jutting, 1959; Vermeulen, 1996) only the following nine species of Diplommatinidae are known from Sumatra: *Diplommatina canaliculata* Von Moellendorff, 1886, *D. liwaensis* Aldrich, 1898, *D. sinulabris* Von Moellendorff, 1902, *D. strophosa* Van Benthem Jutting, 1959, *D. tardigrada* Van Benthem Jutting, 1959, *D. tweediei* Laidlaw, 1949, *D. ventriculus* Von Moellendorff, 1891, *Opisthostoma paulucciae* Crosse & Nevill, 1879, and *Palaina pumila* Van Benthem Jutting, 1959. In the material now studied another eleven species were discovered, all of which new to science. These are described in this paper. For two more species new records are given for Sumatra.

The total number of diplommatinid species actually known for Sumatra is now 22. This number is rather low as compared with the numbers for W. Malaysia and Borneo, but relatively high as compared with those for Java and the islands further eastwards. An investigation of the poorly studied Diplommatinidae from Sulawesi is ongoing; the preliminary result is that the species number will not be much higher than that for Sumatra. The species from Java and W. Malaysia are rather well known (Van Benthem Jutting, 1948, Laidlaw, 1949), while those of Borneo were the subject of some papers by Vermeulen, who described about 200 new ones. As there are still many extensive



Figs 1-10. *Diplommatina* spec.1-2, *D. abundans* spec. nov., paratype (RMNH 92938), W. Sumatra, near Cave Gua Pangian, actual height 1.4 mm. 3-4, *D. canaliculata* Von Moellendorff, 1886, N. Sumatra, Bukit Lawang, actual height 3.3 mm. 5-7, *D. carinaspinosa* spec. nov., paratype (RMNH 92943), W. Sumatra, near Cave Gua Pangian, actual height 1.6 mm. 8-10, *D. gadutensis* spec. nov., paratype (RMNH 92944), W. Sumatra, Kampung Desa Gadut, actual height 1.7 mm. SEM-photographs by J. Goud (NNM, Leiden).

limestone areas in Sumatra to explore, a fairly high number of new species can be expected from there. It is remarkable that Sumatra does not share any species with Java or Sulawesi, only a few with Borneo, and much more with peninsular Malaysia.

Paratypes will be deposited in the collections mentioned under abbreviations and in the reference collection of Dr. J. J. Vermeulen (Singapore). The total number of specimens per locality is indicated after MD/. The material now in the reference collection of the author will eventually be deposited in the collection of the National Museum of Natural History, Leiden. Unless stated otherwise, the specimens mentioned under material for the new species are to be considered paratypes.

Abbreviations for shell characters: B, width; H, height. For collections: BMNH, British Museum (Natural History), London; KW, K. Kittel, Wiesthal; MD, W. J. M. Maassen, Duivendrecht (to be deposited in RMNH); MZB, Museum Zoologicum Bogoriense, Bogor; RMNH, National Museum of Natural History (formerly Rijksmuseum van Natuurlijke Historie), Leiden; SMF, Natur-Museum Senckenberg, Frankfurt am Main; ZMA, Zoölogisch Museum, Universiteit van Amsterdam, Amsterdam.

SYSTEMATIC PART

Family Diplommatinidae

Genus *Diplommatina* Benson, 1849

Diplommatina abundans spec. nov. (figs 1, 2)

Material. — W. Sumatra: near entrance of Cave Gua Pangian, 3 km N of village Lintau, SE of Bukittinggi, 00°28'19.5"S 100°45'11.7"E, vii.1996 (RMNH 92937/holotype, 92938/5; BMNH/5; JV/5; KW/5; MZB/5; SMF/5; ZMA/5; MD/100); do., vii.1997 (MD/125); Kampung Desa Gadut, limestone rocks near the village, E of Payakumbuh, 00°15'36.0"S 100°43'58.7"E, vii.1997 (MD/4).

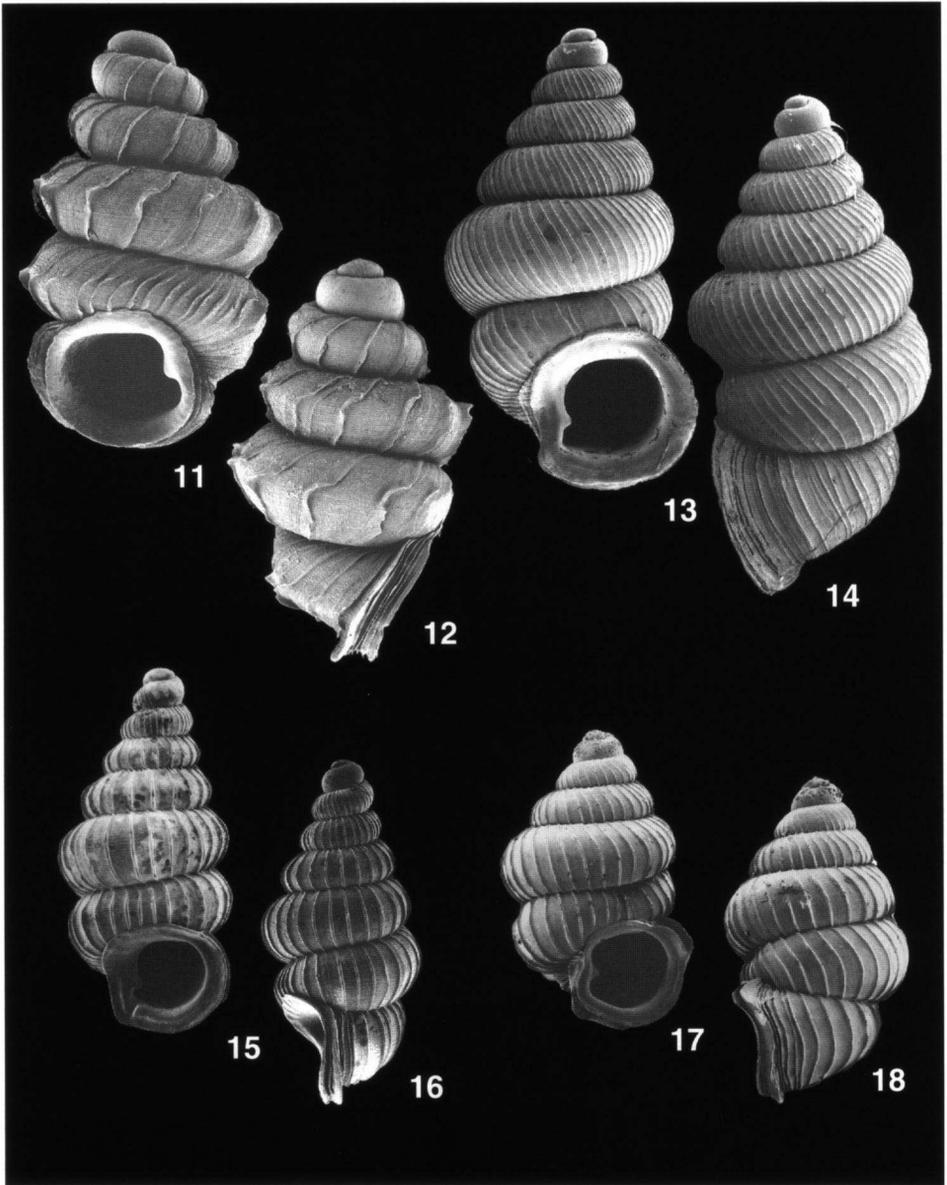
Description. — Shell very small, white and transparent, dextral, fusiform, sides flat to slightly convex; penultimate whorl widest. Whorls 6, well rounded. Suture impressed. Constriction at halfway the parietal side of the peristome. Aperture with a parietalis, a longitudinal palatalis at the level of the peristome, a transversal palatalis, and a distinct columellaris. Tuba of one whorl. Radial ribs straight, distinct, rather sharp, densely spaced (10-12 ribs/0.5 mm on the penultimate whorl). Spiral striation present. Final quarter of the last whorl ascending towards the suture. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis. Peristome double, expanding; palatal side not or hardly sinuous, without a protruding edge; basal side also without edge. Outer peristome somewhat expanding beyond the inner one; inner peristome with or without a slight palatal lip, somewhat expanding at the parietal side.

Dimensions: H 1.3-1.6 mm; B 0.7-0.8 mm.

Derivatio nominis. — The epithet *abundans* is given because this species is very common at its type-locality.

Remarks. — *Diplommatina abundans* is most similar to *D. crosseana* Godwin-Austen & Nevill, 1879, from peninsular Malaysia. It differs from that species in possessing more ribs on the penultimate whorl, a more slender shape, and in being spirally striated.

This species is endemic for Sumatra, where it lives in leaf-litter on limestone rocks.



Figs 11-18. *Diplommatina* spec. 11-12, *D. karoensis* spec. nov., paratype (RMNH 92939), N. Sumatra, near cave Liangdehar, actual height 1.7 mm. 13-14, *D. liwaensis* Aldrich, 1898, W. Sumatra, Baso, actual height 3.6 mm. 15-16, *D. nevilli* (Crosse, 1879), Aceh Tengah, Laot Tawar, actual height 2.7 mm. 17-18, *D. simulabris* Von Moellendorff, 1902, N. Sumatra, Volcano Sinabung, 1900 m alt., actual height 2.3 mm. SEM-photographs by J. Goud (NNM, Leiden).

Diplommatina canaliculata Von Moellendorff, 1886 (figs 3, 4)

Diplommatina canaliculata Von Moellendorff, 1886: 312 (W. Malaysia, "Buket Pondong"). Laidlaw, 1949: 202, fig. 2a, b. Vermeulen, 1996: 32, fig. 35.

Material. — Aceh Besar: westcoast, Pasi, 10 km S of Lhong, vi.1997 (MD/1). Aceh Tengah: Laot Tawar, 7 km NE of Takengon, north shore, 150 m higher than lake, rocks in bamboo forest along wadi, vii.1997 (MD/4). N. Sumatra: Bukit Lawang, SW of Medan, around the Wisma Cottage, viii.1993 (MD/125; MZB/10; RMNH/10); Bukit Lawang, opposite the orang-utan rehabilitation centre, viii.1993 (MD/2); Bukit Lawang, near the entrance of limestone "Bat-cave", viii.1993 (MD/50); Bukit Lawang, near "Boat-rock", E. of village, viii.1993 (MD/25); Bukit Lawang, near entrance of limestone "Cave Luntir", 9 km N of village, viii.1993 (MD/25); Bukit Lawang, numerous small caves in limestone, SE of village at border of rubber tree plantation, viii.1993 (MD/10); do., vi.1996 (MD/25); near the entrance of limestone cave "Liangdehar", near Kuta Buluh, 40 km NW of Berastagi, viii.1993 (MD/25); do., vi.1996 (MD/125); reserve Tinggi Radja, between Berastagi and Pematangsiantar, 400 m alt., deposits of the river Bah Banai, viii.1993 (MD/25). W. Sumatra: Baso, 14 km NW of Bukittinggi in direction Payakumbuh, overgrown limestone outcrop along road, vii.1996 (MD/25).

Remarks. — A species with a large range. Known from peninsular Malaysia, Borneo, Sumatra and Pulau Panaitan, a small island off the westcoast of Java.

Diplommatina carinaspinosa spec. nov. (figs 5-7)

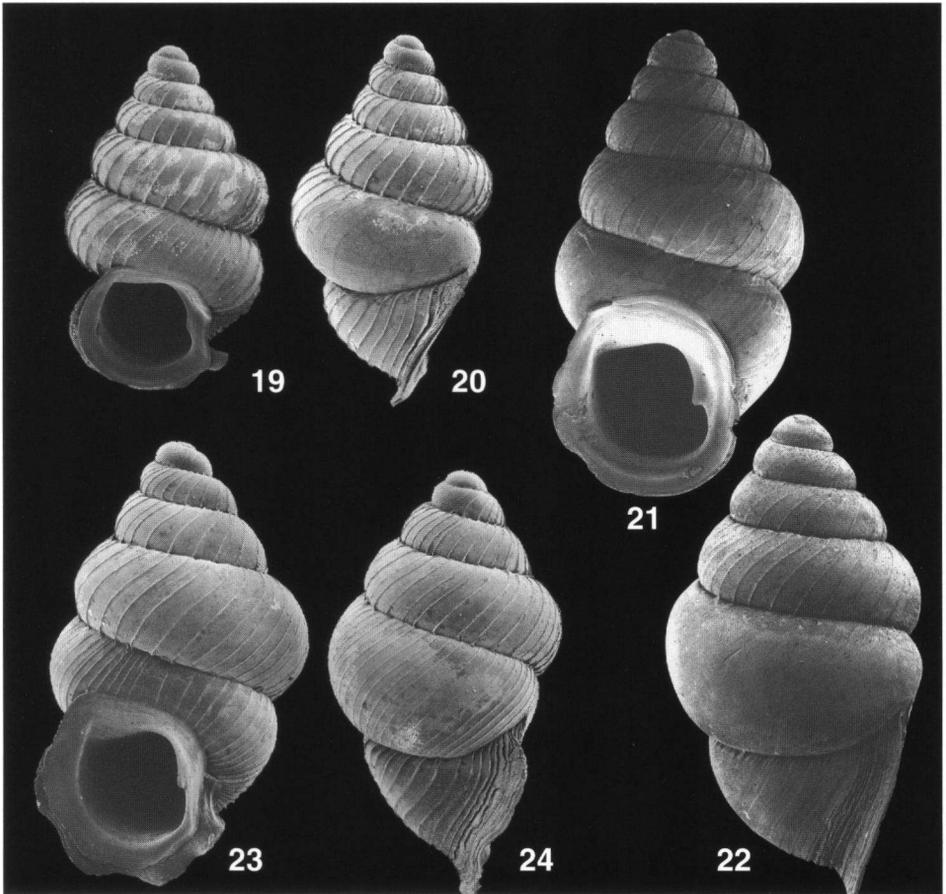
Material. — W. Sumatra: near entrance of Cave Gua Pangian, 3 km N of village Lintau, SE of Bukittinggi, 00°28'19.5"S 100°45'11.7"E, vii.1996 (RMNH 92941/holotype, 92943/5; BMNH/5; JV/5; KW/5; MZB/5; SMF/5; ZMA/5; MD/100); do., vii.1997 (MD/100); at a small cave near Situmbuk, 30 km E of Bukittinggi, 00°21'05.6"S 100°34'10.1"E, vii.1997 (MD/15).

Description. — Shell sinistral, fusiform, lightbrown, sides flat; penultimate whorl widest. Whorls 5-5½; apical whorls more or less mammillated and convex, the following ones strongly keeled. Suture impressed. Constriction at the parietal side of the peristome, close to the angular edge; with a longitudinal palatalis at the level of the peristome, a transversal palatalis, and a distinct columellaris which is directed downwards. Tuba of 7/8 whorl. The protoconch finely punctated, the following whorls with a more or less wavy radial ribbing; on the penultimate whorl the ribs become prominent, very wavy, and sharply angled where they cross the keel; the angle shows as a small spine-like point. Near the aperture the ribs become less prominent. Radial ribs densely spaced (about 12 ribs/0.5 mm on the penultimate whorl). No obvious spiral striation present. Final quarter of the last whorl ascending towards the suture. Umbilicus closed. Aperture slightly tilted with regard to the coiling axis. Peristome double or triple, expanding; palatal side not or hardly sinuous; outer peristome somewhat expanding beyond the inner one; inner peristome continuous, without a palatal lip, somewhat expanding at the parietal side.

Dimensions: H 1.5-1.7 mm; B 0.8-0.9 mm.

Derivatio nominis. — The name refers to *carina* = keel and *spinosa* = with spines.

Remarks. — Apparently an endemic species for Sumatra, living only on limestone rocks.



Figs 19-24. *Diplommatina* spec. 19-20, *D. strophosa* Van Benthem Jutting, 1959, paratype (ZMA), N. Sumatra, Brastagi, 1750 m alt., actual height 3.1 mm. 21-22, *D. tardigrada* Van Benthem Jutting, 1959, N. Sumatra, Volcano Sinabung, 1900 m alt., actual height 3.6 mm. 23-24, *D. tweediei* Laidlaw, 1949, N. Sumatra, Volcano Sinabung, 1900 m alt., actual height 3.0 mm. SEM-photographs by J. Goud (NNM, Leiden).

Diplommatina gadutensis spec. nov. (figs 8-10)

Material. — W. Sumatra: Kampung Desa Gadut, limestone rocks near the village, E of Payakumbuh, 00°15'36.0"S 100°43'58.7"E, vii.1997 (RMNH 92945/holotype, 92944/5; BMNH/2; JV/2; KW/2; MZB/2; SMF/2; ZMA/2; MD/20); Kampung Desa Gadut, limestone rocks half an hour walking from village, E of Payakumbuh, 00°15'35.1"S 00°44'01.1"E, vii.1997 (MD/6).

Description. — Shell sinistral, fusiform, lightbrown, sides flat; body whorl widest. Whorls 5-5½; apical whorls more or less mammillated and rounded, the following ones more or less angulated. Suture impressed. Constriction at the parietal side of the peristome, close to the angular edge, with a longitudinal palatalis at the level of the peristome,

a transversal palatalis, and a distinct columellaris, directed downwards. Tuba of 7/8 whorl. The protoconch finely punctated. The following whorls with a more or less wavy radial ribbing. On the penultimate whorl the fine, sharp ribs become more prominent and angled where they cross the keel; the angle has as a small spine-like point. Near the aperture the ribs become less prominent. Radial ribs very densely spaced (about 20 ribs/0.5 mm on the penultimate whorl). No obvious spiral striation present. Final quarter of the last whorl ascending towards the suture. Umbilicus closed. Aperture slightly tilted with regard to the coiling axis. Peristome double or triple, expanding; palatal side not or hardly sinuous. Outer peristome somewhat expanding beyond the inner one; inner peristome continuous without a palatal lip, somewhat expanding at the parietal side.

Dimensions: H 1.6-1.8 mm; B 0.9 mm.

Derivatio nominis. — The name refers to the type-locality.

Remarks. — Different from *D. carinaspinosa*, apparently its closest relative, by the more densely spaced radial ribs, the width of the penultimate whorl and the less conspicuously carinated whorls. Only known from Sumatra, living on limestone rocks.

Diplommatina karoensis spec. nov. (figs 11, 12)

Material. — N. Sumatra: near the entrance of limestone cave "Liangdehar", near Kuta Buluh, 40 km NW of Berastagi, viii.1993 (MD/6); do., vi.1996 (RMNH 92940/holotype, 92939/2; BMNH/2; JV/2; MZB/2; SMF/2; ZMA/2; MD/10).

Description. — Shell sinistral, fusiform, lightbrown, sides flat; body whorl widest. Whorls 5-5½; apical ones more or less mammillated and convex, the following ones slightly keeled. Suture impressed. Constriction at the parietal side of the peristome, close to the angular edge; with a longitudinal palatalis at the level of the peristome, a transversal palatalis and a distinct columellaris, directed downwards. Tuba of 7/8 whorl. Protoconch whorls finely punctated, the following ones with a more or less wavy radial ribbing; on the penultimate whorl the ribs become prominent, very wavy, and sharply angled where they cross the keel. The angle has as a small spine-like point. Near the aperture the ribs become less prominent. Radial ribs very widely spaced (about 2 ribs/0.5 mm on the penultimate whorl). A distinct spiral striation present. Final quarter of the last whorl ascending towards the suture. Umbilicus closed. Aperture slightly tilted with regard to the coiling axis. Peristome double, expanding; palatal side not or hardly sinuous. Outer peristome somewhat expanding beyond the inner one; inner peristome continuous, without a palatal lip, somewhat expanding at the parietal side.

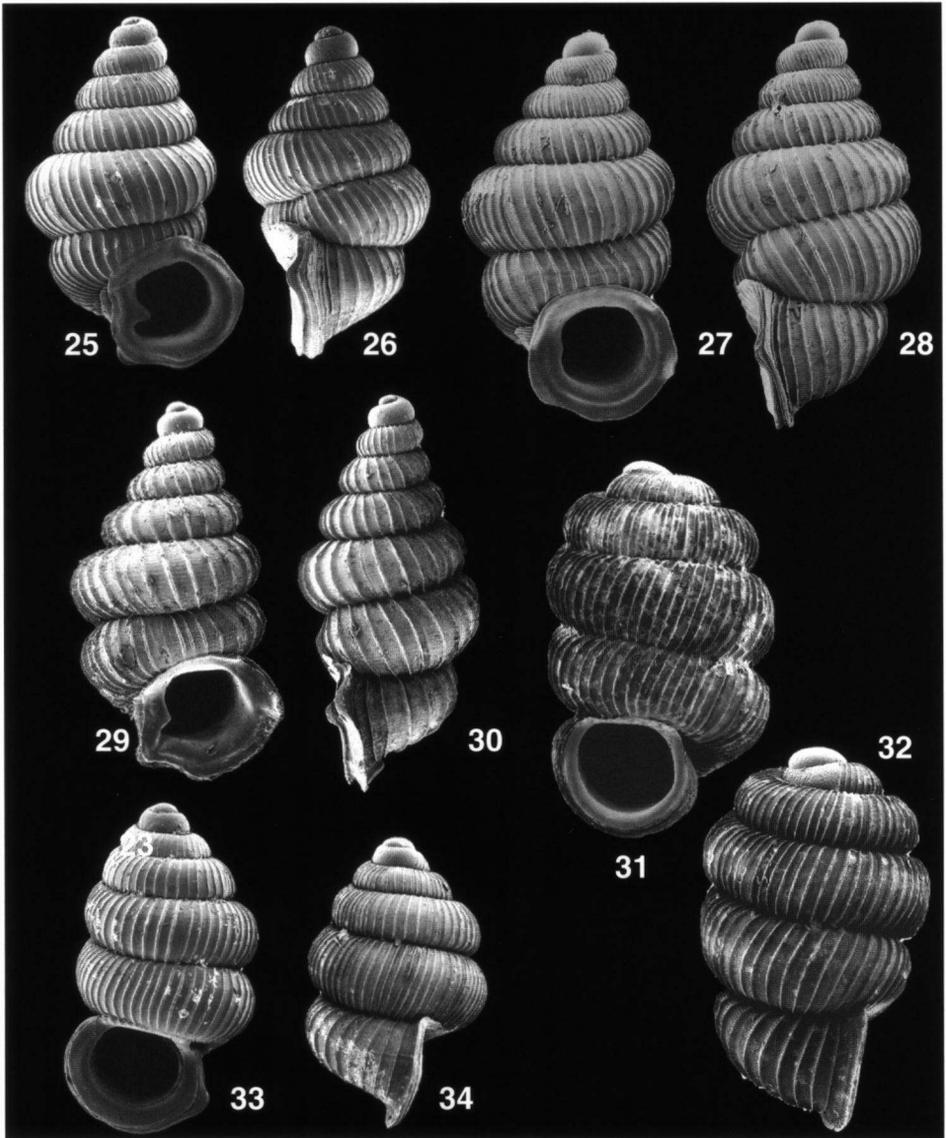
Dimensions: H 1.6-1.9 mm; B 0.9-1.1 mm.

Derivatio nominis. — The name refers to the Karo Highlands in N. Sumatra, home of the Batak people.

Remarks. — With *Diplommatina carinaspinosa* and *D. gadutensis* this species forms a small group of closely related species, characterized by a tilted aperture, short spire, and more or less prominently keeled whorls with wavy radial ribs, forming spine-like points where they cross the keel. This species is the only one with a distinct spiral striation. Apparently endemic for Sumatra, found only on limestone rocks.

Diplommatina liwaensis Aldrich, 1898 (figs 13, 14)

Diplommatina liwaensis Aldrich, 1898: 1, pl. 1 figs 3, 4 (N. Sumatra, "Liwa, 4000 feet"). Van Benthem Jutting, 1959: 83.



Figs 25-34. *Diplommatina* spec. (25-30) and *Palaina* spec. (31-34). 25-26, *D. vanderblommi* spec. nov., paratype (RMNH 92948), W. Sumatra, Bungus Bay, actual height 2.7 mm. 27-28, *D. ventriculus* Von Moellendorff, 1891, N. Sumatra, near cave Liangdehar, actual height 2.9 mm. 29-30, *D. wilhelminae* spec. nov., paratype (RMNH 92947), W. Sumatra, Kampung Desa Gadut, actual height 2.8 mm. 31-32, *P. pumila* Van Benthem Jutting, 1959, N. Sumatra, Volcano Sinabung, 1900m alt., actual height 1.4 mm. 33-34, *P. reederi* spec. nov., paratype (RMNH 92951), Aceh Tengah, Pula Weh, Iboih, actual height 2.5 mm. SEM-photographs by J. Goud (NNM, Leiden).

Material. — W. Sumatra: Baso, 14 km NW of Bukittinggi in direction Payakumbuh, overgrown limestone outcrop along road, vii.1996 (MD/50; BMNH/2; JV/2; MZB/2; RMNH/2; SMF/2).

Remarks. — Apparently endemic for Sumatra, collected on the ground among leaves.

Diplommatina nevillei (Crosse, 1879) (figs 15, 16)

Palaina nevillei Crosse, 1879: 203, 339, pl. 8 fig. 2 (W. Malaysia, "Perak").

Diplommatina nevillei; Vermeulen & Whitten, 1998: 50, 138, fig. 29.

Material. — Aceh Besar: westcoast, Pasi, 10 km S of Lhong, vi.1997 (MD/2). Aceh Tengah: Laot Tawar, 7 km NE of Takengon, north shore, 150 m higher than lake, rocks in bamboo forest along wadi, vii.1997 (MD/12).

Remarks. — A new record for Sumatra. Known from peninsular Malaysia, Sumatra, Java and Bali. This species is most similar to *D. canaliculata*, differing in being smaller, and having a longer palatal tooth in the constriction.

Diplommatina sinulabris Von Moellendorff, 1902 (figs 17, 18)

Diplommatina sinulabris Von Moellendorff, 1902: 143 (W. Malaysia, "Kelantan"). Zilch, 1953: 36, pl. 13 fig. 191. Van Benthem Jutting, 1959: 83.

Material. — Aceh Tengah: Laot Tawar, 7 km NE of Takengon, north shore, 150 m higher than lake, rocks in bamboo forest along wadi, vii.1997 (MD/2; RMNH/2). N. Sumatra: Volcano Sinabung, 1900 m alt., W of Berastagi, cloudforest, on and under vegetation and dead leaves, viii.1993 (MD/2).

Remarks. — Known from peninsular Malaysia and Sumatra only. Living in leaf-litter on limestone as well as on volcanoes.

Diplommatina strophosa Van Benthem Jutting, 1959 (figs 19, 20)

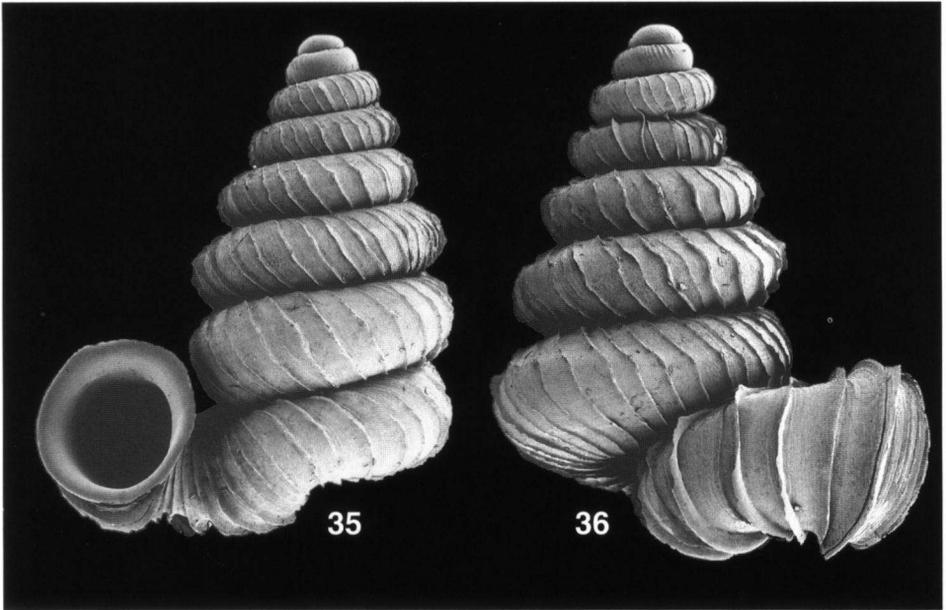
Diplommatina strophosa Van Benthem Jutting, 1959: 82, pl. 1 fig. 3 (North Sumatra, "Brastagi, 1750 m alt.").

Material. — N. Sumatra: Volcano Sinabung, 1900 m alt., W of Berastagi, cloudforest, on and under vegetation and dead leaves, viii.1993 (MD/2; RMNH/1).

Remarks. — Apparently endemic for Sumatra. Known from two volcanoes. Living on the ground between leaves.

Diplommatina tardigrada Van Benthem Jutting, 1959 (figs 21, 22)

Diplommatina tardigrada Van Benthem Jutting, 1959: 82, pl. 1 fig. 4 (North Sumatra, "Brastagi, 1750 m. alt., Dolok pintu, 2000 m alt.").



Figs 35-36. *Plectostoma kitteli* spec. nov., paratype (RMNH 92956), W. Sumatra, Kampung Desa Gadut, actual height 3 mm.

Material. — N. Sumatra: Volcano Sinabung, 1900 m alt., W of Berastagi, cloudforest, on and under vegetation and dead leaves, viii.1993 (MD/10; JV/2; MZB/2; RMNH/2).

Remarks. — Apparently endemic for Sumatra. Known from two volcanoes. Living on the ground between leaves.

Diplommatina tweediei Laidlaw, 1949 (figs 23, 24)

Diplommatina tweediei Laidlaw, 1949: 213, fig. 4e (W. Malaysia, Kelantan, Gua Musang). Van Benthem Jutting, 1959: 81.

Material. — Aceh Tengah: Laot Tawar, 7 km NE of Takengon, north shore, 150 m higher than lake, rocks in bamboo forest along wadi, vii.1997 (MD/1). Aceh Tengah: Laot Tawar, 11 km NE of Takengon, north shore, vii.1997 (MD/2). N. Sumatra: Bukit Lawang, SW of Medan, around the Wisma Cottage, viii.1993 (MD/1); Bukit Lawang, opposite the orang-utan rehabilitation centre, viii.1993 (MD/1); Bukit Lawang, near "Boat-rock", E of village, viii.1993 (MD/1); Bukit Lawang, near entrance of limestone "Cave Luntir", 9 km N of village, viii.1993 (MD/2); Berastagi, Volcano Sibayak, 1700 m alt., secondary forest, viii.1993 (MD/30; RMNH/5; MZB/2; SMF/2); Volcano Sinabung, 1900 m alt., W of Berastagi, cloudforest, on and under vegetation and dead leaves, viii.1993 (MD/7).

Remarks. — Known from peninsular Malaysia and Sumatra only.

Diplommatina vanderblommi spec. nov. (figs 25, 26)

Material. – W. Sumatra: Bungus Bay, 25 km SE of Padang, 2 km N of village near waterfall, vii.1996 (RMNH 92949/holotype, 92948/1; MZB/1; MD/3).

Shell dextral, fusiform, sides flat or slightly convex; penultimate whorl widest. Whorls 7, convex. Suture impressed. Constriction at the angular part of the peristome; with a parietalis, a longitudinal palatalis at the level of the peristome, a transversal palatalis and a distinct columellaris, directed slightly downwards. Tuba of one whorl. Radial ribs straight, moderately distinct, rather low and wide, densely spaced (7-8 ribs/0.5 mm on the penultimate whorl). A hardly visible spiral striation sometimes present in live collected specimens. Final quarter of the last whorl ascending considerably towards the suture. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis. Peristome double, expanding; palatal side not or hardly sinuous. Outer peristome somewhat expanding beyond the inner one. Inner peristome with or without a palatal lip, free and slightly erect at the columellar side, somewhat expanding at the parietal side; basal side at the angular corner with a distinct edge.

Dimensions: H 2.5-2.7 mm; B 1.3-1.4 mm.

Derivatio nominis. – After my colleague and friend Kees van der Blom, in appreciation of his friendship and many interesting discussions.

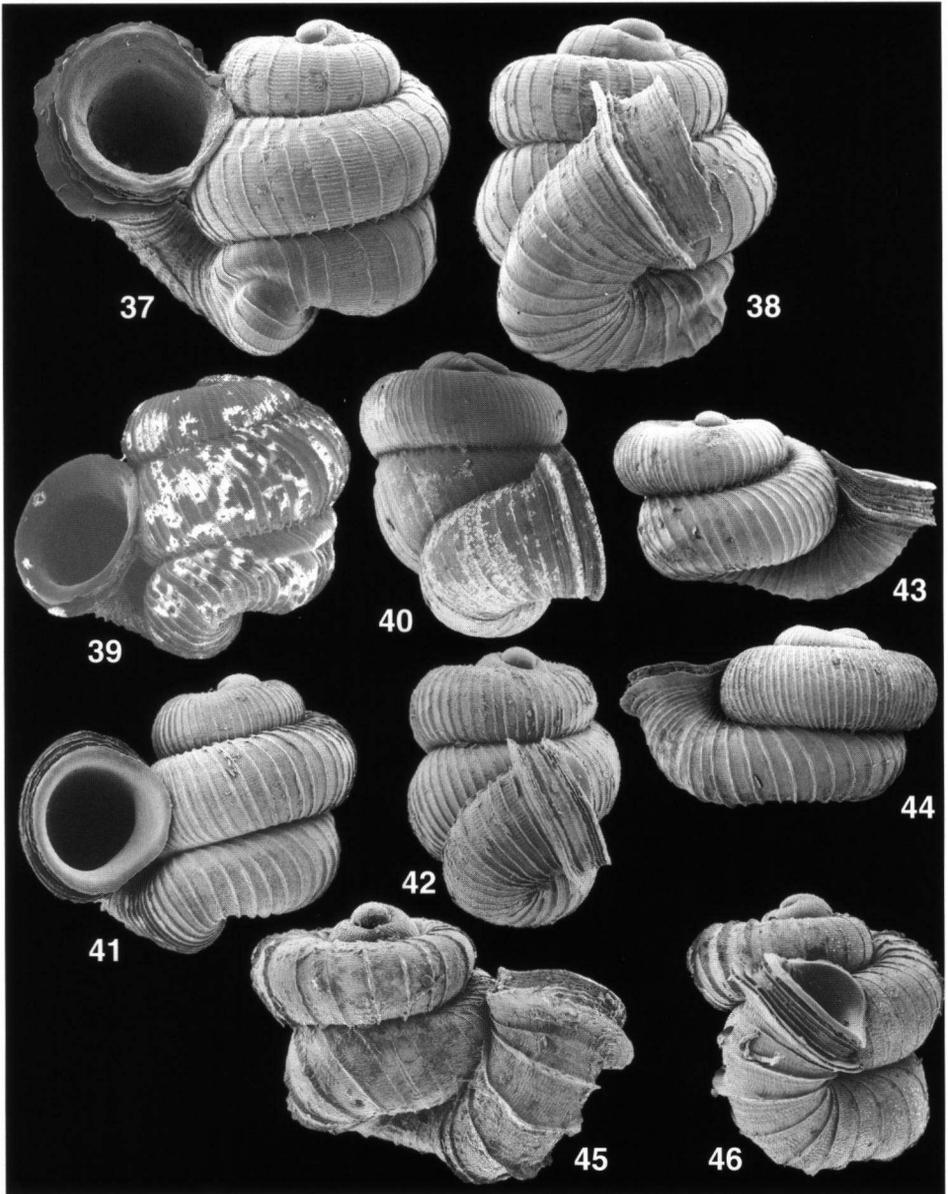
Remarks. – An endemic species from Sumatra. At its type locality collected alive among leaves on a steep slope. Differs from *Diplommatina canaliculata* and *D. nevillei* in the position of the constriction at the angular corner instead of at the columellar one, from *D. ventriculus* by the distinct columellaris and the position of the constriction, from *D. wilhelminae* by the presence of a longitudinal palatalis in the constriction and the more distinct columellaris, and from *D. simulabris* by the broader ultimate whorl and densely spaced ribs.

Diplommatina ventriculus Von Moellendorff, 1891 (figs 27, 28)

Diplommatina ventriculus Von Moellendorff, 1891: 343, pl. 30 fig. 14 (W. Malaysia, "Bukit Pondong"). Laidlaw, 1949: 204, fig. 2d. Van Benthem Jutting, 1959: 84.

Material. – Aceh Tengah: Laot Tawar, 2.5 km E of Takengon at cave near hotel Rengali, south shore, vii.1997 (MD/25); Laot Tawar, 7 km NE of Takengon, north shore, 150 m higher than lake, rocks in bamboo forest along wadi, vii.1997 (MD/1); Laot Tawar, 7 km E of Takengon, south shore, vii.1997 (MD/50). N. Sumatra: near the entrance of limestone cave "Liangdehar", near Kuta Buluh, 40 km NW of Berastagi, viii.1993 (MD/25); do., vi.1996 (MD/50); reserve Tinggi Radja, between Berastagi and Pematangsiantar, 400 m alt., deposits of the river Bah Banai, viii.1993 (MD/10). W. Sumatra: Bukittinggi, canyon near town at shady places, vii.1996 (MD/7); Baso, 14 km NW of Bukittinggi in direction Payakumbuh, overgrown limestone outcrop along road, vii.1996 (MD/100); Payakumbuh, near entrance of Cave Ngalau Indah, vii.1996 (MD/1); 7 km W of Payakumbuh, overgrown limestone outcrop along road, vii.1996 (MD/1); Rimbo Panti reserve, at rocks in primary forest, 00°28'47.6"N 100°04'01.7"E, vii.1997 (MD/5); near cave near Situmbuk, 30 km E of Bukittinggi, 00°21'05.6"S 100°34'10.1"E, vii.1997 (MD/25); Gunung Singgalang, NE of Padang, 13.viii.1996 (KW).

Remarks. – Known from peninsular Malaysia and Sumatra only. The species is common in leaf-litter on limestone.



Figs 37-46. *Opisthostoma* spec. 37-38, *banki* spec. nov., holotype (RMNH 92954), N. Sumatra, near cave Liangdehar, actual height 1.4 mm. 39-40, *O. clerxi* spec. nov., holotype (RMNH 92955), Aceh Tengah, Laot Tawar, actual height 1.0 mm. 41-42, *O. paulucciae* Crosse & Nevill, 1879, W. Sumatra, Kampung Desa Gadut, actual height 1.0 mm. 43-44, *O. platycephalum* Van Benthem Jutting, 1952, paratype (ZMA), Malaysia, Bukit Charas near Kuantan Pahang, actual height 0.7 mm. 45-46, *O. secretum* spec. nov., paratype (RMNH 92952), W. Sumatra, Kampung Desa Gadut, actual height 0.8 mm. SEM-photographs by J. Goud (NNM, Leiden).

Diplommatina wilhelminae spec. nov. (figs 29, 30)

Material. – W. Sumatra: near entrance of Cave Gua Pangian, 3 km N of village Lintau, SE of Bukittinggi, 00°28'19.5"S 100°45'11.7"E, vii.1996 (RMNH 92946/holotype, 92947/5; BNMH/2; JV/2; KW/2; MZB/2; SMF/2; ZMA/2; MD/10); do., vii.1997 (MD/50); Kampung Desa Gadut, limestone rocks near the village, E of Payakumbuh, 00°15'36.0"S 100°43'58.7"E, vii.1997 (MD/50); Kampung Desa Gadut, limestone rocks half an hour walking from village, E of Payakumbuh, 00°15'35.1"S 100°44'01.1"E, vii.1997 (MD/25).

Description. – Shell dextral, fusiform, penultimate whorl of about the same width as the last one, sides flat or slightly concave. Whorls 7, convex. Suture impressed. Constriction close to the angular edge of the peristome, with a longitudinal parietalis, a transversal palatalis, and a distinct columellaris, directed downwards. A longitudinal palatalis is absent. Tuba of 7/8 whorl. Radial ribs straight, distinct, high, rather sharp and thin, rather widely spaced (4-5 ribs/0.5 mm on the penultimate whorl); more ribs on the body whorl (6-7 ribs/0.5 mm). A distinct spiral striation present. Final quarter of the last whorl ascending towards the suture. Umbilicus closed. Aperture hardly tilted with regard to the coiling axis. Peristome double, expanding; palatal side sinuous, with an edge; basal side with a slight edge. Basal edge not or slightly sinuous, sharp or somewhat protruding. Outer peristome somewhat expanding beyond the inner one; inner peristome with or without a palatal lip, usually slightly erect at the columellar side, and somewhat expanding at the parietal side.

Dimensions: H 2.7-3.1 mm; B 1.4-1.5 mm.

Derivatio nominis. – The name refers to my wife Wilma, companion on my trips to Indonesia, in appreciation of her patience during collecting time.

Remarks. – With *Diplommatina canaliculata*, *D. nevillei*, *D. vanderblommi* and *D. ventriculus*, *D. wilhelminae* belongs to a group of similarly looking species. It can be distinguished from all these species by the absence of a longitudinal palatalis.

Genus *Palaina* Semper, 1865

Palaina pumila Van Benthem Jutting, 1959 (figs 31, 32)

Palaina pumila Van Benthem Jutting, 1959: 80, pl. 1 fig. 2 (N. Sumatra, "Brastagi, 1750 m alt.").

Material. – N. Sumatra: Volcano Sinabung, 1900 m alt., W of Berastagi, cloudforest, on and under vegetation and dead leaves, viii.1993 (MD/2; RMNH/2).

Remarks. – Apparently endemic for Sumatra. Known from two volcanoes. Living between leaves on the ground.

Palaina reederi spec. nov. (figs 33, 34)

Material. – Aceh Tengah: Pula Weh, Iboih, in leaf litter in forest, 5 km S of Iboih, vi.1997 (RMNH 92950/holotype, 92951/5; BMNH/2; JV/2; MZB/2; MD/15); Laot Tawar, 7 km NE of Takengon, north shore, 150 m higher than lake-level, rocks in bamboo forest along wadi, vii.1997 (MD/1). Aceh Besar: near Lhong at the westcoast along the coastalroad in leaf-litter near limestone rocks, vi.1997 (MD/9).

Description. — Shell more or less opaque, shining, corneous, sinistral, broadly fusiform. Whorls $6\frac{1}{2}$, convex, suture impressed. Constriction behind the columellar side of the peristome; with a transversal palatalis and three distinct, parallel parietales close to the palatalis. A columellaris is absent. Tuba of about $\frac{1}{2}$ whorl, with a slight swelling close to the constriction. Radial ribs distinct, not sinuous, rather densely spaced (6-8 ribs/0.5 mm on the penultimate whorl). Spiral striation absent in adult specimens, only in some juvenile shells a subtile spiral striation is visible. Peristome well rounded on the palatal and basal side, at the columellar side with a conspicuous, blunt process on the exterior side, double, the outer peristome hardly protruding beyond the inner. The peristome is sinuous at the columellar side where it bends inwards and partly covers the umbilicus, Umbilicus open, partly hidden by the peristome.

Dimensions: H 2.3-2.8 mm, B 1.3-1.6 mm.

Derivatio nominis. — After my colleague and friend Duncan Reeder, in appreciation of his friendship and many interesting discussions.

Remarks. — Apparently endemic for Sumatra. The populations from mainland Sumatra and the islet of Pula Weh show small conchological differences. Shells of the Pula Weh population are somewhat smaller; the whorls are more densely striated and increase more gradually in width. Shells of the other Sumatran *Palaina* species, viz. *P. pumila*, are much smaller (1.4-1.5 mm), very finely striated and more cylindrical. No *Palaina* species are known from peninsular Malaysia and Borneo. This genus is widely distributed in the Papuan region and Sumatra is at the westernmost limits of its range.

Genus *Plectostoma* H. Adams, 1865

Plectostoma kitteli spec. nov. (figs 35, 36)

Material. — W. Sumatra: Kampung Desa Gadut, limestone rocks near the village, E of Payakumbuh, $00^{\circ}15'36.0''S$ $100^{\circ}43'58.7''E$, vii.1997 (RMNH 92942/holotype, 92956/25; BMNH/10; JV/10; MZB/10; SMF/10; ZMA/10; MD/125); Desa Gadut, E of Payakumbuh, 18.viii.1996 (KW/10).

Description. — Shell conical, sinistroid, with flat to slightly convex sides. Apex slightly oblique sometimes. Whorls $6\frac{1}{2}$, convex; last whorl rounded. Constriction with a parietalis, and both a longitudinal and a transversal palatalis; a columellaris is absent. Tuba abruptly narrowed towards the constriction, (slightly) angular below. Apical whorls smooth; the following ones with very sharp radial ribs, which are rather widely spaced (7-8 ribs/1 mm on the penultimate whorl). The ribs on the tuba moderately to widely spaced (6-7 ribs/1 mm halfway the tuba); on the spire and on the tuba slightly sinuous. Spiral striation absent. Umbilicus open, measuring 0.1 mm in diameter. Aperture hardly tilted with regard to the coiling axis, more or less circular to elliptic. Peristome double. Outer peristome spreading far beyond the inner one, but distinctly so only at the parietal and the basal side; absent along the right side of the aperture. Inner peristome distinctly protruding from the outer one for about 0.3 mm, slightly spreading.

Dimensions: H 2.8-3.1 mm, B 1.5-1.6 mm (without tuba); B 2.4-2.6 mm with tuba.

Derivatio nominis. — After my friend Klaus Kittel, who discovered this species.

Remarks. — An endemic species from Sumatra. No representatives of this genus are known from east of Sumatra. The genus is known from Vietnam to the south as far as Borneo and Sumatra. Its nearest relative might be *Plectostoma praeco* Van Benthem

Jutting, 1961, from peninsular Malaysia, but shells of that species are shorter (2.4 mm instead of 3.1 mm) and broader (3.0 mm instead of 2.6 mm, including the tuba).

Genus *Opisthostoma* W.T. & H. Blanford, 1860

Opisthostoma banki spec. nov. (figs 37, 38)

Material. — N. Sumatra: near the entrance of limestone cave "Liangdehar", near Kuta Buluh, 40 km NW of Berastagi, viii.1993 (RMNH 92954/holotype; MD/1); do., vi.1996 (MD/2).

Description. — Shell sinistroid, white, slightly translucent, large for the genus; spire more or less cylindrical. Whorls approximately $3\frac{1}{2}$ (tuba not included); top whorls distinctly oblique, moderately elevated. The penultimate whorl widest, convex with the suture impressed. Constriction distinct, abrupt. Tuba consisting of approximately $\frac{3}{4}$ whorl, touching the body whorls over its entire length, bulging and rather abruptly narrowed towards the constriction, approximately circular in section. Shell with smooth top whorls; the following ones with rather wide, thin and sharp, distinct radial ribs, which are widely spaced on the penultimate whorl (5 ribs/0.5 mm). Ribs crossed by a distinct spiral striation. Umbilicus closed. Aperture tilted $15-45^\circ$ with regard to the coiling axis, its upper margin just below the level of the apex; apertural teeth absent. Peristome double. Outer peristome spreading beyond the inner one, but gradually narrowed towards the right side of the aperture, where it is absent. Inner peristome distinctly protruding beyond the outer one, somewhat spreading; at the right side of the aperture spreading over the widest whorl of the spire as well as the whorl above. Constriction with a transversal lamella at the palatal side and a distinct parietalis, which continues approximately up to the sharp inner curve of the tuba.

Dimensions: H 1.2-1.4 mm; B 1.7-1.8 mm (including tuba); B 1.0-1.1 mm without tuba.

Derivatio nominis. — After my friend Ruud Bank, in appreciation of his friendship over the years and his help in various ways.

Remarks. — An endemic species for Sumatra. Since this is the only Sumatran species with a completely closed umbilicus, it cannot be confused with other species of *Opisthostoma*.

Opisthostoma clerxi spec. nov. (figs 39-40)

Material. — Aceh Tengah: Laot Tawar, 7 km E of Takengon, south shore, vii.1997 (RMNH 92955/holotype; MD/2).

Description. — Shell sinistroid, white, slightly translucent; spire cylindrical, apex oblique. Whorls approximately $3\frac{1}{2}$ (tuba not included), convex, with a hardly impressed suture, forming a cylindrical body which may be slightly oblique; top whorls distinctly oblique, hardly elevated. Constriction distinct and abrupt. Tuba consisting of approximately $\frac{1}{2}$ whorl, touching the other whorls over its entire length and approximately circular in section. Shell with smooth apical whorls; the following ones with distinct radial ribs which are densely spaced on the body whorl (11 ribs/0.5 mm). Ribs crossed by a prominent spiral striation. Umbilicus open, very narrow. Aperture widely ovate to cir-

cular, hardly tilted with regard to the coiling axis of the shell; its upper margin not protruding beyond the level of the apex. Inner peristome moderately thickened and reflected; outer peristome moderately to distinctly flaring at the palatal side. Constriction with a long parietalis which continues into the tuba, a transversal palatalis and an obscure columellaris, deep inside the aperture.

Dimensions: H 1.0-1.1 mm; B 1.2-1.3 mm (including tuba), B 0.8-0.9 mm without tuba.

Derivatio nominis. — Named after John Clerx, my good friend for many years; we collected our first molluscs together.

Remarks. — This species is only known from its type locality. It can easily be recognized by its columellaris hidden deep inside the aperture.

Opisthostoma paulucciae Crosse & Nevill, 1879 (figs 41, 42)

Opisthostoma paulucciae Crosse & Nevill, 1879: 197, 205, 339, pl. 8 fig. 1 ("Buket Pondong, à Pérak, dans l'Indo-Chine"). Van Benthem Jutting, 1952: 14, fig. 4; 1959: 81.

Material. — Aceh Besar: westcoast, Pasi, 10 km S of Lhong, vi.1997 (MD/1). Aceh Tengah: Laot Tawar, 2.5 km E of Takengon at cave near hotel Rengali, south shore, vii.1997 (MD/25); Laot Tawar, 7 km NE of Takengon, north shore, 150 m higher than lake, rocks in bamboo forest along wadi, vii.1997 (MD/2); Laot Tawar, 11 km NE of Takengon, north shore, vii.1997 (MD/1); Laot Tawar, 7 km E of Takengon, south shore, vii.1997 (MD/15). N. Sumatra: Bukit Lawang, SW of Medan, near the entrance of limestone "Bat-cave", viii.1993 (MD/25); Bukit Lawang, near "Boat-rock", E of village, viii.1993 (MD/2); Bukit Lawang, numerous small caves in limestone, SE of village at border of rubber tree plantation, viii.1993 (MD/8). W. Sumatra: Bukittinggi, canyon near town at shady places, vii.1996 (MD/1); Baso, 14 km NW of Bukittinggi in direction Payakumbuh, overgrown limestone outcrop along road, vii.1996 (MD/25); near entrance of Cave Gua Pangian, 3 km N of village Lintau, SE of Bukittinggi, 00°28'19.5"S 100°45'11.7"E, vii.1996 (MD/250); do., vii.1997 (MD/250); Kampung Desa Gadut, limestone rocks near the village, E of Payakumbuh, 00°15'36.0"S 100°43'58.7"E, vii.1997 (MD/250); Kampung Desa Gadut, limestone rocks half hour walking from village, E of Payakumbuh, 00°15'35.1"S 00°44'01.1"E, vii.1997 (MD/5); 2 km W of Payakumbuh, overgrown limestone outcrop along road, vii.1996 (MD/25); at the entrance of a little cave near Situmbuk, 30 km E of Bukittinggi, 00°21'05.6"S 100°34'10.1"E, vii.1997 (MD/100); Payakumbuh, near entrance of Cave Ngalaui Indah, vii.1996 (MD/50); 7 km W of Payakumbuh, overgrown limestone outcrop along road, vii.1996 (MD/20).

Remarks. — Known only from peninsular Malaysia and Sumatra.

Opisthostoma platycephalum Van Benthem Jutting, 1952 (figs 43, 44)

Opisthostoma platycephalum Van Benthem Jutting, 1952: 26, fig. 11 ("W. Malaysia, Pahang, Bukit Charas near Kuantan").

Material. — Aceh Besar: near Lhong at the westcoast along the coastal road in leaf litter near limestone rocks; vi.1997 (MD/1). N. Sumatra: near the entrance of limestone cave "Liangdehar", near Kuta Buluh, 40 km NW of Berastagi, viii.1993 (MD/1).

Remarks. — New record for Sumatra. Known only from peninsular Malaysia and Sumatra.

Opisthostoma secretum spec. nov. (figs 45-46)

Material. — W. Sumatra: Kampung Desa Gadut, limestone rocks half an hour walking from village, E of Payakumbuh, 00°15'35.1"S 00°44'01.1"E, vii.1997 (MD/20); Kampung Desa Gadut, limestone rocks near the village, E of Payakumbuh; 00°15'36.0"S 100°43'58.7"E, vii.1997 (RMNH 92953/holotype, 92952/5; BMNH/2; JV/2; KW/2; MZB/2; SMF/2; ZMA/2; MD/30).

Description. — Shell sinistroid, white, slightly translucent. Whorls approximately 3½ (tuba not included); apical whorls distinctly oblique, moderately to distinctly elevated. The penultimate whorl widest, convex or somewhat angular, with the suture well impressed. Constriction hardly distinct, gradual. Tuba consisting of approximately ¾ whorl, touching the body whorls over its entire length, approximately circular in section. Shell with smooth top whorls, the following ones with rather wide, thin and sharp, distinct radial ribs, which are widely spaced on the penultimate whorl (5 ribs/0.5 mm). Ribs crossed by fine spiral striation. Umbilicus open, deep, very narrow. Aperture tilted 15-45° with regard to the coiling axis, its upper margin clearly below the level of the apex. Without apertural teeth. Peristome double. Outer peristome spreading beyond the inner one, but gradually narrowed towards the right side of the aperture, where it is absent; inner peristome somewhat spreading, distinctly protruding beyond the outer one and on the right side of the aperture attached to one or two whorls of the shell body.

Dimensions: H 0.7-0.8 mm; B 1.2-1.3 mm (including tuba), B 0.8 mm without tuba.

Derivatio nominis. — After the remote (*secretus*) limestone outcrops in the middle of the sawa's near a very small kampong, discovered by some guides from Bukittinggi after asking them for "white rocks".

Remarks. — An endemic species from Sumatra. Conchologically most similar is *Opisthostoma coronatum* Van Benthem Jutting, 1952, from peninsular Malaysia. *O. secretum* differs by the distinctly narrower umbilicus and more oblique top whorls.

KEY TO THE SUMATRAN SPECIES OF DIPLOMMATINIDAE

1a Shell sinistroid	17
1b Shell dextral or sinistral	2
2a With a distinct tooth at the columellar side visible	3
2b No tooth discernible at the columellar side	16
3a Shell sinistral	4
3b Shell dextral	9
4a Aperture tilted	5
4b Aperture normal	7
5a With a distinct keel with needle-like points	<i>D. carinaspinosa</i>
5b Without such sharp processes	6
6a Quite densely striated	<i>D. gadutensis</i>
6b Widely striated	<i>D. karoensis</i>

- 7a With a conspicuously protruding edge at the columellar side 8
 7b Without such an edge *D. tardigrada*
- 8a Shell with 5 whorls *D. tweediei*
 8b Shell with 6 whorls *D. strophosa*
- 9a Shell small, H less than 1.6 mm. *D. abundans*
 9b Shell larger, H over 1.6 mm 10
- 10a With a distinct columellaris 11
 10b Without a distinct columellaris *D. ventriculus*
- 11a Shell slender. 12
 11b Shell more fusiform. 13
- 12a H over 3.2 mm *D. canaliculata*
 12b H less than 2.9 mm *D. nevilli*
- 13a Penultimate whorl distinctly wider as the ultimate one 14
 13b Penultimate whorl approximately same width as the ultimate one 15
- 14a With 7-8 ribs/0.5 mm on the penultimate whorl. *D. vanderblommi*
 14b With 4-5 ribs/0.5 mm on the penultimate whorl *D. sinulabris*
- 15a Columellaris small; apertural palatal side not sinuous *D. liwaensis*
 15b Columellaris distinct; palatal side sinuous *D. wilhelminae*
- 16a Shell small, H less than 1.5 mm *P. pumila*
 16b Shell larger, H over 2.2 mm. *P. reederi*
- 17a Shell B over 1.5 mm *Plectostoma kitteli*
 17b Shell B less than 1.5 mm 18
- 18a Widely ribbed, 5 ribs/0.5 mm on the penultimate whorl *O. secretum*
 18b Ribbed moderately wide. 19
- 19a Umbilicus closed. *O. banki*
 19b Umbilicus open 20
- 20a Spire more or less flat 21
 20b Spire elevated *O. paulucciae*
- 21a Aperture without columellaris *O. platycephalum*
 21b Aperture with an obscure columellaris *O. clerxi*

ACKNOWLEDGEMENTS

Thanks are due to Dr. J. P. M. Clerx (Roermond) for critical reading and comments on the manuscript, to Mr. J. Goud (Leiden) for the excellent SEM photographs, and to Mr. K. Kittel (Wiesthal) for providing his material on loan for a long period. I am also grateful to Dr. E. Gittenberger (RMNH, Leiden), Dr. R. Jansen (SMF, Frankfurt am Main), and Mr. R. G. M. Moolenbeek (ZMA, Amsterdam), who gave access to the collections under their care.

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