THE MARINE MOLLUSCA OF THE KENDENG BEDS (EAST JAVA) GASTROPODA, PART II

(Families Planaxidae - Naticidae inclusive)

BY

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A. GENERAL PART.

1. Introduction.

Part I of this monograph has been published in volume 10 of this Journal, pp. 241—320, 1938. Preparing this second part I met with the help and assistance from many persons and institutes again, for which I express my most cordial thanks here.

The figures illustrating this paper have been drawn once more by Mr. L. P. POUDEROYEN, while the „Zoologisch Insulinde Fonds" supplied the cost of these illustrations.

[1]) Manuscript received 11-XII-1939.

2. Corrigenda of Gastropoda part I.

p. 255: M 237, N. of triangulation pole T 145, read: T 155.
p. 257: M 281, Poetjangan layers, volc. f., l. III, read: l. II.
p. 251: M 106a, Poetjangan ls., volc. f., l. I, delete: l. I.
p. 261: C 74 and C 75, Poetjangan layers, volc. f., add: from a fossil horizon some m. above l. I. (The following species have been recorded from these localities: *Turritella terebra kendengensis* ALTENA (p. 301), *Architectonica perspectiva* (L.) (p. 311) and *A. maxima* (PHIL.) (p. 313). The localities have been enumerated under the heading „Poetjangan layers (volcanic facies)", but must be transferred to the rubric „Poetjangan layers (volcanic facies), horizon above layer I").
p. 263: the two papers by J. COSIJN cited in the bibliography of the present paper (p. 3) should be added here.
p. 269 to be added: SACCO, F., see: BELLARDI, L.
p. 307, 3rd line from bottom: 1933 *Turritella djadjariensis* K. MART., delete: K. MART.

3. Remarks on the age of some fossil localities in the East Indian Archipelago.

Agreeing with C. H. OOSTINGH [2]) I consider the age of some beds which were originally dated as miocene or neogene, to be pliocene. Therefore I have recorded these localities as pliocene, whenever they had to be mentioned under the heading „Fossil distribution" of the species dealt with here. In part I I always added a note: „Pliocene: fide OOSTINGH, 1935, Moll. Plioz. Boemiajoe, p. 2"; these notes have been omitted here. Only the locality Tambakbatoe, mentioned as n. 3 by OOSTINGH (l. c.), is considered to be even younger than pliocene and to belong to layer II of the volcanic facies of the Poetjangan layers.

The localities Tondomoelo, Ngambon — Toeri — Pelem, and Bareng — Toeri („Turi"), mentioned by VAN ES [3]) and VAN DER VLERK [4]), have been referred to as „Bareng beds (Bodjonegoro, Java)" without further specification. Their age may be younger than pliocene and agree with that of the Poetjangan layers.

The beds described as pliocene by STAUB [5]) from Sangkoelirang Bay, NE. Borneo, are considered to be of miocene age according to the opinion of LEUPOLD [6]).

4. Localities collection Dr. J. Cosijn.

To be added:
C 13, Sheet 116A, ± 100 m. NW. of triangulation pole T 155, Poetjangan layers (volcanic facies), layer III.

[2]) 1935, Moll. Plioz. Boemiajoe, p. 2.
[3]) 1931, Age *Pithecanthr.*, p. 94.
[4]) 1932, Zuidrembangsche heuvell., p. 110.
[5]) 1915, Sangkulirangbai.
[6]) See: VAN DER VLERK, 1931, Caenoz. Amphin., Gastr., p. 288.

As COSIJN indicated this locality as a finding place of only Vertebrate remains in his map, I had not included it in my list of his localities. The material dealt with in this paper, however, contains mollusca deriving from loc. C 13.

5. Additions to Bibliography.

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ALTENA, C. O. VAN REGTEREN, 1940, A revision of Cerithidea (Cerithideopsilla) cingulata (Gmelin) and some related species (Mollusca, Gastropoda). Zool. Meded., 22, (in the press).

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JUTTING, W. S. S. VAN BENTHEM, 1939, Shells from prehistoric kitchen-middens in some caves in Celebes. Treubia, 17, n. 1, pp. 1—3.

KOBELT, W., 1898, Die Gattung Cerithium Lam., in: KÜSTER, H. C., Systematische Conchylien-Cabinet von Martini und Chemnitz. Neu herausgegeben und vervollständigt, 1, part 26.

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YOKOYAMA, M., 1926, Molluscan fossils from the tertiary of Mino. Ibid., pp. 213—227.
YOKOYAMA, M., 1926, Tertiary mollusca from Southern Tôtômi. Ibid., pp. 313—365.
YOKOYAMA, M., 1926, Tertiary shells from Tosa. Ibid., pp. 365—368.
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B. SYSTEMATIC PART.

2. Systematic survey of the marine mollusca of the Kendeng beds (continued).

Familia Planaxidae.
Genus *Planaxis* LAMARCK 1822.
Subgenus *Planaxis* LAMARCK.

47. PLANAXIS (PLANAXIS) SONDEIANUS K. MARTIN.

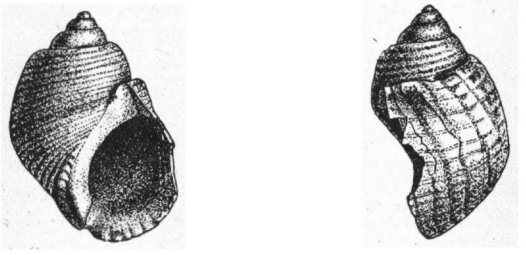
Figures 1*a*, *b*.

+ 1905 *Planaxis* (s. str.) *sondeianus* spec. nov. — K. MARTIN, Foss. Java, p. 222, pl. 40, figs. 661, 661a.
1919 *Planaxis sondeianus* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 95, 141.
1931 *Planaxis sondeianus* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 252.
? 1933 *Planaxis bantamensis* n. sp. — OOSTINGH, Neue Moll. Plioz. Java, p. 212, figs. 1, 2.

Material examined:

Upper Kalibeng layers: Sheet 93B, M 258: 1 ex.; M 260: 1 ex.

MARTIN's species was based on a single bad specimen. My shell from loc. M 258 is a young one; its sculpture agrees with that of the spire (so far preserved) of the holotype, and so does its habitus. The protoconch is missing, but there are 5 whorls left. Its altitude amounts



1*a* 1*b*

Figs. 1*a*, *b*. *Planaxis sondeianus* K. MARTIN, × 1½, from Sheet, 93B, M 260, Upper Kalibeng layers.

to 15 mm. The specimen of loc. M 260 seems to be adult. Its habitus differs from that of the holotype as it is much broader in relation to the altitude. Nevertheless I think it belongs to the same species, as the sculpture is the same as in the holotype, showing the typical flattening of the spirals especially in the front and back parts of the body whorl towards the mouth. Moreover the suture is canaliculated as in MARTIN's specimen, and the characteristic depression near the suture in the youngest part of the body whorl is even more pronounced.

In both specimens faint spiral grooves are visible inside the outer lip close to the mouth.

Especially the second specimen shows a remarkable resemblance to *Planaxis bantamensis* OOSTINGH. From a comparison of the description of this species with that of MARTIN's species it appears that the sculpture of the two species agrees to a great degree. Now the habitus of *Pl. sondeianus* seems to be variable as to the relation alt. : diam., and thus the main difference between the two forms is bridged over. Therefore I think it probable that *Pl. bantamensis* OOSTINGH was founded on not quite adult specimens of *Pl. sondeianus*.

Fossil distribution:

Mal: pliocene: ? Tjimantjeuri (Bantam, Java); [= Upper Kalibeng layers]: Sonde (Madioen, Java).

Recent distribution:

not known living.

Familia Potamididae.

Genus *Potamides* BRONGNIART 1810.

48. „POTAMIDES'' CHERIBONENSIS K. MARTIN.

+ 1906 *Potamides cheribonensis* spec. nov. — K. MARTIN, Foss. Java, p. 320, pl. 45, fig. 742.
1926 *Potamides cheribonensis* MART. — K. MARTIN, Plioc. Verst. Cheribon, pp. 10, 16.
193. *Potamides cheribonensis* MART. — NASON-JONES, Geol. Finsch Coast Area, p. 34.
1931 *Potamides cheribonensis* MART. — VAN ES, Age *Pithecanthr.*, pp. 45, 95, 115, 120.
1931 *Potamides cheribonensis* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 250.
1935 *„Potamides'' cheribonensis* K. MARTIN. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 54 (with further synonymy).

Material examined:

Poetjangan layers (volcanic facies): Sheet 110A, M 117: 3 ex.; M 120: 1 ex.; M 324: ? 2 ex. (casts); Sheet 110B, M 170: 1 fr.; M 286: 1 fr.; C 83: 3 ex.; Sheet 116A, M 208: 1 ex.; layer I: Sheet 105B, M 69: 1 ex.; Sheet 110A, C 55: 1 ex.; horizon above layer I: Sheet 110B, M 274: 3 ex.; layer II: Sheet 110B, M 164: 4 ex.; M 171: 3 ex.; M 175: 2 ex.; M 177: 5 ex.; M 178: 2 ex.; M 284: 4 ex.; C 7: 1 ex.; C 82: 5 ex.; Sheet 116A, M 215: 1 ex.; M 216: 12 ex.; M 218: 1 ex.; M 227: 6 ex.; C 38: 2 ex.; C 40: 1 ex.; layer III: Sheet 110A, M 141: 1 ex.; Sheet 110B, M 180: 2 ex.; M 189: 2 ex.; Sheet 116A, C 13: 6 ex.; C 133: 1 ex.
Kaboeh layers: Sheet 110B, C 28: 1 ex.

My specimens are slightly longer and slenderer than the type. I do not think, however, that this difference is of any importance, the more so, as MARTIN himself (1926, p. 10) mentions specimens from Tjidjoerei, which are slenderer than the type.

As OOSTINGH already remarked, the true generic position of this species will remain doubtful, as long as the characters of the mouth are unknown. In my material no specimens with undamaged outer lips occur.

Fossil distribution:

Mal: neogene: Finsch Coast Area (New Guinea); pliocene: Baribis, Tjidjadjar, Tjidjoerei (Cheribon, Java); Bentarsari Basin (T. J. 54, p. 25), Boemiajoe, Pangkah (Pekalongan, Java); Mount Gombel (Semarang, Java); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer II]: between Djetis and Sidoteko, Soemberringin, Tambakbatoe (Soerabaja, Java).

Recent distribution:

not known living.

Genus *Cerithidea* SWAINSON 1840.
Subgenus *Cerithideopsis* THIELE 1929.
Sectio Cerithideopsilla THIELE 1929.

49. CERITHIDEA (CERITHIDEOPSILLA) CINGULATA (GMELIN).

+ 1790 *Murex cingulatus.* — GMELIN in: LINNÉ, Syst. Nat., ed. 13, 1, p. 3561.
1879 *Cerithium Jenkinsi* nov. spec. — K. MARTIN, Tertiärsch. Java, p. 65, pl. 11, fig. 6.
1884 *Potamides (Tympanotomus) jenkinsi* MART. — K. MARTIN, Tiefbohr. Java, p. 147.
? 1890 *Potamides (Cerithidea) Jenkinsi* MART. — K. MARTIN, Kei-Inseln, Timor, Celebes, p. 279.
? 1895 *Potamides Jenkinsi* K. MART. — K. MARTIN, Tert. Foss. Philipp., pp. 57, 58.
1899 *Potamides (Cerithidea) Jenkinsi* MART. — K. MARTIN, Foss. Java, p. 215, pl. 33, figs. 499, 499a, 500.
1906 *Potamides (Tympanotonos) fluviatilis* POTIEZ and MICH.—TOKUNAGA, Foss. env. Tokyo, p. 25, pl. 1, fig. 52.
1908 *Potamides Jenkinsi* MART., var. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1912 *Potamides (Cerithidea) Jenkinsi* MART. [partim]. — K. MARTIN, Vorl. Bericht, 2, p. 167.
? 1913 *Potamides jenkinsi* K. MARTIN. — SMITH, Contr. Strat. a. Foss. Fauna Philipp., p. 248.
? 1913 *Potamides jenkinsi* K. MART. (?) — PRATT & SMITH, Geol. S. part Bondoc Peninsula, p. 324.
1919 *Potamides Jenkinsi* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 94 [partim], 125, 133 [partim], 134, 141.
? 1920 *Potamides (Tympanotonos) fluviatilis* (POTIEZ et MICHAUD). — YOKOYAMA, Foss. Miura Peninsula, p. 68, pl. 4, figs. 14a, b.
? 1921 *Cerithium jenkinsi* K. MARTIN. — DICKERSON, Fauna Vigo-group, pp. 5, 7, 10, 13, 16, 17, 21.
? 1922 *Potamides fluviatilis* (POTIEZ et MICHAUD). — YOKOYAMA, Foss. Upp. Musashino Kazusa a. Shimosa, p. 71.
? 1922 *Cerithium jenkinsi* K. MARTIN. — DICKERSON, Rev. Philipp. Paleont., pp. 202, 204, 208, pl. 2, fig. 7.
? 1926 *Potamides (Tympanotonos) fluviatilis* (POTIEZ et MICHAUD). — YOKOYAMA, Moll. Foss. Tert. Mino, p. 219.
? 1927 *Potamides (Tympanotonos) fluviatilis* (P. et M.). — YOKOYAMA, Moll. Upp. Musashino Tokyo, p. 395.
? 1927 *Potamides (Tympanotonos) fluviatilis* (P. et M.). — YOKOYAMA, Moll. Upp. Musashino W. Shimôsa a. S. Musashi, p. 441.

? 1928 *Potamides Jensinki* K. MART. — K. MARTIN, Moll. Neog. Atjeh, pp. 7, 16, 25.
? 1928 *Potamides (Tympanotomus) fluviatilis* POTIEZ et MICHELIN [sic]. — YOKOYAMA, Moll. Oil-Field Taiwan, p. 53.
? 1928 *Potamides (Tympanotomus) fluviatilis* (P. et M.). — YOKOYAMA, Semi-foss. Shells Noto, p. 114.
? 1928 *Potamides (Cerithidea) jenkinsi* MARTIN? — VREDENBURG, Moll. post-Eoc. Tert. N. W. India, p. 370.
? 1929 *Potamides jenkinsi* MARTIN. — SIEMON, Jungtert. Moll. Niederl. O.-Indien, p. 40.
? 1931 *Potamides Jenkinsi* MART. (?) — K. MARTIN, Wann löste sich etc., p. 3.
? 1931 *Potamides jenkinsi* MART. — VAN ES, Age *Pithecanthr.*, p. 45.
1931 *Potamides jenkinsi* MART. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 251.
? 1932 *Potamides jenkinsi* MART. — K. MARTIN, Kedoengwaroe, p. 114.
? 1932 *Tympanotonos cingulatus* GMELIN. — NOMURA, Moll. Raised Beach Dep. Kwanto Reg., p. 107.
? 1932 *Potamides Jenkinsi* K. MART. — K. MARTIN, Ouderd. sedim. antikl. Res. Soerabaja, pp. 149, 151.
? 1935 *Potamides cingulata* (GMELIN). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 184.
1940 *Cerithidea (Cerithideopsilla) cingulata* (GMELIN). — VAN R. ALTENA, Rev. *Cerithidea cingulata* (Gmel.) etc., p. , pl. , figs. 1—11.

Material examined:

Upper Kalibeng layers: Sheet 93B, M 258: 2 ex.; M 260: 1 ex.
Poetjangan layers (volcanic facies): Sheet 105B, M 71: 11 ex.; Sheet 110B, M 162: 11 ex.; M 170: 2 ex.; C 71: 1 ex.; C 83: 4 ex.; Sheet 116A, M 234: 1 ex.; below layer I: Sheet 105B, M 68: 1 ex.; layer I: Sheet 110A, M 100: 2 ex.; C 55: 1 ex.; horizon above layer I: Sheet 110B, M 274: 2 ex.; C 74: 2 ex.; layer II: Sheet 110B, M 177: ? 1 fr.; Sheet 116A, M 216: 13 ex. + fr.; M 218: 3 ex.; C 4: 1 ex.; C 5: 2 ex.; C 31: 1 ex.; C 34: 3 ex.; C 36: 2 + ? 1 ex. (enclosed in conglomerate with *Umbonium vestiarium* (L.), *Nassarius* spec., *Dentalium* spec., etc.); layer III: Sheet 110A, M 142: 1 ex.; Sheet 110B, M 188: 1 ex.
Kaboeh layers: Sheet 110A, M 315: 1 ex.

MARTIN has already pointed out the close relationship of his „*Potamides jenkinsi*" with „*P. fluviatilis* POTIEZ & MICHAUD" [= *Cerithidea cingulata* (GMELIN)]. After the examination of a very large recent material I have come to the conclusion that it is impossible to draw a line between the two species, as recent specimens occur which agree perfectly with MARTIN's types. Therefore I have united the two species. As will appear from the synonymy, however, I do not consider all the specimens referred to as „*Potamides jenkinsi*" by K. MARTIN as belonging to the present species. All the shells examined by MARTIN which I saw in the Leiden Museum, lack the outer lips; among my material there are 2 specimens (from the loc. M 234 and M 218) which still possess them.

I have cited with doubt those references to „*Potamides* (or *Cerithium*) *jenkinsi* (MARTIN)" and „*Potamides fluviatilis* P. & M." which are not accompanied by a good figure and of which I did not see the

material they are based on, as it remains doubtful if they bear on *C. cingulata* (GMELIN) in the restricted sense (cf. VAN R. ALTENA 1940).

I do not think that the variety *sondeiana* K. MARTIN (K. MARTIN 1899, fig. 500) has the importance of a stratigraphical subspecies. In the older whorls of recent and fossil specimens of the present species the foremost spiral groove is frequently lacking, thus the variety is only distinguished by this juvenile character persisting in the younger whorls. As many transitional forms to this variety were found in the recent and fossil material I examined, it seems impossible to draw a line between the species and the variety. Among the present material specimens from the localities M 258, M 260, M 170, C 71, C 74, C 83, and C 36 may be considered to belong to the variety *sondeiana* K. MARTIN.

Fossil distribution:

Mal: miocene (Vigo group): ? Bondoc Peninsula (Luzon, Philippines); ? Danao (Cebu, Philippines); upper miocene: ? River Ilarön near Gorön (Luzon, Philippines); pliocene: subsoil (105—180 m.) of Batavia (Java); pliocene: Tjidjadjar, Waled (Cheribon, Java); Mount Gombel[7]) (Semarang, Java); [= Upper Kalibèng layers]: Sonde (Madioen, Java); pliocene: ? Fialarang (Beloe Tassih Fettoh, Timor); ? Atjeh (Sumatra); pliocene or younger: Blakan Kebon (Semarang, Java); „pliocene" [= Poetjangan layers (volcanic facies), layer II]: ? between Djetis and Sidoteko (Soerabaja, Java); quaternary: ? Bondoc Peninsula (Luzon, Philippines).
Jap: miocene — holocene: ? Honsyû; „diluvium" [= pliocene]: Tokyo.
Chi: pliocene (Byôritu beds): ? Taiwan Is. (= Formosa).
Ind: upper miocene (Talar stage of Mekran series): ? NW. India.

Recent distribution:

Mal, Jap, Chi, Ind.

Bathymetrical distribution:

Estuaries, mangrove swamps, brackish and even freshwater ponds.

50. CERITHIDEA (CERITHIDEOPSILLA) DJADJARIENSIS (K. MARTIN).

+ 1899 *Potamides (Cerithidea) djadjariensis* spec. nov. — K. MARTIN, Foss. Java, p. 216, pl. 33, figs. 502, 502a.
? 1906 *Potamides* cfr. *incisus* HOMER .and JACQ. — TOKUNAGA, Foss. Env. Tokyo, p. 26, pl. 1, fig. 53.
1919 *Potamides djadjariensis* MART. — K. MARTIN, Paläoz. Kenntn. Java, pp. 94, 132.
1929 *Potamides djadjariensis* MARTIN. — SIEMON, Jungtert. Moll. Niederl. O.-Indien, p. 40.
1931 *Potamides djadjariensis* MART. — VAN ES, Age *Pithecanthr.*, p. 45.

[7]) I examined a sample of 29 specimens from this loc. (R. G. M. L.) labelled „*Potamides jenkinsi* MART." by K. MARTIN; one of these specimens belongs to the present species, most of the remaining I shall refer to as *C. (Cerithideopsilla)* cf. *microptera* (KIENER) (see p. 10).

1931 *Potamides djadjariensis* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 250.
1940 *Cerithidea (Cerithideopsilla) djadjariensis* (K. MARTIN). — VAN R. ALTENA, Rev. *Cerithidea cingulata* (GMEL.) etc., p. , pl. , figs. 12—19.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 116A, M 216: 7 ex.; C 34: 3 ex.

Fossil distribution:

Mal: pliocene: Tjidjadjar (Cheribon, Java); Kali Glagah (Pekalongan, Java) (G. I. A.).
Jap: „diluvium" [= pliocene]: ? Tokyo.

Recent distribution:

Mal, Jap, Chi, Ind, Mad.

Bathymetrical distribution:

Estuaries, brackish and even freshwater pools.

51. CERITHIDEA (CERITHIDEOPSILLA) cf. MICROPTERA (KIENER).

Figure 2.

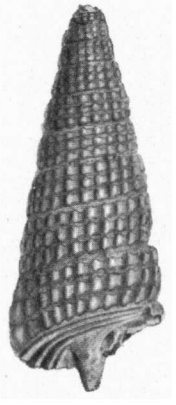


Fig. 2. *Cerithidea* cf. *microptera* (KIENER), × 1½, from Sheet 110A, M 122, Poetjangan layers (volcanic facies), layer II.

[+ 1842 *Cerithium microptera* Nobis. — KIENER, Icon. Coq. Viv., **5**, *Cerithium*, p. 93, pl. 30, figs. 3, 3.
1940 *Cerithidea (Cerithideopsilla) microptera* (KIENER). — VAN R. ALTENA, Rev. *Cerithidea cingulata* (Gmel.) etc., p. , pl. , figs. 23—25].
1912 *Potamides (Cerithidea) Jenkinsi* MART. [partim]. — K. MARTIN, Vorl. Bericht, **2**, p. 167.
1919 *Potamides Jenkinsi* MART. — K. MARTIN, Paläoz. Kenntn. Java, pp. 94 [partim], 133 [partim].
1931 *Potamides jenkinsi* MART. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 251.

Material examined:

Poetjangan layers (volcanic facies): Sheet 105B, M 71: 1 ex.; Sheet 110A, M 137: 1 ex.; Sheet 110B, M 169: 1 ex.;

C 71: 1 ex.; C 83: 1 ex.; Sheet 116B, M 335: 1 ex.; layer II: Sheet 110A, M 122: 1 ex.; Sheet 110B, M 281: 1 ex.; M 284: 1 ex.; C 29: 1 ex.; C 82: ? 1 ex.; Sheet 116A, M 216: 2 ex.; M 218: 1 ex.; M 227: 1 ex.; C 6: 2 ex.; C 34: 2 ex.; C 39: 1 ex.; layer III: Sheet 110B, M 172: 1 ex.; Sheet 116A, M 228: 3 ex.; M 232: 1 fr.
Kaboeh layers: Sheet 110A, M 315: 1 ex.

In all these specimens the outer lip is lacking, and therefore the identification remains doubtful. The same holds true for the specimens from Mount Gombel (R. M. G. M. L.) which I consider to belong to the same species (cf. note 7, p. 9). They are distinctly robuster than *C. cingulata* (GMEL.).

There are no previous records of *C. microptera* (KIENER) in a fossil state; its recent range comprises part of the regions Mal and Chi.

CERITHIDEA (CERITHIDEOPSILLA) spec.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 116A, C 36: 3 ex.; layer III: Sheet 110A, M 139: 1 ex.; Sheet 116A, M 228: 2 ex.

These specimens are very incomplete.

Subgenus *Cerithidea* SWAINSON.
Sectio *Cerithidea* SWAINSON.

52. CERITHIDEA (CERITHIDEA) OBTUSA (LAMARCK).

+ 1822 *Cerithium obtusum.* — LAMARCK, An. s. Vert., 7, p. 71.
1897 *Potamides obtusus* LAM. — MARTENS, Süss- u. Brackw. Moll. Ind. Arch., p. 186, pl. 9, figs. 22, 22b.
1923 *Potamides (Cerithidea) obtusus* LAMARCK sp. — OOSTINGH, Rec. shells Java, p. 76.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110B, M 175: 1 ex.

Fossil distribution:

Mal: pliocene: Tjidjoerei (Cheribon, Java) (G. I. A.).

Recent distribution:

Mal, Mic, Chi, Ind, Mad.

Bathymetrical distribution:

Between tide-marks, in brackish pools.

53. CERITHIDEA (CERITHIDEA) spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 257: 1 ex.
Poetjangan layers (volcanic facies), layer I: Sheet 110B, M 301: 1 ex.

These specimens are too much worn and damaged to enable a specific identification; they do not, however, belong to the preceding species.

Sectio *Phaenommia* MÖRCH 1860.
(= *Aphanistylus* P. FISCHER 1884).

54. CERITHIDEA (PHAENOMMIA) CHARBONNIERI (PETIT).

\+ 1851 *Cerithium Charbonnieri* PETIT. — PETIT, Journ. de Conch., 2, p. 264, pl. 7, fig. 7.
1897 *Potamides charbonnieri* PETIT. — MARTENS, Süss- u. Brackw. Moll. Ind. Arch., p. 190.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 126: 1 ex.

The specimen is very incomplete, but it shows unmistakably the characters of this species, and thus there is no doubt as to the identification.

Fossil distribution:

no previous records.

Recent distribution:

Mal, Chi.

Bathymetrical distribution:

not recorded, presumably an inhabitant of the intertidal zone in estuaries as most *Cerithideae* are.

Genus *Telescopium* MONTFORT 1810.

55. TELESCOPIUM TITAN K. MARTIN.

\+ 1889 *Telescopium Titan* spec. nov. — K. MARTIN, Ein neues *Telescopium* etc., p. 234, pl. 26, figs. 1, 1a, 2, 3.
1890 *Telescopium Titan* MART. — K. MARTIN, Kei-Inseln, Timor, Celebes, pp. 276, 279.
1899 *Telescopium titan* MART. — K. MARTIN, Foss. Java, p. 220, pl. 33, figs. 510—512.
? 1911 *Telescopium titan* MART. (?) — K. MARTIN, Vorl. Bericht, 1, p. 24.
1919 *Telescopium titan* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 94, ? 127, 132, 133.
1929 *Telescopium titan* MARTIN. — SIEMON, Jungtert. Moll. Niederl. O.-Indien, pp. ? 15, ? 29, 40.
193. *Telescopium titan* MART. — NASON-JONES, Geol. Finsch Coast Area, pp. ? 31, 34, ? 48.
1931 *Telescopium titan* MART. — VAN ES, Age *Pithecantr.*, pp. 45, 95, 115, 120.
? 1931 *Telescopium* aff. *Tel.* (s. str.) *titan* K. MARTIN. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 132.
1935 *Telescopium titan* K. MARTIN. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 52 (with further synonymy).

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 + ? 1 ex. + 1 fr.

Poetjangan layers (volcanic facies): Sheet 110B, C 110: ? 1 ex.; Sheet 116A, C 14: 2 ex.; layer II: Sheet 110A, C 54: 2 + ? 2 ex.; Sheet 110B, M 177: 2 ex.; Sheet 116A, M 222: 1 fr.; M 225: 2 ex.; M 227: ? 2 ex.; C 6: ? 2 ex.; ± layer II: M 283: 1 + ? 1 ex.

The two characters which have proved to be the most reliable in distinguishing this species from *T. telescopium* (L.), viz. the projecting edge of the bodywhorl in large specimens and the longer siphonal canal, could not be studied in the present material. It appeared that the apical angle in *T. titan* is generally larger than 35° in *T. telescopium* (L.) generally smaller, but there are exceptions, as the Zoological Museum at Amsterdam possesses a recent *T. telescopium* (L.) with an apical angle of 37°, and even the holotype of *T. titan* (K. MARTIN 1889, pl. 26, fig. 1) has an apical angle of ± 34°. I have considered shells with apical angles larger than 37° to belong to *T. titan* and those with an apical angle smaller than 33° to *T. telescopium* (L.). The remaining specimens have been referred with doubt to one of these two species after accurate comparison with the rather extensive material of the two species available to me.

Fossil distribution:

Mal: neogene: Mandirantjan (Cheribon, Java); Finsch Coast Area (New Guinea); ? SW. New Guinea; lower miocene: ? Njalindoeng beds (Buitenzorg, Java); upper miocene: Tjiodeng (Buitenzorg, Java); pliocene: Tjidjadjar, Tjidjoerei (Cheribon, Java); Boemiajoe (Pekalongan, Java); Mount Gombel (Semarang, Java); Dahana (Nias); ? near Niki Niki (Amanoeban, Timor); Fialarang (Beloe Tassih Fettoh, Timor); Menado, Gorontalo (Celebes); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [=Poetjangan layers (volcanic facies), layer II]: Soemberringin, Tambakbatoe (Soerabaja, Java); pleistocene: ? Finsch Coast Area (New Guinea).

Recent distribution:

not known living.

56. TELESCOPIUM TELESCOPIUM (LINNÉ).

+ 1758 *Trochus telescopium.* — LINNÉ, Syst. Nat., ed. 10, p. 760.
1879 *Cerithium montis Selae* nov. spec. — K. MARTIN, Tertiärsch. Java, p. 66, pl. 12, fig. 1.
1881 *Cerithium montis Selae* MART. — K. MARTIN, Posttert. fauna Blitong, pp. 18, 20.
1884 *Potamides (Telescopium) telescopium* BRUG. — K. MARTIN, Tiefbohr. Java, p. 145.
1887 *Potamides (Telescopium) telescopium* BRUG. — K. MARTIN, Ibid., pp. 328, 348.
1890 *Telescopium fuscum* CHEMN. — K. MARTIN, Kei-Inseln, Timor, Celebes, p. 277.
1899 *Telescopium telescopium* LINN. — K. MARTIN, Foss. Java, p. 220, pl. 33, figs. 509, 509a.
1907 *Telescopium telescopium* LINN. — ICKE & MARTIN, Tert. e. Kwart. Nias, pp. 211, 217.

1913 *Telescopium telescopium* LINN. — PRATT & SMITH, Geol. S. part Bondoc Peninsula, p. 324, pl. 1, fig. 6.
1915 *Telescopium telescopium* BRUG. — STAUB, Sangkulirangbai, p. 128.
1919 *Telescopium telescopium* LINN. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 94, 128, 137.
1920 *Telescopium telescopium* L. — TESCH, Timor, 2, p. 58, pl. 132, fig. 191.
1921 *Telescopium telescopium* LINNAEUS. — DICKERSON, Fauna Vigo group, pp. 8, 14.
1922 *Telescopium telescopium* LINNAEUS. — DICKERSON, Rev. Philipp. Paleont., p. 203, pl. 15, fig. 6.
1923 *Potamides (Telescopium) telescopium* LINNÉ sp. — OOSTINGH, Rec. shells Java, pp. 75, 160.
1927 *Potamides telescopium* L. — VAN DER MEER MOHR, Misc. Zool. Sumatrana, 18, p. 2.
1928 *Telescopium telescopium.* — K. MARTIN, Nachlese, p. 115.
1928 *Potamides telescopium* L. — SCHÜRMANN, Kjökkenm. e. Palaeol. N. Sumatra, p. 236.
1931 *Telescopium telescopium* LINN. — VAN ES, Age *Pithecanthr.*, p. 95.
1931 *Telescopium* (s. str.) *telescopium* L. — KOPERBERG, Jungtert. u. quat. Moll. Timor, p. 131.
1931 *Telescopium fuscum* CHEMN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 252.
1931 *Telescopium telescopium* LINN. — VAN DER VLERK, Ibid., p. 252.
1932 *Telescopium telescopium* L. — VAN DER VLERK, Zuidrembangsche heuvelland, p. 111.
1935 *Telescopium telescopium* (LINNAEUS). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 184, pl. 9, figs. 21, 22.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 122: 4 + ? 8 ex.; C 54: 9 ex.; Sheet 116A, M 221: 1 ex.; layer III: Sheet 110A, M 139: 5 + ? 1 ex.

The differences between this species and *T. titan* K. MARTIN have been discussed above (see p. 13).

Fossil distribution:

Mal: neogene: Ngembak (Semarang, Java); Grissee (Soerabaja, Java); miocene: Sangkoelirang Bay (E. Borneo); (Vigo group): Bondoc Peninsula (Luzon, Philippines); upper miocene: Tjilanang beds (Priangan, Java); pliocene: near Atamboea (Beloe Tassih Fettoh, Timor); near Niki Niki (Amanoeban, Timor); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); quaternary: Lelewono Cave (Nias); Billiton; Manoelea (Malakka, Timor); SW. Celebes; Bondoc Peninsula (Luzon, Philippines).

Chi: holocene (raised coral reef): Taiwan Is. (= Formosa).

Recent distribution:

Mal, Bro, Mel, Que, Jap, Chi, Ind.

Bathymetrical distribution:

Estuaries, in mangrove-swamps between tide marks, generally in brackish water.

TELESCOPIUM spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 254: 3 ex. Poetjangan layers (volcanic facies): Sheet 105B, M 71: 1 ex. (cast); Sheet 110B, M 203: 1 ex.; Sheet 116A, C 14: 1 ex.; layer II: Sheet 110A, M 122: 1 ex.; M 124: 11 ex. + fr.; M 125: 1 ex.; C 54: 5 ex.; Sheet 110B, M 177: 1 ex.; Sheet 116A, M 218: 1 ex.; M 220: 1 ex.; M 222: 1 ex.; M 223: 1 ex.; C 30: 1 ex.; layer III: Sheet 110A, M 139: 2 ex.

The preservation of these specimens does not allow of a more exact identification.

Genus *Terebralia* SWAINSON 1840.

57. TEREBRALIA PALUSTRIS (LINNÉ).

+ 1767 *Strombus palustris.* — LINNÉ, Syst. Nat., ed. 12, p. 1213.
1879 *Pyrazus palustris* LINN. — WOODWARD, Foss. shells Sumatra, p. 498, pl. 13, fig. 11.
1890 *Potamides (Terebralia) palustris* BRUG. — K. MARTIN, Kei-Inseln, Timor, Celebes, p. 277.
1897 *Potamides palustris* L. — MARTENS, Süss- u. Brackw. Moll. Ind. Arch., pp. 176, 289, pl. 9, figs. 24, 25.
1899 *Potamides (Terebralia) palustris* LINN., var. — K. MARTIN, Foss. Java, p. 210, pl. 32, fig. 478.
1907 *Potamides (Terebralia) palustris* LINN., var. — ICKE & MARTIN, Tert. e. Kwart. Nias, p. 217.
1908 *Potamides (Terebralia) palustris* (L.). — BOETTGER, Tert. u. jüng. Verst., p. 669.
1913 *Cerithium (Potamides) palustris* LINN. — SMITH, Contr. Strat. a. Foss. Fauna Philipp., pp. 254, 269, pl. 6, fig. 9.
1919 *Potamides palustris* LINN., var. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 93, 130, 132.
1920 *Potamides (Terebralia) palustris* L. [partim]. — TESCH, Timor, 2, p. 57, pl. 131, figs. 183a, b.
1925 *Potamides (Terebralia) palustris* (LINNÉ). — OOSTINGH, Obi and Halmahera, p. 46.
1925 *Cerithium (Terebralia) palustra* BRUG. — STEFANINI, Descr. Foss. S. Arabia a. Br. Somalil., p. 215, pl. 32, fig. 3.
1927 *Terebralia palustris* (LINNÉ). — COX, Neog. a. Quat. Moll. Zanzibar, p. 84, pl. 18, fig. 4.
1928 *Potamides palustris* LINN. — K. MARTIN, Moll. Neog. Atjeh, pp. 7, 25.
1928 *Potamides palustris.* — K. MARTIN, Nachlese, pp. 108, 118.
1928 *Terebralia palustris* (LINNÉ). — STOCKLEY, Geol. Zanzibar Protect., p. 42.
1929 *Potamides palustris* LINN., var. — SIEMON, Jungtert. Moll. Niederl. O.-Indien, p. 40.
193. *Potamides palustris.* — NASON-JONES, Geol. Finsch Coast Area, p. 28.
1930 *Terebralia palustris* (LINNÉ). — COX, Kenya, p. 137.
1931 *Potamides palustris* LINN., var. — VAN ES, Age *Pithecanthr.*, p. 45.
1931 *Potamides palustris* LINN. — VAN ES, Ibid., non [8]) p. 51, p. 95.
1931 *Potamides (Terebralia) palustris* L. — KOPERBERG, Jungtert. u. Quart. Moll. Timor, p. 129.
1931 *Potamides (Terebralia) palustris* L., subspec. K. MARTIN. — KOPERBERG, Ibid., p. 129.

[8]) Fide OOSTINGH, 1935, Moll. Plioz. Boemiajoe, p. 211.

1931 *Potamides palustris* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 251.
1932 *Potamides palustris* LINN., var. — VAN DER VLERK, Zuidrembangsche heuvelland, p. 111.
1933 *Potamides palustris* L. — NARDINI, Moll. Pleist. Somalia, pp. 172, 173, 174.
1934 *Potamides (Terebralia) palustris* (LIN.). — NARDINI, Moll. Spiagge Em. Mar Rosso, p. 232.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 254: 3 ex.
Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 122: 1 ex.; C 54: 1 ex.; Sheet 110B, M 177: 1 ex.; M 178: 1 ex.; Sheet 116A, M 214: 1 ex.; M 216: 1 ex.; M 222: 1 ex.; M 223: 2 ex.; M 226: 2 ex.; C 6: 1 ex.; C 29: 1 ex.; C 30: 1 ex. (bearing a specimen of *Ostrea* spec.); layer III: Sheet 110A, M 139: 2 ex.
Poetjangan layers (argillaceous facies): Sheet 116A, C 9: 1 ex.

Some specimens practically agree with „*Potamides (Terebralia) palustris* LINN., var." of K. MARTIN. As intermediate forms between this variety and the typical species occur in recent as well as in fossil samples, I cannot attribute the value of a subspecies to it as miss KOPERBERG did.

„*Cerithium lineatum* BORSON" from the upper miocene (Tortonien) of Piedmont (Italy) is considered to be a variety of the present species by SACCO [9]).

Fossil distribution:

Mal: caenozoic: Finsch Coast Area (New Guinea); miocene: Nias; Mindanao (Philippines); lower miocene: West Progo Mountains (Jogjakarta, Java); upper miocene: Tandasngampar (Priangan, Java); Tjiodeng (Buitenzorg, Java); pliocene: Tjidjadjar (Cheribon, Java); E. of Tjidjoelang (Banjoemas, Java) (T. J. 54, p. 38); Atjeh (Sumatra); near Niki Niki (Amanoeban, Timor); Fialarang (Beloe Tassih Fettoh, Timor); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); quaternary: near Hilina (Nias); SW. Celebes.
Ery: quaternary: S. Arabia; raised beaches of Red Sea; Somalia.
Mad: quaternary: Kenya; Tanga.

Recent distribution:

Mal, Bro, Mel, Que, Loy, Tua, Mic, Chi, Ind, Ery, Mad.

Bathymetrical distribution:

Estuaries, mangrove-swamps.

[9]) 1895 *Terebralia palustris*, var. *lineata* (BORS.). — SACCO, Moll. Terr. Terz. Piemonte e Liguria, **16**, p. 51, pl. 3, fig. 26.

58. TEREBRALIA SULCATA (BORN).

† 1778 *Murex sulcatus.* — BORN, Ind. Mus. Caes. Vind., p. 324.
? 1922 *Cerithidea (Pyrazus)* cf. *sulcatus* BRUGUIERE. — DICKERSON, Rev. Philipp. Paleont., p. 202.
1922 *Potamides sulcatus* BORN. — K. MARTIN, Foss. Java, p. 478.
1928 *Potamides sulcatus.* — K. MARTIN, Nachlese, p. 115.
1931 *Potamides palustris* [non] LINN. — VAN ES, Age *Pithecanthr.*, p. 51 [10]).
1931 *Potamides sulcatus* BRUG. — VAN ES, Ibid., p. 95.
1931 *Potamides sulcatus* BORN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 251.
1935 *Terebralia sulcata* (BORN). — OOSTINGH, Moll. Plioz. Boemiajoe, p. 51 (with further synonymy).
1935 *Terebralia sulcata* (BORN). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 186, pl. 9, fig. 23.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 ex.; Sheet 110B, C 83: 1 ex.; layer II: Sheet 110A, M 122: 1 ex.; Sheet 110B, C 82: 1 ex.; Sheet 116A, M 216: 2 ex.

Though all my specimens are damaged, the identification is pretty safe after comparison with recent specimens of this species.

Fossil distribution:

Mal: neogene: Toi Osapi Sòka (Amanoeban, Timor); miocene (Vigo group): Bondoc Peninsula (Luzon, Philippines); lower miocene: Njalindoeng beds (Buitenzorg, Java); upper miocene: Tjilanang beds (Priangan, Java); pliocene: Tjimantjeuri (Bantam, Java); Boemiajoe, Bentarsari Basin (T. J. 54, p. 25), Pangka (Pekalongan, Java); Atjeh (Sumatra); several localities in Amanoeban (Timor); Fialarang (Beloe Tassih Fettoh, Timor); Sinaan (Cebu Is., Philippines); mouth of river Tami (N. coast of New Guinea); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer II]: Soemberringin (Soerabaja, Java); plio- or pleistocene: near Niki Niki (Amanoeban, Timor); quaternary: near Hilina (Nias).
Chi: holocene (raised coral reef): Taiwan Is. (= Formosa).

Recent distribution:

Mal, Fre, Mel, Chi, Ind, Mad.

Bathymetrical distribution:

between tide marks.

Familia Cerithiidae.

Genus *Cerithium* BRUGUIÈRE 1789.

[10]) Fide OOSTINGH, 1935, Moll. Plioz. Boemiajoe, p. 211.

59. CERITHIUM PFEFFERI (DUNKER).

+ 1877 *Vertagus pfefferi* DKR. — DUNKER, Malakozool. Blätter, 24, p. 75.
1882 *Vertagus pfefferi* DKR. — DUNKER, Ind. Moll. Maris Jap., p. 108, pl. 4, figs. 12—14.
1898 *Cerithium* (s. str.) *Pfefferi* DUNKER. — KOBELT, *Cerithium*, p. 145, pl. 27, figs. 12, 13.
1932 *Cerithium pfeifferi* DUNKER. — NOMURA, Moll. Raised Beach Dep. Kwanto Reg., p. 106.
1936 *Cerithium (Proclava) pfefferi* (DUNKER). — SUZUKI & ICHIMURA, Moll. Foss. Raised Beach Takai, p. 711, pl. 40, figs. 17, 17a.
1936 *Cerithium pfeifferi* (DUNKER). — NOMURA & ZINBÔ, Moll. Foss. Okinawa-Zima, p. 260, pl. 11, fig. 28.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 125: 1 ex.; layer III: Sheet 110A, M 142: 1 ex.

Fossil distribution:

Jap: holocene: Bôsô Peninsula (Honsyû).
Chi: pliocene (Simaziri beds): Okinawa-Zima (Ryûkyû Is.).

Recent distribution:

Mal, Jap, Chi, Ery, Mad.

Bathymetrical distribution:

9—90 m.

60. CERITHIUM KARANGENSE K. MARTIN.

+ 1899 *Cerithium (Vertagus) karangense* spec. nov. — K. MARTIN, Foss. Java, p. 206, pl. 31, figs. 469, 470.
1911 *Cerithium (Vertagus) karangense* MART. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1919 *Cerithium karangense* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 93, 130, 131.
1921 *Cerithium karangense* K. MART. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
1927 *Cerithium (Vertagus) karangense* K. MARTIN. — P. J. FISCHER, Seran u. Obi, pp. 33, 53, pl. 212, figs. 20a, b.
193. *Cerithium karangense* MART. — NASON-JONES, Geol. Finsch Coast Area, p. 35.
1931 *Cerithium karangense* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 249.

Material examined:

Poetjangan layers (volcanic facies): Sheet 110B, M 163: 1 ex.; horizon above layer I: Sheet 110B, M 274: 1 ex.; C 74: 3 ex.

My specimens are small (maximum altitude: 14 mm.) and the whorls are less convex than in the types, with which I compared them (R. G. M. L.). They agree, however, in all other characters with MARTIN's species.

I tried to range the species dealed with in this paper in the different subgenera of *Cerithium* which have been described, but the result was very unsatisfactory; and so I have preferred to leave the

genus unsplit. The present species fits into THIELE's subgenus *Proclava* [1]), of which the previous species is the genotype.

Fossil distribution:

Mal: neogene: Finsch Coast Area (New Guinea); upper miocene: Tandasngampar, between Tjilintoeng and Angsana (Priangan, Java); pliocene [= Upper Kalibèng layers]: Padasmalang; pliocene: Obi; Ceram.

Recent distribution:

not known living.

61. CERITHIUM SINENSE (GMELIN).

1790 *Murex sinensis.* — GMELIN in: Linné, Syst. Nat., 1, ed. 13, p. 3542.
1898 *Cerithium (Vertagus) sinense* GMELIN. — KOBELT, Cerithium, p. 20, pl. 4, figs. 2—8.
1899 *Cerithium (Vertagus) obeliscus* BRUGUIÈRE. — K. MARTIN, Foss. Java, p. 206.
1901 *Vertagus obeliscus* (BRUG.). — BULLEN, Pleist. Moll. Perim, p. 255.
1908 *Cerithium obeliscus* BRUG. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1919 *Cerithium obeliscus* BRUG. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 93, 132, 141.
1931 *Cerithium obeliscus* BRUG. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 249.
1935 *Cerithium sinense* (GMELIN). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 181, pl. 9, fig. 13.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.

My only specimen is damaged; it agrees with recent specimens of this species.

Fossil distribution:

Mal: pliocene: Waled (Cheribon, Java); [= Upper Kalibèng layers]: Sonde (Madioen, Java).
Chi: holocene (raised coral reef): Taiwan Is. (= Formosa).
Ery: quaternary: Perim Is.

Recent distribution:

Mal, Bro, Mel, Que, Syd (only recorded from Lord Howe Is.), Loy, Tua, Mic, Jap, Chi, Ind, Ery, Mad.

Bathymetrical distribution:

36 m.

62. CERITHIUM BIOEKENSE OOSTINGH.

+ 1935 *Cerithium bioekense* n. sp. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 49, textfigs. 1*, 2*.

[1]) 1929, Handb. Syst. Weichtierk., 1, p. 212.

Material examined:

Poetjangan layers (volcanic facies), layer III: Sheet 110A, M 139: 2 ex.
Kaboeh layers: Sheet 110A, M 315: 1 ex.

One specimen of loc. M 139 agrees in every respect with OOSTINGH's description and figures; in the second the secondary spiral between the primary spirals 2 and 3 already starts 4 whorls before the body whorl instead of in the last part of the penultimate whorl. In the specimen from loc. M 315 the profile of the younger whorls is slightly more steplike than in the types figured by OOSTINGH.

Fossil distribution:

Mal: pliocene: Boemiajoe (Pekalongan, Java).

Recent distribution:

not known living.

63. CERITHIUM JONKERI K. MARTIN.

Figure 3.

+ 1884 *Cerithium (Vertagus) Jonkeri* nov. spec. — K. MARTIN, Tiefbohr. Java, p. 148, pl. 8, fig. 146.
1887 *Cerithium (Vertagus) Jonkeri* n. sp. — K. MARTIN, Ibid., p. 308.
1890 *Cerithium (Vertagus) Jonkeri* MART. — K. MARTIN, Kei-Inseln, Timor, Celebes, pp. 276, 279.
1899 *Cerithium Jonkeri* MART. — K. MARTIN, Foss. Java, p. 201 (note).
1907 *Potamides* (?) *Jonkeri* MARTIN. — ICKE & MARTIN, Tert. e. Kwart. Nias, pp. 215, 242.
1908 *Potamides jonkeri* K. MARTIN. — O. BOETTGER, Tert. u. jüng. Verst., p. 668.
1911 *Potamides* (?) *Jonkeri* MART. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1919 *Potamides Jonkeri* MART. — K. MARTIN, Palaeoz. Kenntn. Java, p. 94.
1920 *Cerithium (Vertagus) Jonkeri* MARTIN. — TESCH, Timor, 2, p. 54, pl. 131, figs. 178a, b, 179a, b.
1922 *Cerithium jonkeri* K. MARTIN. — DICKERSON, Rev. Philipp. Paleont., pp. 202, 217.
1931 *Cerithium jonkeri* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 249.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 3 ex.; Sheet 105B, M 64: ? 1 + 2 ex.; layer II: Sheet 116A, M 216: 2 ex.; M 220: 1 ex.; layer III: Sheet 110A, M 139: 1 ex.; M 142: 1 ex.

The specimens from the localities M 142 (fig. 3), M 220 and one shell from M 216 lack all axial sculpture in the youngest 2½ whorls. Moreover their varix is not so distinct as in typical specimens. The shell from loc. M 139 is a transitional form between this variety and the typical species.

Fossil distribution:

Mal: miocene (Vigo group): Bondoc Peninsula (Luzon, Philippines); pliocene: Bentarsari Basin (Pekalongan, Java) (T. J. 54, pp. 28, 31); [= Upper Kalibèng layers]: Padasmalang (Madioen, Java); Dahana (Nias); several localities in Fialarang (Beloe Tassih

Fig. 3. *Cerithium jonkeri* K. MARTIN, × 1½, from Sheet 110A, M 142, Poetjangan layers (volcanic facies), layer III.

Fettoh, Timor); Gorontalo (only casts and impressions, R. G. M. L.; Celebes); (Banisilan formation): Agusan Province (Mindanao, Philippines).

Recent distribution:

not known living.

64. CERITHIUM POETJANGANENSE spec. nov.

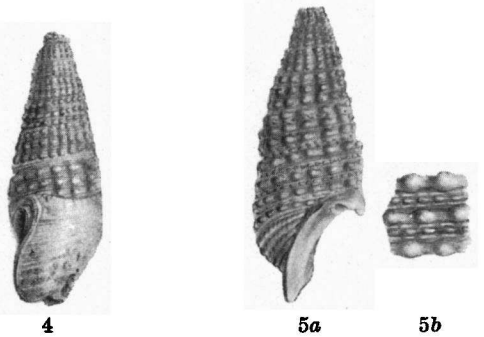
Figures 4, 5*a*, *b*.

Material examined:

Poetjangan layers (volcanic facies), layer III: Sheet 110A, M 139: holotype + 5 ex.

Description: Shell fusiform; topmost whorls wanting in my specimens, in the holotype 7 whorls are left; whorls of the spire almost flat, body whorl flat behind and narrowed before the middle. Sculpture: three primary spirals beaded at the crossing with the axial sculpture; in the interstices 3 to 5 secondary spirals occur, of which the middle one is the strongest; when there are 5, the numbers 1 and 5 are stronger than 2 and 4. In the younger whorls the secondary spirals bear more beads than the primary ones, part of them being situated in the interstices between the axial ribs. The body whorl lacks all axial sculpture, it only possesses beaded spirals of different strength, the stronger ones bearing a smaller number of (larger) beads than the less stronger ones. In the body whorl before the third spiral

two others spirals of the primary type occur, the hindermost of which forms as it were the prolongation of the suture. Between these two spirals and before the foremost secondary spirals occur. In front view (fig. 5*a*) a distinct varix is visible opposite to the aperture in the



4 5*a* 5*b*

Fig. 4. *Cerithium poetjanganense* spec. nov., holotype × 1½, from Sheet 110A, M 139, Poetjangan layers (volcanic facies), layer III.

Figs. 5*a, b*. *Cerithium poetjanganense* spec. nov., paratype, fig. *a*: × 1½, fig. *b*: detail of sculpture more highly magnified, from Sheet 110A, M 139, Poetjangan layers (volcanic facies), layer III.

body whorl. In the older whorls varices occur without regularity. Aperture oval, peristome continuous, with a distinct parietal fold; outer lip parasigmoid [12]). In the holotype, which is my only specimen still possessing the outer lip, the canal is slightly damaged, probably it was short and not very narrow.

Alt. 24 + ? (presumably about 27), Diam. 10,5 (holotype).

Alt. 26 + ? (presumably about 29), Diam. 11 + ? (largest paratype).

The description has been made after the holotype, and as to the sculpture mainly after the largest paratype.

I have named this new species after Mount Poetjangan, in the neighbourhood of which loc. M 139 is situated.

Cerithium poetjanganense spec. nov. is closely related to *C. jonkeri* K. MARTIN (see p. 20), of which it will perhaps prove to be merely a variety when more material is available. I have distinguished it on account of its smaller size, and because in those specimens of *C. jonkeri* K. MARTIN which have sculptured younger whorls, the axial sculpture is always predominant, the spiral sculpture reduced. The top of the spire is very much alike in the two species.

65. CERITHIUM GRANOSUM KIENER.

+ 1842 *Cerithium granosum* Nobis. — KIENER, Icon. Coq. Viv., **5**, *Cerithium*, p. 57, pl. 4, figs. 3, 3.

[12]) DAVIES, 1935, Tert. Faunas, 1, p. 214.

1898 *Cerithium granosum* KIENER. — KOBELT, *Cerithium*, p. 221, pl. 39, figs. 12, 13.
1906 *Cerithium coralium* DUFR., var. — K. MARTIN, Foss. Java, p. 320, pl. 45, figs. 741, 741a, b.
† 1908 *Cerithium rubus* [non] MARTIJN. — O. BOETTGER, Tert. u. jüng. Verst., p. 669.
1920 *Cerithium rubus* [non] MARTYN. — TESCH, Timor, 2, p. 55, pl. 130, figs. 176a, b, 177a, b.
1931 *Cerithium coralium* DUFR. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 248.
1931 *Cerithium rubus* [non] MARTYN [partim]. — VAN DER VLERK, Ibid., p. 249.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 258: 4 ex.; M 261: 1 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 15: 2 fr.; Sheet 110B, C 83: 1 ex.; layer II: Sheet 116A, M 221: 1 ex.; C 31: 1 ex.; layer III: Sheet 110B, C 130: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, M 289: 1 ex.

Some specimens of loc. M 258, and those of the localities C 83 and C 130 are broader in relation to the altitude than the typical species. I found transitional forms to this broader variety in the recent as well as in the fossil material studied for comparison (e. g. K. MARTIN, 1906, pl. 45, figs. 741, 741*a*, *b*).

MARTIN's „*C. coralium* DUFR., var." agrees with *C. granosum*. I have been unable to find the series of specimens from Nias (MARTIN, l. c.) which made MARTIN consider this form a variety of *C. coralium* KIENER, in the Geological Museum at Leiden.

Fossil distribution:

Mal: miocene: Java (probably from one of the localities M or Y of Junghuhn, respectively E. part of the district of Tjidamar, Buitenzorg and Tjilatjap Mountains, Banjoemas); pliocene: Fialarang (Beloe Tassih Fettoh, Timor); between Pene and Niki Niki (Amanoeban, Timor).

Recent distribution:

Mal, Que, Jap, Chi, Ind, Ery.

Bathymetrical distribution:

18—27 m.

66. CERITHIUM CORALIUM KIENER.

+ 1842 *Cerithium coralium* DUFRESNE. — KIENER, Icon. Coq. Viv., 5, *Cerithium*, p. 32, pl. 8, figs. 3, 3.
1898 *Cerithium coralium* DUFRESNE. — KOBELT, *Cerithium*, p. 218, pl. 39, figs. 1, 2.
1899 *Cerithium* (s. str.)*coralium* DUFRESNE. — K. MARTIN, Foss. Java, p. 201, pl. 31, figs. 461, 461a.
† 1907 *Cerithium* (s. str.) *coralium* DUFR. — ICKE & MARTIN, Tert. e. Kwart. Nias, p. 215.
1919 *Cerithium coralium* DUFR. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 93 [partim], 137.

? 1928 *Cerithium coralium* DUFR. — K. MARTIN, Moll. Neog. Atjeh, pp. 7, 16.
1931 *Cerithium coralium* DUFR. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 248.
? 1935 *Cerithium coralium* (DUFRESNE) KIENER. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 49.
1935 *Gourmya corallia* (KIENER). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 182, pl. 9, figs. 19, 20.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 116A, C 31: 1 ex.

Following the opinion of most authors I have kept this species separated from the preceding one. In the present material it was not difficult to distinguish these two forms on account of their sculpture and as far as I am aware this is also possible in well preserved recent material. Now that I have distinguished KIENER's two species I have been obliged to cite some references with doubt, as I could not study the authentic specimens.

My only specimen is slightly damaged; its altitude amounts to 46 mm., but it probably was one or two mm. longer.

Fossil distribution:

Mal: neogene: Ngembak (Semarang, Java); pliocene: ? E. of Tjidjoelang (Banjoemas, Java) (T. J. 54, p. 38); ? Boemiajoe, ? Bentarsari Basin (T. J. 54, pp. 25, 27, 31) (Pekalongan, Java); ? Atjeh (Sumatra); ? Dahana (Nias Is.).

Recent distribution:

Mal, Bro, Mel, Sid, Loy, Chi, Ind.

Bathymetrical distribution:

0—32 m., also in brackish water.

67. CERITHIUM SORDIDULUM GOULD.

+ 1851 *Cerithium sordidulum*. — GOULD, Proc. Boston Soc. N. H., 3 (for 1849), p. 119.
1852 *Cerithium sordidulum* (GOULD). — GOULD, U. S. Exp., Moll. a. Shells, p. 145.
1856 *Cerithium sordidulum* G. — GOULD, Ibid., Atlas, pl. 10, figs. 170, 170a, b.
1865 *Cerithium rubus* [non MARTYN]. — G. B. SOWERBY II in: Reeve, Conch. Ic., 15, *Cerithium*, pl. 11, fig. 75.
1898 *Cerithium serratum* [non] WOOD. — KOBELT, *Cerithium*, p. 213, pl. 38, fig. 1.
1898 *Cerithium sordidulum* GOULD. — KOBELT, Ibid., p. 215, pl. 38, fig. 8.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 139: 1 ex.; layer III: Sheet 110A, M 124: 1 ex.

My specimens agree with recent material from the Siboga Expedition identified as „*Cerithium serratum* WOOD" by SCHEPMAN (Z. M. A.). WOOD's species [13]), however, is based on MARTYN's figure 58 („*Ru-*

[13]) W. WOOD, 1825, Ind. Test., pl. 28, fig. 158.

bus [14])), which undoubtedly represents another, larger species. WOOD's figure seems to be merely a copy of that by MARTYN. Moreover the name is preoccupied by *C. serratum* BRUGUIÈRE 1792. Therefore I adopted GOULD's name for this species. It is closely related to *C. tenellum* G. B. SOWERBY II [15]), which may prove to be only a variety.

Fossil distribution:

Mal: pliocene or younger: Mud-volcano Kalang Anjar (Soerabaja, Java) (G. I. A.).

Recent distribution:

Mal, Mad.

Bathymetrical distribution:

9—50 m.

68. CERITHIUM TUBERCULATUM LINNÉ.

+ 1758 *Strombus tuberculatus.* — LINNÉ, Syst. Nat., ed. 10, p. 1213.
1884 *Cerithium tuberculatum.* — E. A. SMITH, Moll. Alert, p. 63.
1897 *Cerithium tuberculatum* LINNÉ. — MARTENS, Süss- u. Brackw. Moll. Ind. Arch., p. 170.
1899 *Cerithium* (s. str.) *tuberculatum* LINN., var. — MARTIN, Foss. Java, p. 202, pl. 31, figs. 463, 463a.
1908 *Cerithium tuberculatum* LIN., var. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Cerithium* (s. str.) *tuberculatum* LINN., var. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1919 *Cerithium tuberculatum* LINN., var. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 93, 141.
1930 *Clypeomorus tuberculatus* (LINNÉ). — COX, Kenya, pp. 116, 136.
1931 *Cerithium tuberculatum* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 250.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.

My only specimen has a slender habitus, as is typical for MARTIN's var. from Sonde, but the sculpture is different from that of the var. After the examination of a great number of recent specimens of this species I think, however, that this variety doet not exceed the range of variability of the recent species.

Fossil distribution:

Mal: pliocene [= Upper Kalibèng layers]: Sonde, Padasmalang (Madioen, Java).
Mad: pliocene and quaternary: Kenya.

Recent distribution:

Mal, Mel, Que, Chi, Ind, Ery, Mad.

[14]) MARTYN, 1784, Univ. Conch., 2, fig. 58.
[15]) G. B. SOWERBY II, 1855, Thes. Conch., 2, p. 857, pl. 180, figs. 88, 89, 90.

Bathymetrical distribution:

15—27 m.

69. CERITHIUM spec.

Material examined:

Poetjangan layers (volcanic facies), horizon above layer I: Sheet 110B, M 274: 16 fr.

The sculpture of these fragments cannot be distinguished from that of *C. samaranganum* K. MARTIN[16]), but the apical angle is much smaller in my specimens than in MARTIN's species. As the body whorl is wanting in all my specimens, I am unable to identify them.

CERITHIUM spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 ex.; Sheet 105B, M 64: 1 ex.; layer II: Sheet 116A, M 216: 1 ex.; C 30: 1 ex. (aff. *C. granosum* KIENER); layer III: Sheet 110A, M 139: 1 ex.

These specimens are too young or too bad for further identification. They belong to different species, some of them perhaps to species already dealt with above.

Familia Triphoridae.
Genus *Triphora* BLAINVILLE 1828.
Subgenus *Triphora* BLAINVILLE.

70. TRIPHORA (TRIPHORA) PURA (SMITH).

+ 1904 *Triforis purà* n. sp. — E. A. SMITH, Mar. Moll. Maldive a. Laccadive Arch., p. 614, pl. 35, figs. 20, 21.
1909 *Triphora (Euthymia) pura* SMITH. — SCHEPMAN, Prosobr. Siboga Exp., 2, p. 174.

Material examined:

Poetjangan layers, ? (volcanic facies), layer II: Sheet 110B, ? M 278: 1 ex.

My only specimen is very incomplete, but it agrees with SMITH's description and figures and especially with the single shell from Station 47 of the Siboga Expedition (Z. M. A.).

Fossil distribution:

no previous records.

Recent distribution:

Mal, Ind.

[16]) + 1884, Tiefbohr. Java, p. 154, pl. 8, fig. 151.

Bathymetrical distribution:

7—54 m.

Familia Epitoniidae.
Genus *Epitonium* ROEDING 1798.
Subgenus *Cirsostrema* MÖRCH 1852.
Sectio *Elegantiscala* DE BOURY 1911.

71. EPITONIUM (ELEGANTISCALA) SPLENDIDUM (DE BOURY).

+ 1913 *Scala (Elegantiscala) splendida* de Boury, nov. sp. — DE BOURY, Journ. de Conch., 60, p. 286, pl. 10, fig. 8.

Material examined:

Poetjangan layers (volcanic facies): Sheet 110B, C 71: 1 ex.; horizon above layer I: Sheet 110B, M 273: 2 ex.; M 274: 1 ex.; C 75: 1 fr.

Judging from the maximum diameter (15 mm. in the specimen from loc. M 274) of these incomplete specimens, they must have had a greater altitude than DE BOURY's largest specimen. A recent specimen from the Persian Gulf (R. N. H. L.) has an altitude of 57 mm., though the top is wanting. This proves that DE BOURY's species may be still larger than the closely allied *E. arabicum* (NYST) [17]) (= *Scalaria dacussata* KIENER et auctorum [18]), non LAMARCK, = *Sc. kieneri* TAPPARONE CANEFRI), which has recently been recorded from the pliocene of Mombasa Is. [19]). The sculpture and the discus basalis of my specimens strikingly agree with the description and figure of DE BOURY.

E. elongatum (K. MARTIN) [20]) from the upper miocene of Java is closely allied too, but differs from the present species by its less convex whorls (consequently the suture is not so deep), and by the smaller number of axial ribs. *E. verbeeki* (TESCH) [21]) is another allied species from the neogene of the Dutch East Indies; in this species the whorls are, however, broader in relation to their height and the apical angle is larger.

Fossil distribution:

no previous records.

Recent distribution:

Ery, Mad.

Bathymetrical distribution:

not recorded.

Sectio ?

[17]) DE BOURY, 1913, Journ. de Conch., 60, p. 278, pl. 10, fig. 5.
[18]) G. B. SOWERBY II, 1876, in: Reeve, Conch. Ic., 19, *Scalaria*, pl. 15, fig. 114.
[19]) WEIR, 1938, Add. Neog. Moll. faunas Kenya, pp. 66, 68, pl. 5, fig. 5.
[20]) 1879, Tertiärsch. Java, p. 76, pl. 13, fig. 5.
[21]) 1920, Timor, 2, p. 62, pl. 132, figs. 194a, b.

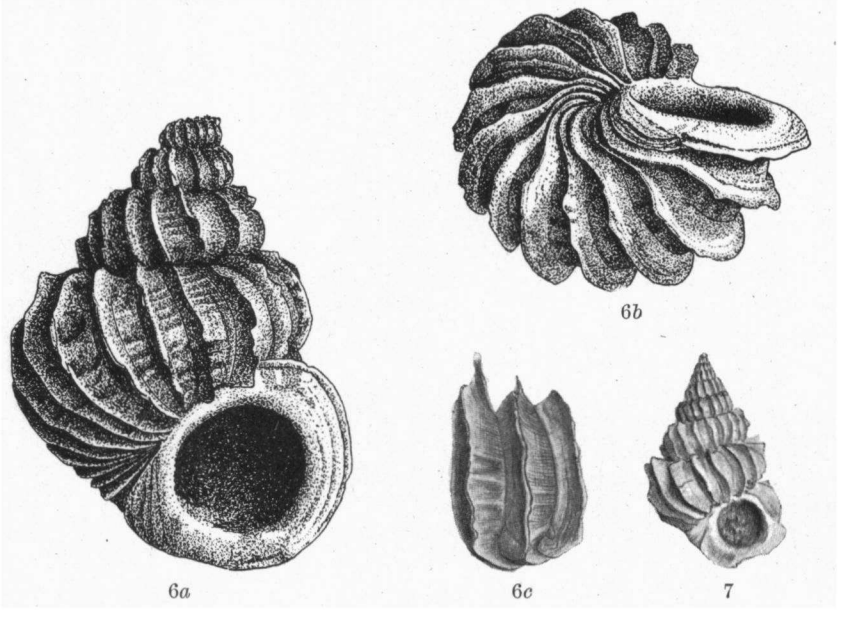
72. EPITONIUM CAROLI-MARTINI spec. nov.

Figures 6*a, b, c,* 7.

Material examined:

Poetjangan layers (argillaceous facies): Sheet 110B, C 78: 2 ex. (holotype + young paratype).

Description: Shell turbiniform, solid, not umbilicate; whorls convex, topwhorls wanting in the holotype, but a reconstruction made



Figs. 6*a, b, c. Epitonium caroli-martini* spec. nov., holotype, figs. *a, b*: × 1½, fig. *c*: detail of sculpture × 8, from Sheet 110B, C 78. Poetjangan layers (argillaceous facies).

Fig. 7. *Epitonium caroli-martini* spec. nov., paratype × 1½, from Sheet 110B, C 78, Poetjangan layers (argillaceous facies).

with the aid of the young paratype shows that there must have been almost ten whorls (not counting the protoconch, which is wanting even in the paratype). Suture deep, but not perforate between the axial ribs. Sculpture: strong axial ribs, of which the sharp outer edge is bent slightly backward; they number 15 on each whorl, every rib corresponding with a ditto (to which it is connected across the suture) on the previous whorl. These ribs make an angle of about 20° with the axis of the shell and they are distinctly spiniferous near the hindermost suture in the better preserved paratype. Between and on the backsides of the axial ribs spirals are visible vanishing towards the hindermost suture; they are 5 in number on the whorls of the

spire and 6 on the body whorl. The 6th spiral is the most distinct one (especially in the paratype), it encircles the discus basalis. Through a lens the interstices and backsides of the axial ribs appear to be spirally striated, these spirals being crossed by equally minute lines of growth. Aperture circular, peristome continuous with an auricle [22]) at the columellar side, corresponding with a fold formed by the basal parts of the axial ribs of the body whorl.

Alt. 40 + ?, Diam. 30 (holotype).

Alt. 19, Diam. 11,5 (paratype).

I have named this new species after Professor Dr. K. MARTIN, including his Christian name in order to prevent homonymity with *Scalaria martinii* W. WOOD 1828.

I have tried in vain to range this new species in one of the sections of the subgenus *Cirsostrema*. The habitus and sculpture agree with *Stenorytis* CONRAD 1862, but according to COSSMANN [23]) this group has a perforate suture and lacks the fold formed by the basal parts of the axial ribs in the body whorl. Into other sections, as e. g. *Gyroscala* DE BOURY 1887, it does not fit for other reasons. I am not acquainted with any closely related species.

Subgenus *Epitonium* ROEDING.
Genus *Epitonium* ROEDING.

73. EPITONIUM (EPITONIUM) spec.

Material examined:

Poetjangan layers (argillaceous facies): Sheet 110B, M 264: 1 ex.

This specimen may be a young *Epitonium scalare* (LINNÉ) [24]), but its preservation is too bad for us to be sure about it.

74. EPITONIUM (EPITONIUM) spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 244: 1 ex.

The present shell belongs to another species than the preceding one, but it is all the same too badly preserved to be identified.

Familia Eulimidae.
Genus *Leiostraca* H. & A. ADAMS 1853.

75. LEIOSTRACA BIVITTATA H. & A. ADAMS.

Figure 8.

1850 *Eulima bilineata* [non ALDER]. — ADAMS & REEVE, Zool. Voy. Samarang, p. 52, pl. 11, fig. 24.

[22]) COSSMANN, 1912, Essais Paléoconch. Comp., **9**, p. 17.
[23]) l. c., p. 44.
[24]) 1874 *Scalaria pretiosa*. — G. B. SOWERBY II in: REEVE, Conch. Ic., **19**, *Scalaria*, pl. 1, fig. 4.

+ 1853 *Leiostraca bivittata* H. and A. ADAMS. — H. & A. ADAMS, Gen. Rec. Moll., 1, p. 238.
1866 *Leiostraca bivittata.* — G. B. SOWERBY II in: REEVE, Conch. Ic., 15, *Leiostraca*, pl. 1, figs. 6a, b.

Material examined:

Poetjangan layers (volcanic facies), horizon above layer I: Sheet 110B, M 274: 1 ex.

My only specimen exactly agrees with a recent specimen of this species from Karachi, which Mr. TOMLIN was so kind as to forward to me.

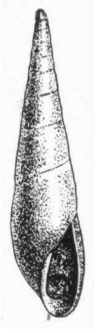


Fig. 8. *Leiostraca bivittata* H. & A. ADAMS, × 8, from Sheet 110B, M 274, Poetjangan layers (volcanic facies), horizon above layer I.

Fossil distribution:

no previous records.

Recent distribution:

Mal, Que, Jap, Ind, Ery.

Bathymetrical distribution:

82—450 m.

Genus *Eulima* RISSO 1826.
(? = *Melanella* BOWDICH 1822).

76. EULIMA MARTINII A. ADAMS.

+ 1854 *Eulima Martinii.* — A. ADAMS in: G. B. SOWERBY II, Thes. Conch., 2, p. 795, pl. 169, fig. 5.
1905 *Eulima* (s. str.) *sondeiana* spec. nov. — K. MARTIN Foss. Java, p. 269, pl. 40, figs. 649, 649a, b.
1908 *Eulima sondeiana* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1919 *Eulima sondeiana* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 100, 142.
1921 *Eulima Martinii* A. AD. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
1927 *Eulima* (s. str.) *Martinii* A. AD. — P. J. FISCHER, Seran u. Obi, p. 51, pl. 212, figs. 17a, b.
1931 *Eulima sondeiana* MART. — VAN ES, Age *Pithecanthr.*, pp. 95, 116.
1931 *Eulima martinii* A. AD. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 260.
1931 *Eulima sondeiana* MART. — VAN DER VLERK, Ibid., p. 260.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 257: 1 ex. Poetjangan layers (volcanic facies): Sheet 110B, C 44: 11 ex.; layer I: Sheet 110A, M 90: 1 ex.; M 95: 1 ex.; M 100: 2 ex.; M 292: 3 ex.; M 298: 2 ex.; M 301: 2 ex.; C 60: 2 ex.; horizon above layer I: Sheet 110B, M 273: 2 ex.; M 274: 1 ex.; layer II: Sheet 110A, M 131: 4 ex.; C 54: 2 ex.; Sheet 116A, M 219: 1 ex.; C 4: 1 ex.; C 37: 1 ex.; C 40: 1 ex.; ± layer II?: Sheet 109C, M 346: some fr.

My specimens agree with recent specimens of this species. *E. sondeiana* K. MARTIN is based upon a not adult specimen with a conspicuous peripheral angle in the body whorl. In my material young specimens occur which show this peripheral angle more or less distinctly. Transitional forms make it impossible to distinguish *sondeiana* from *martinii*. I do not think that they can be separated on account of the disposition of the varices as P. J. FISCHER thinks the only possibility, therefore I have united them.

Fossil distribution:

Mal: pliocene [= Upper Kalibèng layers]: Sonde (Madioen, Java); pliocene: Ceram; „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies)]: Soemberringin (Soerabaja, Java).

Recent distribution:

Mal, Bro, Mel, Que, Jap, Chi, Ind, Ery.

Bathymetrical distribution:

13—51 m.

Genus *Niso* RISSO 1826.

77. **NISO MARMORATA** (G. B. SOWERBY I).

+ 1834 *Eulima marmorata.* — G. B. SOWERBY I, Proc. Zool. Soc., p. 7.
1866 *Niso marmorata.* — G. B. SOWERBY II in: REEVE, Conch. Ic., 15, *Niso*, fig. 5.
1910 *Niso marmorata* SOWERBY. — COSSMANN, Karikal, 3, p. 69, pl. 5, figs. 9, 10.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 252: 2 ex.; M 255: 1 ex.; M 260: 1 ex.; M 261: 1 ex.

The descriptions of the species of this genus as given in the monographs of A. ADAMS, G. B. SOWERBY II, and Tryon are inadequate for certain identification. Though I had noticed a close resemblance of my specimens with SOWERBY's figure of *N. candidula* A. AD.[25]), I doubted of my identification, as A. ADAMS' original figure of this

[25]) G. B. SOWERBY II, 1866, in: REEVE, Conch. Ic., 15, *Niso*, fig. 6.

species [26]) is different. Therefore I sent some of my specimens to Mr. TOMLIN, who had the kindness to compare them with the types in the British Museum. I copy the following remarks from Mr. TOMLIN's letter: „*goniostoma* is narrower and not your species. I very much doubt whether the other two [i.e. *candidula* A. AD. and *marmorata* SOW.] are separable species; the type of *candidula* is a trifle broader than that of *marmorata*, but it is a very slight difference. Your shells, to me, are the same species as *marmorata* (colour of course excepted)."

My specimens agree in every respect with COSSMANN's figure of a specimen from the pliocene of Karikal referred to above.

Fossil distribution:

Ind: pliocene: Karikal.

Recent distribution:

Mal.

Bathymetrical distribution:

not recorded.

Familia Pyramidellidae.
Genus *Odostomia* FLEMING 1817.
Subgenus *Odostomia* FLEMING.

78. ODOSTOMIA (ODOSTOMIA) REGINA THIELE.

Figure 9.

+ 1925 *Odostomia regina* n. sp. — THIELE, Gastr. d. Tiefsee-Exp., 2, p. 316, pl. 27, fig. 17.

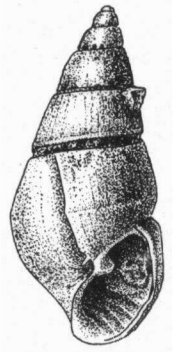


Fig. 9. *Odostomia regina* THIELE, × 15, from Sheet 110B, ? M 278, Poetjangan layers, ? (volcanic facies), layer II.

[26]) A. ADAMS, 1854, in: G. B. SOWERBY II, Thes. Conch., 2, p. 802, pl. 170, figs. 4, 5.

Material examined:

Poetjangan layers, ? (volcanic facies), layer II: Sheet 110B, ? M 278: 1 ex.

My only specimen is not quite adult: it has only 5 postnuclear whorls instead of 6 and its altitude is only about 3 mm. For the rest it strikingly agrees with THIELE's description and figure. The fossil *O. ptychochila* (O. BOETTGER) [27]) is closely related, but differs among others in the position of the plica columellaris; another closely related species: *O. hilgendorfi* CLESSIN [28]) has been recorded from pliocene beds of Japan [29]).

Fossil distribution:

no previous records.

Recent distribution:

Mal (type locality only: Padang).

Bathymetrical distribution:

not recorded.

Genus *Pyramidella* LAMARCK 1799.
Subgenus *Pyramidella* LAMARCK.

79. PYRAMIDELLA (PYRAMIDELLA) spec.

Material examined:

Poetjangan layers (volcanic facies): Sheet 105B, M 53: 1 ex.

The specimen is too bad for further identification.

80. PYRAMIDELLA (PYRAMIDELLA) FASTIGIUM (A. ADAMS).

+ 1854 *Obeliscus fastigium* A. ADAMS. — A. ADAMS in: G. B. SOWERBY II, Thes. Conch., 2, p. 809, pl. 171, fig. 8.
1865 *Pyramidella fastigium*. — G. B. SOWERBY II in: REEVE, Conch. Ic., 15, *Pyramidella*. pl. 2, fig. 11.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.

I owe the identification of this specimen to Mr. TOMLIN, who was so kind as to compare it with specimens in the collection of the British Museum. Though there is a distinct spiral groove round the periphery of the body whorl [30]), which is a character of the section

[27]) In: VERBEEK, BOETTGER & VON FRITSCH, 1883, Tertiärform. Sumatra, p. 47, pl. 2, figs. 12a, b.
[28]) DALL & BARTSCH, 1906, Proc. U. S. Nat. Mus., 30, p. 364, fig. 5.
[29]) YOKOYAMA, 1920, Foss. Miura Peninsula, p. 81, pl. 5, figs. 6a, b.
[30]) This feature is not visible in ADAMS' original figure, but the specimen figured by SOWERBY shows it clearly.

Longchaeus MÖRCH 1875, I have kept this species in the typical section on account of its umbilicus.

Fossil distribution:

no previous records.

Recent distribution:

Mal.

Bathymetrical distribution:

not recorded.

Subgenus *Otopleura* P. FISCHER 1885.

81. PYRAMIDELLA (OTOPLEURA) RETICULATA K. MARTIN.

Figure 10.

+ 1905 *Pyramidella (Otopleura) reticulata* spec. nov. — K. MARTIN, Foss. Java, p. 271, pl. 40, figs. 652, 652a, 653.
1908 *Pyramidella reticulata* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1919 *Pyramidella reticulata* MART. — K. MARTIN, Palaeoz. Kenntn. Java, p. 101, 142.
1931 *Pyramidella reticulata* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 261.

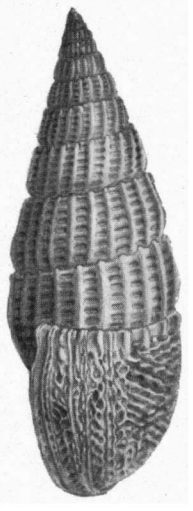


Fig. 10. *Pyramidella reticulata* K. MARTIN, × 4, from Sheet 93B, M 257, Upper Kalibèng layers.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 3 ex.; M 257; 5 ex.; M 258: 1 ex.

The sample of loc. M 257 contains a nearly undamaged specimen. the protoconch only is missing. There are 12 whorls; the aperture has a basal notch. In the second half of the body whorl the sculpture consists no more of axial ribs and spirals in the interstices, but of at first zigzag, subsequently irregular rugosities; the beads of the axial ribs along the suture only are left (fig. 10). The dimensions of the figured specimen are: Alt. 11,5, Diam. 7. The shallow spiral groove in the body whorl can be observed in most of my specimens; in the figured shell it is only visible just behind the outer lip.

Fossil distribution:

Mal: p l i o c e n e [= U p p e r K a l i b è n g l a y e r s]: Sonde.

Recent distribution:

not known living.

Familia Amaltheidae.
Genus *Cheilea* MODEER 1793.
(= *Mitrularia* SCHUMACHER 1817).

82. CHEILEA TORTILIS (REEVE).

Figure 11.

\+ 1858 *Calyptraea tortilis*. — REEVE, Conch. Ic., 11, *Calyptraea*, pl. 1, figs. 2a, b.
non 1909 *Mitrularia equestris* LINNÉ, var. *tortilis* [non] REEVE. — SCHEPMAN, Prosobr. Siboga Exp., 2, p. 200.

Material examined:

U p p e r K a l i b è n g l a y e r s: Sheet 93B, M 252: 1 ex.

My specimen agrees exactly with REEVE's figure; the diameter of the mouth is ± 15 mm. The shell from Station 225 of the Siboga

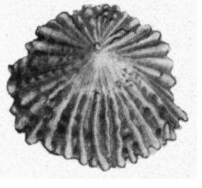


Fig. 11. *Cheilea tortilis* (REEVE), × 2, from Sheet 93B, M 252, Upper Kalibèng layers.

Expedition (Z. M. A.) has a finer and much more regular sculpture, in which the characteristic concentric wrinkles, so clearly figured by REEVE, are lacking. I doubt if TRYON was right in uniting REEVE's species with *equestris* (LINNÉ), to which species the Siboga specimen belongs without doubt, and therefore I prefer to keep *tortilis* REEVE apart.

Fossil distribution:

no previous records.

Recent distribution:

Mel, ? Mic, Galapagos Islands.

Bathymetrical distribution:

not recorded.

Genus *Amalthea* SCHUMACHER 1817.

83. AMALTHEA LISSA (E. A. SMITH).

Figures 12*a*, *b*.

+ 1894 *Capulus lissus*. — E. A. SMITH, Rep. Moll. Bay Bengal & Arab. Sea, p. 166, pl. 4, figs. 4—6.
1909 *Amalthea (Malluvium) lissa* SMITH. — SCHEPMAN, Prosobr. Siboga Exp., 2, p. 199.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: ? 1 ex.
Poetjangan layers (volcanic facies), horizon above layer I: Sheet 110B, M 273: 7 ex.; C 75: 1 ex.

Miss VAN BENTHEM JUTTING has kindly compared my specimens

12*a* 12*b*

Figs. 12*a*, *b*. *Amalthea lissa* (E. A. SMITH), × 2, from Sheet 110B, M 273, Poetjangan layers (volcanic facies), horizon above layer I.

from loc. M 273 with SMITH's types in the British Museum, with which they appeared to agree very well.

The only specimen dredged in shallow water by the Siboga (Stat. 164, 32 m.; Z. M. A.) is characterised by being „very flat and broad". As it is improbable that my specimens derive from a deep sea deposit, it is remarkable that several of them agree rather well with exactly this specimen. Probably this is merely a coincidence, as the habitus of Amaltheids is likely to be influenced in the first place by the substratum.

The specimen from loc. M 251 is not adult and rather bad. Therefore its identification remains doubtful.

Fossil distribution:

no previous records.

Recent distribution:

Mal, Ind, Ery.

Bathymetrical distribution:

32—648 m., generally from greater depths than 150 m.

Familia Calyptraeidae.
Genus *Calyptraea* LAMARCK 1799.
Sectio *Calyptraea* LAMARCK.

84. CALYPTRAEA (CALYPTRAEA) TUDUNG K. MARTIN.

+ 1905 *Calyptraea* (s. str.) *tudung* spec. nov. — K. MARTIN, Foss. Java, p. 251, pl. 41, figs. 676, 676a, b, c.
1919 *Calyptraea tudung* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 98, 123.
1929 *Calyptraea tudung* MARTIN. — SIEMON, Jungtert. Moll. Niederl. O.-Ind., p. 54.
1931 *Calyptraea tudung* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 256.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 94a: 1 ex.; M 96: 1 ex.; ? (volcanic facies), layer II: Sheet 110B, ? M 278: ? 1 ex.

The specimen from loc. ? M 278 is young and therefore I am not quite sure about the identification. The other shells agree exactly with MARTIN's type (R. G. M. L.).

Fossil distribution:

Mal: pliocene: Tjimantjeuri (Bantam, Java); Tjihondje (Priangan, Java).

Recent distribution:

not known living.

Sectio *Bicatillus* SWAINSON 1840.

85. CALYPTRAEA (BICATILLUS) MORBIDA (REEVE).

Figure 13.

1859 *Crucibulum extinctorium* [non LAMARCK]. — REEVE, Conch. Ic., 11, *Crucibulum*, pl. 5, figs. 14a, b, 20a, b.
+ 1859 *Crucibulum morbidum*. — REEVE, Ibid., pl. 7, figs. 24a, b.
1910 *Crucibulum (Bicatillus) conulatum* nov. sp. — COSSMANN, Karikal, 3, p. 54, pl. 3, figs. 21—23.
1919 *Crucibulum extinctorium* [non] LAMK. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 98, 122, 123.
1931 *Crucibulum extinctorium* [non] LAMK. — VAN ES, Age *Pithecanthr.*, pp. 95, 116.
1931 *Crucibulum extinctorium* [non] LAMK. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 257.
1935 *Calyptraea (Bicatillus) renovata* (CROSSE et FISCHER). — OOSTINGH, Moll. Plioz. Boemiajoe, p. 42 (with further synonymy).
1938 *Calyptraea (Bicatilus* [sic]*) morbidum* (REEVE). — ADAM & LELOUP, Prosobr. et Opisthobr., p. 109.

Material examined:

Poetjangan layers (volcanic facies): Sheet 105B, M 53: 1 ex.; Sheet 110A, M 130: 13 ex.; M 195: 1 ex.; layer I: Sheet 105B, M 66: 1 ex.; M 87: 1 ex.; Sheet 110A, M 86: 7 ex.; M 89: 29 ex.; M 90: 12 ex.; M 94a: 1 ex.; M 106: 2 ex.; M 292 + 293: 2 ex.; Sheet 110B, M 156: 1 ex.; M 157: 15 ex.; M 158: 1 ex.; M 270: 2 ex.; C 76: 4 ex.; C 77: 2 ex.; C 88: 1 ex.; horizon above layer I: Sheet 110B, M 273: 1 ex.; M 274: 1 ex.; C 75: 1 ex.; layer II: Sheet 110A, M 122: 1 ex.; M 123: 1 ex.; C 54: 1 ex.; Sheet 110B, M 168: 1 ex.; M 177: 1 ex.; ? M 278: 1 ex.; M 281: 1 ex.; Sheet 116A, M 216: 4 ex.; C 31: 1 ex.; layer II?: Sheet 109C, M 346: 1 ex.; layer III: Sheet 110A, M 139: 1 ex.; M 141: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110B, M 267: 3 ex.; Sheet 116A, M 320: 1 ex.
Kaboeh layers: Sheet 110B, C 28: 2 ex.

This species is rather variable. The height of my specimens varies in relation to the diameter, as is the case in recent samples of this

Fig. 13. *Calyptraea morbida* (REEVE), × 2, from Sheet 110A, M 89, Poetjangan layers (volcanic facies), layer I.

species. At the localities M 86, M 87, M 89 and C 31 a small but high form has been collected. The dimensions of some specimens are: from M 86: Alt. 9, Diam. 9; from M 87: Alt. 14, Diam. 12; from M 89: Alt. 9, Diam. 9; Alt. 10, Diam. 7,5; Alt. 12, Diam. 10.

Some specimens agree with *Crucibulum conulatum* COSSMANN, I do not think that this form can be distinguished as a good species.

Fossil distribution:

Mal: neogene: Tjihowe (Buitenzorg, Java) (T. J. 30, p. 17); (Lower Palembang layers): near Gedongbatin (Lampoengsche districten, Sumatra) (T. S. 9, p. 18); pliocene: Tjikeusik, Tjimantjeuri (Bantam, Java); Tjisantja, Tjihondje (Priangan, Java) (T. J. 54, pp. 34, 35); Tjidjoerei (Cheribon, Java); Tjidjoelang (T. J. 54, p. 37), Sikoenang Ridge (T. J. 66, p. 18) (Banjoemas, Java); Boemiajoe, Bentarsari Basin (T. J. 54, pp. 25, 27, 31), Pangka (Pekalongan, Java); Benkoelen — Kroeë, Peninsula of S. Benkoelen (T. S. 3, p. 23) (Benkoelen, Sumatra); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer II]: Soemberringin, between Djetis and Sidoteko, Tambakbatoe (Soerabaja, Java).
Ind: pliocene: Karikal.

Recent distribution:

Mal, Jap, Chi, Ind, Mad.

Bathymetrical distribution:

0—18 m.

CALYPTRAEA spec.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 98: 1 ex. (cast).

The present cast, which has a diameter of 32 mm., may belong to the previous or some other species.

Genus *Crepidula* LAMARCK 1799.
Subgenus *Siphopatella* LESSON 1830.

86. CREPIDULA (SIPHOPATELLA) WALSHI REEVE.

+ 1859 *Crepidula walshi.* — REEVE, Conch. Ic., 11, *Crepidula*, figs. 17a, b.
1884 *Crepidula (Ergea) scutum* nov. spec. — K. MARTIN, Tiefbohr. Java, p. 169, pl. 9, fig. 164.
1910 *Crepidula (Siphopatella)* cf. *Walshi* HERM. — COSSMANN, Karikal, 3, p. 52, pl. 3, figs. 19, 20.
1919 *Crepidula scutum* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 98, 119, 124.
1920 *Crepidula orbella* YOKOYAMA. — YOKOYAMA, Foss. Miura Peninsula, p. 76, pl. 4, figs. 22, 23.
1931 *Crepidula walshii* HERM. — VAN ES, Age *Pithecanthr.*, p. 116.
1931 *Crepidula scutum* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 257.
1932 *Ergaea walshii* HERMANSON. — NOMURA, Moll. Raised Beach Dep. Kwanto Reg., p. 110.
1935 *Crepidula (Siphopatella) walchi* (HERMANNSEN MS.) REEVE. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 42 (with further synonymy).
1935 *Crepidula (Syphopatella) walshi* REEVE. — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 197, pl. 9, figs. 28a, b.
1936 *Crepidula (Syphopatella) walshii* (HERMANSON) REEVE. — SUZUKI & ICHIMURA, Moll. Foss. Raised Beach Takai, p. 711.
1937 *Siphopatella walsohi* (HERMANSON). — NOMURA, Moll. Plioc. Tosa, p. 74.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 ex.; Sheet 110B, M 169: 1 ex.; layer I: Sheet 110A, M 89: 1 ex.; layer II: Sheet 110B, M 175: 4 ex.; Sheet 116A, M 216: 1 ex. (inside the aperture of a specimen of *Polinices didyma* (RÖDING)).

In Leiden I examined MARTIN's type of *Cr. scutum,* but I am unable to detect the „feine Radiallinien" to which this author refers in his original description of this species. It is remarkable that MARTIN mentions this feature no more in 1919, when he compares his species with the recent *Cr. walshi* a second time. Now that the variability of *walshi* is better known, these radial lines are — as OOSTINGH (l. c., p. 43) already remarked — the only difference between the recent and

the extinct species. MARTIN remarks that the sculpture was not involved in these radial lines, thus I can only presume that it was due to a colour pattern which has vanished since. Such a colour pattern is not enough to distinguish a separate species, therefore I put *scutum* K. MARTIN in the synonymy of *walshi* REEVE.

Fossil distribution:

Mal: pliocene: Tjidjoerei (Cheribon, Java); Boemiajoe (Pekalongan, Java); Sangiran, Baringinan (Soerakarta, Java); Atjeh (Sumatra); „pliocene" [= Poetjangan layers (volcanic facies), layer II]: Soemberringin, between Djetis and Sidoteko (Soerabaja, Java); quaternary: subsoil of Batavia, from a depth of 6 m.
Jap: pliocene: Miura Peninsula (Honsyû); Tosa (Sikoku); quaternary: Miura Peninsula, environment of Tokyo, Bôsô Peninsula (Honsyû).
Chi: pliocene (Byoritu beds): Taiwan Is. (= Formosa).

Recent distribution:

Mal, Bro, Jap, Chi, Ind, Ery.

Bathymetrical distribution:

0—18 m.

Familia Xenophoridae.
Genus *Xenophora* FISCHER VON WALDHEIM 1807.
Subgenus *Tugurium* P. FISCHER 1880.
Sectio *Tugurium* P. FISCHER.

87. XENOPHORA (TUGURIUM) CALCULIFERA (REEVE).

+ 1843 *Phorus calculiferus*. — REEVE, Proc. Zool. Soc., 10 (for 1842), p. 162.
1843 *Phorus calculiferus*. — REEVE, Conch. Ic., 1, *Phorus*, pl. 1, fig. 1.
1905 *Xenophora (Tugurium) calculifera* REEVE. — K. MARTIN, Foss. Java, p. 253, pl. 38, figs. 607, 607a, b, 608, 608a, b.
1908 *Xenophora calculifera* REEVE. — K. MARTIN, Alt. Sch. Sondé u. Trinil, pp. 9, 12.
1910 *Xenophora (Tugurium) calculifera* REEVE. — COSSMANN, Karikal, 3, p. 52, pl. 3, figs. 12—15.
1911 *Xenophora (Tugurium) calculifera* REEVE. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 49.
1919 *Xenophora calculifera* REEVE. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 98, 142.
1931 *Xenophora calculifera* REEVE. — VAN ES, Age *Pithecanthr.*, p. 116.
1931 *Xenophora calculifera* REEVE. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 257.
1932 *Xenophora calculifera* REEVE. — K. MARTIN, Kedoengwaroe, p. 114.
1936 *Xenophora (Tugurium) calculifera* REEVE. — PANNEKOEK, Altmioc. Moll. Rembang, p. 56.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 6 ex.; M 252: 1 ex. (juv.); M 255: 4 ex. (juv.) + some fr.; M 257: 20 ex. + several fr.; M 260: 6 ex. + several fr.; M 261: 1 ex.

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 83: 1 fr.; M 100: 1 fr.; M 105: 1 ex.; M 292: 3 ex.; M 292 or 293: 1 ex. M 297: 3 ex. + some fr.; M 298: 3 ex.; M 300: 1 ex.; M 301: 2 ex.; C 60: 16 ex.; Sheet 110B, M 157: 1 ex.; horizon above layer I: Sheet 110B, M 274: 1 fr.; C 74: 1 ex.; layer II: Sheet 110A, M 125: 1 ex.; Sheet 116A, M 216: 2 ex.; layer II?: Sheet 109C, M 347: 2 ex.

Fossil distribution:

Mal: lower miocene: Rembang beds (Java); pliocene [= Upper Kalibèng layers]: Doekoepengkol, Padasmalang, Sonde (Madioen, Java); „pliocene" [= Poetjangan layers (volcanic facies)]: Soemberringin (Soerabaja, Java); [= Poetjangan layers (volcanic facies), layer II]: between Djetis and Sidoteko (Soerabaja, Java).
Ind.: pliocene: Karikal.

Recent distribution:

Mal, Chi.

Bathymetrical distribution:

88 m.

XENOPHORA spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 249: 1 ex.; Sheet 99B, M 6: 1 ex. (cast).
Poetjangan layers (volcanic facies), layer I: Sheet 105B, M 67: 1 ex. (cast); Sheet 110A, M 292: 1 ex.; M 297: 2 ex:; M 299: 2 ex.; layer II?: Sheet 109C, M 346: 1 ex. (cast).

These specimens are badly preserved; they may belong to the previous species.

Familia Strombidae.
Genus *Rimella* L. AGASSIZ 1840.
Sectio *Dientomochilus* COSSMANN 1904.

88a. RIMELLA (DIENTOMOCHILUS) CANCELLATA CANCELLATA (LAMARCK).

+ 1816 *Strombus cancellatus.* — LAMARCK, Tabl. encycl. et méth., 23, pl. 408, figs. 5a, b, liste p. 3.
1851 *Rostellaria cancellata.* — REEVE, Conch. Ic., 6, *Rostellaria,* pl. 3, figs. 10a, b.
1918 *Rimella cancellata* REEVE. — CHAPMAN, Caenoz. Foss. Oil-Fields Papua, p. 10.
1920 *Rostellaria (Rimella) cancellata* LAM. [partim]. — TESCH, Timor, 2, p. 51 [only 1 ex. without spine].
1921 *Rimella cancellata* LAM. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
1927 *Rimella cancellata* LAM. — P. J. FISCHER, Seran u. Obi, pp. 33, 57 [partim], pl. 212, fig. 26.
193. *Rimella cancellata* REEVE. — NASON-JONES, Geol. Finsch Coast Area, pp. 48, 80.

1931 *Rimella cancellata* LAMK. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 245.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 126: 1 ex.; C 54: 1 + ? 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, C 96: ? 1 ex.

The specimen from loc. C 96 is not quite adult, and one of those from loc. C 54 is damaged, therefore their identification remains dubious. The other two specimens agree with recent shells of this species with which I compared them. I examined 30 recent adult specimens of this species (Z. M. A., R. N. H. L.). In all these the spiral sculpture continued on the labrum, which is not the case in the next subspecies, and all but one lacked the tooth characteristic of *R. cancellata spinifera* (K. MARTIN) (vide infra) and *R. c. timorensis* KOPERBERG [31]). This single toothed specimen was a dead shell from a river mouth on the S. coast of Obi (Z. M. A.), and perhaps a fossil washed down by the river. The Timor form [32]) of this species is intermediate between the recent typical species and the fossil javanese *spinifera* (K. MARTIN) in having a spine and a sculptured labrum. The specimen figured by P. J. FISCHER seems typical, but that author mentions another, smaller shell, bearing a spine.

Fossil distribution:

Mal: neogene: Finsch Coast Area (New Guinea); pliocene: Timor; Cape Possession (Papua); Ceram; Obi.

Recent distribution:

Mal, Ind.

Bathymetrical distribution:

27—54 m.

88b. RIMELLA (DIENTOMOCHILUS) CANCELLATA SPINIFERA (K. MARTIN).

+ 1899 *Rostellaria (Rimella) spinifera* spec. nov. — K. MARTIN, Foss. Java, p. 192, pl. 30, figs. 447, 447a, 448.
1903 *Rimella cancellata* [non] (LAMK.). — COSSMANN, Karikal, 2, p. 166, pl. 6, figs. 14, 15.
1914 *Rimella spinifera* MART. — K. MARTIN, Samml. Geol. Reichsmus. Leiden, (2), 2, p. 158.
1919 *Rimella spinifera* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 92, 132.
1927 *Rostellaria cancellata* var. *spinifera* MART. — P. J. FISCHER, Seran u. Obi, p. 33.
1928 *Rimella spinifera* K. MART. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 17, 25.

[31]) 1931, Jungtert. u. quart. Moll. Timor, p. 128.
[32]) TESCH, 1920, Timor, 2, p. 51, pl. 130, figs. 171a, b; KOPERBERG, l. c.; collection G. I. A.

non 1928 *Rostellaria (Rimella) spinifera* MARTIN, var. *formosana*. — YOKOYAMA, Moll. Oil-Field Taiwan, p. 50, pl. 4, fig. 9.
193. *Rimella spinifera* MART. — NASON-JONES, Geol. Finsch Coast Area, pp. 35, ? 90.
1931 *Rimella spinifera* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr. p. 245.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 22 ex.; Sheet 105B, M 56: 1 ex.; layer I: Sheet 110A, M 82a: 3 ex.; M 89: 2 ex.; M 90: 8 ex.; M 95: 2 ex.; layer II: Sheet 110B, M 177: 1 ex.

These specimens agree with MARTIN's species by the presence of a spine and a labrum without spiral sculpture. The length of this form proves to be rather variable: adult specimens measure 23—39 mm. In some specimens the sinus situated near the canal in the outer lip is hardly developed; in these shells the spine is always rudimental. Judging from the figures COSSMANN's „*Rimella cancellata* (LAMK.)" agrees with this latter form.

YOKOYAMA's „var. *formosana*" from the pliocene of Taiwan is certainly more closely related to the typical species than to the present subspecies. According to NOMURA [33]) it may be a distinct species.

Fossil distribution:

Mal: neogene: Finsch Coast Area (New Guinea); pliocene: Waled (Cheribon, Java); Atjeh (Sumatra); Obi.
Ind.: pliocene: Karikal.

Recent distribution:

not known living.

88. RIMELLA (DIENTOMOCHILUS) CANCELLATA subsp.?

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 30 ex.; Sheet 105B, M 53: 3 ex.; layer I: Sheet 105B, M 67: 1 ex.; Sheet 110A, M 82a: 3 ex.; M 89: 2 ex.; M 90: 7 ex.; M 153: 2 ex.; layer II: Sheet 110A, M 125: 1 ex.; M 126: 1 ex.; M 129: 1 ex.

These specimens are too much damaged or too young to allow of a subspecific identification.

RIMELLA (DIENTOMOCHILUS) spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.
Poetjangan layers (volcanic facies), layer II: Sheet 116A, C 35: 1 ex.

[33]) 1935 *Tibia formosana* (YOKOYAMA). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 180.

These specimens are not adult and moreover damaged.

Genus *Tibia* ROEDING 1798.
(= *Rostellaria* LAMARCK 1799).
Sectio *Tibia* ROEDING.

89. TIBIA (TIBIA) FUSUS (LINNÉ).

+ 1758 *Murex Fusus*. — LINNÉ, Syst. Nat., ed. 10, p. 752.
1842 *Rostellaria Rectirostrum* LAM. [partim]. — G. B. SOWERBY II, Thes. Conch., 1, p. 22, pl. 5, fig. 8.
1851 *Rostellaria fusus* [partim]. — REEVE, Conch. Ic., 6, *Rostellaria*, pl. 2, fig. 7.
1921 *Rostellaria ficus* [sic]. — DICKERSON, Fauna Vigo group, pp. 7, 14.
1921 *Rostellaria fusus* LINNAEUS. — DICKERSON, Ibid., p. 9.
1922 *Rostellaria fusus* LINNAEUS. — DICKERSON, Rev. Philipp. Paleont., p. 202, pl. 5, figs. 1a, b.
1928 *Rostellaria* sp. — YOKOYAMA, Moll. Oil-Field Taiwan, p. 51, pl. 4, fig. 2.
? 1934 *Rostellaria fusus* LMK. — NARDINI, Moll. spiagge em. Mar Rosso, p. 234.
1935 *Tibia fusus* (LINNAEUS). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 180, pl. 8, figs. 19, 20.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 257: 1 ex.
Poetjangan layers (volcanic facies), layer II: Sheet 110B, M 173: 3 ex.; M 280: ? 1 ex.; Sheet 116A, C 6: 1 ex.; C 121: 1 ex.; layer III: Sheet 110B, M 183: 1 ex.; M 193: 1 ex.; Sheet 116A, M 228: 3 ex.; M 232: ? 1 ex.; C 112: 1 ex.

All my specimens are damaged, some of them so much that a certain identification is impossible. The most complete shells agree in every respect with recent material of this species.

NARDINI not only refers to figures representing the present species, but also to SOWERBY's figure of the next one, so his record of „*Rostellaria fusus* LMK." from the Peninsula of Buri remains doubtful.

Fossil distribution:

Mal: miocene: (Vigo group): Bondoc Peninsula (Luzon, Philippines).
Chi: pliocene (Byoritu beds): Taiwan Is. (= Formosa).
Ery: quaternary: ? Peninsula of Buri (Red Sea).

Recent distribution:

Mal, Jap, Chi, Ery.

Bathymetrical distribution:

not recorded.

90. TIBIA (TIBIA) MELANOCHEILOS (A. ADAMS).

1842 *Rostellaria Rectirostrum* LAM. [partim]. — G. B. SOWERBY II, Thes. Conch., 1, p. 22, pl. 5, fig. 10.
1851 *Rostellaria fusus* [partim]. — REEVE, Conch. Ic., 6, *Rostellaria*, pl. 2, figs. 5a, b.

+ 1854 *Gladius (Rostellaria) melanocheilus* A. ADAMS. — A. ADAMS, Proc. Zool. Soc. 1854, p. 42, pl. 27, fig. 9.
1903 *Rostellaria fusus* [non] LINN. — COSSMANN, Karikal, 2, p. 165, pl. 6, figs. 24, 25.
1929 *Rostellaria fusus* [non] LINNE. — YOKOYAMA, Plioc. shells Tônohama, p. 13, pl. 7, fig. 1.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: ? 1 ex.; Sheet 110A, M 108: 1 ex.; layer I: Sheet 110A, M 76: 1 ex.; M 85: 2 ex.; M 95: 1 ex.; layer III: Sheet 110A, M 143: 1 ex.

This species is distinguished from the former not only by its colour being darker throughout the shell and purple-brow between the digitations of the outer lip, but also by its less slender habitus, the more expanded digitations of the labrum, and by the whorls being less convex. Moreover the adult shells do not attain the size of the adult *T. fusus* (L.). *Tibia verbeeki* (K. MARTIN) [34]) is closely related, but it has an even less slender habitus and the posterior part of the inner lip is more callous than in the two recent species.

COSSMANN followed Tryon in not distinguishing *T. melanocheilus* from *T. fusus* (L.), as appears from his reference to page 128, pl. 10 fig. 17 [*fusus* (L.)] and pl. 11 fig. 21 [*melanocheilus* (A. AD.)] of the 7th volume of the Manual of Conchology. Judging from his own figures, which represent an incomplete shell of which the whorls are not very convex, his specimen may belong to the present species. The same holds true for the specimen figured by YOKOYAMA.

Fossil distribution:

Jap: pliocene: Tosa province (Sikoku).
Ind: pliocene: Karikal.

Recent distribution:

Mal, Jap.

Bathymetrical distribution:

not recorded.

91. TIBIA (TIBIA) POWISII (PETIT).

+ 1840 *Rostellaria powisii.* — PETIT, Rev. Zool. Cuvier., 3, p. 326.
1851 *Rostellaria povisii* [sic]. — REEVE, Conch. Ic., 6, *Rostellaria*, pl. 2, figs. 4a, b.
1899 *Rostellaria* (s. str.) *Powisii* PETIT, *modesta* var. nov. — K. MARTIN, Foss. Java, p. 191, pl. 30, figs. 443, 443a, b, 444.
1908 *Rostellaria Powisii* PETIT, var. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1909 *Rostellaria Powisii* PETIT & var. *abyssicola* n. var. — SCHEPMAN, Prosobr. Siboga Exp., 2, p. 154, pl. 16, fig. 2, pl. 11, fig. 5.
1911 *Rostellaria Pourisii* [sic] PETIT. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.

[34]) 1899 *Rostellaria* (s. str.) *Verbeeki* spec. nov. — K. MARTIN, Foss. Java, p. 189, pl. 30, figs. 438, 439, 440.

1919 *Rostellaria Powisii* PETIT, var. *modesta* MART. — K. MARTIN, Palaeoz. Kenntn. Java, p. 92.
1919 *Rostellaria Powisii*. — K. MARTIN, Ibid., p. 141.
1920 *Rostellaria* (s. str.) *Powisii* PETIT. — TESCH, Timor, 2, p. 51, pl. 130, figs. 170a, b.
1929 *Rostellaria powisii* PETIT, var. *modesta* MART. — CHAPMAN, Rep. further series foss. Barum R., p. 59.
1931 *Rostellaria (Sulcogladius) Powisii* PETIT, subspec. *timorensis* n. s. sp. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 127.
1931 *Rostellaria powisii* PETIT. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 246.
1931 *Rostellaria powisii* PETIT, prior *modesta* MART. — VAN DER VLERK, Ibid., p. 246.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 23 ex.; M 252: 3 ex.; M 260: 4 ex.

My specimens belong to the var. *modesta* K. MARTIN, which is distinguished from the typical species by its more obsolete sculpture. The examined shells show this character more or less distinctly; one damaged specimen, of which the body whorl only is left, cannot be distinguished from the typical species. The body whorl, however, is generally more distinctly sculptured than the spire in this variety, so this specimen may also belong to the variety. The most extreme specimens of the var *modesta* K. MARTIN agree — as TESCH already remarked — with SCHEPMAN's var. *abyssicola* (Z. M. A.).

The dimensions of the adult specimens vary considerably in my material: the smallest has a length of 31 mm, and the largest, which is damaged, must have been longer than a recent shell of 60 mm which I used for comparison.

The subsp. *timorensis* KOPERBERG seems a local form which is but little different from the typical species.

Fossil distribution:

Mal: upper miocene: Amanoeban (Timor); Barum River (New Guinea); pliocene: Bentarsari Basin (Pekalongan, Java) (T. J. 54, pp. 25, 28); [= Upper Kalibèng layers]: Sonde, Padasmalang (Madioen, Java); Bintoehan (Benkoelen, Sumatra) (T. S. 7, p. 20); several localities in Amanoeban (Timor).

Recent distribution:

Mal, Jap, Chi, Ind.

Bathymetrical distribution:

247—274—? 397 m.

Genus *Strombus* LINNÉ 1758.
Subgenus *Canarium* SCHUMACHER 1817.
Sectio *Oostrombus* SACCO 1893.

92. STROMBUS (OOSTROMBUS) GIBBERULUS LINNÉ.

+ 1758 *Strombus gibberulus.* — LINNÉ, Syst. Nat., ed. 10, p. 744.
1890 *Strombus gibberulus* L. — K. MARTIN, Kei-Inseln, Timor, Celebes, p. 278, 280.
1892 *Strombus gibberulus* L. — ORTMANN, Koralriffe Dar-es-Salaam, p. 642.
1900 *Canarium gibberulus* LINNAEUS. — NEWTON, Shells raised beaches Red Sea, p. 509.
1901 *Canarium gibberulum* (LINN.) — BULLEN, Pleist. Moll. Perim Is., p. 254.
1910 *Strombus gibberulus* L. — KOERT & TORNAU, Geol. u. Hydr. Darressalam, u. Tanga, p. 10.
1920 *Strombus gibberulus* L. — TESCH, Timor, 2, p. 49, pl. 130, figs. 166a, b.
1925 *Strombus (Canarium) gibberulus* LINNÉ. — OOSTINGH, Obi and Halmahera, p. 69.
1927 *Strombus gibberulus* L. — P. J. FISGHER, Seran u. Obi, p. 33.
1930 *Strombus (Canarium) gibberulus* LINNÉ. — COX, Kenya, p. 138.
1931 *Strombus (Canarium) gibberulus* LINNÉ. — COX, Farsan Is., pp. 5, 7.
1931 *Stromubs gibberulus* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 246.
1933 *Strombus gibberulus* L. — NARDINI, Moll. Pleist. Somalia, p. 171 [35]).
1934 *Strombus (Canarium) gibberulus* LIN. — NARDINI, Moll. spiagge em. Mar Rosso, p. 222.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.

Fossil distribution:

Mal: pliocene: near Niki-Niki (Amanoeban, Timor); Obi; quaternary: Ajer Sago near Koepang (Timor); ? near Makassar (Celebes).
Ery: quaternary: raised beaches of Red Sea Region; French Somalia; Perim Is.
Mad: quaternary: Kenya; Tanga.

Recent distribution:

Mal, Mel, Que, Loy, Tua, Mic, Jap, Chi, Ind, Ery, Mad.

Bathymetrical distribution:

22—27 m.

Sectio *Labiostrombus* OOSTINGH 1925.

93. STROMBUS (LABIOSTROMBUS) CANARIUM LINNÉ.

+ 1758 *Strombus canarium.* — LINNÉ, Syst. Nat., ed. 10, p. 745.
1851 *Strombus canarium.* — REEVE, Conch. Ic., 6, *Strombus*, pl. 18, figs. 46a, b.
1851 *Strombus Isabella.* — REEVE, Ibid., pl. 18, fig. 51.
1881 *Strombus isabella* LAM. — K. MARTIN, Posttert. fauna Blitong, p. 19.
? 1881 *Strombus canarium* LIN. (?). — K. MARTIN, Ibid., p. 19.
1884 *Strombus canarium.* — BRAZIER, Rec. shells clay Maclay Coast, p. 989.
1890 *Strombus isabella* LAM. — K. MARTIN, Kei-Inseln, Timor, Celebes, pp. 276, 278, 279.
1895 *Strombus isabella* LAM. — K. MARTIN, Tert. Foss. Philipp., pp. 57, 59.
1899 *Strombus* (s. str.) *isabella* LAM. [partim]. — K. MARTIN, Foss. Java, p. 184.
1907 *Strombus isabella* LAM. — SCHEPMAN, Moll. Posttert. Celebes, p. 185.

[35]) Citing M. DREYFUSS, whose original paper I was unable to consult.

1907 *Strombus* (s. str.) *isabella* LAM. — ICKE & MARTIN, Tert. e. Kwart. Nias, p. 214.
1908 *Strombus (Strombus) canarium* L. — BOETTGER, Tert. u. jüng. Verst., pp. 668, 669.
1911 *Strombus* (s. str.) *isabella* LAM. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1913 *Strombus isabella* LAM. — SMITH, Stratigr. and foss. invert. Philipp., p. 248.
1913 *Strombus canarium* LINN. — PRATT & SMITH, Geol. Bondoc Penin., pp. 324, 330, pl. 1, fig. 14.
1916 *Strombus isabella* LAMK. — K. MARTIN, Altmioc. Fauna W. Progogeb., p. 246.
1919 *Strombus isabella* LAMK. [partim]. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 91, 147.
1920 *Strombus isabella* [non] LAM. — TESCH, Timor, 2, p. 48, pl. 129, figs. 165a, b.
1921 *Strombus canarium* LINNAEUS. — DICKERSON, Fauna Vigo group, pp. 6, 8, 14.
1922 *Strombus canarium* (LINNAEUS). — DICKERSON, Rev. Philipp. Paleont., p. 202, pl. 5, fig. 3, pl. 15, fig. 14.
1922 *Strombus isabella* LAM. — DICKERSON, Ibid., p. 217.
1923 *Strombus canarium* LINN. — OOSTINGH, Rec. shells Java, pp. 80, 161.
1925 *Strombus (Strombus) canarium* LINNÉ. — OOSTINGH, Obi and Halmahera, p. 51.
1927 *Strombus Isabella* LAM. — P. J. FISCHER, Seran u. Obi, p. 33.
1928 *Strombus canarium* LINN. — K. MARTIN, Moll. Neog. Atjeh, pp. 7, 28.
193. *Strombus isabella*. — NASON-JONES, Geol. Finsch Coast Area, pp. 28, 79.
1931 *Strombus isabella* LAM. — VAN ES, Age *Pithecanthr.*, pp. 39, 45, non *) 51, 95, 115.
1931 *Strombus* (s. str.) *canarium* L. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 124.
1931 *Strombus* aff. *Str.* (s. str.) *isabella* LAMARCK. — KOPERBERG, Ibid., p. 125.
1931 *Strombus canarium* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 246.
1931 *Strombus isabella* LAMK. — VAN DER VLERK, Ibid., p. 246.
1932 *Strombus isabella* LAM. — K. MARTIN, Kedoengwaroe, p. 114.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 258: 3 ex.; M 260: 3 ex.
Poetjangan layers (volcanic facies): Sheet 110A, M 130: 7 ex.; Sheet 110B, M 169: 1 ex.; C 83: 1 ex.; layer I: Sheet 105B, M 66: 3 ex.; M 68: 3 ex.; Sheet 110A, M 90: some fr.; M 105: 3 ex.; M 106: 1 ex.; layer II: Sheet 110A, M 122: 18 ex.; M 123: 13 ex.; M 124: 9 ex.; M 126: 3 ex.; M 304: 1 ex.; C 54: 17 ex.; Sheet 110B, M 168: 1 ex.; M 176: 2 fr.; M 177: 1 ex.; M 281: 1 ex.; Sheet 116A, M 215: 3 ex.; M 216: 3 ex.; M 217: 1 ex.; M 223: 2 ex.; M 224: 2 ex.; M 227: 1 ex.; C 4: 1 ex.; C 33: 1 ex.; layer III: Sheet 110A, M 139: 20 ex.; M 141: 1 ex. + 1 fr.; M 142: 4 ex.; Sheet 110B, M 179: 1 ex.

The greater part of my specimens belongs to the variety *isabella* LAMARCK.

Fossil distribution:

Mal: neogene: Finsch Coast Area (New Guinea); miocene (Vigo group): Bondoc Peninsula (Luzon, Philippines); pliocene: Baribis, Tjidjadjar (Cheribon, Java); [= Upper Kalibèng layers]: Padasmalang (Madioen, Java); pliocene: Atjeh (Su-

*) Cf. OOSTINGH, 1935, Moll. Plioz. Boemiajoe, p. 211.

matra; Dahana (Nias); several localities in Amanoeban (Timor); several localities in Fialarang (Beloe Tassih Fettoh, Timor); Obi; Gorontalo (Celebes); Mindanao (Philippines); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer II]: between Djetis and Sidoteko, Soemberringin (Soerabaja, Java); quaternary: Goenoeng Tegiring (near Sepoeloe, Madoera); Billiton; near Niki-Niki (Amanoeban, Timor); between Aé Lomea and Atamboea (Beloe Tassih Fettoh, Timor); Maclay Coast, Finsch Coast Area (New Guinea); near Makassar (Celebes); Kajoe Ragi (Minahassa, Celebes); Bondoc Peninsula (Luzon, Philippines).

Recent distribution:

Mal, Mel, Que, Mic, Jap, Chi, Ind, Mad.

Bathymetrical distribution:

5—46 m.

94. STROMBUS (LABIOSTROMBUS) VARINGINENSIS MARTINI OOSTINGH.

1899 *Strombus* (s. str.) *isabella* LAM., var. *thersites*. — K. MARTIN, Foss. Java, p. 184, pl. 30, figs. 423, 424, 425.
1908 *Strombus isabella* LAM., var. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1919 *Strombus isabella* LAMK. [partim]. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 91, 132, 141.
193. *Strombus isabella* LAM., var. *thersites* MART. — NASON-JONES, Geol. Finsch Coast Area, p. 32.
1931 *Strombus isabella* [non] LAM. [partim]. — VAN ES, Age *Pithecanthr.*, p. 51[37]).
1931 *Strombus Thersites* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 247.
+ 1935 *Strombus (Labiostrombus) varinginensis martini* n. nom. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 57 (with further synonymy).

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: numerous ex.; M 13: 1 ex.; Sheet 105B, M 57: 1 ex.; Sheet 110A, M 82a: 2 ex.

Judging from my material this form is more closely related to *Str. canarium* L. (vide supra) than to *Str. varinginensis* K. MARTIN[38]), with which species OOSTINGH recently compared it. The little knobs on the columella near the canal appear to be no reliable feature, as some of my specimens, though the state of preservation of this portion of the shell is good, do not show them.

One specimen of loc. M 82a is rather sturdy, thus even more closely approaching *Str. canarium* L., from which it is different only by the conspicuous knob on the dorsal side of the body whorl. The other specimen of this same locality is very bad, therefore its identification remains doubtful.

[37]) Cf. OOSTINGH, 1935, Moll. Plioz. Boemiajoe, p. 211.
[38]) + 1899 *Strombus* (s. str.) *varinginensis* spec. nov. — K. MARTIN, Foss. Java, p. 184, pl. 30, figs. 426—429.

Fossil distribution:

Mal: pliocene: Waled (Cheribon, Java); E. of Tjidjoelang (Banjoemas, Java) (T. J. 54, p. 38); Pangka, Bentarsari Basin (T. J. 54, pp. 25, 28, 31), Boemiajoe (Pekalongan, Java); [= Upper Kalibèng layers]: Sonde (Madioen, Java); pliocene: Atjeh (Sumatra); Obi; „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); quaternary: Finsch Coast Area (New Guinea).

Recent distribution:

not known living.

STROMBUS (LABIOSTROMBUS) spec.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: several fr.; Sheet 105B, M 54: 2 ex.; layer I: Sheet 110A, M 296: 1 ex.; layer II: Sheet 110A, M 124: 1 fr.; M 128: 1 fr.; Sheet 116A, M 221: 1 fr:; C 5: 1 ex.; C 6: 1 ex.; C 30: 1 ex.

These bad specimens and fragments belong to one of the two previous mentioned species.

95. STROMBUS (LABIOSTROMBUS) FENNEMAI K. MARTIN.

+ 1899 *Strombus* (s. str.) *Fennemai* spec. nov. — K. MARTIN, Foss. Java, p. 181 [partim], pl. 29, figs. 418, 419, 420.
1908 *Strombus Fennemai* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Strombus* (s. str.) *Fennemai* MART. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1919 *Strombus Fennemai* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 91 [partim], non 132, 141.
non 1920 *Strombus Fennemai* MARTIN. — TESCH, Timor, 2, p. 47, pl. 129, figs. 164a, b.
non 1921 *Strombus Fennemai* K. MART. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
non 1927 *Strombus Fennemai* K. MARTIN, var. — P. J. FISCHER, Seran u. Obi, p. 56, pl. 212, figs. 24a, b.
1928 *Strombus Fennemai* K. MART. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 17, 25.
1931 *Strombus Fennemai* MART. — VAN ES, Age *Pithecanthr.*, p. 95.
1931 *Strombus fennemai* MART. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 246.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 252: 2 ex.; M 225: 1 ex.; M 257: ? 3 ex.; M 260: 37 ex.; M 261: 1 ex.
Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 125: ? 1 ex.

The altitude of adult specimens of this species varies from ± 30 to ± 40 mm. My only specimen from loc. M 125, of which only the body whorl and penultimate whorl are available, is not quite typical: its body whorl is slightly slenderer, a greater part of the penultimate

whorl is exposed and the outer lip is more rounded at the back. As this is the only specimen from younger strata than those from which the typical species originates, it is possible that these differences have at least subspecific significance. To judge about this question more material is, however, required.

The specimens figured by TESCH and P. J. FISCHER are different from the type, as these authors already pointed out [39]). They agree, however, with recent specimens dredged by the Siboga and referred to by SCHEPMAN [40]) as „*Strombus (Gallinula) labiosus* GRAY", the only difference consisting of the Timor fossils being larger (Alt. 37) than the Siboga shells (29 and 32,5 mm.). It seems likely that all these specimens belong to the same species as described and figured by REEVE [41]) and TRYON [42]) as *Str. labiosus*, of which the length would vary from 29 (SCHEPMAN) — 51 mm. (TRYON). The original *Strombus labiosus* of W. WOOD [43]), which has been badly figured and of which the altitude has been indicated as only ¾ of an inch, may be another species.

Fossil distribution:

Mal: neogene: Watoeloemboeng (Semarang, Java); pliocene [= Upper Kalibèng layers]: Sonde, Padasmalang (Madioen, Java); pliocene: Atjeh (Sumatra); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java).

Recent distribution:

not known living.

96. STROMBUS (LABIOSTROMBUS) MADIUNENSIS K. MARTIN.

Figure 14.

+ 1899 *Strombus* (s. str.) *madiunensis* spec. nov. — K. MARTIN, Foss. Java, p. 183, pl. 29, figs. 422, 422a, 422b.
1908 *Strombus madiunensis* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1919 *Strombus madiunensis* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 91, 141.
1927 *Strombus madiunensis* MART. — P. J. FISCHER, Seran u. Obi, p. 33.
1928 *Strombus madiunensis* K. MART. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 25.
1931 *Strombus madiunensis* MART. — VAN ES, Age *Pithecanthr.*, p. 95.
1931 *Strombus madiunensis* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 247.
1932 *Strombus madiunensis* MARTIN. — VAN DER VLERK, Zuidrembangsche heuvell., p. 111.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 10 ex.; layer I: Sheet 110A, M 82a: 5 ex.; M 83: 1 ex.; M 90: 2 ex.;

[39]) I examined the specimens from Waled (Cheribon, Java) mentioned by K. MARTIN (R. G. M. L.); they are damaged, but I think they agree better with the form from Ceram and Timor than with the typical *Str. fennemai*.
[40]) 1909, Prosobr. Siboga Exp., 2, p. 149.
[41]) 1851, Conch. Ic., 6, *Strombus*, pl. 18, fig. 50.
[42]) 1885, Man. Conch., 7, p. 116.
[43]) 1828, Suppl. Ind. Test., p. 13, pl. 4, *Strombus*, fig. 3.

M 95: 2 ex.; C 53: 1 ex.; layer II: Sheet 110A, M 122: 1 ex.; Sheet 110B, M 281: 15 ex.; C 68: 9 ex.; Sheet 116A, M 216: 1 ex.; M 218: 1 ex.; M 219: 3 ex.; C 37: 2 ex.; C 39: 1 ex.; layer III: Sheet 116A, M 228: 3 ex.

This species proves to be rather variable. The specimen figured by MARTIN (1905, figs. 422, 422a, b) — here designed as lectotype —, and his paratype (R. G. M. L.) are small specimens; though they are adult, their altitudes amount to respectively 33 and ± 34 mm. In my material several adult specimens have an altitude of 40—45 mm., a damaged shell from loc. M 228 must have been still considerably larger, whereas other specimens, especially from the localities M 281 and C 68, are of the same size at MARTIN's types. Further the relation Alt.: Diam. varies, the shoulder of the younger whorls may be more

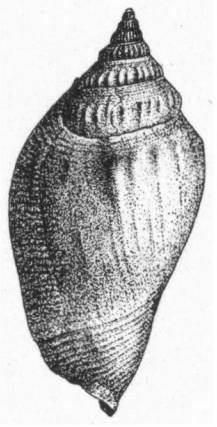


Fig. 14. *Strombus madiunensis* K. MARTIN, × 1½, from pliocene beds in Atjeh, Sumatra (R. G. M. L.).

or less pronounced, and the axial sculpture of the younger whorls of the spire more or less conspicuous. Also the length of the spire is variable in relation to the total altitude of the shell. At first I thought that my specimens belonged to more than one species, but the existence of all sorts of transitional forms makes it impossible to distinguish more than one species in this material.

Str. madiunensis is closely related to *Str. succinctus* L.[44]); the only reliable feature to distinguish the two species is the presence of a number (about 6 in well preserved specimens) of knobs protruded in axial direction on the dorsal and left side of the body whorl in *Str. madiunensis*, while *Str. succinctus* L. bears but one more or less conspicuous knob or none at all.

In Leiden (R. G. M. L.) I could examine a specimen of this species from the pliocene of Atjeh mentioned by K. MARTIN (1928). I have

[44]) 1851 *Strombus succinctus*. — REEVE, Conch. Ic., 6, *Strombus*, pl. 17, fig. 43.

figured it here as its habitus is strikingly alike that of *Str. succinctus* L.

It is remarkable that this species has not been found again in the Upper Kalibèng layers, from which it was originally described by MARTIN, but only in the younger Poetjangan layers.

Fossil distribution:

Mal: p l i o c e n e [= U p p e r K a l i b è n g - l a y e r s]: Sonde (Madioen, Java); p l i o c e n e: Atjeh (Sumatra); Obi; „p l i o c e n e" [probably = P o e t j a n g a n l a y e r s]: Bareng beds (Bodjonegoro, Java).

Recent distribution:

not known living.

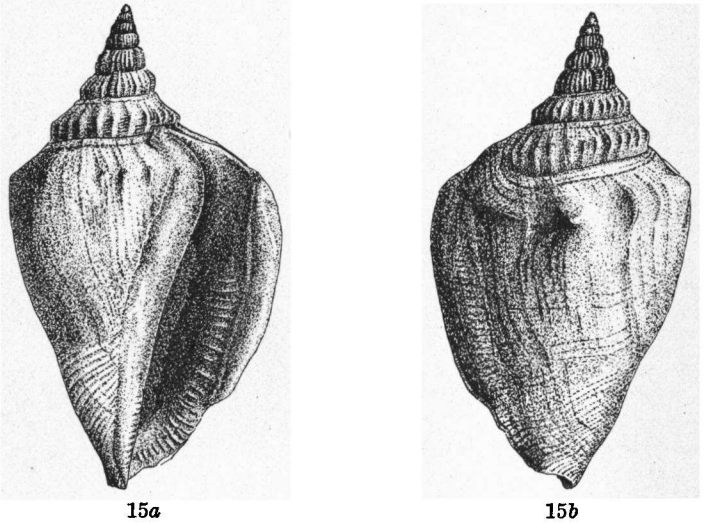
97. STROMBUS (LABIOSTROMBUS) RUTTENI spec. nov.

Figures 15*a, b*.

1911 *Strombus* spec. 1 — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 49.

Material examined:

U p p e r K a l i b è n g l a y e r s: Sheet 93B, Padasmalang: holotype + 4 paratypes (Selenka collection, R. G. M. L.); Sheet 93B, M 252: 1 paratype.



15*a* 15*b*

Figs. 15*a, b*. *Strombus rutteni* spec. nov., holotype × 1½, from pliocene beds at Padasmalang, Java (R. G. M. L.).

Description: Shell fusiform, with broadly expanded outer lip. Whorls more than 10 in number, protoconch consisting of ± 3, smooth, convex whorls; older whorls of the spire regularly convex; in the

younger whorls a distinct shoulder is visible. Spire with a fine spiral sculpture, which is becoming obsolete towards the body whorl. There are about 20 spiral grooves in the antepenultimate whorl, one of these, situated near the posterior suture, is more conspicuous than the others and can be followed from the oldest sculptured whorls up to close to the outer lip. In the dorsal side of the body whorl the spiral sculpture has almost completely faded away, except along the suture and in the front part, which shows some 10 distinct spiral grooves. The older whorls of the spire bear regular axial ribs, which gradually pass into knobs on the edge of the shoulder of the younger whorls; these knobs are more or less protruded in axial direction. Body whorl with one conspicuous dorsal knob, and 3 smaller ones, protruded in axial direction, on the left side. Ventral side of the body whorl smooth. Aperture long and narrow. Outer lip with a sinus in front and one at the back, between these two it has a thickened edge; it is wrinkled inside. A narrow notch between the inner and outer lip reaches the shoulder of the antepenultimate whorl. Columella covered by a thin callus; wrinkled obsoletely in the hindermost part, more conspicuously in front.

Alt. 43, Diam. 25 (holotype).

Alt. 45, Diam. 27 (largest paratype).

Alt. 37, Diam. 22 (paratype from loc. M 252).

The description has been made after the holotype, as to the protoconch after one of the paratypes from Padasmalang.

I have named this new species after professor Dr. L. M. R. RUTTEN.

Strombus rutteni spec. nov. is related to several recent and fossil species of the sectio *Labiostrombus,* but seems nevertheless to be a distinct form. It differs from *Str. madiunensis* K. MARTIN (vide supra) mainly by its more expanded outer lip. It also resembles *Str. variabilis* SWAINSON (vide infra), which has, however, a coarser axial sculpture, and which never has the inside of the outer lip wrinkled.

Fossil distribution:

Mal: pliocene [= Upper Kalibèng layers]: Doekoepengkol (Madioen, Java).

Recent distribution:

not known living.

98. STROMBUS (LABIOSTROMBUS) VARIABILIS SWAINSON.

+ 1820 *Strombus variabilis.* — SWAINSON, Zool. Ill., (1), 1, pl. 10, 2 figs.
1850 *Strombus variabilis.* — REEVE, Conch. Ic., 6, *Strombus,* pl. 10, figs. 21a—d.
1907 *Strombus* (s. str.) *variabilis* SWAINS. — ICKE & MARTIN, Tert. e. Kwart. Nias, pp. 214, 239, pl. 15, figs. 23, 23a.
1931 *Strombus variabilis* SWAINS. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 247.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.

My only specimen of this species is damaged, but it could be identified with certainty by comparison with recent specimens of this species.

Fossil distribution:

Mal: p l i o c e n e: Dahana (Nias).

Recent distribution:

Mal, Mel, Que, Loy, Chi, Ery.

Bathymetrical distribution:

28—45 m.

99. STROMBUS (LABIOSTROMBUS) PULCHELLUS REEVE.

+ 1851 *Strombus pulchellus.* — REEVE, Conch. Ic., 6, *Strombus*, pl. 19, fig. 52.

Material examined:

U p p e r K a l i b è n g l a y e r s: Sheet 93B, M 260: 1 ex.

My specimen agrees with recent specimens of this species (Z. M. A.).

Fossil distribution:

no previous records.

Recent distribution:

Mal, Ind.

Bathymetrical distribution:

36 m.

STROMBUS (LABIOSTROMBUS) spec.

Material examined:

U p p e r K a l i b è n g l a y e r s: Sheet 93B, M 258: 1 fr.
P o e t j a n g a n l a y e r s (v o l c a n i c f a c i e s), l a y e r I: Sheet 105B, M 67: 2 ex.; l a y e r I I: Sheet 110B, M·173: 1 ex.

These incomplete specimens and fragments are too bad to be identified more exactly.

Subgenus *Canarium* SCHUMACHER 1817.
Sectio *Canarium* SCHUMACHER.

100. STROMBUS (CANARIUM) PLICATUS LAMARCK.

+ 1816 *Strombus plicatus.* — LAMARCK, Tabl. encycl. et méth., 23, pl. 408, figs. 2a, b, liste p. 3.
1850 *Strombus dentatus* [non LINNÉ]. — REEVE, Conch. Ic., 6, *Strombus*, pl. 9, fig. 17.
1881 *Strombus urceus* [non] L. — K. MARTIN, Posttert. fauna Blitong, p. 19.
1890 *Strombus urceus* [non] L. — K. MARTIN, Kei-Inseln, Timor, Celebes, p. 278.

1899 *Strombus (Canarium) dentatus* [non] LINN., var. — K. MARTIN, Foss. Java, p. 188, pl. 30, fig. 437.
1899 *Strombus urceus* [non] LINN. — K. MARTIN, Ibid., p. 189.
1900 *Canarium dentatum* [non] LINNAEUS, var. *erythrinum* CHEMNITZ. — NEWTON, Pleist. shells Red Sea, p. 508.
1901 *Canarium dentatum*, var. *erythrinum* (CHEM.) — BULLEN, Pleist. Moll. Perim Is., p. 254.
1907 *Strombus dentatus* [non] LIN., var. *elegans* SOW. — SCHEPMAN, Posttert. Celebes, p. 186.
1907 *Strombus muricatus* MARTINI. — SCHEPMAN, Ibid., p. 186.
1907 *Strombus (Canarium) muricatus* MARTINI. — ICKE & MARTIN, Tert. e. Kwart. Nias, pp. 214, 240.
1908 *Strombus dentatus* [non] LIN., var. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Strombus (Canarium) dentatus* [non] LINN., var. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1919 *Strombus dentatus* [non] LINN., var. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 91, 141.
1920 *Strombus urceus* [non] L. — TESCH, Timor, 2, p. 49, pl. 130, figs. 168a, b.
1922 *Strombus dentatus sonde* (LAMARCK) K. MARTIN [sic]. — DICKERSON, Rev. Philipp. Paleont., pl. 5, fig. 7.
1929 *Strombus dentatus* LAM. — PAPP, Geol. NE. Sepik Distr., p. 72.
1929 *Strombus dentatus* LAM. — CHAPMAN, Rep. Foss. Marienberg, p. 82.
193. *Strombus elegans*. — NASON-JONES, Geol. Finsch Coast Area, p. 43.
193. *Strombus dentatus* LAM. — NASON-JONES, Ibid., p. 90.
1930 *Strombus (Canarium) plicatus* LAMARCK. — COX, Kenya, p. 138.
1931 *Strombus (Canarium) plicatus* LAMARCK. — COX, Farsan Is., pp. 5, 7.
1931 *Strombus dentatus* [non] LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 246.
1931 *Strombus dentatus* [non] LINN., var. *elegans* SOW. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 246.
1931 *Strombus muricatus* MARTINI. — VAN DER VLERK, Ibid., p. 247.
1931 *Strombus urceus* [non] LINN. — VAN DER VLERK, Ibid., p. 247.
1934 *Strombus muricatus* (MARTINI). — NARDINI, Moll. spiagge em. Mar Rosso, p. 220, pl. 16, figs. 10a, b.
1935 *Strombus dentatus* [non] LINNAEUS. — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 179.
1936 *Strombus (Canarium) dentatus* [non] LINNAEUS. — NOMURA & ZINBÔ, Moll. Foss. Okinawa-Zima, p. 259.
1938 *Strombus (Canarium) plicatus* LAMARCK. — ADAM & LELOUP, Prosobr. et Opisthobr., p. 112, pl. 1, figs. 8a—e.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 82a: 1 ex.

My only specimen belongs to the typical species. Though it is adult, its altitude is but 27 mm.

Fossil distribution:

Mal: neogene: Finsch Coast Area (New Guinea); miocene: (Vigo group): Bondoc Peninsula (Luzon, Philippines); upper miocene: NE. Sepik district (New Guinea); pliocene: Bentarsari Basin (Pekalongan, Java) (T. J. 54, pp. 25, 28); [= Upper Kalibèng layers]: Sonde, Padasmalang (Madioen, Java); pliocene: Dahana (Nias); quaternary: Billiton; Finsch Coast Area (New Guinea); near Makassar (Celebes); Kajoe Ragi (Minahassa, Celebes).

Chi: pliocene (Byôritu beds): Taiwan Is. (= Formosa); (Simaziri beds): Okinawa-Zima (Ryûkyû Is.).
Ery: quaternary: raised beaches of Red Sea region; Perim Is.
Mad: quaternary: Kenya.

Recent distribution:

Mal, Mel, Syd, Loy, Tua, Haw, Jap, Chi, Ind, Ery, Mad.

Bathymetrical distribution:

0—36 m.

101. STROMBUS (CANARIUM) GENDINGANENSIS K. MARTIN.

+ 1899 *Strombus (Canarium) gendinganensis* spec. nov. — K. MARTIN, Foss. Java, p. 187, pl. 30, figs. 432, 432a, 433, 433a.
1908 *Strombus gendinganensis* K. MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Strombus (Canarium) gendinganensis* MART. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 49.
1919 *Strombus gendinganensis* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 91, 141.
1922 *Strombus gendinganensis* K. MARTIN. — DICKERSON, Rev. Philipp. Paleont., pl. 5, fig. 4.
1931 *Strombus gendinganensis* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 246.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 257: 1 ex.

The present specimen differs from the type by being smaller and lacking all knobs on the dorsal side of the body whorl. Among the shells identified by MARTIN (R. G. M. L.) there is one shell, which represents a transitional form between my shell and the type. It is nearly as slender as my specimen and bears three obsolete knobs on the dorsal side of the body whorl. On the other hand my shell resembles smooth specimens of *Str. unifasciatus* K. MARTIN [45]), e. g. the shell from Tjilintoeng figured by MARTIN (l. c., fig. 436). This species is, however, distinguished by the presence of several varices in the older whorls, and by the absence of spiral sculpture in the outside of the labrum.

Fossil distribution:

Mal: miocene (Vigo group): Bondoc Peninsula (Luzon, Philippines); pliocene [= Upper Kalibèng layers]: Sonde, Doekoepengkol (Madioen, Java).

Recent distribution:

not known living.

Sectio *Euprotomus* GILL 1869.

[45]) 1899 *Strombus (Canarium) unifasciatus* MART. — K. MARTIN, Foss. Java, p. 187, pl. 30, figs. 434, 434a, 435, 436, 436a.

102. STROMBUS (EUPROTOMUS) LAMARCKII G. B. SOWERBY II.

1758 *Strombus Auris dianae* [partim]. — LINNÉ, Syst. Nat., ed. 10, p. 743.
+ 1842 *Strombus Lamarckii* GRAY. — SOWERBY II, Thes. Conch., 1, p. 35, pl. 9, figs. 98, 99, 88, 93.
? 1936 *Strombus (Euprotomus) auris-dianae* [non] LINNAEUS. — NOMURA & ZINBÔ, Moll. Foss. Okinawa-Zima, p. 259, pl. 11, figs. 26a, b.
1938 *Strombus (Euprotomus) lamarckii* GRAY. — ADAM & LELOUP, Prosobr. et Opisthobr., p. 117.
1938 *Strombus lamarckii* GRAY. — WEIR, Add. Neog. Moll. Kenya, pp. 66, 68, pl. 5, fig. 2.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 257: 1 ex.

The specimen figured by NOMURA & ZINBÔ seems to be different from this species (= *Str. auris-dianae* auct. non L.) and still more from the true *Str. auris-dianae* L.

Fossil distribution:

Chi: pliocene (Simaziri beds): ? Okinawa-Zima (Ryûkyû Is.).
Mad: pliocene: Kenya.

Recent distribution:

Mal, Bro, Mel, Jap, Chi, Ind, Mad.

Bathymetrical distribution:

46 m.

STROMBUS spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 250: 1 ex.; M 260: 1 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 14: 1 fr.; layer II: Sheet 110A, M 121: 1 ex.; M 125: 1 ex.; layer III: Sheet 110A, M 139: 1 ex.; M 142: 2 fr.
Poetjangan layers (argillaceous facies): Sheet 110A, M 289: 1 ex.

These specimens are too incomplete even to allow of the identification of the subgenus to which they belong.

Familia Naticidae.
Genus *Polinices* MONTFORT 1810.
Sectio *Polinices* MONTFORT.

103. POLINICES (POLINICES) CUMINGIANUS (RÉCLUZ).

Figures 16, 17, 18.

+ 1844 *Natica cumingiana.* — RÉCLUZ, Proc. Zool. Soc., 11 (for 1843), p. 210.
1844 *Natica powisiana.* — RÉCLUZ, Ibid., p. 210.
1854 *Natica glaucinoides*? DESH., var. — D'ARCHIAC & HAIME, Descr. An. Foss Inde, p. 280, pl. 25, figs. 10, 11.

1855 *Natica cumingiana.* — REEVE, Conch. Ic., 9, *Natica*, pl. 4, figs. 13a, b.
1855 *Natica powisiana.* — REEVE, Ibid., pl. 6, figs. 22a, b.
1905 *Natica (Polinices) powisiana* RECLUZ. — K. MARTIN, Foss. Java, p. 263, pl. 39, figs. 633, 633a, 634—637, 637a.
1908 *Natica powisiana* RECLUZ. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Natica powisiana* RECL. — K. MARTIN, Vorl. Bericht, 1, p. 21.
1912 *Natica powisiana* RECLUZ. — K. MARTIN, Ibid., 2, p. 159.
1918 *Natica powisiana* RECLUZ. — CHAPMAN, Rep. Caen. foss. Oil-fields Papua, p. 9.
1921 *Natica cumingsiana* [sic] RECLUZ. — DICKERSON, Fauna Vigo group, pp. 12, 14.
1921 *Natica powisiana* RECL. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
1922 *Natica cumingiana* RECLUZ. — DICKERSON, Rev. Philipp. Paleont., p. 202, pl. 4, fig. 3b [46]).
1922 *Polinices powisianus* (RECLUZ). — YOKOYAMA, Foss. Upp. Musashino Kazuso a. Shimosa, pp. 8. 83.
1927 *Natica (Polinices) powisiana* RECLUZ. — P. J. FISCHER, Seran u. Obi, p. 47, pl. 212, figs. 8—10.
1928 *Natica (Polinices) powisiana* RECLUZ. — VREDENBURG, Moll. Tert. NW. India, p. 397.
1928 *Natica powisiana.* — K. MARTIN, Nachlese, p. 116.
1928 *Polinices powisianus* RECL. — YOKOYAMA, Plioc. shells Hyuga, p. 333.
1929 *Natica powisiana* RECLUZ. — CHAPMAN, Rep. further series foss. Barum R., pp. 59, 60.
1931 *Polinices (Naticina) powisiana* (RÉCLUZ). — COX, Farsan Is., p. 5.
1931 *Natica powisiana* RECL. — VAN ES, Age *Pithecanthr.*, pp. 39, 58, 95, 116.
1931 *Natica powisiana* RECLUZ. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.
1934 *Natica powisiana* RECLUZ. — NARDINI, Moll. spiagge em. Mar Rosso, p. 236, pl. 18, figs. 3a—c.
1935 *Natica (Polinices) powisiana* RECLUZ. — WANNER & HAHN, Mioc. Moll. Rembang, p. 264, pl. 20, figs. 11, 12.
1935 *Polinices (Polinices) powisianus* (RECLUZ). — OOSTINGH, Moll. Plioz. Boemiajoe, p. 47 (with further synonymy).
1936 *Polynices* (s. str.) *powisianus* RECL. — PANNEKOEK, Altmioc. Moll. Rembang, p. 58.

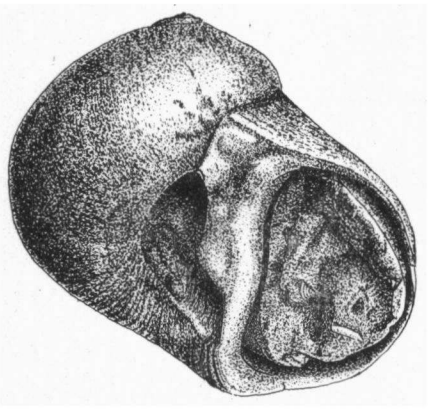
Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 9 ex.; M 252: 1 ex.; M 255: 11 ex.; M 257: 29 ex.; M 260: 29 ex.
Poetjangan layers volcanic facies): Sheet 99B, M 24: 1 ex.; Sheet 110A, M 107: 2 ex.; Sheet 110B, C 44: 1 ex.; layer I: Sheet 110A, M 95: 1 ex.; M 101: 4 ex.; M 291: 2 ex.; M 292: 4 ex.; M 292 + 293: 2 ex.; M 301: 3 ex.; C 1: ? 1 ex.; C 52: 3 ex.; C 100: 1 ex.; C 101: 1 ex.; C 102: 3 ex.; layer I ?: Sheet 110A, M 104: 1 ex.; horizon above layer I: Sheet 110B, M 273: 2 ex.; M 274: 4 ex.; C 74: 1 ex.; C 75: 6 ex.; layer II: Sheet 110A, M 125: 5 ex.; M 126: 4 ex.; Sheet 110B, M 281: 1 ex.; C 68: 1 ex.; Sheet 116A, M 216: 1 ex.; M 218: 4 ex.; C 37: 1 ex.; C 39: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, M 111: 2 ex.; Sheet 110B, C 78: 1 ex.

This is a very variable species. I have figured some of my specimens: 1) a large specimen in which the dip of the suture increases

[46]) In this plate the numbers of the figures 3b and 6 have evidently been confounded.

in the second half of the body whorl, exposing thus a greater part of the penultimate whorl than in the typical species. This form occurs at the localities M 104 (fig. 16) and C 44. 2) An incomplete shell with a very pointed spire and a funiculus which is rather strong. This specimen (from loc. M 126) agrees with a recent shell from the Aroe



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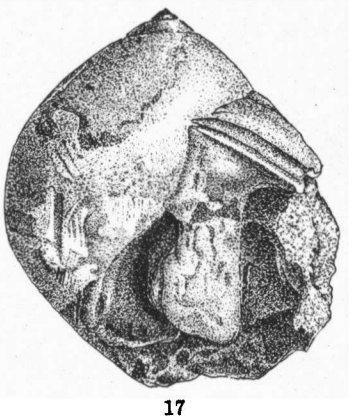

17

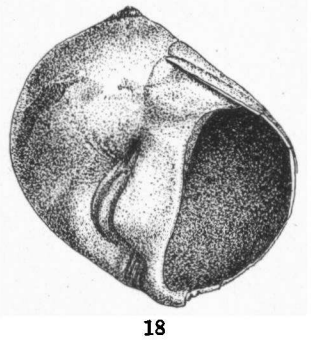

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Fig. 16. *Polinices oumingianus* (RÉCLUZ), × 1½, from Sheet 110A, M 104, Poetjangan layers (volcanic facies), layer I?

Fig. 17. *Polinices oumingianus* (RÉCLUZ), × 1½, from Sheet 110A, M 126, Poetjangan layers (volcanic facies), layer II.

Fig. 18. *Polinices oumingianus* (RÉCLUZ), var. *madioenensis* var. nov., holotype × 1½, from Sheet 93B, M 260, Upper Kalibèng layers.

Islands (Z. M.-A.). 3) A variety to which MARTIN already drew attention and which is characterised by its broad funiculus filling the umbilicus entirely or almost so. As this variety seems to be extinct, it may be worth naming and I propose the name var. *madioenensis* var. n. for it. It occurs at the localities M 257 (1 ex.) and M 260 (4 ex., among which the holotype of the variety). MARTIN recorded it from Sonde (1905, l. c., fig. 634) and P. J. FISCHER from Ceram (1927, l. c., figs. 9, 10). In Leiden (R. G. M. L.) I saw moreover a specimen belonging to this variety from Waled (Cheribon, Java).

Several authors consider *„Natica cumingiana"* and *„N. powisiana"* of RÉCLUZ to be synonyms and I think they are right; the first name has to be used as it has priority of position.

Fossil distribution:

Mal: neogene: district of Buitenzorg (Priangan, Java); Jogjakarta (Java); Barum River (New Guinea); lower miocene: Njalindoeng beds (Buitenzorg, Java); Rembang beds (Rembang, Java); miocene (Vigo group): Bondoc Peninsula (Luzon, Philippines); upper miocene: Tjikarang (Junghuhn's loc. R), Tadasngampar, Paroengponteng, Tjilanang beds (only from Junghuhn's loc. O) (Priangan, Java); pliocene: Baribis, Waled (Cheribon, Java); Bentarsari Basin (T. J. 54, p. 28) (Pekalongan, Java); Sikoenang Ridge (T. J. 66, p. 19) (Banjoemas, Java); Sangiran (Soerakarta, Java); [= Upper Kalibèng layers]: Padasmalang, Sonde, Doekoepengkol, Rangoen (Madioen, Java); pliocene: Kroeë (T. S. 6, p. 20); Bintoehan (T. S. 7, p. 20) (Benkoelen, Sumatra); Atjeh (Sumatra); Ceram; Cape Possession (Papua); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies) layer II]: Soemberringin, between Djetis and Sidoteko (Soerabaja, Java).
Jap: pliocene: Shimosa province (Honsyû); Hyuga province (Kyûsyû).
Ind: lower miocene (Gaj series): NW. India.
Ery: quaternary: 3 localities in Red Sea region.

Recent distribution:

Mal, Que, Jap, Ery.

Bathymetrical distribution:

32—72 m.

104. POLINICES (POLINICES) MAMMILLA (LINNÉ).

1758 *Nerita Mammilla.* — LINNÉ, Syst. Nat., ed. 10, p. 776.
1855 *Natica mamilla.* — REEVE, Conch. Ic., 6, *Natica,* pl. 7, figs. 27a, b.
1864 *Natica Flemingiana* ? [non] RÉCLUZ. — JENKINS, Tert. Moll. Mt. Sela, p. 57, pl. 6, fig. 7.
1869 *Natica mamilla* LINNEO. — ISSEL, Malac. Mar Rosso, p. 285.
1879 *Natica mamilla* LAM. — K. MARTIN, Tertiärsch. Java, p. 81, pl. 13, figs. 13, 13a.
1881 *Natica mamilla* LAM. — K. MARTIN, Posttert. fauna Blitong, p. 20.
1895 *Natica mamilla* LAM. — K. MARTIN, Tert. foss. Philipp., pp. 57, 58, 59.
1901 *Natica mammilla* (LINN.) — BULLEN, Pleist. Moll. Perim Is., p. 255.
1905 *Natica (Polinices) mamilla* LINN. — K. MARTIN, Foss. Java, p. 263.
1907 *Natica (Mamma) mamilla* LINNÉ. — HALL & STANDEN, Moll. raised reef Red Sea, p. 67.
1908 *Natica mamilla* LIN. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1910 *Natica mammilla* L. — KOERT & TORNAU, Geol. u. Hydrol. Daressalam u. Tanga, pp. 9, 15.
1911 *Natica mamilla* LINN. — K. MARTIN, Vorl. Bericht, 1, p. 47.
1911 *Natica (Polinices) mamilla* LAM. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 49.

1913 *Natica mamilla* LAM. — W. D. SMITH, Stratigr. a. foss. invert. Philipp., p. 248.
1913 *Polynices (Natica) mamilla* LAM. — W. D. SMITH, Ibid., p. 266, pl. 4, fig. 13.
1913 *Natica mamilla* LINN. — PRATT & SMITH, Geol. S. Bondoc Peninsula, p. 330.
1918 *Natica mamilla* LINN. — CHAPMAN, Rep. caen. foss. oil-field Papua, pp. 9, 12.
1919 *Natica mamilla* LINN. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 99, 122, 123, 128, 132, 142, 146.
1920 *Natica mamilla* L. — TESCH, Timor, 2, p. 71, pl. 133, figs. 209a, b, 210a, b.
1921 *Natica mamilla* LAMARCK. — DICKERSON, Fauna Vigo group, pp. 6, 7, 14, 17, 18.
1922 *Natica mamilla* LAMARCK. — DICKERSON, Rev. Philipp. Paleont., pp. 202, 216, 217, pl. 4, fig. 5.
1928 *Natica mamilla.* — K. MARTIN, Nachlese, p. 116.
1928 *Natica (Polinices) mamilla* (LINNÉ). — SCHÜRMANN, Kjökkenmöddinger e. Palaeolith. N. Sumatra, p. 241.
193. *Natica mamilla* LAM. — NASON-JONES, Geol. Finsch Coast Area, pp. 34, 43, 48.
1931 *Polinices (Naticina) mammilla* (LINNÉ). — COX, Farsan Is., p. 7.
1931 *Natica mamilla* LINN. — VAN ES, Age *Pithecanthr.*, pp. 95, 116.
1931 *Natica mamilla* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.
1932 *Natica mamilla* L. — VAN BENTHEM JUTTING, Preh. shells Sampoeng Cave, p. 103.
1934 *Natica mammilla* (LIN.). — NARDINI, Moll. spiagge em. Mar Rosso, p. 237.
1935 *Polinices (Polinices) mamilla* (LINNAEUS). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 202, pl. 9, figs. 31a, b.
1935 *Polinices (Polinices) mammilla* (LINNÉ). — OOSTINGH, Moll. Plioz. Boemiajoe, p. 47 (with further synonymy).
1938 *Polinices (Naticina) mammilla* (LINN.) — WEIR, Add. Neog. Moll. Kenya, p. 66.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 255: 1 ex.; M 257: 2 ex.; M 258: 2 ex.; M 260: 9 ex.; M 261: 4 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 9: 32 ex.; Sheet 105B, M 53: 4 ex.; Sheet 110B, M 195: 1 ex.; C 83: 1 ex.; below layer I: Sheet 105B, M 68: 1 ex.; layer I: Sheet 110A, M 82a: 7 ex.; M 83: 2 ex.; M 84: 1 ex.; M 86: 1 ex.; M 89: 1 ex. (with a specimen of *Ostrea* spec. fixed in the aperture); M 90: 11 ex.; layer II: Sheet 110A, M 122: 3 ex., M 123: 1 ex.; C 54: 1 ex.; Sheet 110B, M 177: 8 ex.; M 178: 1 ex.; C 2: 1 ex.; C 3: 1 ex.; Sheet 116A, M 216: 4 ex.; M 226: 1 ex.; C 33: 1 ex.; C 34: 1 ex.; C 35: 1 ex.; C 37: 1 ex.; layer III: Sheet 110A, M 139: 2 ex.; Sheet 110B, M 188: 1 ex.
Kaboeh layers: Sheet 110B, C 28: 3 ex.

The distinction of fossil specimens of this species and *P. aurantia* (LAMARCK) is sometimes very difficult. I found, however, no specimens in my material agreeing so well with typical specimens of *P. aurantia* (LAM.) as the shells from Sondé described and figured by K. MARTIN[47]). I am unable to draw a line between the more tumid shells and those which are slenderer than the typical *P. mammilla* (L.) in my material, as the two forms are connected by transitional specimens. Therefore I record my whole material as *P. mammilla.*

[47]) 1905, Foss. Java, p. 263, pl. 39, figs. 631, 632.

Fossil distribution:

Mal: neogene: Finsch Coast Area (New Guinea); miocene: W. part of the district of Tjidamar (Junghuhn's loc. K; Buitenzorg, Java); (Vigo group): Bondoc Peninsula (Luzon, Philippines); upper miocene: Tjilanang beds (Priangan, Java); Cape Possession (Papua); near Minanga (Luzon, Philippines); pliocene: Tjimantjeuri, Tjikeusik (Bantam, Java); Tjihondje (Priangan, Java); Waled (Cheribon, Java); Bentarsari Basin (T. J. 54, pp. 25, 27, 31), Boemiajoe (Pekalongan, Java); E. of Tjidjoelang (T. J. 54, p. 38) (Banjoemas, Java); [= Upper Kalibèng layers]: Sonde, Padasmalang, Doekoepengkol, Rangoen (Madioen, Java); pliocene: Benkoelen—Kroeë, Peninsula of S. Benkoelen (T. S. 3, p. 24), Bintoehan (T. S. 7, p. 20) (Benkoelen, Sumatra); Atjeh (Sumatra); districts of Beloe Tassih Fettoh, Malakka, and Amanoeban, and at the border of Amanoeban and Mollo (Timor); Cape Possession (Papua); Salac y Maputi River (Mindanao, Philippines); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer II]: Soemberringin (Soerabaja, Java); quaternary: Grissee (Soerabaja, Java); near Makassar (Celebes); Finsch Coast Area (New Guinea); Agusan River (Mindanao, Philippines); subrecent: Sampoeng Cave (near Ponorogo, Madioen, Java; secondary locality); (Kjökkenmöddinger): N. Sumatra.
Chi: holocene (raised coral reef): Taiwan Is. (= Formosa).
Ery: quaternary: several localities in Red Sea region.
Mad: pliocene: Kenya; quaternary: Kenya; Darressalam.

Recent distribution:

Mal, Fre, Mel, Que, Loy, Haw, Mic, Jap, Chi, Ind, Ery, Mad.

Bathymetrical distribution:

0—55 m.

Sectio *Neverita* Risso 1826.

105. POLINICES (NEVERITA) DIDYMUS (Roeding).

+ 1798 *Albula Didyma.* — Roeding, Mus. Boltenianum, p. 20.
1855 *Natica Lamarckiana.* — Reeve, Conch. Ic., 6, *Natica*, pl. 2, figs. 6a, b.
1855 *Natica Chemnitzii.* — Reeve, Ibid., pl. 2, figs. 7a, b.
1855 *Natica Petiveriana.* — Reeve, Ibid., pl. 5, figs. 17a, b.
1884 *Natica (Neverita) didyma* Bolten. — K. Martin, Tiefbohr. Java, p. 165.
1905 *Natica (Neverita) ampla* Philippi. — K. Martin, Foss. Java, p. 262, pl. 39, figs. 628, 629.
1906 *Natica ampla* Rve. — Tokunaga, Foss. Env. Tôkyô, p. 18, pl. 1, figs. 32a—c.
1908 *Natica ampla* Philippi. — K. Martin, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Natica (Neverita) ampla* Phil. — Martin-Icke, Foss. Gastr. Trinil, p. 47.
1919 *Natica ampla* Phil. — K. Martin, Palaeoz. Kenntn. Java, pp. 99, 125, 126. 132.
1920 *Polinices (Neverita) ampla* (Philippi). — Yokoyama, Foss. Miura Peninsula, pp. 10, 77, pl. 5, figs. 5, 6.
1922 *Polinices (Neverita) ampla* (Philippi). — Yokoyama, Foss. Upp. Musashino Kazusa a. Shimosa, pp. 8, 84.

1923 *Natica (Neverita) didyma* BOLTEN sp. — OOSTINGH, Rec. shells Java, p. 66, pl. fig. 7.
1923 *Polinices (Neverita) ampla* (PHILIPPI). — YOKOYAMA, Tert. Moll. Dainichi in Tôtômi, p. 12.
1923 *Polinices (Neverita) ampla* (PHILIPPI). — YOKOYAMA, Tert. foss. Kii, p. 53.
1925 *Polinices (Neverita) ampla* (PHILIPPI). — YOKOYAMA, Tert. Moll. Shinano a. Echigo, pp. 2, 7.
1926 *Polinices (Neverita) ampla* (PHILIPPI). — YOKOYAMA, Tert. Moll. Shiobara in Shimotsuké, pp. 129, 131.
1926 *Polinices (Neverita) ampla* (PHILIPPI). — YOKOYAMA, Tert. Moll. S. Tôtômi, pp. 318, 344.
1926. *Polinices ampla* (PHIL.). — YOKOYAMA, Tert. shells Tosa, p. 365.
1926 *Polinices ampla* PHIL. — YOKOYAMA, Foss. Moll. oil-fields Akita, p. 378.
1927 *Polinices (Neverita) ampla* (PHIL.). — YOKOYAMA, Moll. Upp. Musashino Tokyo, p. 395.
1927 *Polinices (Neverita) ampla* (PHIL.). — YOKOYAMA, Moll. Upp. Musashino W. Shimôsa a. S. Musashi, p. 442.
1927 *Polinices ampla* (PHIL.). — YOKOYAMA, Foss. Moll. Kaga, p. 167.
1928 *Polinices ampla* (PHIL.). — YOKOYAMA, Semi-foss. shells Noto, p. 115.
1928 *Natica ampla* PHIL. — K. MARTIN, Moll. Neog. Atjeh, pp. 6, 24.
1928 *Polinices ampla* (PHIL.). — YOKOYAMA, Plioc. shells Hyuga, p. 333.
1928 *Polinices ampla* (PHIL.). — YOKOYAMA, Neog. shells Higashiyama, Echigo, p. 353.
1929 *Polinices ampla* (PHIL.). — YOKOYAMA, Plioc. shells Tonohama, Tosa, p. 10.
1929 *Polinices ampla* (PHIL.). — YOKOYAMA, Neog. shells Chugoku, p. 364.
1931 *Natica ampla* PHIL. — VAN ES, Age *Pithecanthr.*, p. 116.
1931 *Natica ampla* PHIL. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 257.
1932 *Natica ampla* PHIL. — K. MARTIN, Kedoengwaroe, p. 114.
1935 *Polinices (Neverita) didyma* (BOLTEN). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 204.
1936 *Polinices (Neverita) didymus* (BOLTEN). — NOMURA & ZINBÔ, Moll. Foss. Okinawa-zima, p. 262.
1936 *Polinices (Neverita) didyma* („BOLTEN'' RÖDING). — SUZUKI & ICHIMURA, Moll. raised beach Takai, p. 712.
1936 *Polinices didyma* (BOLTEN). — OTUKA, Plioc. Moll. Akita, p. 727.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.; M 261: 1 ex.
Poetjangan layers (volcanic facies): Sheet 110A, M 130: 1 ex.; Sheet 110B, M 163: 1 ex.; C 83: 2 ex.; Sheet 116A, M 209: 1 ex.; M 234: 2 ex.; layer I: Sheet 110A, M 94a: 1 ex.; M 292: 1 ex.; M 292 or 293: 1 ex.; layer II: Sheet 110A, M 122: 1 ex.; M 124: 1 ex.; M 125: 2 ex.; M 126: 1 ex.; Sheet 110B, M 177: 5 ex.; M 178: 1 ex.; M 282: 1 ex.; C 2: 1 ex.; C 29: 2 ex.; C 82: 1 ex.; Sheet 116A, M 214: 1 ex.; M 216: 4 ex. (one of these with a specimen of *Crepidula walshi* REEVE inside the aperture); M 217: 2 ex.; M 218: 4 ex.; M 219: 1 ex.; M 221: 1 ex.; M 224: 1 ex.; M 226: 1 ex.; M 227: 1 ex.; C 6: 1 ex.; C 30: 1 + ? 1 ex:; C 33: 1 ex.; C 37: 1 ex.; layer III: Sheet 110B, M 185: 3 ex.; M 190: 1 ex.; C 118: 1 ex.; Sheet 116A, M 228: 2 ex.; M 232: 1 ex.; C 112: 2 ex.
Poetjangan layers (argillaceous facies): Sheet 110B, C 85: 1 ex.; C 92: 1 ex.
Kaboeh layers: Sheet 110B, C 28: 2 ex.

Both the more pointed form (var. *chemnitzii* (REEVE)) and the variety with a flat spire (var. *petiveriana* (REEVE)) occur in my mater-

ial; transitional forms make it impossible to separate them. The first mentioned variety was collected e.g. in the localities: M 177, M 185, M 218, M 227, M 232, the second in the localities: M 177, M 209, M 214, M 221.

The coloration of the specimens from the localities M 130 and M 221 agrees with that of a shell from Sondé described by MARTIN (1905, p. 262), as they possess a dark area round the umbilicus. The specimen from loc. M 94a is a monstrosity: it has a mammillate apex, which is due to regeneration of the young shell after damage.

Fossil distribution:

Mal: neogene: district of Tjidamar (Buitenzorg, Java); upper miocene: Tjiodeng, Palaboean Ratoe (Buitenzorg, Java); pliocene: Tjidjadjar (Cheribon, Java); Bentarsari Basin (T. J. 54, p. 25) (Pekalongan, Java); Sikoenang Ridge (T. J. 66, p. 18), village of Penoesoepan (T. J. 66, p. 23) (Banjoemas, Java); [= Upper Kalibèng layers]: Sonde, Padasmalang (Madioen, Java); pliocene: Peninsula of S. Benkoelen (T. S. 3, p. 24), Bintoehan (T. S. 7, p. 20) (Benkoelen, Sumatra); Atjeh (Sumatra); „pliocene" [= Poetjangan layers (volcanic facies]: Soemberringin (Soerabaja, Java); [= Poetjangan layers (volcanic facies), layer II]: Soemberringin, between Djetis and Sidoteko (Soerabaja, Java).
Jap: miocene—holocene: numerous localities in Honsyû; pliocene: Hyuga province (Kyûsyû); Tosa province (Sikoku).
Chi: pliocene (Byôritu beds): Taiwan Is. (= Formosa).

Recent distribution:

Mal, Mel, Que, Syd, Jap, Chi, Ind, Ery, Mad, Cap.

Bathymetrical distribution:

not recorded.

106. POLINICES (NEVERITA) SULCIFER (K. MARTIN).

+ 1905 *Natica (Neverita) sulcifera* spec. nov. — K. MARTIN, Foss. Java, p. 262, pl. 39, 630, 630a, b.
1908 *Natica sulcifera* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1919 *Natica sulcifera* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 99, 142.
1931 *Natica sulcifera* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 259.
1933 *Natica sulcifera.* — DE JONGH, Voorwoord, T. J. 14, p. 10.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 258: 1 ex.

This specimen agrees perfectly with MARTIN's type (R. G. M. L.).

Fossil distribution:

Mal: pliocene: Tjimantjeuri (T. J. 14, p. 34) (Bantam, Java); Sikoenang Ridge (T. J. 66, p. 19) (Banjoemas, Java); [= Upper Kalibèng layers]: Sonde (Madioen, Java); pliocene·

Peninsula of S. Benkoelen (T. S. 3, p. 22); Bintoehan (T. S. 7, p. 18) (Benkoelen, Sumatra).

Recent distribution:

not known living.

Sectio *Mammilla* SCHUMACHER 1817.

107. POLINICES (MAMMILLA) SUBFILOSUS spec. nov.

Figures 19*a*, *b*.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 98: 1 ex.; M 101: 1 ex. (holotype); C 60: 1 ex.; layer II: Sheet 110A, M 129: 1 ex.

Description: Shell ovoid, umbilicate; whorls nearly 4 in the holotype, 5 in the apparently adult paratype of loc. M 129; whorls of

19*a* 19*b*

Figs. 19*a*, *b*. *Polinices subfilosus* spec. nov., holotype × 2, from Sheet 110A, M 101, Poetjangan layers (volcanic facies), layer I.

the spire slightly convex, rapidly increasing; body whorl tumid, occupying almost the entire altitude of the shell. Sculpture: rather regular spiral striae crossing the lines of growth are visible through a lens. Aperture ovoid; outer lip sharp; parietal portion of the peristome represented by a thin callus on the penultimate whorl; there is a shallow notch at the point of junction of the parietal callus and the inner lip. Posterior half of the columellar lip bent over the umbilicus, rather abruptly merging into the anterior half, which is sharp and passes gradually into the outer lip. Umbilicus moderately wide, partly covered by the columellar lip when seen in front view (fig. 19*a*), rapidly narrowing when looked in from the base.

Alt. 14,5, Diam. 13 (holotype).

Alt. 19, Diam. 17 (largest paratype, from loc. M 129).

Polinices subfilosus spec. nov. is closely related to *P. filosus* (REEVE) (vide infra); the sculpture is the same in these two species. The new species differs from *P. filosus* (REEVE) by being broader in relation to the length, and by the shape of the columellar lip.

108. POLINICES (MAMMILLA) FILOSUS (REEVE).

+ 1855 *Natica filosa.* — REEVE, Conch. Ic., 9, *Natica*, pl. 17, figs. 72a, b.
1905 *Natica (Mamilla) melanostoma* [non] GMELIN. — K. MARTIN, Foss. Java, p. 266, pl. 39, figs. 642, 642a.
1907 *Natica filosa* SOW. — SCHEPMAN, Posttert. Moll. Celebes, p. 192.
? 1911 *Natica (Mamilla) melanostoma* [non?] GMEL. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 49.
1919 *Natica melanostoma* [non] GMEL. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 99, 128 (?), 142.
1920 *Natica melanostoma* [non] GMEL. — TESCH, Timor, 2, p. 72, pl. 133, figs. 212a, b [48]).
1927 *Natica (Mammilla) melanostoma* GMEL. [partim]. — P. J. FISCHER, Seran u. Obi, p. 47.
1928 *Natica melanostoma* [non] GMEL. — K. MARTIN, Moll. Neog. Atjeh, pp. 6, 24.
1931 *Natica melanostoma* GMEL. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.
1932 *Natica melanostoma* [non] GMEL. — K. MARTIN, Kedoengwaroe, p. 114.
1935 *Polinices (Polinices) filosus* (REEVE). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 203, pl. 9, fig. 34.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 255: 1 ex.; M 260: 1 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 9: 4 ex.; Sheet 105B, M 53: ? 1 ex.; Sheet 110B, M 161: 1 ex.; C 70: 1 ex.; Sheet 116A, M 325: 1 ex.; layer I: Sheet 110A, M 100: ? 1 ex.; M 101: 1 ex.; M 102: 1 ex.; M 106: 3 ex.; M 291: 1 ex.; M 292 or 293: 1 ex.; M 295: 1 ex.; M 301: 1 ex.; C 59: 1 ex.; C 60: 7 ex.; Sheet 110 B, M 157: 2 ex.; horizon above layer I: Sheet 110B, M 274: 1 ex.; layer II: Sheet 110A, M 123: 1 ex.; M 125: 1 ex.; C 54: 2 ex.; Sheet 110B, M 278: 6 ex.; M 281: 1 ex.; M 284: 1 ex.; Sheet 116A, M 216: 1 ex.; layer II?: Sheet 109C, M 346: 1 + ? 1 ex.; M 347: 2 ex.; layer III: Sheet 110A, M 139: 1 ex.; M 142: 1 ex.; M 143: 1 ex.; Sheet 116A, M 228: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, M 109: ? 1 ex.

This species differs from the closely related *P. melanostoma* (GMELIN) [49]) by its conspicuous and rather regular spiral sculpture. In the last mentioned species at most some irregular and obsolete spiral striae are visible through a lens. The shallow groove, which occurs in the columella just at the place where it meets the parietal callus, is generally more distinct in the present species than in *P. melanostoma.* Especially in young shells it is conspicuous, as is to be seen in MARTIN's (1905) figure 642. In *P. melanostoma* (GMELIN) it is on the contrary often wanting.

REEVE's original figure of this species represents a shell of which the spire occupies a greater part of the total altitude than in my specimens. I saw, however, recent shells of the same shape as my

[48]) 212a is erroneously indicated as 211a in the plate.
[49]) 1855 *Natica melanostoma.* — REEVE, Conch. Ic., 9, Natica, pl. 8, figs. 30a, b.

fossils, being in other respects (colour, sculpture) quite typical, and therefore I do not hesitate to identify my material with *P. filosus*.

Specimens from Padasmalang and Rangoen, referred to as „*Natica (Mamilla) melanostoma* GMEL." by mrs MARTIN-ICKE (R. G. M. L.), are likely to belong to the present species, though they are too badly preserved to allow of a certain identification. A specimen from the Atjeh collection described by K. MARTIN (1928), and labelled „*Natica melanostoma* GMEL." certainly belongs to *P. filosus*. Probably „*Natica melanostoma* GMEL." of VAN ES[50]) is also the present species.

Fossil distribution:

Mal: pliocene [= Upper Kalibèng layers]: Sonde, ? Padasmalang, ? Rangoen (Madioen, Java); pliocene: Atjeh (Sumatra); Amanoeban (Timor); „pliocene" [= Poetjangan layers (volcanic facies), layer II]: between Djetis and Sidoteko (Soerabaja, Java); quaternary: Minahassa (Celebes). Chi: pliocene (Byôritu beds): Taiwan Is. (= Formosa).

Recent distribution.

Mal, Bro, Que, Syd, Jap.

Bathymetrical distribution:

22—55 m.

POLINICES (MAMMILLA) spec.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 292 or 293: 1 ex.; M 295: 1 ex.; M 298: 1 ex.; layer II: Sheet 110A, M 313: 1 ex.; Sheet 110B, M 177: 1 ex.; Sheet 116A, M 217: 1 ex.; M 218: 1 ex.; layer III: Sheet 110A, M 142: 1 ex. Poetjangan layers (argillaceous facies): Sheet 110A, C 45: 1 ex.

These specimens are too bad to allow of a more exact identification; they may belong to the previous species.

109. POLINICES (MAMMILLA) SIMIAE (DESHAYES).

Figure 20.

+ 1838 *Natica simiae* DESH. — DESHAYES in: LAMARCK, An. s. Vert., ed. 2, 8, p. 652.
1855 *Natica Simiae.* — REEVE, Conch. Ic., 9, *Natica*, pl. 17, figs. 76a, b.
1869 *Natica simiae* LAMARCK. — ISSEL, Malac. Mar Rosso, p. 285.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 82a: 2 ex.

[50]) 1931, Age *Pithecanthr.*, pp. 95, 116.

These two specimens have thicker shells than *P. filosa* (REEVE) (vide supra), the mouth is smaller in relation to the total shell, and the funiculus is thicker. There is no trace of a spiral sculpture. They agree with recent specimens of this species (Z. M. A.), which is gener-

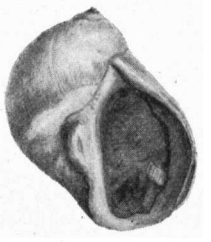


Fig. 20. *Polinices simiae* (DESHAYES), × 2, from Sheet 110A, M 82a, Poetjangan layers (volcanic facies), layer I.

ally distinguished on account of its typical colour pattern, of which nothing is left in my specimens.

Fossil distribution:

Ery: quaternary: Red Sea region.

Recent distribution:

Mal, Loy, Tua, Jap, Ind, Ery, Mad, Cap.

Bathymetrical distribution:

8—36 m.

Genus *Natica* SCOPOLI 1777.

110. NATICA VITELLUS (LINNÉ).

† 1758 *Nerita Vitellus.* — LINNÉ, Syst. Nat., ed. 10, p. 776.
1855 *Natica vitellus.* — REEVE, Conch. Ic., 9, *Natica*, pl. 10, figs. 39a, b.
1905 *Natica* (s. str.) *vitellus* LINN. — K. MARTIN, Foss. Java, p. 261, pl. 39, figs. 624, 624a, 625.
1908 *Natica vitellus* LIN. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1912 *Natica vitellus* LINN. — K. MARTIN, Vorl. Bericht, 2, p. 159.
1921 *Natica vitellus* LIN. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
193. *Natica vitellus* LINN. — NASON-JONES, Geol. Finsch Coast Area, p. 34.
1931 *Natica vitellus* LINN. — VAN ES, Age *Pithecanthr.*, p. 58.
† 1931 *Natica* aff. *N.* (s. str.) *vitellus* LINN. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 137.
1931 *Natica vitellus* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 259.
1932 *Natica vitellus* LINN. — HAANSTRA & SPIKER, Foss. Altmioz. Rembang, p. 1096.
1935 *Natica (Natica) vitellus* (LINNAEUS). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 200, pl. 9, figs. 33a, b.
1935 *Natica* (s. str.) *vitellus* LINNÉ. — WANNER & HAHN, Mioc. Moll. Rembang, p. 264.
1935 *Natica vitellus* (LINNÉ). — OOSTINGH, Moll. Plioz. Boemiajoe, p. 45 (with further synonymy).
1936 *Natica* (s. str.) *vitellus* L. — PANNEKOEK, Altmioc. Moll. Rembang, p. 59.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 255: 5 ex.; M 260: 1 ex.
Poetjangan layers (volcanic facies): Sheet 93B, M 9: 8 ex.; layer I: Sheet 110A, M 105: 2 ex.; M 298: 3 ex.; Sheet 110B, M 153: 2 ex.; layer above layer I: Sheet 110B, M 274: 3 ex.; layer II: Sheet 110A, M 126: 2 ex.; M 128: 1 ex.; M 129: 1 ex.; Sheet 110B, M 278: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, M 289: 1 ex.; Sheet 110B, M 264: 8 ex.; C 86: 1 ex.

Only those specimens have been recorded here in which the callus covering the umbilicus is clearly more extensive than in *N. helvacea* LAMARCK (vide infra). I cited the doubtful specimens of my material mostly young ones) separately below (as *Natica* spec.).

I agree with Miss KOPERBERG (l. c.) that the identification of a great part of the material recorded as *„N. vitellus"* from the Dutch East Indian Tertiaries seems doubtful. A revision especially of the material of the Leiden Museum must be awaited to judge about this question.

Fossil distribution:

Mal: neogene: Tjidaoen (Junghuhn's loc. L;. middle part of the district of Tjidamar, Buitenzorg, Java); Ajer Abab-Ajer Penoekal (Palembang, Sumatra); Finsch Coast Area (New Guinea); miocene: W. part of the district of Tjidamar (Junghuhn's loc. K; Buitenzorg, Java); lower miocene: Njalindoeng beds (Buitenzorg, Java); Rembang beds (Rembang, Java); upper miocene: Tjitaroem (T. J. 30, p. 16) (Batavia, Java); Tjiodeng (Buitenzorg, Java); pliocene: Tjimantjeuri, Tjikeusik (Bantam, Java); subsoil of Batavia, from a depth of 130 m. (Java); Boemiajoe (Pekalongan, Java); Sikoenang Ridge (T. J. 66, p. 18) (Banjoemas, Java); Sangiran (Soerakarta, Java); [= Upper Kalibèng layers]: Sonde, Padamaslang, Doekoepengkol (Madioen, Java); pliocene: Peninsula of S. Benkoelen (T. S. 3, p. 24), Benkoelen — Kroeë, Bintoehan (T. S. 7, p. 20) (Benkoelen, Sumatra); Dahana (Nias); Ceram; District of Amanoeban (Timor).
Jap: pliocene: Kyûsyû.
Chi: pliocene: (Byôritu beds): Taiwan Is. (= Formosa).

Recent distribution:

Mal, Bro, Que, Jap, Chi.

Bathymetrical distribution:

not recorded.

111. NATICA HELVACEA LAMARCK.

† 1822 *Natica helvacea.* — LAMARCK, An. s. Vert., 6, part 2, p. 200.
1855 *Natica globosa.* — REEVE, Conch. Ic., 9, *Natica*, pl. 11, figs. 46a, b.

1905 *Natica* (s. str.) *globosa* CHEMN. — K. MARTIN, Foss. Java, p. 259, pl. 38, figs. 618, 618a, 619, 619a, 620, 620a.
1910 *Natica globosa* (CHEMN.). — COSSMANN, Karikal, 3, p. 60, pl. 4, figs. 13, 14.
1911 *Natica globosa* CHEMN. — K. MARTIN, Vorl. Bericht, 1, pp. 21, 47.
1912 *Natica* (s. str.) *globosa* CHEMN. — K. MARTIN, Vorl. Bericht, 2, p. 169.
non 1913 *Natica globosa* CHEMN. — W. D. SMITH, Stratigr. a. foss. invert. Philipp., p. 265, pl. 4, fig. 12.
1928 *Natica globosa* (CHEMN.). — VREDENBURG, Moll. Tert. NW. India, 2, p. 396.
1928 *Natica globosa*. — K. MARTIN, Nachlese, p. 116.
1931 *Natica globosa* CHEMN. — K. MARTIN, Wann lösste sich etc., p. 3.
1931 *Natica globosa* CHEMN. — VAN ES, Age *Pithecanthr.*, pp. 39, 45, 51, 58, 69, 95.
1931 *Natica globosa* CHEMN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.
1935 *Natica helvacea* LAMARCK. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 44 (with further synonymy).

Material examined:

Poetjangan layers (volcanic facies): Sheet 105A, M 31: 1 ex.; Sheet 105B, M 53: 1 ex.; Sheet 110B, C 44: 2 ex.; C 70: 1 ex.; layer I: Sheet 105B, M 87: 1 ex.; Sheet 110A, M 89: 1 ex.; M 94a: 1 ex.; C 105: 2 ex.; layer II: Sheet 110A, M 128: 1 ex.; layer II ?: Sheet 109C, ? M 347: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, C 45: 1 ex.

Judging from the figure W. D. SMITH's „*Natica globosa* CHEMN." does not agree with the present species.

Fossil distribution:

Mal: neogene (Lower Palembang beds): near Gedongbatin (T. S. 9, p. 18) (Lampoengsche districten, Sumatra); Palembang (T. S. 9, p. 18) (Sumatra); neogene: Ajer Abab — Ajer Penoekal (Palembang, Sumatra); SW. New Guinea; miocene: Sangkoelirang Bay (E. Borneo); miocene: W. part of the district of Tjidamar (Junghuhn's loc. K; Buitenzorg, Java); lower miocene: Njalindoeng beds (Buitenzorg, Java); upper miocene: Tjiodeng, Palaboean Ratoe (Buitenzorg, Java); Tjilanang beds, Tjiberem (Junghuhn's loc. T), Tjilintoeng — Angsana (Priangan, Java); pliocene: Soedimanik (Bantam, Java); Tjidjadjar, Tjidjoerei, Baribis (Cheribon, Java); Boemiajoe, Bentarsari Basin (T. J. 54, pp. 27, 31) (Pekalongan, Java); Sikoenang Ridge (T. J. 66, p. 18) (Banjoemas, Java); Mount Gombel (Semarang, Java); Sangiran, Kalioeter (Soerakarta, Java); Bintoehan (T. S. 7, p. 19) (Benkoelen, Sumatra); district of Mollo (Timor); pliocene or younger: subsoil of Blakan Kebon (Semarang, Java); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer II]: between Djetis and Sidoteko (Soerabaja, Java); quaternary: subsoil of Batavia, at a depth of 0—6 m. (Java).
Ind: upper miocene (Talar stage of Mekran series): NW. India; pliocene: Karikal.

Recent distribution:

Mal, Que, Ind.

Bathymetrical distribution:

27—36 m.

NATICA spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 3 ex.; M 252: 3 ex.; M 255: 1 ex.; M 257: 11 ex.; M 258: 1 ex.; M 260: 2 ex. Poetjangan layers (volcanic facies): Sheet 99B, M 9: 7 ex.; M 16: 5 ex.; Sheet 105B, M 63: 2 ex.; Sheet 110A, M 107: 1 ex.; Sheet 110B, M 161: 1 ex.; M 163: 2 ex.; M 167: 2 ex.; Sheet 115C, M 329: 1 ex.; below layer I: Sheet 105B, M 68: 1 ex.; layer I: Sheet 105B, M 67: 6 ex.; Sheet 110A, M 82a: 1 ex.; M 84: 3 ex.; M 86: 4 ex.; M 88: 3 ex.; M 89: 26 ex.; M 90: 2 ex.; M 91: 1 ex.; M 94a: 4 ex.; M 94b: 1 ex.; M 95: 3 ex.; M 100: 8 ex.; M 292 + 293: 3 ex.; M 295: 1 ex.; C 103: 1 ex.; Sheet 110B, M 271: 1 ex.; horizon above layer I: Sheet 110B, M 273: 2 ex.; M 274: 1 ex.; C 75: 1 ex.; layer II: Sheet 110A, M 126: 3 ex.; Sheet 110B, M 176: 11 ex.; M 278: 7 ex.; M 280: 1 ex.; Sheet 116A, M 216: 2 ex.; layer II?: Sheet 109C, M 346: 3 ex.; M 347: 1 ex.; layer III: Sheet 110A, M 142: 1 ex.; Sheet 110B, M 180: 2 ex. Poetjangan layers (argillaceous facies): Sheet 110B, M 267: 5 ex.; Sheet 115C, M 328: 1 ex.; Sheet 116A, M 322: 1 ex.

These specimens are too young or too much damaged to allow of a more exact identification: they probably belong to the two previous mentioned species.

112. NATICA HYPOGLYPHA[51] spec. nov.

Figures 21*a*, *b*, *c*.

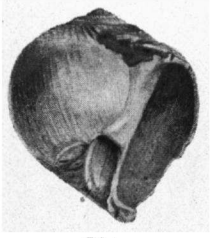
Material examined:

Upper Kalibèng layers: Sheet 105B, M 50a: 9 ex. (holotype + 8 paratypes).

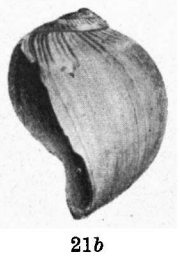
Description: Shell globular, umbilicate; whorls ± 5, which number has been found by reconstruction of the holotype (the largest shell available) by means of a paratype still in possession of the protoconch. Protoconch smooth, further whorls of the spire with a slightly concave ramp along the hindermost suture and with a rounded shoulder along the foremost suture. The protoconch has at least 1½ whorls, but its transition into the sculptured whorls cannot be determined exactly in any of my specimens. Body whorl with the same concave ramp

[51]) *ὑπόγλυφος*: somewhat grooved.

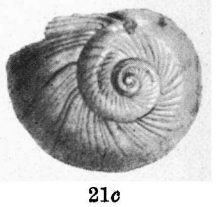
continuing along the suture, its altitude is nearly equal to the total height of the shell. The ramp of the whorls is grooved in axial direction, these grooves rapidly vanish in the shoulder; in the remainder of the shell, which is practically only the remainder of the body whorl, minute lines of growth crossed by equally minute spiral striae are visible through a lens. Aperture semicircular; outer lip simple; parietal



21*a*



21*b*



21*c*

Figs. 21*a, b, c.* *Natica hypoglypha* spec. nov., holotype × 1½, from Sheet 105B, M 50a, Upper Kalibeng layers.

portion of the peristome large, formed by a callus; length of the columellar lip equal to the half of the length of the parietal callus. Umbilicus narrow, partly covered by the parietal callus; when looked in from the base, a trifle more than the entire body whorl is visible.

Alt. 18, Diam. 17 (holotype).

This new species is sufficiently characterised by its globose habitus, its peculiar sculpture, and by the broad parietal callus. I am not acqainted with a closely related species.

113. NATICA RUFA (BORN).

+ 1778 *Nerita rufa.* — BORN, Ind. Mus. Caes. Vind., p. 413.
1855 *Natica rufa.* — REEVE, Conch. Ic., 9, *Natica,* pl. 16, figs. 70a, b.
1883 *Natica vitellus* [non] LAM. — K. MARTIN, Nachtr. Tertiärsch. Java, p. 254.
1884 *Natica (Neverita) vitellus* [non] LAM. — K. MARTIN, Tiefbohr. Java, pp. 164 [partim], 308.
1905 *Natica* (s. str.) *rufa* BORN. — K. MARTIN, Foss. Java, p. 260, pl. 39, figs. 621, 621a, 622, 622a, 623, 623a.
1908 *Natica rufa* BORN. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Natica rufa* BORN. — K. MARTIN, Vorl. Bericht, 1, pp. 21, 47.
1911 *Natica* (s. str.) *rufa* BORN. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1912 *Natica rufa* BORN. — K. MARTIN, Vorl. Bericht, 2, pp. 159, 169.
1914 *Natica* (s. str.) *rufa* BORN. — K. MARTIN, Mioc. Gastr. O.-Borneo, p. 331.
1919 *Natica rufa* BORN. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 99, 122, 124, 127, 128, 130, 133, 137, 138, 142, 145.
1920 *Natica rufa* BORN. — TESCH, Timor, 2, p. 69, pl. 133, figs. 208a, b.
1921 *Natica spadicea* REEVE. — DICKERSON, Fauna Vigo group, pp. 6, 12, 14.
1921 *Natica rufa* BORN. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
1922 *Natica spadicea* REEVE. — DICKERSON, Rev. Philipp. Paleont., pp. 202, 216, pl. 4, figs, 3a, c, 6 [52]).
1927 *Natica* (s. str.) *rufa* BORN. — P. J. FISCHER, Seran u. Obi, p. 46.
1928 *Natica rufa* BORN. — K. MARTIN, Moll. Neog. Atjeh, pp. 6, 24.

[52]) In this plate the numbers 3b and 6 have evidently been confounded.

1928 *Natica rufa*. — K. MARTIN, Nachlese, p. 116.
1929 *Natica rufa* BORN. — SIEMON, Jungtert. Moll. Niederl. O.-Ind., pp. 6, 17.
1931 *Natica rufa* BORN. — VAN ES, Age *Pithecanthr.*, pp. 58, 95, 116.
1931 *Natica* (s. str.) *rufa* BORN. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 136.
1931 *Natica rufa* BORN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 259.
1932 *Natica rufa* BORN. — HAANSTRA & SPEKER, Benkoelen u. Palembang, pp. 1313, 1314.
1935 *Natica (Natica) rufa* BORN. — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 200, pl. 9, figs. 29a—c.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 249: 1 ex.; M 251: 22 ex. + 4 opercula; M 252: 2 ex. + 2 opercula; M 255: 3 ex.; M 257: 10 ex. + ? 1 operculum (juv.); M 260: 5 ex.; M 261: 1 operculum; Sheet 105B, M 43: 1 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 operculum; M 25: 1 ex.; layer I: Sheet 105B, M 67: 3 ex.; Sheet 110A, M 83: 1 ex.; M 84: 3 ex.; M 89: 1 ex.; M 95: 1 ex.; M 98: 1 ex.; M 101: 5 ex.; M 291: 4 ex.; M 292: 9 ex.; M 292 + 293: 3 ex.; M 297: 1 ex.; M 298: 1 ex.; M 301: 12 ex.; C 52: 5 ex.; C 60: 2 ex.; C 100: 1 ex.; Sheet 110B, M 155: 1 ex.; M 157: 1 ex.; layer I?: Sheet 110A, M 104: 3 ex.; ± layer I: Sheet 110B, M 269: 1 ex.; horizon above layer I: Sheet 110B, M 273: 6 ex.; C 74: 1 ex.; C 75: 4 ex.; layer II: Sheet 110A, M 125: 3 ex.; M 126: 1 ex.; Sheet 116A, M 216: 2 ex.; M 217: 1 ex.; M 227: 1 ex.; C 37: 2 ex.; C 39: ? 1 ex. (juv.); layer III: Sheet 116A, M 228: 2 ex.; M 232: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, M 111: 1 ex.; Sheet 110B, M 150: 1 ex.; C 78: 5 ex.; C 80: 4 ex.; C 81: 1 ex.; C 86: 1 ex.; Sheet 116A, M 333: 1 ex. (with the operculum in situ).

Fossil distribution:

Mal: neogene: Ngembak (Semarang, Java); Jogjakarta (Java); Ajer Abab — Ajer Penoekal (Palembang, Sumatra); Toi Osapi Sòka (Amanoeban, Timor); miocene: NE. Koetei (E. Borneo); (Vigo group): Bondoc Peninsula (Luzon, Philippines); lower miocene: Njalindoeng beds (Buitenzorg, Java); Rembang beds (Rembang, Java); upper miocene: Tjilanang beds, Tadasngampar, Paroengponteng (Priangan, Java); pliocene: Tjikeusik (Bantam, Java); subsoil (81 m. and 130—134 m.) of Batavia (Java); Sikoenang Ridge (T. J. 66, p. 18) (Banjoemas, Java); Mount Gombel (Semarang, Java); Sangiran (Soerakarta, Java); [= Upper Kalibèng layers]: Sonde, Padasmalang (Madioen, Java); pliocene: Kroeë (T. S. 6, p. 20), Benkoelen — Kroeë, Bintoehan (T. S. 7, p. 19) (Benkoelen, Sumatra); four localities in Amanoeban and at the border of Amanoeban and Mollo (Timor); two localities in Fialarang (Beloe Tassih Fettoh, Timor); Ceram; SW. New Guinea; (Banisilan formation): Cotabato district (Mindanao, Philippines); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poet-

jangan layers (volcanic facies), layer II]: Soemberringin, Tambakbatoe (Soerabaja, Java).
Chi: pliocene (Byôritu beds): Taiwan (= Formosa).

Recent distribution:

Mal, Jap, Chi, Ind, Ery, Mad.

Bathymetrical distribution:

22—36 m.

114. NATICA GENDINGANENSIS K. MARTIN.

+ 1905 *Natica* (s. str.) *gendinganensis* spec. nov. — K. MARTIN, Foss. Java, p. 262, pl. 39, figs. 627, 627a.
1908 *Natica gendinganensis* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Natica* (s. str.) *gendinganensis* MART. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 49.
1919 *Natica gendinganensis* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 99, 142.
1931 *Natica gendinganensis* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 252: 9 ex.; M 255: 16 ex.; M 260: 7 ex.
Poetjangan layers (volcanic facies), horizon above layer I: Sheet 110B, M 274: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110B, C 78: 1 ex.
Terraces?: Sheet 93B, M 256: 4 ex.

Fossil distribution:

Mal: pliocene [= Upper Kalibèng layers]: Sonde, Padasmalang, Doekoepengkol (Madioen, Java).

Recent distribution:

not known living.

115. NATICA OTITIS [53] spec. nov.

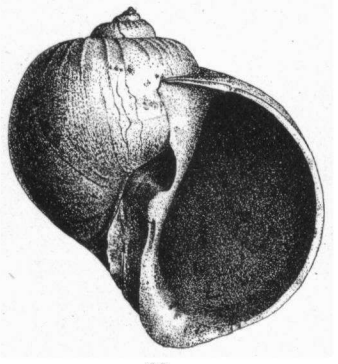
Figures 22*a, b, c.*

1905 *Natica* (s. str.) *ala-papilionis* [non] CHEMN. [partim]. — K. MARTIN, Foss. Java, p. 255, pl. 38, figs. 610, 610a [tantum].
1919 *Natica ala-papilionis* [non] CHEMN. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 98 [partim], 132.
1921 *Natica alae-papilionis* [sic] CHEMN., var. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
1927 *Natica* (s. str.) *ala-papilionis* CHEMN., var. — P. J. FISCHER, Seran u. Obi, p. 46, pl. 212, figs. 7a, b.
1931 *Natica alapapilionis* [non] CHEMN. [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 257.

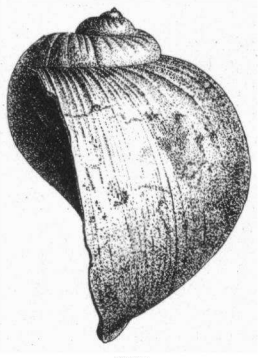
[53]) ὠτίτης, ὠτῖτις: eared, because of the aperture being ear-shaped.

Material examined:

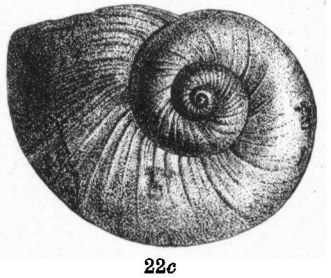
Poetjangan layers (volcanic facies): Sheet 110A, M 309: 2 ex.; Sheet 110B, M 163: 2 ex.; M 167: 1 ex.; layer I: Sheet 110A, M 86: 1 ex.; M 89: 4 ex.; M 298: 2 ex.; Sheet 110B, C 76: 1 ex.; horizon above layer I: Sheet 110B, M 273: 2 ex.; M 274: 1 ex.; C 75: 1 ex.; layer II: Sheet 110A, M 125: 1 ex.; M 126: 2 ex.; M 304: 4 ex.; M 311: 1 ex.; Sheet 110B, M 168: 2 ex.; M 172: 1 ex.; M 176: 1 ex.; M 177: 1 ex.; M 278: holotype + 3 ex.;



22*a*



22*b*



22*c*

Figs. 22*a, b, c.* *Natica otitis* spec. nov., holotype × 1, from Sheet 110B, M 278, Poetjangan layers (volcanic facies), layer II (fig. *a* is no exact front view: the outer lip is damaged and the shell has been turned somewhat to the left, therefore the umbilicus may seem wider than it really is).

M 280: 1 ex.; M 281: 19 ex.; C 68: 4 ex.; Sheet 116A, M 218: 1 ex.; layer II ?: Sheet 109C, M 346: 4 ex.; M 347: 1 ex.; layer III: Sheet 110B, M 189: 4 ex.; M 193: 1 ex.

Poetjangan layers (argillaceous facies): Sheet 110A, C 107: 1 ex.

Description: Shell globular, widely umbilicate; whorls $6^1/_2$, convex, but flattened or slightly concave along the hindermost suture. Protoconch consisting of 2—$2^1/_2$ whorls, smooth. The sculpture of the

younger whorls consists of rather regular lines of growth; every time one of about four of these lines of growth continues as an axial wrinkle on the sutural shelf. Aperture ± semicircular; outer lip simple; parietal callus occupying $^2/_7$—$^1/_4$ of the inner lip. Umbilicus wide, with a funiculus and encircled by a rather sharp keel formed by the base of the body whorl.

Alt. 45, Diam. 44 (holotype).

Alt. 42,5, Diam. 43 (paratype from loc. M 177).

The description has been made after the holotype, and as to the sculpture also after some paratypes from loc. M 281.

Natica otitis spec. nov. is closely related to *N. ala-papilionis* (ROEDING) [54]), of which K. MARTIN considered it to be a variety. My large material is, however, so uniformely distinct from the great number of recent specimens with which I compared it, that I am convinced it belongs to a separate species. The new species differs from *N. ala-papilionis* (ROEDING) by its considerable size, by the parietal portion of the peristome being broader, by the funiculus being situated nearer to the parietal callus, and by the conspicuous keel encircling the umbilicus. By the last mentioned character it reminds of *N. rostalina* JENKINS [55]), in which this keel is, however, still more conspicuous, and which has moreover a different habitus and a less pronounced sculpture in the sutural shelf.

The present species may prove to be identical with *N. obscura* J. DE C. SOWERBY [56]) from the lower miocene (Gáj series) of NW. India, but the short description and the figures of that species are inadequate for a certain identification, and comparison of specimens must be awaited to settle this question.

Fossil distribution:

Mal: p l i o c e n e: Waled (Cheribon, Java); Ceram.

Recent distribution:

not known living.

116. NATICA ZEBRA LAMARCK (sensu latiori).

+ 1822 *Natica zebra.* — LAMARCK, An. s. Vert., 6, part 2, p. 203.
1855 *Natica zebra.* — REEVE, Conch. Ic., 9, *Natica*, pl. 13, figs. 53a, b.
1907 *Natica picta* RECLUZ. — SCHEPMAN, Posttert. Moll. Celebes, p. 191.
1908 *Natica zebra* LAM. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1912 *Natica zebra* LAM. — K. MARTIN, Vorl. Bericht, 2, pp. 109, 159.
1921 *Natica zebra* LAM. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
1928 *Natica zebra.* — K. MARTIN, Nachlese, p. 116.

[54]) + 1798 *Cochlis Ala Papilionis.* — ROEDING, Mus. Boltenianum, p. 146.
1855 *Natica ala-papilionis.* — REEVE, Conch. Ic., 9, *Natica*, pl. 14, figs. 60a, b.

[55]) K. MARTIN, 1905, Foss. Java, p. 256, pl. 38, fig. 611.

[56]) J. DE SOWERBY, 1840, Syst. list etc. Cutch, p. 328, pl. 26, fig. 2; VREDENBURG, 1928, Moll. Tert. NW. India, 2, p. 397; non NOETLING, 1901, Fauna Mioc. beds Burma, p. 284, pl. 19, figs. 2, 2a, b, 3, 3a—d (as already stated by K. MARTIN, 1905, Foss. Java, p. 256 footnote).

1931 *Natica picta* RÉCLUZ. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.
1931 *Natica zebra* LAMK. — VAN DER VLERK, Ibid., p. 259.
1935 *Natica* (s. str.) *zebra* LAM. — WANNER & HAHN, Mioc. Moll. Rembang, p. 264.
1935 *Natica zebra* LAMARCK. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 46 (with further synonymy).
1935 *Natica (Natica) zebra* LAMARCK. — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 199, pl. 9, figs. 25a, b.
1936 *Natica* (s. str.) *zebra* LAM. — PANNEKOEK, Altmioc. Moll. Rembang, p. 59.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 6 ex.; M 252: 1 ex.; M 255: 7 ex.; M 257: 13 ex.; M 258: 1 ex.; M 260: 4 ex. Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 ex.; layer I: Sheet 110A, M 94b: 1 ex.; M 98: 1 ex.; M 100: 2 ex.; M 292: 1 ex.; M 297: 2 ex.; M 298: 1 ex.; C 60: 1 ex.; layer II: Sheet 110B, M 176: 2 ex.; M 177: ? 1 ex. (juv.); layer III: Sheet 110B, M 185: 1 ex.

Recent specimens of *N. zebra* and *N. picta* RÉCLUZ [57]) can easily be distinguished on account of their colour pattern. Besides in *N. zebra* the whorls are flatter than in *N. picta* RÉCLUZ, but this difference proved to be not constant enough to serve as a criterion for the distinction of fossil specimens of these two species. I failed to detect any other difference between these two species and thus I am forced to unite the fossil specimens of *N. picta* RÉCLUZ and *N. zebra* as „*Natica zebra* LAMARCK (sensu latiori)".

Fossil distribution:

Mal: neogene: Ngembak (Semarang, Java); miocene: Sangkoelirang Bay (E. Borneo); lower miocene: W. Progo Mountains (Jogjakarta, Java); Rembang beds (Rembang, Java); upper miocene: Tjikao (T. J. 30, p. 15) (Batavia, Java); Tjilanang beds (only from Junghuhn's loc. O), Tadasngampar (Priangan, Java); plio.cene: Tjikeusik, Tjimantjeuri (Bantam, Java); Boemiajoe (Pekalongan, Java); [= Upper Kalibèng layers]: Sonde, Padasmalang, Doekoepengkol (Madioen, Java); pliocene: Kroeë (T. S. 6, p. 20), Bintoehan (T. S. 7, p. 19) (Benkoelen, Sumatra); Ceram; quaternary: subsoil of Soengaiboeroeng (T. S. 13, p. 21) (border of Palembang and Lampoengsche districten, Sumatra); Kajoe Ragi (Minahassa, Celebes).
Chi: pliocene: (Byôritu beds): Taiwan Is. (= Formosa).

Recent distribution:

Mal, Bro, Loy, Mic, Jap, Chi, Ind, Mad.

Bathymetrical distribution:

15—40 m.

[57]) REEVE, 1855, Conch. Ic., 9, *Natica*, pl. 15, figs. 67a, b.

117. NATICA LINEATA (ROEDING).

+ 1798 *Cochlis Lineata.* — ROEDING, Mus. Boltenianum, p. 147.
1855 *Natica lineata.* — REEVE, Conch. Ic., 9, *Natica*, pl. 7, fig. 24.
1912 *Natica lineata* LAM. — K. MARTIN, Vorl. Bericht, 2, pp. 159, 169.
1915 *Natica lineata* LAM. — ZWIERZYCKI, Foss. Sumatra, pp. 106, 124.
193. *Natica lineata.* — NASON-JONES, Geol. Finsch Coast Area, p. 31.
1931 *Natica lineata* LAMK. — VAN ES, Age *Pithecanthr.*, pp. 45, 58, 95.
1931 *Natica lineata* LAMK. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.
1935 *Natica lineata* LAMARCK. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 46, pl. 5, figs. 54a, b, c (with further synonymy).

Material examined:

Poetjanganlayers (volcanic facies), layer I: Sheet 105B, M 67: 1 ex.; Sheet 110A, M 298: 1 ex.; Sheet 110B, M 157: 2 ex.; layer II: Sheet 110A, M 122: 2 ex.; M 123: 1 ex.; Sheet 110B, M 176: 1 ex.; M 177: 3 ex.; M 284: 2 ex.; C 7: 1 ex.; Sheet 116A, M 216: 5 ex.; M 217: 2 ex.; M 218: 3 ex.; C 34: 2 ex.; C 37: 1 ex.; C 39: 6 ex.; layer III: Sheet 110A, M 142: 1 ex.; Sheet 110B, M 189: 1 ex.; M 197: 2 ex.

Fossil distribution:

Mal: neogene (Lower Palembang layers): near Gedongbatin (T. S. 9, p. 18) (Lampoengsche districten, Sumatra); Palembang (T. S. 9, p. 18) (Palembang, Sumatra); lower miocene: Rembang beds (Rembang, Java); pliocene: Tjimantjeuri, Tjikeusik (Bantam, Java); Tjidjadjar, Waled (Cheribon, Java); Boemiajoe (Pekalongan, Java); Mount Gombel (Semarang, Java); Sangiran (Soerakarta, Java); Kroeë (T. S. 6, p. 20) (Benkoelen, Sumatra); Atjeh (Sumatra); „pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); quaternary: Finsch Coast Area (New Guinea).

Recent distribution:

Mal, Que, Chi, Ind.

Bathymetrical distribution:

8—36 m.

118. NATICA MAROCHIENSIS (GMELIN).

+ 1790 *Nerita marochiensis.* — GMELIN in: LINNÉ: Syst. Nat., ed. 13, 1, p. 3673.
1855 *Natica Marochiensis.* — REEVE, Conch. Ic., 9, *Natica*, pl. 13, fig. 52.
1855 *Natica Gualteriana.* — REEVE, Ibid., pl. 25, figs. 114a, b.
1884 *Natica* (s. str.) *chinensiformis* nov. spec. — K. MARTIN, Tiefbohr. Java, pp. 166, 308, pl. 8, fig. 161.
1905 *Natica* (s. str.) *marochiensis* GMEL. — K. MARTIN, Foss. Java, p. 258, pl. 38, figs. 616, 616a, b, 617, 617a.
1907 *Natica marochiensis* GMELIN. — HALL & STANDEN, Moll. raised reef Red Sea, p. 67.
1907 *Natica marochiensis* GMEL. — SCHEPMAN, Posttert. Moll. Celebes, p. 191.
1910 *Natica lurida* PHIL. — KOERT & TORNAU, Geol. u. Hydrol. Darressalam u. Tanga, p. 9.
1910 *Natica marochiensis* GMELIN, var. *lurida* PHIL. — COSSMANN, Karikal, 3, p. 59, pl. 4, figs. 11, 12.

1911 *Natica marochiensis* GMEL. — K. MARTIN, Vorl. Bericht, 1, pp. 21, 47.
1911 *Natica* (s. str.) *morochiensis* [sic] GMEL. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
1913 *Natica marochiensis* GMEL. — W. D. SMITH, Stratigr. a. foss. evert. Philipp., p. 266.
1914 *Natica* (s. str.) *marochiensis* GMEL. — K. MARTIN, Mioc. Gastr. O.-Borneo, p. 331.
1919 *Natica marochiensis* GMEL. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 99, 127, 128, 130, 131, 138.
1920 *Natica marochiensis* GMEL. — TESCH, Timor, 2, p. 68, pl. 132, figs. 205a, b.
1921 *Natica marochiensis* GMEL. — P. J. FISCHER, Pliocänfauna Seran, pp. 244, 286.
1927 *Natica* (s. str.) *marochiensis* GMEL. — P. J. FISCHER, Seran u. Obi, pp. 33, 45.
1928 *Natica marochiensis* GMEL. — K. MARTIN, Moll. Neog. Atjeh, pp. 6, 24.
1928 *Natica marochiensis*. — K. MARTIN, Nachlese, pp. 109, 111, 116.
1929 *Natica marochiensis* GMELIN. — CHAPMAN, Rep. further series foss. Barum R., p. 59.
1929 *Natica chinensiformis*. — PAPP, Geol. NE. Sepik District, p. 72.
1929 *Natica chinensiformis*. — CHAPMAN, Rep. foss. Marienberg, p. 82.
193. *Natica chinensiformis*. — NASON-JONES, Geol. Finsch Coast Area, pp. 50, 80.
1930 *Natica marochiensis* (GMELIN). — COX, Kenya, p. 139.
1931 *Natica marochiensis* (GMELIN). — COX, Farsan Is., p. 5.
1931 *Natica marochiensis* MART. [sic]. — VAN ES, Age *Pithecanthr.*, p. 58.
1931 *Natica marochiensis* GMEL. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 258.
1932 *Natica marochiensis* GMEL. — K. MARTIN, Kedoengwaroe, p. 114.
1934 *Natica marochiensis* (GMEL.). — NARDINI, Moll. spiagge em. Mar Rosso, p. 236.
1936 *Natica* (s. str.) *marochiensis* GMEL. — PANNEKOEK, Altmioc. Moll. Rembang, p. 59.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 9: 5 ex.; Sheet 110A, M 120: 1 ex.; Sheet 110B, M 286: 1 ex.; below layer I: Sheet 105B, M 68: 1 ex.; layer I: Sheet 105B, M 67: 2 ex.; Sheet 110A, M 89: 2 ex.; M 101: ? 1 ex.; ± layer I: Sheet 110A, M 294: 2 + ? 1 ex.; horizon above layer I: Sheet 110B, M 273: 2 ex.; M 274: 1 ex.; C 74: 2 ex.; layer II: Sheet 110A, M 127: 1 ex.; M 313: ? 1 ex.; Sheet 110B, ? M 278: 1 ex.; M 284: 1 ex.; Sheet 116A, M 216: 3 ex.; M 220: 1 ex.; C 31: 2 ex.; C 36: ? 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110B, M 267: 1 ex.

In some of my specimens (e. g. from loc. M 9) the umbilicus is entirely or almost entirely closed by the funiculus; I saw, however, recent East Indian specimens of this species showing the same feature (Z. M. A., R. N. H. L.), and moreover this variety is connected with the typical species by transitional forms.

In the shell from loc. C 36 the spire is higher and the rimate umbilicus nearly straight instead of crescent-shaped. Abnormal growth after damage, which can be deduced from some scars in the body whorl, may be the cause of these abnormalities.

Fossil distribution (records from the Indo-Westpacific area only are taken into consideration):
Mal: neogene: Barum River, Sepik district, Finsch Coast Area (New Guinea); lower miocene: Njalindoeng beds (Buitenzorg, Java); West Progo Mountains (Jogjakarta, Java); Rembang beds (Rembang, Java); upper miocene: Tjilanang beds, Tadasngampar, Tjilintoeng (Priangan, Java); NE. Koetei (E. Borneo); pliocene: Tjimantjeuri (T. J. 14, p. 34) (Bantam, Java); Tjihondje (T. J. 54, p. 35) (Priangan, Java); Bentarsari Basin (T. J. 54, pp. 25, 27, 31) (Pekalongan, Java); E. of Tjidjoelang (T. J. 54, p. 38), Sikoenang Ridge (T. J. 66, p. 18) (Banjoemas, Java); Sangiran (Soerakarta, Java); [=Upper Kalibèng layers]: Padasmalang (Madioen, Java); pliocene: Peninsula of S. Benkoelen (T. S. 3, p. 23), Bintoehan (T. S. 7, p. 19) (Benkoelen, Sumatra); Atjeh (Sumatra); several localities in Amanoeban and Beloe Tassih Fettoh (Timor); Ceram; Obi; „pliocene" [=Poetjangan layers (volcanic facies), layer II]: between Djetis and Sidoteko (Soerabaja, Java); quaternary: Kajoe Ragi (Minahassa, Celebes); Agusan River (Mindanao, Philippines).
Ind: pliocene: Karikal.
Ery: quaternary: two localities in Red Sea region.
Mad: quaternary: Kenya, Darressalam.

Recent distribution:

This species has been recorded from almost all the regions of the Indo-Westpacific area (Mal, Mel, Que, Syd, Loy, Tua, Haw, Mic, Jap, Chi, Ind, Ery, Mad), but further also from California, the West Indies, etc. A critical revision of a large recent material must be awaited to be sure if really one and the same species is always referred to.

Bathymetrical distribution:

9—72 m.

NATICA spec.

Material examined

Upper Kalibèng layers: Sheet 93B, M 260: 2 opercula.

POLINICES or NATICA spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 255: 3 ex.; M 260: 4 ex.; Sheet 105B, M 43: 1 ex.; M 47: 2 ex.
Poetjangan layers (volcanic facies): Sheet 99B, M 9: 2 ex.; M 23: 4 ex.; Sheet 105B, M 53: 1 ex.; M 56: 1 ex.; Sheet 110B, M 161: 1 ex.; Sheet 116A, M 209: 1 ex.; M 324: 1 ex.; M 325: 2 ex.; below layer I: Sheet 105B, M 68: 1 ex.; layer I: Sheet 105B, M 67: 4 ex.; Sheet 110A, M 89: 1 ex.; M 90: 1 ex.; M 95: 2 ex.; M 98: 1 ex.; M 100: 1 ex.; M 101: 1 ex.; M 291: 3 ex.; M 292: 6 ex.;

M 295: 6 ex; M 297: 1 ex.; M 298: 7 ex.; M 301: 12 ex.; Sheet 110B, M 272: 1 ex.; C 84: 1 ex.; C 95: 1 ex.; horizon above layer I: Sheet 110B, M 273: 1 ex.; M 274: 1 ex.; C 74: 1 ex.; layer II: Sheet 110A, M 125: 7 ex.; M 281: 1 ex.; M 304: 2 ex.; M 313: 1 ex.; Sheet 110B, M 166: 1 ex.; M 176: 1 ex.; Sheet 116A, M 216: 2 ex.; M 219: 1 ex.; C 31: 1 ex.; layer II?: Sheet 109C, M 347: 1 ex.; layer III: Sheet 110A, M 139: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, M 289: 1 ex.; Sheet 110B, C 90: 1 ex.

These specimens are too bad or too young to allow of a more exact identification. They have been recorded here, as the occurrence of Naticids may be important in determining the facies of a locality.

Genus *Sinum* ROEDING 1798.
(= *Sigaretus* LAMARCK 1799).
Sectio *Eunaticina* P. FISCHER 1885.

119. SINUM (EUNATICINA) PAPILLA (GMELIN).

Figures 23*a*, *b*.

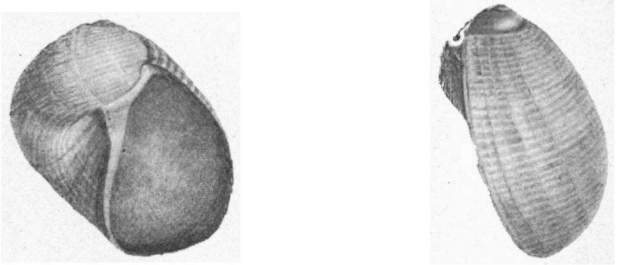
+ 1790 *Nerita Papilla.* — GMELIN in: LINNÉ, Syst. Nat., ed. 13, 1, p. 3675.
1843 *Sigaretus papillus* NOBIS. — RÉCLUZ in: CHENU, Ill.. Conch., 1, *Sigaretus*, p. 7, pl. 1, figs. 1a, b, 2a, b.
1884 *Sigaretus papilla* GRAY. — K. MARTIN, Tiefbohr. Java, p. 168.
1905 *Sigaretus (Eunaticina) papilla* CHEMN. — K. MARTIN, Foss. Java, p. 269, pl. 40, figs. 647, 648.
1906 *Sigaretus papilla* GMEL. — YOKUNAGA, Foss. Env. Tôkyô, p. 19, pl. 1, fig. 34.
1908 *Sigaretus papilla* CHEMN. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1910 *Sigaretus papilla* CHEMN. — KOERT & TORNAU, Geol. u. Hydrol. Darressalam u. Tanga, p. 9.
1911 *Sigaretus papilla* CHEMN. — K. MARTIN, Vorl. Bericht, 1, p. 47.
1919 *Sigaretus papilla* CHEMN. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 100, 128, 134, 142.
1920 *Sigaretus papilla* CHEMN. — TESCH, Timor, 2, p. 68, pl. 132, figs. 204a, b.
1922 *Sigaretus (Eunaticina) papilla* (GM.). — YOKOYAMA, Foss. upp. Musashino Kazusa a. Shimosa, pp. 8, 84, pl. 5, fig. 8.
1923 *Sigaretus (Eunaticina) papilla* GMELIN. — YOKOYAMA, Tert. Moll. Dainichi in Tôtômi, p. 12.
1923 *Sigaretus (Eunaticina) papilla* (GMELIN). — YOKOYAMA, Tert. Moll. Kii, p. 53.
1926 *Sigaretus (Eunaticina) papilla* GMELIN. — YOKOYAMA, Tert. Moll. S. Tôtômi, pp. 318, 345.
1927 *Sigaretus papilla* GM. — YOKOYAMA, Moll. upp. Musashino Tokyo, p. 396.
1927 *Sigaretus (Eunaticina) papilla* (GM.). — YOKOYAMA, Foss. Upp. Musashino W. Shimosa a. S. Musashi, p. 442.
1928 *Sigaretus (Eunaticina) papilla* GM. — YOKOYAMA, Semifoss. shells Noto, p. 115.
1928 *Sigaretus papilla.* — K. MARTIN, Nachlese, p. 116.
1928 *Sigaretus papilla* GM. — YOKOYAMA, Neog. shells Higashiyama, Echigo, p. 353.
1929 *Sigaretus (Eunaticina) papilla* GM. — YOKOYAMA, Neog. shells Chugoku, p. 364.
1931 *Sigaretus papilla* CHEMN. — VAN ES, Age *Pithecanthr.*, p. 58.
1931 *Sigaretus papilla* CHEMN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 260.

1932 *Eunaticina papilla* GMELIN. — NOMURA, Moll. raised beach dep. Kwanto, p. 112.
1935 *Eunaticina papilla* (GMELIN). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 205, pl. 9, figs. 27a, b.
1936 *Sinum (Eunaticina) papillum* (GMELIN). — SUZUKI & ICHIMURA, Moll. raised beach dep. Takai, p. 712.

Material examined:

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 ex.; Sheet 110A, M 130: 2 ex.; layer II: Sheet 110B, M 176: 1 ex.; layer III: Sheet 110B, M 189: 1 ex.
Poetjangan layers (argillaceous facies): Sheet 110A, C 45: 1 ex.; Sheet 110B, M 264: 1 ex.

Whereas the typical form of this species has a rather pointed spire, some of my specimens are distinguished by a flattened spire.



23*a* 23*b*

Figs. 23*a, b*. *Sinum papilla* (GMELIN), var. *madoerensis* var. nov., holotype × 1½, from Madoera, recent (R. N. H. L.).

I saw recent specimens of this same variety from Madoera (R. N. H. L.), one of which has been figured here. It may be referred to as var. *madoerensis* var. nov.; my specimens from the localities M 176 and M 189 belong to it, probably also the young shell from loc. M 264. The shell from the pliocene of Taiwan figured by NOMURA (1935) seems to present the same characters.

Fossil distribution:

Mal: upper miocene: Tjilanang beds (Priangan, Java): pliocene: Sangiran (Soerakarta, Java); [= Upper Kalibèng layers]: Sonde (Madioen, Java); pliocene: near Atamboea (Beloe Tassih Fettoh, Timor); pliocene or younger: Blakan Kebon (Semarang, Java).
Jap: miocene—holocene: several localities in Honsyû.
Chi: pliocene (Byôritu beds): Taiwan Is. (= Formosa).
Mad: quaternary: Darressalam.

Recent distribution:

Mal, Fre, Jap, Chi, Ind, Ery, Mad.

Bathymetrical distribution:

not recorded.

120. SINUM (EUNATICINA) LAMARCKIANUM (RÉCLUZ).

+ 1843 *Sigaretus lamarckianus* (Nobis). — RÉCLUZ in: CHENU, Ill. Conch., 1, *Sigaretus*, p. 7, pl. 1, figs. 5a, b.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: ? 1 ex.

As my only specimen is juvenile (Alt. 13, Diam. 12) its identification is not quite sure. It is conspicuously broader in relation to the altitude than specimens of equal size of the previous species; moreover the interstices between the spirals are wider.

Fossil distribution:

no previous records.

Recent distribution:

Mal, Jap (Z. M. A.).

Bathymetrical distribution:

not recorded.

Sectio *Sinum* ROEDING.

SINUM (SINUM) spec.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 116A, C 31: 1 ex.

This is a small, probably young, specimen.

121. SINUM (SINUM) EXIMIUM (REEVE).

Figure 24.

+ 1864 *Sigaretus eximius*. — REEVE, Conch. Ic., 15, *Sigaretus*, pl. 5, fig. 22.
1910 *Sigaretus Bonneti* nov. sp. — COSSMANN, Karikal, 3, p. 67, pl. 5, figs. 4, 5.
1928 *Sigaretus laevigatus* RECL., prior. — K. MARTIN, Moll. Neog. Atjeh, pp. 6, 15, 24.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 90: 1 ex.; layer II: Sheet 110B, M 284: 2 ex.; Sheet 116A, C 31: 1 ex.; C 34: 1 ex.; C 39: 1 ex.

These specimens agree with a halfgrown recent shell of this species from Ceram with which I compared them (R. N. H. L.). The relation Alt. : Diam. is variable as appears from the measurements

listed below. Young specimens of *S. laevigatum* (LAMARCK) of equal size differ from specimens of the present species by having a smaller number of whorls.

In Leiden (R. G. M. L.) I could examine one of the specimens refer-

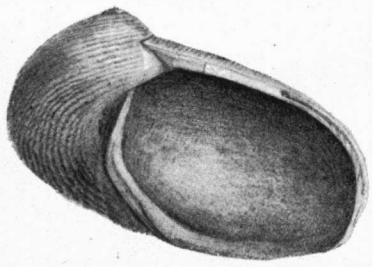


Fig. 24. *Sinum eximium* (REEVE), × 3, from Sheet 110A, M 90, Poetjangan layers (volcanic facies), layer I.

red to by K. MARTIN (1928) as „*Sigaretus laevigatus* RECL., prior"; it proved to belong to the present species. I can find no differences of any importance between the description and figures of „*Sigaretus Bonneti*" by COSSMANN and *S. eximium*.

Measurements:

1 ex. from loc. M 90:	Alt. 14,	Diam. 15.
1 ex. from loc. M 284:	Alt. 16,	Diam. 19.
1 ex. from loc. C 34:	Alt. 13,	Diam. 13.5.
1 ex. from loc. C 39:	Alt. 14,	Diam. 14.
recent ex. (R. N. H. L.):	Alt. 9,	Diam. 9,5.
„*Sigaretus Bonneti*" of COSSMANN:	Alt. 8,5	Diam. 10.

Fossil distribution:

Mal: p l i o c e n e: Atjeh (Sumatra).
Ind: p l i o c e n e: Karikal.

Recent distribution:

Mal.

Bathymetrical distribution:

not recorded.

122. SINUM (SINUM) INCISUM (REEVE).

+ 1864 *Sigaretus incisus*. — REEVE, Conch. Ic., 15, *Sigaretus*, pl. 3, fig. 11.
1874 *Sigaretus undulatus* LISCHKE. — LISCHKE, Jap. Meeres-Conch., 3, p. 54, pl. 3, figs. 11—14.
1928 *Sigaretus undulatus* LISCHKE. — YOKOYAMA, Moll. oil-field Taiwan, p. 64, pl. 6, fig. 5.

Material examined:

Poetjangan layers (volcanic facies), layer above layer I: Sheet 110B, M 274: 1 ex.

Though my only specimen is damaged, I am pretty sure about its identification after accurate comparison with a recent specimen from the Moluccas (Z. M. A.) which agrees with REEVE's description and figures, and differs from specimens of *S. planulatum* (RÉCLUZ) [58]) in the same way as stated by REEVE (l. c.).

As TRYON [59]) already remarked „*Sigaretus undulatus* LISCHKE" seems to be a synonym of *S. incisum*.

Fossil distribution:

Chi: pliocene (Byoritz beds): Taiwan Is. (= Formosa).

Recent distribution:

Mal, Jap.

Bathymetrical distribution:

not recorded.

[58]) 1864 *Sigaretus planulatus*. — REEVE, Conch. Ic., 15, *Sigaretus*, pl. 2, figs. 7a, b.
[59]) 1886, Man. Conch., 8, p. 57.