

**THE MARINE MOLLUSCA OF THE KENDENG
BEDS (EAST JAVA)
GASTROPODA PART IV
(Families Cassididae - Ficidae inclusive)**

BY

**C. O. VAN REGTEREN ALTENA,
Rijksmuseum van Natuurlijke Historie, Leiden ¹⁾**

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A. GENERAL PART.

1. Introduction

Part III of this monograph (by Dr. F. A. SCHILDER) was published in volume 12 of this Journal, pp. 171—194, 1941.

The fourth part deals with the families which can be summarised as Tonnacea (= Doliacea THIELE). They contain 31 species, two of which are new to science. The manuscript was already completed in the summer of 1940, but there was no earlier occasion for publication.

As in the previous parts I owe the illustrations (except figures 4a, b, which are photographs) to the skilful hand of Mr. L. P. POUDEROYEN, whose beautiful drawings always give perfect satisfaction. The cost of these illustrations was supplied by the Zoölogisch Insulinde Fonds.

2. Additions to Bibliography.

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¹⁾ Manuscript received 30 IV 1942.

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B. SYSTEMATIC PART.

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

Familia Cassididae.

Genus *Sconsia* GRAY 1847

151. *SCONSIA MARTINI* spec. nov.

Figure 1.

- 1884 *Cassidaria striata* [non] LAM. — K. MARTIN, Tiefbohr. Java, p. 139.
- 1899 *Morio* (*Sconsia*) *striata* [non] LAM. — K. MARTIN, Foss. Java, p. 158, pl. 24, figs. 366, 366a, 367, 367a.
- 1908 *Morio striata* [non] LAM. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
- 1919 *Sconsia striata* [non] LAM. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 89, 137, 141.
- 1931 *Sconsia striata* [non] LAMK. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 242.
- non 1935 *Sconsia striata* [nec] LAM. — WANNER & HAHN, Mioc. Moll. Rembang, p. 257, pl. 19, fig. 21.
- non 1936 *Sconsia striata* [nec] LAM. — PANNEKOEK, Altmioc. Moll. Rembang, p. 7.

Material examined:

[miocene: Ngembak (Semarang, Java): 1 ex. (holotype, R. G. M. L.); upper miocene: Selatjau (= W. of Paroengponteng; Priangan, Java): 1 ex. (damaged, see MARTIN 1899, figs. 367, 367a; R. G. M. L.); pliocene [= Upper Kalibèng layers]: Sonde (Madioen, Java): 1 ex. (see MARTIN 1899, figs. 366, 366a; R. G. M. L.).]

Upper Kalibèng layers: Sheet 93B, M 251: 1 ex. (damaged); M 260: 1 ex. (juv.).

Description: Shell fusiform; whorls at least $6\frac{1}{2}$; protoconch damaged in all my specimens, consisting of at least 2 smooth, moderately convex whorls. Further whorls bearing spirals, of which the number increases from 6, to about 10 in the penultimate whorl. In the spire the spirals are crossed by lines of growth, and consequently its sculpture is decussated. Bodywhorl rather inflated, occupying about $\frac{5}{6}$ of the total length of the shell, bearing a varix opposite to the aperture. Bodywhorl bearing spirals on its whole surface, these spirals are about 45 in number, in the back part of the last whorl and along the outer lip and the varix the spirals are crossed by lines of growth, but these evanesce towards the middle of the dorsal side of the body whorl. Aperture narrow at the back, rather wide at $\frac{1}{3}$ of its length

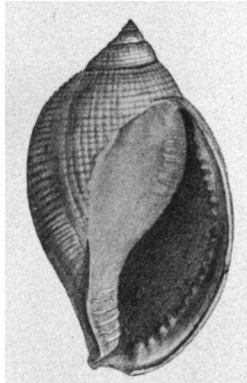


Figure 1. *Sconsia martini* spec. nov., holotype $\times 1\frac{1}{2}$, from the miocene at Ngembak (R. G. M. L.).

from the beginning of the canal. Parietal portion of the inner lip consisting of a broad callus on the body whorl, the continuation of which covers the columella; the inner lip is sigmoid and wrinkled throughout its length. Outer lip thickened, crenate inside. Canal short.

-Alt. 32, Diam. 18,5 (holotype).

Alt. 33,5, Diam. 21 (largest paratype, from Sonde in R. G. M. L.).

I have named this new species after Professor Dr. K. MARTIN.

Although there is a great resemblance with the recent West Indian *Sc. striata* (LAMARCK)²⁾, there is no doubt that the javanese form is distinct: it is a smaller species, in which the relatively more numerous spirals are flatter and separated by shallower grooves, it is more inflated, so that the aperture is broader, especially in the front part, and it has a shorter canal. The present species also resembles the recent *Sc. grayi* A. ADAMS³⁾, especially as to the sculpture and the shape of the canal; *Sc. martini* sp. nov., however, seems to be slenderer and to have a more pointed spire. If *Sc. grayi*, of which the habitat is unknown till now, might prove to live in the Indo-Westpacific area, *martini* could perhaps better be considered a subspecies of that species.

¹⁾ 1848 *Cassidaria striata*. — REEVE, Conch. Ic., 5, *Cassidaria*, pl. 1, spec. 3, fig. 2.

²⁾ 1854, Proc. Zool. Soc., p. 136, pl. 28, fig. 6.

It is remarkable that the neogenic *Sconsias* of the Eastern Hemisphere show a convergent evolution with those of the Western Hemisphere, as not only the javanese neogenic species resembles *Sc. striata* (LAM.), but also two forms from the Italian miocene have been described by SACCO ⁴⁾ as "varieties" of that recent West-Indian species.

We can draw the following scheme for the evolution of the principal species of *Sconsia* in the Eastern Hemisphere ⁵⁾:

		Italy	India	Java
pliocene	(Upper Kalibèng layers)			<i>martini</i>
miocene	("upper miocene")			<i>martini</i>
	(Helvetien)	<i>striatula</i> ⁶⁾		<i>pulchra</i> ⁸⁾
(Rembang beds ± = Burdigalien)	<i>miocenica</i> ⁷⁾			
oligocene	(Tongrien = Lower Nari series)	<i>beyrichi</i> ⁹⁾	→ <i>beyrichi</i> ¹⁰⁾	

No recent species of *Sconsia* have been found in the Eastern Hemisphere.

There is one more specimen labelled "*Sconsia striata* LAM." in the Leiden collection, originating from neogene beds in Jogjakarta (Java), and mentioned by MARTIN in 1884. This is a bad specimen and, though I agree with MARTIN that it belongs to the genus *Sconsia*, I think it cannot be identified specifically.

The figure of "*Sconsia striata* LAM." by WANNER & HAHN does not match the present species, nor the true *Sc. striata* (LAMARCK), for the

⁴⁾ 1890 *Sconsia striata*, var. *miocenica* SACC. — SACCO, Moll. Terz. Piemonte e Liguria, p. 72, pl. 2, fig. 31.

1890 *Sconsia striata*, var. *miocinflata* SACC. — SACCO, l. c., p. 72, pl. 2, fig. 32.

⁵⁾ For the evolution of the American species of *Sconsia* see: PILSBRY, Proc. Ac. Nat. Sci. Philadelphia, 73, pp. 361—362, 1922.

⁶⁾ 1890 *Galeodosconsia striatula* (BON.). — SACCO, Moll. Terz. Piemonte e Liguria, p. 69.

⁷⁾ See note 4, p. 92.

⁸⁾ 1936 *Sconsia pulchra* nov. spec. — PANNEKOEK, Altmio. Moll. Rembang, p. 44, pl. 2, figs. 22—24.

⁹⁾ 1890 *Sconsia beyrichi* (MIGHT.). — SACCO, Moll. Terz. Piemonte e Liguria, p. 71, pl. 2, fig. 28.

¹⁰⁾ 1925 *Sconsia beyrichi* (MICHELOTTI). — VREDENBURG, Moll. Tert. NW. India, 1, p. 276, pl. 3, fig. 6.

spirals are much broader and consequently less in number, the axial sculpture occurs throughout the dorsal side of the last whorl and the outer lip is more expanded in front. It rather seems to represent a specimen of *Sc. pulchra* PANNEKOEK¹¹⁾, with the types of which species I compared it accurately.

Genus *Phalium* LINK 1807.

Subgenus *Phalium* LINK.

152. **PHALIUM (PHALIUM) GLAUCUM** (LINNÉ).

- + 1758 *Buccinum glaucum*. — LINNÉ, Syst. Nat., ed.10, p. 737.
 1848 *Cassis glauca*. — REEVE, Conch. Ic., 5, *Cassis*, pl. 12, fig. 33.
 1881 *Cassis glauca* LAM. — K. MARTIN, Posttert. fauna Blitong, p. 20.
 † 1903 *Semicassis (Bezocardia) cf. glauca* (LINN.)† — COSSMANN, Karikal, 2, p. 161, pl. 6, fig. 8.
 1925 *Cassis (Phalium) glauca* (LINNÉ). — OOSTINGH, Obi and Halmahera, p. 115.
 1931 *Cassis glauca* LAMK. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 242.
 1935 *Phalium glaucum* (LINNÉ). — BAYER, Cat. Cassididae, p. 99.

Material examined:

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

Fossil distribution:

Mal: quaternary: Billiton.

Ind: pliocene: † Karikal.

Recent distribution:

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

Bathymetrical distribution:

no exact records; this species lives on reefs.

PHALIUM (PHALIUM) spec.

Material examined:

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

This fragment belongs to the previous mentioned species or to a closely related form.

153. **PHALIUM (PHALIUM) spec.**

Material examined:

Upper Kalibèng layers: Sheet 105B, M 50a: 1 ex.

This is a young specimen. It resembles somewhat the juvenile *Phalium (Phalium) glaucum* (Linné) (vide supra), but it belongs without any doubt to another species.

Subgenus *Semicassis* MÖRCH 1852.

Sectio *Semicassis* MÖRCH.

154. **PHALIUM (SEMICASSIS) PILA** (REEVE).

- + 1848 *Cassis pila*. — REEVE, Conch. Ic., 5, *Cassis*, pl. 9, fig. 21.
 1899 *Cassis (Semicassis) pila* REEVE, var. — K. MARTIN, Foss. Java, p. 154, pl. 24, figs. 356, 356a, 357, 358, 359, 359a.

¹¹⁾ See note 8, page 92.

- 1907 *Cassis bisulcata* [non] WAGN. — SCHEPMAN, Posttert. Moll. Celebes, p. 182.
 1908 *Cassis pila* REEVE, var. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
 1911 *Cassis (Semicassis) pila* REEVE, var. — MARTIN-IGKE, Foss. Gastr. Trinil, pp. 47, 48.
 † 1912 *Cassis (Semicassis) pila* REEVE † — K. MARTIN, Vorl. Bericht, 2, p. 167.
 1913 *Cassis pila* REEVE. — W.D. SMITH, Stratigr. a. foss. evert. Philipp., pp. 254, 263, pl. 5, fig. 6.
 1915 *Cassis (Semicassis) pila* REEVE. — ZWIERZYCKI, Foss. Sumatra, pp. 109, 120.
 1915 *Cassis pila* REEVE. — STAUB, Sangkulirangbai, p. 129.
 1919 *Cassis pila* REEVE, var. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 132, 133, 141.
 1920 *Cassis (Semicassis) pila* REEVE. — TESCH, Timor, 2, p. 44, pl. 129, figs. 157[a], 157b.
 1921 *Cassis pila* REEVE, var. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
 1927 *Cassis (Semicassis) pila* REEVE, var. K. MARTIN. — P. J. FISCHER, Seran u. Obi, p. 60.
 1928 *Cassis pila* REEVE. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 25.
 † 1928 *Cassis pila* (prior) † — K. MARTIN, Nachlese, p. 115.
 1929 *Cassis pila* REEVE. — SIEMON, Jungtert. Moll. Niederl. O.-Indien, pp. 7, 8, 13, 17, 30.
 1929 *Semicassis pila* REEVE, var. — CHAPMAN, Rep. further series foss. Barum R., p. 60.
 1931 *Cassis pila* REEVE. — VAN ES, Age *Pithecanthr.*, pp. 39, 57, 82, 89, 95, 97.
 1931 *Cassis pila* REEVE. — VAN DER VLIERK, Caenoz. Amphin., Gastr., p. 242.
 1932 *Cassis pila* REEVE. — HAANSTRA & SPIKER, Jungneog. Moll. Benkoelen u. Palembang, p. 1313.
 1932 *Cassis pila* REEVE, var. — VAN DER VLIERK, Zuidrebangsche heüvell, p. 111.
 1932 *Cassis pila* REEVE. — K. MARTIN, Kedoengwaroe, p. 114.
 1935 *Phalium pila* (REEVE). — BAYER, Cat. Cassididae, p. 103.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 252: 3 ex.; M 255: 2 ex.; M 257: 3 ex.; M 260: 11 ex.; M 261: 1 ex.
 Poetjangan layers (volcanic facies): Sheet 110A, M 107: 1 ex.; Sheet 110B, M 161: 1 ex.; M 163: 2 ex.; M 167: 1 ex.; below layer I: Sheet 105B, M 68: 1 ex.; layer I: Sheet 105B, M 67: 4 ex.; Sheet 110A, M 95: 1 ex.; M 98: 4 ex.; M 291: 3 ex.; M 292: 2 ex.; M 292 + 293: 2 ex.; M 296: 1 ex.; M 297: 5 ex.; M 298: 3 ex.; M 299: † 2 ex. (bad specimens); M 301: 9 ex.; C 53: 1 ex.; C 60: 5 ex.; C 101: 1 ex.; Sheet 110B, M 157: 1 ex.; C 77: 1 ex.; horizon above layer I: Sheet 110B, M 273: 1 ex.; M 274: 1 fr.; layer II: Sheet 110A, M 125: 13 ex.; M 281: 2 ex.; M 304: 4 ex.; C 1: 2 + † 1 ex.; Sheet 116A, M 216: 5 ex.; M 217: 1 ex.; C 30: † 1 ex. (cast); C 39: 2 ex.; C 40: 2 ex.; ± layer II?: Sheet 109C, M 346: 2 ex.; layer III: Sheet 110B, M 189: † 1 ex. (damaged).
 Poetjangan layers (argillaceous facies): Sheet 110A, M 110; † 1 ex.; M 112: 1 ex.; M 289: † 1 ex. (cast); Sheet 110B, C 92: 1 ex.

My material agrees with MARTIN's "*Cassis pila* REEVE, var.", as the sculpture (the axial sculpture in all my shells, the spiral sculpture in most of them) is more pronounced than in the recent type. The breadth of the spirals and their number are varying. From several localities I got specimens with narrower and more numerous spirals which are not always easily separable from the next species.

As MARTIN (1899) remarked, his variety is intermediate between *Ph. pila* (REEVE) and *Ph. bisulcatum* (SCHUBERT & WAGNER)¹². Young specimens from the Upper Kalibèng layers agree in every respect with "*Cassis bisulcata* WAGN." (R. G. M. L.) mentioned by SCHEPMAN in his list of quaternary mollusca from Kajoe Ragi (Celebes).

¹² 1848 *Cassis bisulcata*. — REEVE, Conch. Ic., 5, *Cassis*, pl. 3, figs. 6a, b.

Fossil distribution:

Mal: neogene: ? Tjikidang (Buitenzorg, Java); Barum River (N. Guinea); (upper miocene — pliocene): Cotabato (Mindanao, Philippines); miocene: W. part of the district of Tjidamar (= Junghuhn's loc. K; Buitenzorg, Java); upper miocene: ? Tjilanang beds (Priangan, Java); pliocene: Waled (= Menengteng ravine), Pangka, Baribis (Cheribon, Java); ? Mount Gombel (Semarang, Java); Sangiran (Soerakarta, Java) [= Upper Kalibèng layers]: Sonde, Padasmalang, coral limestone N. of Redjoeno¹³ (Madioen, Java); Benkoelen — Kroeë, near Kroeë (Benkoelen, Sumatra); Atjeh (Sumatra); between Noil None and Pene (Amanoeban, Timor); Ceram; SW. New Guinea; "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies)]: Soekoen — Soko — Tjabehan¹⁴ (near the frontier between Bodjonegoro and Kediri, Java); Soemberringin (Soerabaja, Java); [= Poetjangan layers (volcanic facies), layer II]: between Djetis and Sidoteko, Soemberringin (Soerabaja, Java); [= Poetjangan layers (argillaceous facies)]: Kedander¹⁵ (Soerabaja, Java); pleistocene (Kaboeh layers): ? (an *Ph. japonicum* (Reeve) ?) W. of Rantji (Malang, Java; T. J. 116, p. 39); quaternary: Kajoe Ragi (Celebes).

Recent distribution:

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

Bathymetrical distribution:

4—72 m.

155. PHALIUM (SEMICASSIS) JAPONICUM HERKLOTSI (K. MARTIN).

- [+ 1848 *Cassis japonica*. — REEVE, Conch. Ic., 5, *Cassis*, pl. 9, figs. 23a, b.
 1921 *Cassis japonica* REEVE [partim]. — P. J. FISCHER, Pliocænfauna Seran, p. 244.
 1927 *Cassis (Semicassis) japonica* REEVE. — P. J. FISCHER, Seran u. Obi, p. 60.
 1928 *Cassis japonica* REEVE. — YOKOYAMA, Moll. Oil-Field Taiwan, p. 46, pl. 3, fig. 3.
 1931 *Cassis japonica* REEVE. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 242.
 1935 *Phalium japonicum* (REEVE). — BAYER, Cat. Cassididae, p. 102.
 1935 *Phalium (Semicassis) japonicum*. — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 169.]
- + 1879 *Cassis Herklotsi* nov. spec. — K. MARTIN, Tertiärsch. Java, p. 45, pl. 8, figs. 7, 7a.
 1899 *Cassis (Semicassis) Herklotsi* MART. — K. MARTIN, Foss. Java, p. 155, pl. 24, figs. 360, 360a, 361, 361a.
 1908 *Cassis Herklotsi* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
 1911 *Cassis (Semicassis) Herklotsi* MART. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 48.
 1919 *Cassis Herklotsi* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 141, 154.
 1921 *Cassis japonica* [non] REEVE [partim]. — P. J. FISCHER, Pliocænfauna Seran, p. 244.
 1927 *Cassis (Semicassis) japonica* REEVE, var. *minor* [non] KÜSTER. — P. J. FISCHER, Seran u. Obi, p. 61, pl. 212, figs. 28a, b, 29a, pl. 213, figs. 29b, 30a, b.
 1931 *Cassis herklotsi* MART. — VAN ES, Age *Pithecanthr.*, pp. 39, 69.
 ? 1931 *Cassis (Semicassis) japonica* REEVE, aff. var. *minor* KÜSTER. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 122.
 1931 *Cassis herklotsi* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 242.

¹³) Referred to as upper miocene by VAN ES, 1931, Age *Pithecanthr.*, p. 82, evidently near localities M 4 and M 6 in Sheet 99B.

¹⁴) Referred to as middle pliocene by VAN ES, l. c., p. 97; evidently near the localities M 26, M 34 and between M 29 and M 31 in Sheet 105A.

¹⁵) Referred to as lower pliocene by VAN ES, l. c., p. 111; evidently near the localities M 112 and M 113 in Sheet 110A.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 3 ex.; M 252: 2 ex.; M 255: 9 ex.; M 257: 9 ex.
Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 101: ? 1 ex. (damaged).

P. J. FISCHER drew attention to the great resemblance between *Cassis herklotsi* of K. MARTIN and the var. *minor* KÜSTER¹⁶⁾ of *Phalium japonicum* (REEVE). In my specimens, which match the types of *herklotsi*, however, the spirals seem to be narrower than in *Phalium japonicum* and moreover *herklotsi* is a smaller form than even KÜSTER's var. *minor*. Therefore I have considered *herklotsi* as a subspecies of *japonicum*.

It is not always easy to separate this form from the preceding species.

Fossil distribution:

(Of the typical *japonicum*): Mal: pliocene: Ceram; (Byôritu beds): Taiwan (= Formosa); pleistocene (Kaboeh layers): ? (an *Phalium pila* (Reeve) ?) W. of Rantji (Malang, Java; T. J. 116, p. 39).

Jap: pliocene: Honsyû.

(Of the subsp. *herklotsi*): upper miocene: Tjikarang W. of Tjilaoet-eureun (= Junghuhn's loc. R; Priangan, Java); pliocene: Baribis (Che-ribon, Java); Kalioeter (Soerakarta, Java); Sonde, Padasmalang (Madioen, Java); near Niki Niki (Amanoeban, Timor); Ceram.

Recent distribution:

(Of the typical *japonicum*): Jap, Chi.

The subspecies *herklotsi* is not known living.

Familia Cymatiidae.

Genus *Gyrineum* LINK 1807.

Subgenus *Gyrineum* LINK.

Sectio *Gyrineum* LINK.

156. GYRINEUM (GYRINEUM) BITUBERCULARE (LAMARCK).

- + 1816 *Ranella bitubercularis*. — LAMARCK, Tabl. Enc. Méth. (Vers), pl. 412, fig. 6, liste p. 4.
1883 *Ranella raninoides* nov. spec. — K. MARTIN, Nachtr. Tertiärsch. Java, p. 203, pl. 9, fig. 6.
1884 *Ranella bitubercularis* LAM. — K. MARTIN, Tiefbohr. Java, p. 136.
1895 *Ranella raninoides* K. MART. — K. MARTIN, Tert. Foss. Philipp., pp. 57, 58, 59.
1899 *Ranella (Apollo) bitubercularis* LAM. — K. MARTIN, Foss. Java, p. 149, pl. 23, figs. 349, 350, 350a, 351.
1903 *Ranella karikalensis* nov. sp. — COSSMANN, Karikal, 2, p. 156, pl. 5, figs. 20, 21.
1907 *Gyrineum tuberculare* LAM. — SCHEPMAN, Posttert. Moll. Celebes, p. 182.
1907 *Ranella (Apollo) bitubercularis* LAM. — ICCKE & MARTIN, Tert. e. Kwart. Nias, p. 237.
1908 *Ranella bitubercularis* LAM. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
1911 *Ranella (Apollo) bitubercularis* LAM. — MARTIN-ICCKE, Foss. Gastr. Trinil, p. 47.
1912 *Ranella bitubercularis* LAM. — K. MARTIN, Vorl. Bericht, 2, p. 159.
1913 *Ranella raninoides* K. MART. — W. D. SMITH, Stratigr. a. foss. evert. Philipp., pp. 248, 267.
1919 *Ranella bitubercularis* LAMK. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 130, 131, 141.
1920 *Ranella (Apollo) bitubercularis* LAM. — TESCH, Timor, 2, p. 43, pl. 129, figs. 155a, b.

¹⁶⁾ + 1857 *Cassis japonica*, var. *minor*. — KÜSTER, *Cassis* etc. in Syst. Conch. Cab. von MARTINI CHEMNITZ neu herausgegeben, 3, part 1b, p. 43, pl. 52, fig. 9.

- 1921 *Ranella raninoides* MART. — DICKERSON, Fauna Vigo group, p. 17.
 1922 *Ranella raninoides* MART. — DICKERSON, Rev. Philipp. Paleont., p. 217.
 1925 *Ranella bituberoularis* LAMARCK. — VREDENBURG, Moll. Tert. NW. India, p. 255.
 1927 *Ranella bituberoularis* LAM. — P. J. FISCHER, Seran u. Obi, p. 33.
 1928 *Ranella bituberoularis* LAMK. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 25.
 1929 *Ranella bituberoularis* LAM. — SIEMON, Jungtert. Moll. Niederl. O.-Indien, p. 54.
 1931 *Ranella bituberoularis* LAMK. — K. MARTIN, Wann löste etc., p. 2.
 1931 *Ranella bituberoularis* LAMK. — VAN ES, Age *Pithecanthr.*, pp. 95, non p. 51 *).
 1931 *Ranella bituberoularis* LAMK. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 240.
 1932 *Ranella bituberoularis* LAM. — HAANSTRA & SPIKER, Foss. Altmioz. Rembang, pp. 1096, 1100.
 1932 *Ranella bituberoularis* LAM. — HAANSTRA & SPIKER, Benkoelen u. Palembang, p. 1314.
 1932 *Ranella bituberoularis* LAMK. — VAN DER VLERK, Zuidrembangsche heuvell., p. 111.
 1933 *Argobuccinum bituberoulare* (LAMARCK). — BAYER, Cat. Cymatiidae, p. 38.
 1935 *Ranella (Apollo) bituberoularis* LAMK. — WANNER & HAHN, Mioc. Moll. Rembang, p. 257.
 1936 *Argobuccinum (Gyrineum) cf. bituberoulare* LAM. — PANNEKOEK, Altmioz. Moll. Rembang, p. 43.
 1939 *Gyrineum bituberoulatum* [sic] (LAMARCK). — MUKERJEE, Foss. Fauna Garo Hills, p. 54.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 2 ex.
 Poetjangan layers (volcanic facies): Sheet 110B, C 71: 1 ex.;
 layer II: Sheet 110A, M 125: 7 ex.; M 304: 1 ex.; Sheet 110B, M 173:
 1 ex.; M 278: 4 ex.; M 281: 1 ex.; C 68: 1 ex.; layer III: Sheet 110A,
 M 143: 1 ex.

This species is rather variable; it includes specimens agreeing with *Ranella karikalensis* of COSSMANN, but I am unable to make rational divisions between the different forms, as all sorts of transitions are present. VREDENBURG also put *karikalensis* COSSMANN into the synonymy of the present species.

Specimens with more axial ribs than the type, which occur in my material as well as in recent samples of this species (Z. M. A.), can be separated from the next species by their longer siphonal canal and their greater height in relation to the breadth.

Fossil distribution:

Mal: neogene: Jogjakarta (Java); Ajer Akab — Ajer Penoeal (Palembang, Sumatra); valley of the Maäbo (Nias); lower miocene: Rembang beds (Rembang, Java); upper miocene: Tadasngampar, Selatjau (= W. of Paroengponteng), between Tjilintoeng and Angsana (Priangan, Java); River Merawoe near village of Penoesoepan (Banjoemas, Java; T. J. 66, p. 23); neighbourhood of Minanga (Luzon, Philippines); pliocene: Tjihondje (Priangan, Java); Bentarsari basin (Pekalongan, Java; T. J. 54, p. 28); [= Upper Kalibèng layers]: Sonde, Padasmalang (Madioen, Java); pliocene: Atjeh (Sumatra); Dahana (Nias); one locality in Fatoe Leo (Timor); near Pene (Amanoeban (Timor), and one locality in Malakka (Beloe Tassih Fettoh, Timor); Obi; River Agusan (Mindanao, Philippines); "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); quaternary: Kajoe Ragi (Celebes).
 Ind: lower miocene: Assam; upper miocene (Talar stage of Mekran beds): NW. India; pliocene: Karikal.

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

Recent distribution:

Mal, Que, Loy, Chi, Ind, Ery.

Bathymetrical distribution:

8—88 m.

157. **GYRINEUM (GYRINEUM) GYRINUS (LINNÉ).**

- + 1758 *Murex Gyrinus*. — LINNÉ, Syst. Nat., ed. 10, p. 748.
 1895 *Ranella gyrina* LINN. — K. MARTIN, Tert. Foss. Philipp., pp. 57, 58, 59.
 † 1899 *Ranella (Apollo) gyrina* LINN. (†). — K. MARTIN, Foss. Java, p. 149, pl. 23, figs. 347, 347a.
 1907 *Gyrineum gyrinus* LIN. — SCHEPFMAN, Posttert. Moll. Celebes, p. 182.
 1913 *Ranella gyrina* LINN. — W. D. SMITH, Stratigr. a foss. evert. Philipp., pp. 248, 267.
 † 1919 *Ranella gyrina* LINN. (†). — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 137.
 1921 *Ranella gyrina* LINN. — DICKERSON, Fauna Vigo group, p. 17.
 1922 *Ranella tuberculata* [non] BRODERIP. — DICKERSON, Rev. Philipp. Paleont., p. 202, pl. 4, fig. 14.
 1922 *Ranella gyrina* LINN. — DICKERSON, Ibid., p. 217.
 1931 *Ranella gyrina* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 241.
 1933 *Argobuccinum gyrinum* (LINNÉ). — BAYER, Cat. Cymatiidae, p. 38.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110B, C 89: 1 ex.; layer II: Sheet 110B, M 175: 1 ex.; Sheet 116A, C 39: 1 ex.; layer III: Sheet 110B, M 193: 2 ex.

The knobs at the crossing of axial and spiral sculpture are less conspicuous in my specimens than in most recent shells of this species. For the rest my specimens agree with the recent form.

Fossil distribution:

Mal: miocene: Ngembak (Semarang, Java); (Vigo group): Bondoc Peninsula (Luzon, Philippines); upper miocene: neighbourhood of Minanga and Ilarön upward of Gorön (Luzon, Philippines); pliocene: River Agusan (Mindanao, Philippines); quaternary: Kajoe Ragi (Celebes).

Recent distribution:

Mal, Mel, Que, Loy.

Bathymetrical distribution:

22—36 m.

158. **GYRINEUM (GYRINEUM) JUNGHUJNI (K. MARTIN).**

- + 1879 *Ranella Junghuhni* nov. spec. — K. MARTIN, Tertiärsch. Java, p. 54, pl. 10, figs. 2, 2a, b.
 1899 *Ranella (Apollo) Junghuhni* MART. — K. MARTIN, Foss. Java, p. 150.
 1919 *Ranella Junghuhni* MART. — K. MARTIN, Palaeoz. Kenntn. Java, p. 88.
 1931 *Ranella junghuhni* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 241.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, C 60: 1 ex.

My only specimen perfectly agrees with MARTIN's type (R. G. M. L.), but its length is only 13 mm.

Fossil distribution:

Mal: miocene: W. part of the district of Tjidamar (= locality K of Junghuhn; Buitenzorg, Java).

Recent distribution:
not known living.

159. **GYRINEUM (GYRINEUM) NATATOR** (ROEDING).

- + 1798 *Tritonium Natator*. — ROEDING, Mus. Boltenianum, p. 127.
 1884 *Ranella tuberculata* BROD. — K. MARTIN, Tiefbohr. Java, p. 137.
 † 1895 *Ranella tuberculata* [sic] LAM. — NOETLING, Marine foss. mioc. Burma, p. 31, pl. 7, figs. 1, 1a—c.
 1899 *Ranella (Apollo) tuberculata* BROD. — K. MARTIN, Foss. Java, p. 149, pl. 23, figs. 348, 348a.
 1900 *Apollon tuberculatum* BRODERIP. — NEWTON, Shells raised beaches R. Sea, p. 509.
 † 1901 *Ranella prototuberculata* spec. nov. [partim]. — NOETLING, Fauna mioc. Burma, p. 306, pl. 20, figs. 9, 9a—d [tantum].
 1918 *Bursa tuberculata* BRODERIP sp. — CHAPMAN, Rep. caen. foss. oil-field Papua, p. 10.
 1919 *Ranella tuberculata* BROD. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 137, 146.
 † 1921 *Ranella tuberculata* NOETLING. — VREDENBURG, Rev. NOETLING's Monogr. Tert. Burma, pp. 270, 289.
 1921 *Ranella tuberculata* BRODERIP. — DICKERSON, Fauna Vigo group, pp. 6, 7, 9, 12, 14.
 non 1922 *Ranella tuberculata* BRODERIP. — DICKERSON, Rev. Philipp. Paleont., p. 202, pl. 4, fig. 14 [= *Gyrineum gyrinus* (L.), vide supra].
 † 1925 *Ranella tuberculata* NOETLING. — VREDENBURG, Moll. Tert. NW. India 1, p. 251.
 1925 *Bursa tuberculata* BRODERIP sp. — CHAPMAN, Papua and N. Guinea, p. 86.
 1928 *Ranella tuberculata* BROD. — K. MARTIN, Moll. Neog. Atjeh, pp. 6, 25.
 1931 *Ranella tuberculata* BROD. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 241.
 1933 *Argobuccinum natator* (ROEDING). — BAYER, Cat. Cymatiidae, p. 38.
 1935 *Bursa (Gyrineum) natatoria* („BOLTEN" RÖDING). — OTUKA, Oti Graben S. Noto Peninsula, p. 868.
 † 1939 *Gyrineum tuberculatum* (RISSO). — MUKERJEE, Foss. fauna Garo Hills, p. 53.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110B, M 175: 1 ex.; M 176: 2 ex.

Both in spiral and axial direction the sculpture is more pronounced than in most recent specimens of this species.

Fossil distribution:

Mal: miocene: Ngembak (Semarang, Java); (Vigo group): Bondoc Peninsula (Luzon, Philippines); pliocene: Tjimantjeuri (T. J. 14, p. 34; Bantam, Java); Atjeh (Sumatra); Cape Possession (S. coast of N. Guinea); pliocene or younger: mudvolcano Kalang Anjar (Soerabaja, Java); quaternary: Grissee (Soerabaja, Java).

Jap: pleistocene: Noto Peninsula (Honsyû).

Ind: oligocene (Nari series): † NW. India; miocene: † Burma; lower miocene: † Annam.

Ery: pleistocene: raised beaches of Red Sea.

Recent distribution:

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

Bathymetrical distribution:

This species lives near low tide mark.

GYRINEUM (GYRINEUM) spec.

Material examined:

Poetjangan layers (volcanic facies), layer III: Sheet 110B, M 189: 1 ex.

This specimen is too bad to allow of a specific identification.

Sectio *Biplex* PERRY 1811.

160. GYRINEUM (BIPLEX) PERCA (PERRY).

- + 1811 *Biplex perca*. — PERRY, Conchology, pl. 4, fig. 5.
 1840 *Ranella bufo*. — J. DE C. SOWERBY, Syst. list Cutch, p. 329, pl. 26, fig. 16.
 1884 *Ranella (Eupleura) pulchra* GRAY, var. — K. MARTIN, Tiefbohr. Java, p. 135, pl. 7, fig. 136.
 1919 *Ranella pulchra* GRAY. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 137.
 1920 *Ranella (Biplex) pulchra* GRAY. — TESCH, Timor, 2, p. 43, pl. 129, figs. 156a, b.
 1925 *Ranella (Biplex) bufo* J. DE C. SOWERBY. — VREDENBURG, Moll. Tert. NW. India, p. 255.
 1929 *Gyrineum pulchra* (GRAY). — CHAPMAN, Rep. further series foss. Barum R., p. 62.
 1931 *Ranella bufo* J. DE C. SOW. (= *pulchra* GRAY). — K. MARTIN, Wann löste etc., p. 2.
 1931 *Ranella pulchra* GRAY. — VAN ES, Age *Pithecanthr.*, pp. 57, 69, 95.
 1931 *Ranella (Biplex) pulchra* GRAY, subsp. *timorensis* KUENEN. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 119.
 1931 *Ranella pulchra* GRAY. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 241.
 1933 *Argobuccinum perca* (PERRY). — BAYER, Cat. Cymatiidae, p. 39.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 2 ex.; M 252: 1 ex.; M 257: 1 ex.

Poetjangan layers (volcanic facies), layer I: Sheet 105B, M 67: 1 ex.

Poetjangan layers (argillaceous facies): Sheet 116B, M 333: 1 ex.

All my specimens show a rather close axial sculpture, as is also the case in the specimens mentioned by K. MARTIN and by Miss KOPERBERG and in some of those referred to by TESCH. I saw recent specimens too showing this character, and therefore I have not separated the fossil form from the recent species.

I presume that VREDENBURG synonymised *bufo* J. DE C. SOWERBY with *pulchra* GRAY after inspection of the type of the former. Therefore I have followed him here, although SOWERBY'S figure is inadequate for a certain identification.

Fossil distribution:

Mal: neogene: Barum River (New Guinea); miocene: Ngembak (Semarang, Java); pliocene: Sangiran, Kalioter (Soerakarta, Java); Bintoehan (T. S. 7, p. 20; Benkoelen, Sumatra); several localities in Amanoeban, one at the border of Amanoeban and Mollo, and one in Insana (Timor); pliocene or younger: mudvolcano Kalang Anjar (Soerabaja, Java) (G. I. A.); "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java).

Ind: lower miocene (Gaj beds): NW. India.

Recent distribution:

Mal, Mel, Jap, Ind.

Bathymetrical distribution:

13—349 m.

Genus *Cymatium* ROEDING 1798.
Subgenus *Lampusia* SCHUMACHER 1817.

161. CYMATIUM (LAMPUSIA) PILEARE (LINNÉ).

- + 1767 *Murex Pileare*. — LINNÉ, Syst. Nat., ed. 12, p. 1217.
 1869 *Triton pileare* LAMARCK. — ISSEL, Malac. Mar Rosso, p. 270.
 1884 *Tritonium (Simpulum) gembacanum* nov. spec. — K. MARTIN, Tiefbohr. Java, p. 129, pl. 7, figs. 131.
 † 1887 *Tritonium (Simpulum) gembacanum* n. sp.† — K. MARTIN, Tiefbohr. Java, p. 308.
 1899 *Triton (Simpulum) pilearis* LINN., var. — K. MARTIN, Foss. Java, p. 141, pl. 22, figs. 323, 323a, 324.
 1900 *Lampusia pilearis* LAMARCK. — NEWTON, Shells raised beaches R. Sea, p. 509.
 1907 *Aquillus pilearis* LIN. — SCHEPMAN, Posttert. Moll. Celebes, p. 180.
 1907 *Lotorium (Simpulum) pileare* LINNÉ. — HALL & STANDEN, Moll. raised reef R. Sea, p. 67.
 1911 *Triton pilearis* LINN., var. — K. MARTIN, Vorl. Bericht, 1, p. 20.
 1911 *Triton pilearis* LINN. — K. MARTIN, Ibid., p. 46.
 1912 *Triton pilearis* LINN. — K. MARTIN, Vorl. Bericht, 2, p. 159.
 1914 *Triton (Simpulum) pilearis* LINN., var. — K. MARTIN, Mioc. Gastr. O. Borneo, p. 330.
 1915 *Triton (Simpulum) pilearis* L. — TESCH, Timor, 1, p. 66, pl. 82, figs. 146a, b.
 1916 *Eutritonium (Lampusia) pileare* L. — K. MARTIN, Altmioc. W. Progogeb., p. 242.
 1926 *Eutritonium pileare* LINN., var. — K. MARTIN, Plioc. Verst. Cheribon, pp. 10, 16.
 1928 *Eutritonium pileare* LINN., prior. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 25.
 1928 *Eutritonium pileare*. — K. MARTIN, Nachlese, pp. 109, 111.
 1928 *Cymatium pileare* LINNAEUS. — OSTERGAARD, Foss. Moll. Oahu, p. 5.
 1930 *Cymatium (Lampusia) aquatilis* (REEVE). — COX, Kenya, p. 141.
 1931 *Eutritonium pileare* LAMK., var. — VAN ES, Age *Pithecanthr.*, pp. 47¹¹⁾, 94.
 1931 *Eutritonium pileare* LINN. — VAN ES, Ibid., pp. 57, 115.
 1931 *Eutritonium pileare* LINN. — VAN DER VLIERK, Caenoz. Amphin., Gastr., p. 239.
 1932 *Cymatium pileare* (LIN.). — NOMURA, Moll. raised beach Kwanto Reg., p. 130.
 1933 *Cymatium pileare* (LINNÉ). — BAYER, Cat. Cymatiidae, p. 46.
 1934 *Triton aquatilis* REEVE. — NARDINI, Moll. spiagge em. Mar Rosso, p. 209, pl. 15, figs. 21a, b.
 1935 *Cymatium pileare*. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 226.
 1939 *Cymatium pileare* (LINNAEUS). — OSTERGAARD, Foss. Moll. Molokai & Maui, pp. 68, 72, 76.

Material examined:

Poetjangan layers (volcanic facies): Sheet 110A, C 43: 1 ex.; Sheet 110B, M 167: 1 ex.; layer II: Sheet 110A, M 126: 1 ex.; Sheet 110B, M 281: 1 ex.; layer III: Sheet 110A, M 142: 1 ex.

My specimens match the recent material of this species which I could compare (Z. M. A.).

I agree with BAYER, who considers *Triton aquatilis* REEVE to be a variety of this species. This variety has been recorded from pleistocene beds in Kenya and Port Sudan. My specimens belong to the typical species and not to MARTIN's variety, which — as MARTIN already stated — it is difficult to separate from the variable recent form. Therefore MARTIN's variety cannot be considered a distinct species, as has been suggested by NARDINI.

Fossil distribution:

Mal: miocene: Ngembak (Semarang, Java); lower miocene: Njalindoeng beds (Buitenzorg, Java); W. Progo Mountains (Jogjakarta, Java); Rembang beds (Rembang, Java); upper miocene: Tjilang beds, Tjadasngampar, between Tjilintoeng and Angsana (Priangan, Java); NE. Koetei (E. Borneo); pliocene: Tjidjoerei, Tjidjadjar (Cheribon, Java);

¹¹⁾ Not mentioned from Tjidjadjar by MARTIN.

Sangiran (Soerakarta, Java); Atjeh (Sumatra); ? one locality in Fialarang Beloe Tassih Fettoh, Timor); "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer II]: Soemberringin (Soerabaja, Java); quaternary: Kajoe Ragi (Celebes).

Haw: pleistocene: Oahu, Molokai (Hawaii).

Jap: quaternary: raised beach deposits of Kwanto Region (Honsyû).

Ery: pleistocene (raised beaches): Red Sea region.

Mad: pleistocene: Kenya.

Recent distribution:

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

Bathymetrical distribution:

9—36 m.

Subgenus *Ranularia* SCHUMACHER 1817.

Sectio *Ranularia* SCHUMACHER.

162. CYMATIUM (RANULARIA) CLAVATOR (DILLWYN).

- + 1817 *Murex clavator*. — DILLWYN, Descr. Cat. rec. shells, 2, p. 701.
- † 1883 *Triton pyrum* LAM. ? — K. MARTIN, Nachtr. Tertiärsch. Java, p. 207, pl. 9, fig. 8.
- 1899 *Triton (Ranularia) pseudopyrum* spec. nov. — K. MARTIN, Foss. Java, p. 143, pl. 22, figs. 326, 326a, 327, 328.
- 1908 *Triton pseudopyrum* MART. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
- 1911 *Triton (Ranularia) pseudopyrum* MART. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 48, 49.
- 1915 *Triton (Ranularia) pseudopyrum* K. MARTIN. — TESCH, Timor, 1, p. 67, pl. 82, figs. 148a, b.
- 1919 *Eutritonium pseudopyrum* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 87, 128, 132, 141.
- 1921 *Triton pseudopyrum* K. MART. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
- 1922 *Triton clavator* LAMARCK. — DICKERSON, Rev. Philipp. Paleont., p. 216.
- 1927 *Triton (Ranularia) pseudopyrum* K. MARTIN. — P. J. FISCHER, Seran u. Obi, p. 63.
- 1928 *Eutritonium pseudopyrum*. — K. MARTIN, Nachlese, p. 114.
- 1931 *Eutritonium pseudopyrum* MART. — VAN ES, Age *Pithecanthr.*, pp. 57, 94.
- 1931 *Eutritonium pseudopyrum* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 239.
- 1932 *Eutritonium pseudopyrum* MART. — VAN DER VLERK, Zuidrebangsche heuvell., p. 111.
- 1933 *Cymatium clavator* (DILLWYN). — BAYER, Cat. Cymatiidae, p. 49.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 255: 2 ex.; M 257: 1 ex.; M 260: 1 ex.

Poetjangan layers (volcanic facies), ± layer I: Sheet 110A, M 269: 1 ex. (bad specimen); horizon above layer I: Sheet 110B, M 274: 2 ex.; layer II: Sheet 110A, M 125: 1 ex.; Sheet 110B, M 177: 1 ex.; M 281: 1 ex.; ± layer II?: Sheet 109C, M 346: 2 ex.

I am unable to find a difference of any importance between the types of MARTIN's *Triton pseudopyrum* (R. G. M. L.) and the recent *Cymatium clavator* (DILLWYN), of which I could examine several specimens (Z. M. A., R. N. H. L.).

Fossil distribution:

Mal: upper miocene: Tjilanang beds (Priangan, Java); pliocene: Waled (= Menengteng ravine; Cheribon, Java); Bentarsari basin (Peka-

longan, Java; T. J. 54, p. 25); Sangiran (Soerakarta, Java); Sonde, Padas-malang, † Doekoepengkol (Madioen, Java); one locality in Fialarang (Beloe Tassih Fettoh, Timor); Ceram; (Banisilan formation): Cotabato district (Mindanao, Philippines); pliocene or younger: mud-volcano Kalang Anjar (Soerabaja, Java; G. I. A.); "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java).

Recent distribution:

Mal, Chi, Ind, Mad.

Bathymetrical distribution:

not recorded.

CYMATIUM (RANULARIA) spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 257: 1 ex.
Poetjangan layers (volcanic facies): Sheet 110B, C 71: 1 ex.;
layer I: Sheet 110A, C 101: 1 ex.; horizon above layer I: Sheet
110B, M 274: 3 ex.

The specimen from locality M 257 is damaged: the front side of the body whorl is broken off. The spire is more pointed than in the previous species, and moreover the suture is distinctly canaliculate in the last and penultimate whorls. For the rest it strongly resembles the previous species.

The other specimens are also too incomplete to allow of a specific identification.

Sectio Gutturium MÖRCH 1852.

163. CYMATIUM (GUTTURNIUM) PFEIFFERIANUM (REEVE).

- + 1844 *Triton Pfeifferianus*. — REEVE, Proc. Zool. Soc., p. 112.
- 1844 *Triton Pfeifferianus*. — REEVE, Conch. Ic., 2, *Triton*, pl. 4, fig. 14.
- † 1921 *Triton pfeifferianum* REEVE. — DICKERSON, Fauna Vigo group, pp. 8, 14.
- † 1922 *Triton pfeifferianum* REEVE. — DICKERSON, Rev. Philipp. Paleont., p. 203, pl. 5, fig. 16.
- 1932 *Triton pfeifferianus* REEVE. — K. MARTIN, Kedoengwaroe, p. 114.
- 1933 *Cymatium pfeifferianum* (REEVE). — BAYER, Cat. Cymatiidae, p. 51.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex.
Poetjangan layers (volcanic facies): Sheet 110B, C 44: 1 ex.;
layer I: Sheet 110A, M 90: 1 ex.; horizon above layer I: Sheet
110B, C 75: 1 ex.; layer II: Sheet 110B, M 278: 1 ex.

My specimens agree with recent specimens of this species. I doubt whether the record of this species from the Vigo group of Bondoc Peninsula (Luzon) is right, as DICKERSON's (1922) figure seems to represent a different species.

Fossil distribution:

Mal: miocene (Vigo group): † Bondoc Peninsula (Luzon, Philippines);
"pliocene" [= Poetjangan layers (volcanic facies),
layer II]: between Djetis and Sidoteko (Soerabaja, Java).

Recent distribution:

Mal, Bro, Que, Mad.

Bathymetrical distribution:
13—69 m.

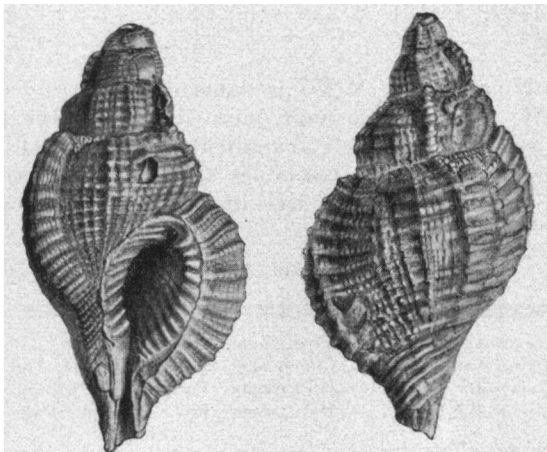
164. *CYMATIUM (GUTTURNIUM) BAYERI* spec. nov.

Figures 2a, b.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 110A, M 128: 1 ex. (holotype).

Description: Shell fusiform; in the only specimen the topwhorls are wanting, there are $4\frac{1}{2}$ whorls left. Whorls convex, body whorl with a rather long siphonal canal. Sculpture: spiral ribs crossed by ribs in axial direction. In the first whorl available these are of equal strength and thus the sculpture is reticulate, but gradually the spirals become stronger in the younger whorls, while the axial ribs remain the same. Spirals 5 in number in the



Figures 2a, b. *Cymatium (Gutturnium) bayeri* spec. nov., holotype $\times 1\frac{1}{2}$, from Sheet 110A, M 128, Poetjangan layers (volcanic facies), layer II.

oldest whorl available, 6 in the next whorls up to the penultimate. Varices are rather regularly placed at a distance of $\frac{2}{3}$ whorl of one another; between these varices irregular, not very pronounced, knoblike ribs occur, on which the sculpture continues. Body whorl occupying more than $\frac{2}{3}$ of the total length of the shell, ornamented by spirals crossed by axial ribs of a finer type. Here also the knoblike ribs occur, they are 5 in number on the dorsal side of the body whorl between the last varix and the outer lip. Aperture oval, outer lip strongly thickened, bearing 12 regular longitudinal wrinkles inside; inner lip concave, bearing 13 almost regular wrinkles, of which the hindermost 5 correspond with spiral ribs of the body whorl. Siphonal canal as long as the length of the mouth.

Alt. 38 + ?, Diam. 19; Alt. of the last whorl 29.

I have named this new species after Dr. CH. BAYER.

Cymatium bayeri spec. nov. is closely related to *C. pfeifferianum* (REEVE) (vide supra), from which it is distinguished by its less slender habitus and by its less pronounced axial sculpture.

CYMATIUM spec.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 292: 1 ex.; layer II: Sheet 110A, M 123: 1 ex. (juv. and damaged); layer II ? : Sheet 109C, M 347: 1 ex. (juv.).

These specimens are inadequate for a more precise identification.

Genus *Distorsio* ROEDING 1798.

(= *Distortrix* LINK 1807, *Persona* MONTFORT 1810).

165. *DISTORSIO CANCELLINA* (DE ROISSY).

Figure 3.

- + 1805 *murex cancellinus*. — DE ROISSY in: BUFFON, Hist. Gén. et Part. Moll., 6, p. 56, n. 12.
- 1884 *Nassa* (†) *lamonganana* nov. spec. — K. MARTIN, Tiefbohr. Java, p. 125, pl. 7, fig. 128.
- 1899 *Persona reticulata* LINN. — K. MARTIN, Foss. Java, p. 145, pl. 23, fig. 336.
- 1903 *Persona metableta* nov. sp. an *Persona cancellina* ROISSY, vel varietas? — COSSMANN, Karikal, 2, p. 159, pl. 6, figs. 4, 5.
- 1908 *Distorsio cancellinus* (ROISSY). — DALTON, Notes Geol. Burma, p. 629, pl. 55, fig. 4.
- 1908 *Persona reticulata* LIN. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
- 1911 *Persona reticulata* LINN. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 49.
- 1913 *Persona reticulata* LINN. — TESCH, Foss. Padangsche bovenl., p. 161.
- 1915 *Persona (Distortrix) reticulata* L. — TESCH, Timor, 1, p. 69, pl. 82, figs. 151a, b.
- 1919 *Persona reticulata* LINN. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 87, 122, 130, 141, 145.
- 1921 *Persona reticulata* LIN. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
- 1921 *Distortio clathrata* LAMARCK. — DICKERSON, Fauna Vigo group, pp. 7, 13.
- 1922 *Distortio clathrata* LAMARCK. — DICKERSON, Rev. Philipp. Paleont., pp. 202, 216, pl. 2, fig. 20.
- 1925 *Persona reticulatus* (LINNAEUS) [partim]. — VREDENBURG, Moll. Tert. NW. India, 1, p. 234.
- 1926 *Persona cancellina* DESH. — K. MARTIN, Plioc. Verst. Cheribon, pp. 10, 16.
- 1927 *Persona reticulata* L. — P. J. FISCHER, Seran u. Obi, pp. 33, 65.
- 1928 *Persona reticulata* LINN. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 25.
- 1928 *Persona reticulata*. — K. MARTIN, Nachlese, p. 114.
- 1928 *Distortio cancellinus* (ROISSY). — YOKOYAMA, Moll. oil-field Taiwan, p. 44, pl. 3, fig. 8.
- 1929 *Distorsia* [sic] *lamonganana* (MART.). — PAPP, Geol. N.E. Sepik District, p. 72.
- 1929 *Distorsia* [sic] *lamonganana* MART. — CHAPMAN, Rep. fossils Marienberg, p. 82.
193. *Distortio lamonganana* (MART.). — NASON-JONES, Geol. Finsch Coast Area, p. 34.
- 1931 *Persona reticulata* LINNÉ [partim]. — K. MARTIN, Wann löste etc., p. 2.
- 1931 *Persona cancellina* DESH. — VAN ES, Age *Pithecanthr.*, p. 44¹⁴⁾.
- 1931 *Persona reticulata* LINN. — VAN ES, Ibid., pp. 57, 115.
- 1931 *Persona (Distorsio) reticulata* L., subspec. *Kueneri* n. ssp. — KOPPERBERG, Jungtert. u. quart. Moll. Timor, p. 118.
- 1931 *Persona reticulata* LINN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 240.
- 1932 *Persona cancellina* DESH. — K. MARTIN, Kedoengwaroe, pp. 111, 114.
- 1933 *Distortrix cancellina* (DE ROISSY). — BAYER, Cat. Cymatiidae, p. 54.
- 1934 *Distorsio reticulata* (LINK). — NOMURA & ZINBÖ, Moll. Ryūkyū-limestone Kikai-Zima, p. 138.
- 1935 *Distorsio reticulata* (LINK). — NOMURA, Cat. Tert. a. Quart. Moll. Taiwan, p. 167.
- 1935 *Distorsio cancellinus*. — OOSTINGH, Moll. Plioz. Boemiajoe, p. 226.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: 1 ex. (holotype of the var. *denseplicata* var. nov.) + 1 ex. (juv.); M 252: 2 ex.; M 255: 1 ex.; M 257: 2 ex.; M 260: 20 ex.

¹⁴⁾ Not mentioned from Tjidjadar by K. MARTIN.

Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 ex.; Sheet 110A, M 134: 1 ex.; Sheet 110B, M 163: 1 ex.; Sheet 116A, M 212: 1 ex.; C 120: 1 ex.; layer I: Sheet 105B, M 67: 1 ex.; Sheet 110A, M 82a: 1 ex.; M 98: 1 ex.; M 101: 3 ex.; M 297: 2 ex.; M 298: 4 ex.; M 301: 1 ex.; C 1: 3 ex.; C 52: 4 ex.; C 60: 5 ex.; horizon above layer I: Sheet 110B, C 74: 1 ex.; C 75: 2 ex.; layer II: Sheet 110B, M 168: 1 ex.; M 171: 1 ex.; M 173: 4 ex.; M 278: 6 ex.; C 68: 1 ex.; Sheet 116A, M 216: 1 ex.; M 227: 1 ex.; C 5: 1 ex.; C 38: 2 ex.; layer III: Sheet 110A, M 139: 2 ex.; M 143: 1 ex.; Sheet 116A, M 228: 1 ex.
 Poetjangan layers (argillaceous facies): Sheet 110B, C 80: 1 ex.

Both my material and recent samples which I used for comparison, showed that this species is very variable. Some of my specimens seem to agree with the subspecies *kueneni* KOPERBERG. There exist, however, transitional forms between the type and this subspecies from Timor, and therefore I am unable to distinguish them rigidly in my material. All the

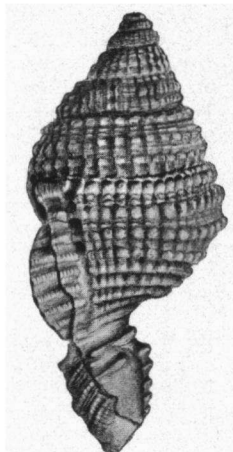


Figure 3. *Distorsio cancellina* (DE ROUSSY), var. *denseplicata* var. nov., holotype $\times 1\frac{1}{2}$, from Sheet 93B, M 251, Upper Kalibèng layers.

same it seems impossible to separate *Persona metableta* of COSSMANN from this species, as has already been stated by VREDENBURG. This author also includes the European oligocene *D. subclathrata* (D'ORBIGNY) in the synonymy of the present species, but the figures of this European form which I could examine, seem to represent a different species.

The sculpture of one specimen from locality M 251 (fig. 3) differs from that of all other specimens of this species which I saw. The axial ribs are namely about twice as numerous as in those other specimens in which the axial sculpture is already rather dense. Nevertheless I do not think this difference so important that a new species should be described, for the shell agrees in all other respects with the typical *D. cancellina*. Therefore I propose the name var. *denseplicata* var. nov. for it.

Fossil distribution:

Mal: neogene: Soengei Lipai (S. of Bangkinang, Sumatra's Westkust, Sumatra); Finsch Coast Area (New Guinea); miocene (Vigo group):

Bondoc Peninsula (Luzon, Philippines); lower miocene: Njalindoeng beds (Buitenzorg, Java); upper miocene: Tjitaroem (Batavia, Java; T. J. 30, p. 16); Tjilanang beds, Tjadasngampar (Priangan, Java); River Merawoe (near village of Penoesoepan; Banjoemas, Java; T. J. 66, p. 23); NE. Sepik district (New Guinea); pliocene: Tjikeusik (Bantam, Java); Tjidjoerei, ? Tjidjadjar (Cheribon, Java); Bentarsari Basin (Pekalongan, Java; T. J. 54, pp. 25, 28); Sangiran (Soerakarta, Java); Sonde, ? Doekoe-pengkol (Madioen, Java); Kroeë (Benkoelen, Sumatra; T. S. 6, p. 20); Atjeh (Sumatra); several localities in Amanoeban (Timor); Ceram; Obi; (Bansilan formation): Cotabato district (Mindanao, Philippines); pliocene or younger: mud-volcano Kalang Anjar (Soerabaja, Java; G. I. A.); "miocene" [= Poetjangan layers (volcanic facies), layer II]: Tambakwatoe (Soerabaja, Java); "pliocene" [= Poetjangan layers (volcanic facies)]: Soemberringin (Soerabaja, Java); [= idem, layer II]: between Djetis and Sidoteko (Soerabaja, Java). Chi: pliocene (Byôritu beds): Taiwan (= Formosa); pleistocene (Ryûkyû limestone): Kikai-Zima (Ryûkyû Is.). Ind: lower miocene (Gaj beds): NW. India; miocene: Burma; pliocene: Karikal.

Recent distribution:

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

Bathymetrical distribution:

18—162 m.

Familia Bursidae.

Genus *Bursa* ROEDING 1798.

Subgenus *Ranella* LAMARCK 1812.

Sectio *Colubrellina* P. FISCHER 1884.

166. **BURSA (COLUBRELLINA) GRANULARIS (ROEDING).**

- + 1798 *Tritonium granulare*. — ROEDING, Mus. Boltenianum, p. 127.
 1844 *Ranella granifera*. — REEVE, Conch. Ic., 2, *Ranella*, pl. 6, fig. 30.
 1869 *Ranella granifera* LAMARCK. — ISSEL, Malac. Mar Rosso, p. 271.
 1928 *Ranella granifera* LAMK. — K. MARTIN, Neog. Moll. Atjeh, pp. 8, 25.
 1931 *Ranella granifera* LAMK. — VAN DER VLIERK, Caenoz. Amphin., Gastr., p. 240.
 1932 *Bursa granularis* BOLTEN. — BAYER, Cat. Bursae, p. 229.

Material examined:

Poetjangan layers (volcanic facies), layer II: Sheet 116A, C 37: 1 ex.; layer III: Sheet 110B, M 189: 1 ex.

Fossil distribution:

Mal: pliocene: Atjeh (Sumatra).

Ery: pleistocene (raised beaches): Red Sea.

Recent distribution:

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

Bathymetrical distribution:

12—22 m.

167. **BURSA (COLUBRELLINA) CORRUGATA (PERRY).**

- + 1811 *Biplex corrugata*. — PERRY, Conchology, pl. 5, fig. 1.
 1899 *Ranella* (s. str.) *affinis* BROD. — K. MARTIN, Foss. Java, p. 147.

- 1907 *Gyrineum affine* BROD. — SCHEPMAN, Posttert. Moll. Celebes, p. 182.
 1919 *Ranella affinis* BROD. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 130.
 1920 *Ranella (Bursa) affinis* BROD. — TESCH, Timor, 2, p. 42, pl. 129, figs. 154a, b.
 1931 *Ranella affinis* BROD. — VAN DER VLEEK, Caenoz. Amphin., Gastr., p. 240.
 1932 *Bursa granulatis* BOLTEN, var. *corrugata* PERRY. — BAYER, Cat. Bursae, p. 229.
 1934 *Ranella affinis* BROD. — NARDINI, Moll. Spiagge em. Mar Rosso, p. 210, pl. 15, figs. 22a, b.

Material examined:

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

Fossil distribution:

Mal: upper miocene: Tjadasngampar (Priangan, Java); pliocene: near Niki Niki (Amanoeban, Timor); pliocene or pleistocene: boundary of Amanoeban and Amanoetoeng near Niki Niki (Timor); quaternary: Kajoe Ragi (Celebes).

Ery: pleistocene: Red Sea region.

Recent distribution:

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

Bathymetrical distribution:

9—45 m.

Sectio *Ranella* LAMARCK.

168. BURSA (*RANELLA*) RUBETA (ROEDING).

- + 1798 *Tritonium rubeta*. — ROEDING, Mus. Boltenianum, p. 128.
 1899 *Ranella (Lampas) lampas* LINN. — K. MARTIN, Foss. Java, p. 148, pl. 23, figs. 346, 346a.
 1907 *Bursa lampas* LIN. — SCHEPMAN, Posttert. Moll. Celebes, p. 181.
 1914 *Bursa (Tutufa) rubeta* (BOLTEN). — SMITH, Journ. of Conch., 14, p. 238.
 1919 *Ranella lampas* LINN. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 132.
 1931 *Ranella lampas* LINN. — VAN DER VLEEK, Caenoz. Amphin., Gastr., p. 241.
 1932 *Bursa rubeta* BOLTEN. — BAYER, Cat. Bursae, p. 230.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 298: 1 ex.; C 52: 1 ex.; C 59: 1 ex.; horizon above layer I: Sheet 110B, C 75: 1 ex.; layer II: Sheet 110A, M 129: 1 ex.; Sheet 110B, M 278: 1 ex.; M 281: 1 ex.; Sheet 116A, M 218: 1 ex.; C 34: 1 ex.
 Poetjangan layers (argillaceous facies): Sheet 110B, M 149: 1 ex.; M 333: 2 ex.

Fossil distribution:

Mal: pliocene: Waled (= Menengteng ravine; Cheribon, Java); quaternary: Kajoe Ragi (Celebes).

Recent distribution:

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

Bathymetrical distribution:

Low tide mark — 36 m.

Subgenus *Bursa* ROEDING.
Sectio *Bursa* ROEDING.

169. *BURSA (BURSA) MARGARITULA* (DESHAYES).

- 1835 *Ranella margaritula* (NOB.). — DESHAYES, Mollusques, in: Bélanger, Voy. Indes-Or., Zoologie, p. 424, pl. 3, figs. 13—15.
 1844 *Ranella margaritula*. — REEVE, Conch. Ic., 2, *Banella*, pl. 3, fig. 15.
 1899 *Ranella* (s. str.) *margaritula* DESH. [partim]. — K. MARTIN, Foss. Java, p. 146, pl. 23, figs. 337, 337a, 338, 339.
 1903 *Ranella margaritula* DESH. — COSSMANN, Karikal, 2, p. 154, pl. 5, figs. 22, 23.
 1915 *Ranella margaritula* DESK. [sic]. — ZWIERZYCKI, Voorl. Onderz. foss. Sumatra, pp. 109, 120.
 1919 *Ranella margaritula* DESH. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88 [partim], 122, 132.
 1921 *Ranella margaritula* DESH. — P. J. FISCHER, Pliocénfauna Seran, p. 244.
 1927 *Ranella (Bursa) margaritula* DESH. — P. J. FISCHER, Seran u. Obi, p. 65.
 1931 *Ranella margaritula* DESH. [partim]. — VAN DER VLIERK, Caenoz. Amphin., Gastr., p. 241.
 1932 *Bursa margaritula* DESHAYES. — BAYER, Cat. Bursae, p. 225.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 90: 1 ex.; M 296: 1 ex.; layer II: Sheet 116A, C 37: 1 ex.; layer III: Sheet 110A, C 49: 1 ex.

Poetjangan layers (argillaceous facies): Sheet 110A, C 106: 1 ex.

The specimen from Ngembak (R. G. M. L.) attributed to this species by K. MARTIN in 1899 and 1919 seems rather to be a young specimen of the next species.

Fossil distribution:

Mal: pliocene: Tjimantjeuri (T. J. 14, p. 34), Tjikeusik (Bantam, Java); Waled (= Menengteng ravine; Cheribon, Java); near Kroeë (Benkoelen, Sumatra); Ceram.

Ind: pliocene: Karikal.

Recent distribution:

Mal, Chi, Ind.

Bathymetrical distribution:

22—40 m.

170. *BURSA (BURSA) KOPERBERGAE* nom. nov.

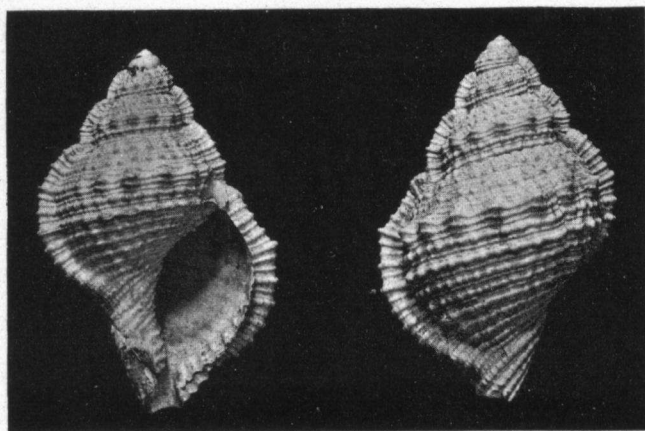
Figures 4a, b, 5.

- 1899 *Ranella* (s. str.) *margaritula* [non] DESH. [partim]. — K. MARTIN, Foss. Java, p. 146.
 1909 *Bursa subgranosa* [non] (BECK) SOWERBY. — SCHEPMAN, Prosoobr. Siboga, 2, p. 117.
 1919 *Ranella margaritula* [non] DESH. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88 [partim], 137.
 1920 *Ranella (Bursa) nobilis* [non] REEVE. — TESOH, Timor, 2, p. 41, pl. 129, figs. 153a, b.
 1922 *Ranella subgranosa* [non] BECK [partim]. — DICKERSON, Rev. Philipp. Paleont., p. 202, pl. 4, fig. 13b [tantum].
 1931 *Ranella (Apollon) nobilis* REEVE, subsp. *timorensis* KUENEN. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 120.
 1931 *Ranella margaritula* [non] DESH. [partim]. — VAN DER VLIERK, Caenoz. Amphin., Gastr., p. 241.
 1931 *Ranella nobilis* [non] REEVE [partim]. — VAN DER VLIERK, Ibid., p. 241.

Material examined:

Poetjangan layers (volcanic facies): Sheet 116B, M 335: 1 fr.; layer I: Sheet 105B, M 67: 4 ex. (juv.); Sheet 110A, M 100: 3 ex.; M 291: 4 ex.; M 291 + 292: 8 ex.; M 292 + 293: 1 ex.; M 298: 2 ex.; C 1: 3 ex.; C 55: 1 ex.; C 101: 2 ex.; C 102: 2 ex.; Sheet 110B, C 77: 1 ex.; C 88: 1 ex.; \pm layer I: Sheet 110B, M 269: 1 ex.; horizon above layer I: Sheet 110B, M 273: 1 ex.; layer II: Sheet 110A, M 125: 4 ex.; Sheet 116A, C 115: 2 ex.

Poetjangan layers (argillaceous facies): Sheet 110A, M 109: 1 ex.; M 112: 1 ex.; M 289: 5 ex. (juv.); C 42: 1 ex.; C 45: 2 ex.; C 106: 1 ex.; Sheet 110B, C 47: 1 ex.; C 78: 1 ex.; C 90: 1 ex.; Sheet 116B, M 333: 2 ex.



Figures 4a, b. *Bursa (Bursa) koperbergae* nom. nov., lectotype $\times 1\frac{1}{2}$, from Toi Osapi Soka or Nono Fatoe Fekoe, province of Amanoeban, Timor.

I think the form described by miss KOPERBERG as *Ranella nobilis timorensis* is a distinct species. The name, however, is preoccupied by *Ranella pulchra timorensis* published by the same author on the previous page. Therefore I propose the name *Bursa koperbergae* nom. nov. for the present species. The lectotype (collection Instituut voor Mijnbouwkunde, Delft, n. 13846), which has been collected at Toi Osapi Soka or at Nono Fatoe Fekoe (Amanoeban, Timor), is a not quite adult shell; it has been figured here (figs. 4a, b¹⁹).

Bursa koperbergae is related to *B. nobilis* (REEVE) (vide infra); especially the shape of the mouth with its broadly expanded inner and outer lips points to this relationship. The sculpture is, however, quite different from that of *B. nobilis*, which justifies a separation of the two forms.

SCHPEMAN identified three dead shells taken by the Siboga as "*Bursa subgranosa* (BECK) SOWERBY", but they surely belong to the present species. The largest of these specimens has been figured here (fig. 5), as it clearly demonstrates the characters of the aperture. By these characters, and by the fact that it lacks all trace of spines, *B. koperbergae* can be distinguished

¹⁹) I owe the photographs of the lectotype to the courtesy of Dr P. KRUIZINGA.

from *B. subgranosa* (SOWERBY). It seems probable that *B. koperbergae* is a recent species, though no living specimens have been met with till now.

It is very difficult, sometimes even impossible, to separate the young specimens of the present species from those of *B. nobilis* (REEVE), and of the variety of *B. margaritula* (DESH.) described from Tjikeusik by K. MARTIN²⁰).

Fossil distribution:

Mal: miocene: Ngembak (Semarang, Java); (Vigo group): Bondoc Peninsula (Luzon, Philippines); pliocene: several localities in Amanoeban, and one locality in Insana (Timor); pliocene or younger: mud-volcano Kalang Anjar (Soerabaja, Java; G. I. A.).

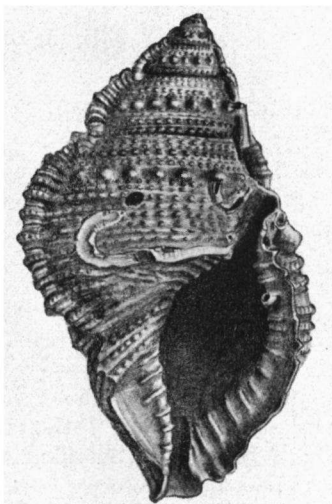


Figure 5. *Bursa (Bursa) koperbergae* nom. nov., $\times \frac{3}{4}$, from Station 306 of the Shiboga Expedition (Z. M. A.).

Recent distribution:

? Mal.

Bathymetrical distribution:

? 247—289 m.

171. BURSA (BURSA) NOBILIS (REEVE).

- + 1844 *Ranella nobilis*. — REEVE, Proc. Zool. Soc., p. 137.
- 1844 *Ranella nobilis*. — REEVE, Conch. Ic., 2, *Ranella*, pl. 4, fig. 16.
- 1879 *Ranella elegans* [non] BECK [partim]. — K. MARTIN, Tertiärsch. Java, p. 55, pl. 10, fig. 3.
- 1884 *Ranella elegans* [non] BECK [partim]. — K. MARTIN, Tiefbohr. Java, p. 137.
- 1899 *Ranella* (s. str.) *nobilis* REEVE. — K. MARTIN, Foss. Java, p. 146, pl. 23, figs. 340, 341, 342.
- 1908 *Ranella nobilis* REEVE. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
- † 1911 *Ranella nobilis* REEVE. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 48.
- 1911 *Ranella nobilis* REEVE. — K. MARTIN, Vorl. Bericht, 1, pp. 20, 46.
- † 1913 *Ranella nobilis* REEVE. — W. D. SMITH, Contr. Stratigr. a. Foss. Fauna Philipp., p. 267.
- † 1915 *Ranella nobilis* REEVE. — ZWIERZYCKI, Voorl. onderz. foss. Sumatra, pp. 109, 120.

²⁰) 1899, Foss. Java, p. 146, pl. 23, figs. 337, 337a, 338, 339.

- 1919 *Ranella nobilis* REEVE. — K. MARTIN, Palaeoz. Kennntn. Java, pp. 88, 126, 128, 130, 141.
 ? 1927 *Ranella nobilis* REEVE. — P. J. FISCHER, Seran u. Obi, p. 33.
 ? 1929 *Gyrineum nobilis* (REEVE). — CHAPMAN, Rep. further series foss. Barum R., p. 60.
 ? 193. *Gyrineum nobilis* REEVE. — NASON-JONES, Geol. Finsch Coast Area, p. 34.
 ? 1931 *Ranella nobilis* REEVE. — VAN ES, Age *Pithecanthr.*, pp. 57, 94, 111, 115, 119.
 1931 *Ranella nobilis* REEVE [partim]. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 241.
 ? 1932 *Ranella nobilis* REEVE. — VAN DER VLERK, Zuidrebangsche heuvell., p. 111.
 ? 1932 *Ranella nobilis* REEVE. — K. MARTIN, Kedoengwaroe, p. 114.
 1932 *Bursa bufonia* GMELIN, var. *nobilis* REEVE. — BAYER, Cat. *Bursae*, p. 227.
 1932 *Ranella nobilis* REEVE. — HAANSTRA & SPIKER, Benkoelen & Palembang, pp. 1313, 1314.
 ? 1934 *Bursa nobilis* (REEVE). — NOMURA & ZINBÔ, Moll. Ryûkyû-limestone Kikai-Zima, p. 137.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 252: 1 ex.; M 257: 3 ex.; M 260: 5 ex.

My specimens agree in every respect with the shells of this species identified by K. MARTIN (R. G. M. L.). Some references have been cited with doubt in the synonymy, as it appeared that the previous species has not been kept separate by all authors. I could examine the specimens mentioned by HAANSTRA & SPIKER; they proved to belong to the present species.

Fossil distribution:

Mal: neogene: Djogja (Java); Ajer Abab — Ajer Peneokal (Palembang, Sumatra); ? Barum River, ? Finsch Coast Area (New Guinea); (mio-pliocene): ? Arorog (Masbate, Philippines), lower miocene: Njalindoeng beds (Buitenzorg, Java); upper miocene: Tjilangang beds, Tjadasngampar (Priangan, Java); pliocene: ? Bentarsari Basin (Pekalongan, Java; T. J. 54, pp. 25, 28); ? Sangiran (Soerakarta, Java); Sonde, ? Padas malang (Madioen, Java); Benkoelen — Kroeë, ? near Kroeë (Benkoelen, Sumatra); ? Obi; "pliocene" [probably = Poetjangan layers]: ? Bareng Beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies), layer I]: ? Simo (Soerabaja, Java); [= Poetjangan layers (volcanic facies), layer II]: ? between Djetis and Sidoteko; ? Soemberringin (Soerabaja, Java); [= Poetjangan layers (argillaceous facies)]: ? Kedander (Soerabaja, Java); Chi: quaternary ? Kikai-Zima (Ryûkû Is.).

Recent distribution:

Mal, Chi.

Bathymetrical distribution:

not recorded.

172. BURSA (BURSA) SUBGRANOSA (G. B. SOWERBY II).

- + 1841 *Ranella subgranosa* BECK. — G. B. SOWERBY II, Proc. Zool. Soc., 9, p. 52.
 1841 *Ranella sub-granosa* SOW. Jun. — G. B. SOWERBY II, Conch. Ill., pl. 92, figs. 18, 18.
 1844 *Ranella albivaricosa*. — REEVE, Proc. Zool. Soc., p. 136.
 1844 *Ranella albivaricosa*. — REEVE, Conch. Ic., 2, *Ranella*, pl. 1, fig. 2.
 1884 *Ranella interrupta* nov. spec. — K. MARTIN, Erg. Tiefbohr. Java, p. 138, pl. 7, figs. 138, 138a, b.
 1884 *Ranella albivaricosa*. — BRAZIER, Rec. shells clay MacLay Coast, p. 988.
 1899 *Ranella* (s. str.) *subgranosa* BECK. — K. MARTIN, Foss. Java, p. 146.
 1907 *Bursa rana* [non] LIN. — SCHEPMAN, Posttert. Moll. Celebes, p. 181.

- 1908 *Ranella albivariosa* RVE. — BOETTGER, Tert. u. jüng. Verst., p. 674.
 1908 *Ranella subgranosa* BECK. — K. MARTIN, Alt. Sch. Sondé u. Trinil, p. 9.
 1911 *Ranella* (s. str.) *subgranosa* BECK. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 49.
 1913 *Bursa (Ranella) subgranosa* BECK. — W. D. SMITH, Stratigr. and foss. invert. Philipp., pp. 254, 266, pl. 4, fig. 15.
 1915 *Ranella (Bursa) subgranosa* BECK (SOWERBY). — TESCH, Timor, 1, p. 70, pl. 82, figs. 152a—c.
 1918 *Bursa interrupta* MARTIN sp. — CHAPMAN, Cenoz. foss. oil-fields Papua, p. 10.
 1919 *Ranella subgranosa* BECK. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 88, 125, 132, 141, 145.
 1921 *Ranella subgranosa* BECK. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
 † 1921 *Ranella subgranulosa* [sic] BECK. — DICKERSON, Fauna Vigo group, pp. 6, 14.
 1922 *Ranella subgranosa* BECK [partim]. — DICKERSON, Rev. Philipp. Paleont., pp. 202, 216, pl. 4, fig. 13a [tantum].
 1926 *Ranella subgranosa* BECK. — K. MARTIN, Plioc. Verst. Cheribon, pp. 10, 16, 21.
 1927 *Ranella (Bursa) subgranosa* BECK. — P. J. FISCHER, Seran u. Obi, p. 65.
 1928 *Gyrineum scolestum* n. sp. — YOKOYAMA, Moll. oil-field Taiwan, p. 44, pl. 3, figs. 5, 6.
 1931 *Ranella (Apollon) subgranosa* BECK. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 121.
 1931 *Bursa subgranosa* BECK. — VAN ES, Age *Pithecanthr.*, pp. 39, 57, 69, 94, 111, 115, 116.
 1931 *Ranella albivariosa* REEVE. — VAN DER VLIERK, Cenoz. Amphin., Gastr., p. 240.
 1931 *Ranella rana* [non] LINN. — VAN DER VLIERK, Ibid., p. 241.
 1931 *Ranella subgranosa* BECK. — VAN DER VLIERK, Ibid., p. 241.
 1932 *Ranella subgranosa* BECK. — VAN DER VLIERK, Zuidrebangsche heuvel., p. 111.
 1932 *Bursa albivariosa* REEVE. — BAYER, Cat. *Bursae*, p. 224.
 1932 *Bursa subgranosa* BECK. — BAYER, Ibid., p. 226.
 † 1934 *Ranella subgranosa* BECK. — KUTASSY, Jungtert. kor. en moll. O.-Celebes, pp. 307, 315, pl. 6, figs. 14, 15.
 1935 *Bursa (Gyrineum) subgranosa* (BECK). — NOMURA, Cat. tert. a. quart. Moll. Taiwan, p. 165.
 1935 *Bursa subgranosa*. — OOSTINGH, Plioz. Moll. Boemiajoe, p. 226.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 252: 4 ex.; M 255: 5 ex.; M 257: 2 ex.; M 260: 2 ex.
 Poetjangan layers (volcanic facies): Sheet 99B, M 9: 1 ex.; M 25: 1 ex.; Sheet 110A, M 130: 2 ex.; M 309: 1 ex.; C 63: 1 ex.; Sheet 110B, M 161: 4 ex.; M 163: 12 ex.; M 167: 3 ex.; C 44: 1 ex.; C 64: 1 ex.; C 66: 1 ex.; C 71: 9 ex.; below layer I: Sheet 105B, M 68: 1 ex.; layer I: Sheet 105B, M 67: 2 ex.; M 87: 1 ex.; Sheet 110A, M 89: 2 ex.; M 90: 4 ex.; M 95: 3 ex.; M 100: 1 ex.; M 292: 1 ex.; M 295: 1 ex.; M 297: 1 ex.; M 298: 6 ex.; M 300: 2 ex. + fr.; M 301: 2 ex.; M 302: 1 ex.; C 1: 3 ex.; C 60: 10 ex.; Sheet 110B, M 153: 6 ex.; M 156: 11 ex.; M 157: 2 ex.; M 158: 1 ex.; M 158A: 2 ex.; M 270: 1 ex.; M 271: 1 ex.; M 272: 1 ex.; C 77: 5 ex.; C 79: 2 ex.; C 88: 4 ex.; C 89: 8 ex.; C 91: 3 ex.; horizon above layer I: Sheet 110B, M 273: 4 ex. + fr.; M 274: 14 ex. + some fr.; C 74: 4 ex.; C 75: 5 ex.; layer II: Sheet 110A, M 123: 3 ex.; M 124: 1 ex.; M 125: 8 ex.; M 126: 4 ex.; M 304: 4 ex.; C 54: 6 ex.; Sheet 110B, M 160: 2 ex.; M 164: 3 ex.; M 166: 3 ex.; M 171: 4 ex.; M 173: 14 ex.; M 177: 2 ex.; M 278: 13 ex. + some fr.; M 281: 13 ex.; M 284: 11 ex.; C 29: 1 ex.; C 68: 5 ex.; C 82: 10 ex.; † M 278: 5 ex. (juv.); Sheet 116A, M 216: 22 ex.; M 217: 13 ex.; M 218: 3 ex.; M 219: 3 ex.; C 4: 1 ex.; C 5: 4 ex.; C 6: 1 ex.; C 33: 6 ex.; C 34: 7 ex.; C 37: 7 ex.; C 38: 1 ex.; C 39: 14 ex.; C 40: 5 ex.; C 115: 1 ex.; C 121: 2 ex.; layer II †: Sheet 109C, M 346: 8 ex.; M 347: 11 ex.; layer III: Sheet 110A, M 139: 6 ex.; M 142: 1 fr.; M 143: 10 ex.; Sheet 110B, M 193: 1 ex.; Sheet 116A, M 228: 5 ex.

Poetjangan layers (argillaceous facies): Sheet 110A, M 289: 2 ex.; M 290: 1 ex.; C 45: 1 ex.; C 46: 3 ex.; C 106: 2 ex.; Sheet 110B, M 149: 1 ex.; M 205: 1 ex.; M 263: 1 ex.; M 264: 23 ex.; M 267: 1 ex.; M 268: some fr.; C 47: 3 ex.; C 78: 1 ex.; C 85: 2 ex.; C 92: 2 ex.; Sheet 115C, M 328: 9 ex.; Sheet 116A, M 321: 2 ex.; M 322: 1 ex.; Sheet 116B, M 333: 2 ex.

After having studied a large number of recent specimens of this species (R. N. H. L., Z. M. A.) I am convinced that *Ranella albivaricosa* of REEVE is only a variety of *Ranella subgranosa* BECK of G. B. SOWERBY II. The typical species has a higher spire and less developed spines than its more common variety, but type and variety are connected by all sorts of transitional forms. My fossil shells show the same variability as the recent material which I inspected. In the greater part of my fossils the spines are well developed, while the height of the spire varies considerably.

Some authors²¹⁾ consider *Ranella elegans* BECK of SOWERBY II²²⁾ as a variety of the present species. My material contains no specimens which agree with SOWERBY's figures nor with recent shells belonging to this form.

Fossil distribution:

Mal: neogene: ? near Toba (Celebes); Island of Saonek Besar (near Waigeo); miocene (Vigo group): Bondoc Peninsula (Luzon, Philippines); pliocene: subsoil of Batavia (at a depth of 130 m., Java); Tjidjoerei, Waled (= Menengteng ravine), Baribis (Cheribon, Java); Sangiran, Kalioter (Soerakarta, Java); [= Upper Kalibèng layers]: Sonde, Padasmalang, Doekoepengkol (Madioen, Java); pliocene: several localities in Amanoeban, and one in Fialarang (Timor); Ceram; Cape Possession (S. coast of New Guinea); (Banisilan formation): Catobato district (Mindanao, Philippines); pliocene or younger: mud-volcano Kalang Anjar (Soerabaja, Java; G. I. A.); young pliocene or old pleistocene: near Niki Niki (Amanoeban, Timor); "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies)]: Soemberringin (Soerabaja, Java); [= Poetjangan layers (volcanic facies), layer I]: Simo (Soerabaja, Java); [= Poetjangan layers (volcanic facies), layer II]: Soemberringin, Tambakwatoe (Soerabaja, Java); [= Poetjangan layers (argillaceous facies)]: Kedander (Soerabaja, Java); quaternary: Kajoe Ragi (Celebes); Maclay Coast (NE. New Guinea); Agusan River (Mindanao, Philippines).
Chi: pliocene (Byôritu beds): Taiwan I. (= Formosa).

Recent distribution:

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

Bathymetrical distribution:

Mud-banks exposed at spring-tides — 204 m.

BURSA (BURSA) spec.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A,

²¹⁾ E. g. BAYER, 1932, Cat. *Bursae*, p. 226.

²²⁾ 1841, Conch. Ill., pl. 92, figs. 17. 17.

M 291: 1 ex.; Sheet 110B, C 55: 1 ex.; C 84: 1 ex.; layer II: Sheet 110A, M 304: 1 ex. (cast).

Poetjangan layers (argillaceous facies): Sheet 110B, M 266: 1 ex.; C 97: 1 ex.

These specimens are too bad to allow of a more exact identification.

Familia Tonnidae.

Genus *Tonna* BRÜNNICH 1772.

Subgenus *Tonna* BRÜNNICH.

173. TONNA (TONNA) COSTATA (MENKE).

- + 1828 *Dolium costatum*. — MENKE, Syn. Meth. Moll., p. 63.
 1877 *Dolium costatum* DESH. — TENISON-WOODS, Tert. foss. New Guinea, p. 268.
 1879 *Dolium costatum* DESH. — K. MARTIN, Tertiärsch. Java, p. 40, pl. 7, figs. 9, 10.
 1883 *Dolium costatum* MKE, var. *Martini* m. — BOETTGER, Tertiärformation Sumatra, p. 84, pl. 6, figs. 4a, b, 5a, b.
 † 1890 *Dolium costatum* DESH. (†). — K. MARTIN, Kei Inseln, Timor, Celebes, p. 280.
 1899 *Dolium* (s. str.) *costatum* DESH. — K. MARTIN, Foss. Java, pl. 161, pl. 25, figs. 371, 371a, b, 372, 373.
 1907 *Dolium costatum* DESH. — SCHEPMAN, Posttert. Moll. Celebes, p. 182.
 1910 *Dolium costatum* DESH. — KOERT & TORNAU, Geol. & Hydrol. Darressalam, p. 12.
 1911 *Dolium costatum* DESH. — MARTIN-ICKE, Foss. Gastr. Trinil, pp. 47, 48, 49.
 1913 *Dolium costatum* MENKE. — W. D. SMITH, Stratigr. and foss. invert. Philipp., pp. 254, 264, pl. 5, figs. 5 [†], 8.
 1915 *Dolium costatum* DESK. [sic]. — ZWIERZYCKI, Voorl. onderz. foss. Sumatra, pp. 105, 109, 120, 122.
 1918 *Dolium costatum* DESH. — CHAPMAN, Caenoz. foss. oil-fields Papua, p. 10.
 1919 *Dolium costatum* DESH. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 89, 122, 123, 132, 141, 151.
 1920 *Dolium costatum* MENKE. — TESCH, Timor, 2, p. 45, pl. 129, fig. 159.
 1922 *Dolium costatum* MENKE. — DICKERSON, Rev. Philipp. Paleont., p. 213.
 1925 *Dolium costatum* DESH. — CHAPMAN, Papua and N. Guinea, p. 86.
 1925 *Tonna (Tonna) costata* (MENKE). — OOSTINGH, Obi and Halmahera, p. 123.
 1927 *Dolium costatum* DESH. — P. J. FISCHER, Seran u. Obi, p. 33.
 1928 *Dolium costatum* DESH. — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 25.
 † 1929 *Dolium costatum* DESH. — SIEMON, Jungtert. Moll. Niederl. O.-Indien, 7, 17, 31.
 non 1929 *Dolium costatum* MENKE. — YOKOYAMA, Plioc. shells Tonohama, p. 13, pl. 7, figs. 2, 2.
 1931 *Tonna (Dolium) costata* (MENKE). — COX, Geol. Farsan Is., p. 7.
 1931 *Dolium costatum* DESH. — VAN ES, Age *Pithecanthr.*, pp. 39, 57, 95, 115, non 51²⁾).
 1931 *Dolium costatum* DESH. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 242.
 1931 *Dolium costatum* DESH., prior *martini* BOETTG. — VAN DER VLERK, *Ibid.*, p. 242.
 1932 *Dolium costatum* DESH. — HAANSTRA & SPIKER, Benkoelen u. Palembang, p. 1313.
 1937 *Dolium costatum* MENKE. — BAYER, Cat. *Dolidae*, p. 34.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 249: 1 ex.; M 250: 1 ex.; M 260: 1 ex.; M 261: 1 ex.

Poetjangan layers (volcanic facies): Sheet 110A, M 120: 1 ex.; layer I: Sheet 105B, M 67: 1 ex.; Sheet 110A, M 82a: 1 ex.; Sheet 110B, M 271: 1 ex.; layer II: Sheet 110A, M 129: 1 ex.; Sheet 116A, M 226: 1 ex.

Kaboech layers: Sheet 110B, M 202: 1 ex.

I cannot agree with K. MARTIN (1899), TESCH and SIEMON, who consider "*Dolium lischkeanum* KÜSTER" to be a synonym of "*Dolium costatum* MENKE".

²⁾ Cf. OOSTINGH, 1935, Moll. Plioz. Boemiajoe, p. 211.

SIEMON's record has moreover been cited with doubt, as his specimens are said to have 18—19 and 23 spiral ridges in the body whorl. The "*Dolium costatum* MENKE" figured by YOKOYAMA belongs to another species (perhaps *Tonna fasciata* (BRUGUIÈRE) ?, vide infra); it differs from the present species by the greater number of spiral ribs and by being higher in relation to the breadth.

VREDENBURG²⁴) includes "*Dolium costatum* MENKE" in the synonymy of "*Dolium (Eudolium) tessellatum* BRUGUIÈRE". This is, however, another species, and it is impossible to decide to which species VREDENBURG's specimens belonged, the more so as he includes more valid species in his synonymy. So for the time being VREDENBURG's record is of no value for the parallelisation of the Mekran series with neogene javanese beds²⁵).

Fossil distribution:

Mal: neogene (pliocene?): Soedimanik, Pasir Mental (Bantam, Java); neogene: E. part of Djampang Koelon (= Junghuhn's locality C), middle part of the district of Tjidamar (= Junghuhn's locality L) (Buitenzorg, Java); ? SW. New Guinea; miocene: W. part of the district of Tjidamar (= Junghuhn's locality K; Buitenzorg, Java); Sibod Gulch (Naga, Cebu, Philippines); upper miocene: ? Tjilanang beds (only from Junghuhn's locality O; Priangan, Java); pliocene: Tjimantjeurih (Bantam, Java); Waled (= Menengteng ravine), Baribis (Cheribon, Java); Sangiran (Soerakarta, Java); [= Upper Kalibèng layers]: Sonde, Padasmalang, Doekoepengkol (Madioen, Java); pliocene: Peninsula of S. Benkoelen (T. S. 3, p. 24), Kroeë, Bintoehan (T. S. 7, p. 20), Benkoelen — Kroeë (Benkoelen, Sumatra); Atjeh (Sumatra); two localities in Amanoeban (Timor); Obi; Cape Possession (S. coast of New Guinea); (Malumbang formation): Bondoe Peninsula (Luzon, Philippines); "pliocene". [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); [= Poetjangan layers (volcanic facies)]: Soemberringin (Soerabaja, Java); [= Poetjangan layers (volcanic facies), layer II]: Soemberringin (Soerabaja, Java); quaternary: ? Ajer Sago (near Koepang, Timor); Kajoe Ragi (Celebes). Ery: pleistocene (reef limestone): Farsan Is. Mad: pleistocene: Darressalam.

Recent distribution:

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

Bathymetrical distribution:

13—36 m.

174. TONNA (TONNA) FASCIATA (BRUGUIÈRE).

- + 1789 *Buccinum fasciatum* NOB. — BRUGUIÈRE, Tabl. Enc. Méth., Vers, 1, p. 247.
 1849 *Dolium fasciatum*. — REEVE, Conch. Ic., 5, *Dolium*, pl. 7, figs. 11a, b.
 1910 *Dolium fasciatum* BRUG. — KOERT & TORNAU, Geol. & Hydrol. Darressalam, p. 10.
 1912 *Dolium* (s. str.) *fasciatum* BRUG. — K. MARTIN, Vorl. Bericht, 2, p. 167.
 1919 *Dolium fasciatum* BRUG. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 89, 133.
 1931 *Dolium fasciatum* BRUG. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 242.
 1937 *Dolium fasciatum* (BRUGUIÈRE). — BAYER, Cat. Doliidae, p. 38.

²⁴) 1925, Moll. Tert. NW. India, p. 282.

²⁵) Cf. K. MARTIN, 1931, Wann löste etc., p. 5.

Material examined:

Poetjangan layers (volcanic facies); Sheet 110B, C 44: 1 ex.; layer II: Sheet 116A, M 216: 1 ex.; M 217: 1 ex.; M 218: 1 ex.; M 219: 1 fr.; M 222: 1 fr.; M 224: 1 ex.; layer III: Sheet 110A, M 143: 3 fr.

Though my specimens are all damaged, I am pretty sure of their identification after accurate comparison with recent shells belonging to this species.

Fossil distribution:

Mal: pliocene: Mount Gombel (Semarang, Java).

Mad: pleistocene: Darressalam.

Recent distribution:

Mal, Jap, Chi, Ind.

Bathymetrical distribution:

not recorded.

175. *TONNA (TONNA) MODJOKASRIENSIS* (K. MARTIN).

- + 1899 *Dolium* (s. str.) *modjokasriense* spec. nov. — K. MARTIN, Foss. Java, p. 160, pl. 25, figs. 370, 370a.
 1919 *Dolium modjokasriense* MART. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 89, 145.
 1931 *Dolium modjokasriense* MART. — VAN ES, *Age Pithecanthr.*, p. 95.
 1931 *Dolium modjokasriense* MART. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 243.
 1932 *Dolium modjokasriense* MART. — VAN DER VLERK, Zuidrebangsche heuvell., p. 111.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 98: 1 ex.; M 291: 1 fr.; M 292: 1 ex.; M 298: 1 ex.; C 1: 1 ex.; Sheet 110B, M 272: ? 2 fr.; layer II: Sheet 110A, M 122: 1 ex.; M 304: 1 ex.; M 311: 1 ex.; C 54: 1 ex.

Poetjangan layers (argillaceous facies): Sheet 110A C 45: ? 1 ex.; Sheet 110B, C 48: 1 ex.

It is not always possible to separate specimens of this species from those of *T. zonata* (GREEN) (vide infra), especially because fossil shells of *Tonna* are nearly always damaged.

Fossil distribution:

Mal: "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java); "miocene" [= Poetjangan layers (volcanic facies), layer II]: Tambakwatoe (Soerabaja, Java).

Recent distribution:

not known living.

176. *TONNA (TONNA) ZONATA* (GREEN).

- + 1830 *Dolium zonatum*. — GREEN, Trans. Albany Inst., 1, p. 131, pl. 4 [non vidi].
 1879 *Dolium crenulatum* PHIL. — K. MARTIN, Tertiärsch. Java, p. 41, pl. 14, fig. 6.
 1899 *Dolium* (s. str.) *zonatum* GREEN, var. — K. MARTIN, Foss. Java, p. 159, pl. 25, figs. 368, 368a, b, 369, 369a.
 1911 *Dolium zonatum* GREEN. — MARTIN-ICKE, Foss. Gastr. Trinil, p. 47.
 1919 *Dolium zonatum* GREEN, var. — K. MARTIN, Palaeoz. Kenntn. Java, pp. 89, 132, 151.
 1921 *Dolium zonatum* GREEN. — P. J. FISGHER, Pliocänfauna Seran, p. 244.
 1926 *Dolium zonatum* GREEN. — K. MARTIN, Plioc. Verst. Cheribon, pp. 10, 16, 21.
 1927 *Dolium* (s. str.) *zonatum* GREEN. — P. J. FISGHER, Seran u. Obi, p. 61.
 1928 *Dolium zonatum* GREEN (prior) † — K. MARTIN, Moll. Neog. Atjeh, pp. 8, 18, 25.

- 1931 *Dolium* (s. str.) *zonatum* GREEN. — KOPERBERG, Jungtert. u. quart. Moll. Timor, p. 123.
 1931 *Dolium zonatum* GREEN. — VAN ES, Age *Pithecanthr.*, p. 95.
 1931 *Dolium zonatum* GREEN. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 243.
 1932 *Dolium zonatum* GREEN. — VAN DER VLERK, Zuidrebangsche heuvell., p. 111.
 1935 *Tonna zonata* (GREEN). — NOMURA, Cat. Tert. a. quart. Moll. Taiwan, p. 170, pl. 8, fig. 29.
 1937 *Dolium zonatum* GREEN. — BAYER, Cat. Doliidae, p. 49.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 257: 1 ex.; M 261: 2 ex.
 Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 102: ? 1 ex.; M 107: 2 fr.; C 105: 1 ex.; Sheet 110B, M 153: ? 1 ex.; M 158: 1 ex.; C 79: 1 ex.; horizon above layer I: Sheet 110B, C 75: ? 1 ex.; layer II: Sheet 110B, M 176: 1 ex.; Sheet 116A, M 216: 3 ex.; M 219: 2 ex.; C 6: 2 ex.; C 34: ? 1 ex.; C 37: 2 ex.; layer III: Sheet 110B, M 189: 1 ex.
 Poetjangan layers (argillaceous facies): Sheet 110B, M 266: 1 ex.

Specimens agreeing with the variety of *K. MARTIN* occur in my material as well as typical specimens and transitional forms between type and variety.

Fossil distribution:

Mal: neogene: E. part of Djampang Koelon (= Junghuhn's locality C), Middle part of district of Tjidamar (= Junghuhn's locality L; Buitenzorg, Java); pliocene: Tjibeët (Buitenzorg, Java; T. J. 30, p. 18); Tjidjoerei, Waled (= Menengteng ravine; Cheribon, Java); Padasmalang (Madioen, Java); Kroeë (Benkoelen, Sumatra; T. S. 6, p. 20); Atjeh (Sumatra); between Niki Niki and Pene (Amanoeban, Timor); Ceram; "pliocene" [probably = Poetjangan layers]: Bareng beds (Bodjonegoro, Java).
 Chi: pliocene (Byôritu beds): Taiwan Is. (= Formosa).

Recent distribution:

Jap, Chi, Mad.

Bathymetrical distribution:

not recorded.

TONNA (TONNA) spec.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 291: 2 fr.; M 292: 2 ex.; M 292 + 293: 5 ex. + some fr.; layer II: Sheet 110A, M 304: 2 ex.; Sheet 110B, M 284: 1 fr.
 Poetjangan layers (argillaceous facies): Sheet 110B, M 264: 1 ex. + 2 fr.

These specimens belong to the two previous mentioned species, but they are too bad to allow of an exact identification.

177. TONNA (TONNA) AMPULLACEA (PHILIPPI).

- + 1845 *Dolium ampullaceum*. — PHILIPPI, Zeitschr. f. Malakozool., 2, p. 147.
 1849 *Dolium ampullaceum* PH. — PHILIPPI, Abb. u. Beschr., 3, *Dolium*, p. 11, pl. 2.
 1919 *Tonna ampullacea* PHILIPPI — HEDLEY, Rec. Austral. Mus., 12, p. 330, pl. 44, fig. 7.
 1937 *Dolium ampullaceum* PHILIPPI — BAYER, Cat. Doliidae, p. 31.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 251: ? 1 fr.
 Poetjangan layers (volcanic facies): Sheet 110B, M 163:
 several fr.; layer I: Sheet 110B, M 271: ? 1 fr.; horizon above
 layer I: Sheet 110B, M 273: ? 2 fr.; layer II: Sheet 110A, M 125:
 ? 1 fr.; Sheet 110B, M 164: 1 fr.; \pm layer II?: Sheet 109C, M 347:
 ? 1 fr.; layer III: Sheet 110B, M 186: 2 ex. (casts).

Several fragments and some bad specimens of a large species of *Tonna* agree strikingly with the exquisite recent specimens of this species with which I could compare them (Z. M. A., R. N. H. L.). Nevertheless the identification remains somewhat doubtful as long as no good specimens of this species will have been found in the Kendeng beds.

Fossil distribution:

no previous records.

Recent distribution:

Mel, "Australia", "Oceanus Pacificus".

178. *TONNA (TONNA) spec.*

Material examined:

Poetjangan layers (volcanic facies): Sheet 110B, C 44: 1 ex.

This specimen agrees in several respects with *T. cepa* (ROEDING)²⁶⁾, but its spirals are slightly narrower and probably more numerous than in that series. The shell belongs to a new species, but it is too bad for description.

179. *TONNA (TONNA) spec.*

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, C 60: 1 ex.

This specimen probably belongs to a new species, allied e. g. to *T. deshayesii* (REEVE)²⁷⁾, but it is too incomplete for description.

180. *TONNA (TONNA) spec.*

Material examined:

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

This specimen has a distinct shoulder as is characteristic of *T. losariensis* (K. MARTIN)²⁸⁾, but it probably does not belong to that species.

TONNA (TONNA) spec.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 242: 1 ex.; M 249: 16 ex. (casts, some of them may equally well belong to the genus *Phalium*); M 260: 1 ex. (juv.).

Poetjangan layers (volcanic facies): Sheet 99B, M 14: 2 ex.

²⁶⁾ 1937 *Dolium cepa* (BOLTEN). — BAYER, Cat. Doliidae, p. 32.

²⁷⁾ 1937 *Dolium deshayesii* REEVE. — BAYER, Cat. Doliidae, p. 35.

²⁸⁾ + 1899 *Dolium* (s. str.) *losariense* spec. nov. — K. MARTIN, Foss. Java, p. 163, pl. 25, figs. 377, 377a, 378.

(casts); M 23: 1 ex. (cast); layer I: Sheet 110A, M 105: 1 ex. (cast); C 52: 1 ex.; Sheet 110B, C 95: 1 ex. (cast); C 109: 2 ex. (casts); layer II: Sheet 110A, M 123: 1 fr.; M 125: 2 fr.; Sheet 110B, M 168: 1 ex.; Sheet 116A, M 216: 1 ex. (cast); M 219: 1 ex.; \pm layer II: Sheet 109C, M 346: 3 fr.; layer III: Sheet 110A, C 1: 1 ex.; Sheet 110B, M 190: 1 fr. Poetjangan layers (argillaceous facies): Sheet 110A, M 289: 1 ex. (cast).

These specimens are too bad for specific identification.

Familia Ficidae.

Genus *Ficus* ROEDING 1798.

181. *FICUS SUBINTERMEDIA* (D'ORBIGNY).

- + 1852 *Pyrula subintermedia*. — D'ORBIGNY, Prodrôme Paléont., 3, p. 173.
- 1879 *Pyrula ficoides* LAM. — K. MARTIN, Tertiärsch. Java, p. 56, pl. 14, figs. 7, 7a.
- 1903 *Pyrula reticulata* [non] LAMK. — COSSMANN, Karikal, 2, p. 163, pl. 6, figs. 10, 11.
- † 1918 *Pyrula reticulatum* [non] LAM. — CHAPMAN, Caenoz. foss. oil-fields Papua, p. 10.
- 1919 *Pyrula ficoides* LAMK. — K. MARTIN, Palaeoz. Kennntn. Java, p. 89.
- 1921 *Ficula reticulata* [non] LAM. — P. J. FISCHER, Pliocänfauna Seran, p. 244.
- 1921 *Ficus reticulata* [non] (LAMARCK). — DICKERSON, Fauna Vigo group, pp. 12, 13.
- 1922 *Ficus reticulata* [non] (LAMARCK). — DICKERSON, Rev. Philipp. Paleont., p. 202, pl. 2, fig. 23.
- † 1925 *Pyrula reticulatum* [non] LAM. — CHAPMAN, Papua and New Guinea, p. 86.
- 1927 *Ficula reticulata* [non] LAM. — P. J. FISCHER, Seran u. Obi, p. 62.
- 1931 *Pyrula ficoides* LAMK. — VAN DER VLERK, Caenoz. Amphin., Gastr., p. 243.
- 1935 *Ficus ficoides* (LAMARCK). — NOMURA, Cat. Tert. a. quart. Moll. Taiwan, p. 172.
- 1939 *Pyrula subintermedia* (D'ORBIGNY). — BAYER, Cat. Pirulidae, p. 379.

Material examined:

Upper Kalibèng layers: Sheet 93B, M 260: 1 ex. (juv.).
 Poetjangan layers (volcanic facies): Sheet 110B, M 169: 1 fr.; layer I: Sheet 110A, M 298: 1 ex.; layer II: Sheet 110A, M 311: 1 ex.; Sheet 116A, M 216: 1 ex.; C 34: 1 ex.; C 37: 2 ex.; C 39: 1 ex.

Fossil distribution:

Mal: miocene: W. part of the district of Tjidamar (Buitenzorg, Java); (Vigo group): Bondoc Peninsula (Luzon, Philippines); pliocene: Kroeë (T. S. 6, p. 20), Bintohan (T. S. 6, p. 20; Benkoelen, Sumatra); Ceram; ? Cape Possession (S. coast of New Guinea).
 Jap: pleistocene: Central Honsyû.
 Chi: pliocene (Byôritu beds): Taiwan I. (= Formosa).
 Ind: pliocene: Karikal.

Recent distribution:

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

Bathymetrical distribution:

54—90 m.

FICUS spec.

Material examined:

Poetjangan layers (volcanic facies), layer I: Sheet 110A, M 301: 1 ex. (cast).
 Poetjangan layers (argillaceous facies): Sheet 110A, M 289: 1 ex. (cast).

It is possible that these specimens also belong to *Ficus subintermedia* (D'ORBIGNY).