



## 大川, 生花苗および当縁層の中新世有孔虫について

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**Miocene Foraminifera from the Okawa, Oikamanai and Tōberi Formations of the Toyokoro Hill, Tokachi Province, Hokkaido.**

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吉田三郎：大川，生花苗および当縁層の中新世有孔虫について

**Introduction and Acknowledgements**

The Foraminiferal faunas described in this paper are from the Toyokoro Hill, Tokachi Province, Eastern Hokkaidō, Japan. The stratigraphic succession of the Toyokoro Hill is established by the writer as follows (in descending order) :

Pliocene	Ikeda Formation
	Taiki Formation
Miocene	Tōberi Formation
	Oikamanai Formation
	Okawa Formation
	Noyaushi Formation
	Tokachi Poronai Formation
Mesozoic	Toyokoro Formation

The Okawa formation consisting of greyish, massive sandy silt which reaches a thickness of 600 meters, associated with fine grained, light grey and poorly sorted sandstone is well observed in Noyaushi and Ainuzawa. The Oikamanai formation is made up of greyish hard shale, locally interbedded with sandy silt and is developed in Noyaushi, Okawa and Ogawa. The Tōberi formation consisting of the alternation of conglomerate,

coarse sandstone and hard shale is developed in Noyaushi and Ogawa.

Foraminiferal fauna of the Okawa formation was found in several horizons of the sandy silt member of the formation. The most common species of the fauna are *Cyclammina japonica* Asano, *Martinottiella communis* (d'Orbigny) and *Haplophragmoides compressum* LeRoy which are frequently found in the Miocene formations of Japan. *Rotalia nipponica* Asano which is also commonly found in the Miocene and Pliocene deposits of Japan, occurs in the formation. The Oikamanai and Tōberi formations contain a few foraminiferal species which are poorly preserved. *Pullenia asanoi* Yoshida is commonly found in the former formation and *Cyclammina cancellata* Brady in the latter.

Thus, it can be said that the Okawa, Oikamanai and Tōberi assemblages belong to the Miocene Foraminiferal sequences of Japan and perhaps the middle Miocene Kawabata Series of Hokkaidō.

The specimens here treated are deposited in the collection of the Geological Institute, the Kushiro Branch of Hokkaidō Gakugei University. Catalogue numbers of registered

Miocene Foraminifera from the Ōkawa, Oikamanai and Tōberi Formations

Table 1. Foraminifera from the Ōkawa, Oikamanai and Tōberi Formations.

(A : Abundant, C : Common, F : Few, R : Rare)

Species	ŌKAWA FORMATION											OIKAMANAI FORMATION				TōBERI FORMATION
	2701	2702	2703	2704	2706	2620	2621	2627	2637	2638	2714	2715	3006	8901	8902	8006
<i>Bathysiphon</i> sp.	—	R	—	F	—	—	—	—	—	R	R	—	R	C	—	—
<i>Bulimina</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	R	—	—	—
<i>Cassidulina</i> ōkawaensis Yoshida, sp. nov.	R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Cibicides</i> sp.	R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Cyclammina</i> cancellata Brady	F	—	—	—	—	F	—	—	—	—	—	—	R	F	—	R
<i>C. japonica</i> Asano	—	—	—	—	—	—	—	—	F	—	—	R	—	—	—	—
<i>C.</i> sp.	—	R	F	F	—	—	R	R	R	—	—	—	—	F	—	—
<i>Eponides</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	R
<i>Haplophragmoides</i> compressum LeRoy	F	—	F	F	A	C	C	—	—	—	—	—	—	R	A	—
<i>Lagena</i> acuticosta Reuss	R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Martinottiella</i> communis (d'Orbigny)	—	—	—	R	—	—	A	—	—	—	—	—	—	—	—	—
<i>Nodosaria</i> cf. <i>carinata</i> (Neugeboren)	—	—	—	—	—	—	—	—	—	R	—	—	—	—	—	—
<i>N.</i> sp.	—	—	—	—	—	—	—	—	—	—	—	—	R	—	—	—
<i>Plectofrondicularia</i> toyokoroensis Yoshida, sp. nov.	R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	R
<i>Pullenia</i> asanoi Yoshida, sp. nov.	—	—	—	—	—	—	—	—	—	—	—	—	F	—	—	—
<i>Rotalia</i> nipponica Asano	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Textularia</i> sp.	—	—	—	R	—	—	—	—	—	—	—	—	—	—	—	—
<i>Uvigerina</i> sp.	R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Uvigerinella</i> cf. <i>californica</i> Cushman	R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>U.</i> (?) sp.	R	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

specimens are indicated in the text as HGKT.

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### Systematic Descriptions

Family RHIZAMINIDAE

Genus BATHYSIPHON Sars, 1872

*Bathysiphon* sp.

Plate 1, figures Ia, b, c, d.

Test cylindrical, often tapering slightly, straight or slightly curved ; wall cemented with fine grained, amorphous material.

This form resembled to *B. filiformis* Sars, but is poorly preserved and fragmentary.

Family LITUOLIDAE

Genus HAPLOPHRAGMOIDES Cushman, 1910



Genus CYCLAMMINA H. B. Brady, 1876

*Cyclammina japonica* Asano

Plate 2, figures 1a, b ; 2a, b.

*Cyclammina japonica* Asano, 1950, Cushman Found. Foram. Res., Contrib., vol. 1, pts. 3 and 4, p. 78, pl. 11, figs. 3—8.

*Cyclammina japonica* Asano, 1951, Ill. Cat. Jap. Tert. Small. Foram., pt. 10, p. 6, figs. 20, 21.

The type of this species are from the Miocene Shiiya formation, but appears first in the middle part of the Poronai shale (Oligocene) and ranges up to a little above the base of the Kitaura formation (Upper Miocene).

*Cyclammina cancellata* Brady

Plate 2, figures 3a, b.

*Cyclammina cancellata* Brady, 1879, Quart. Jour. Micr. Sci., 19, p. 62.

*Cyclammina cancellata* Asano, 1950, Cushman Found. Foram. Res., Contrib., vol. 1, pts. 3 and 4, pl. 11, figs. 1a—2b.

*Cyclammina cancellata* Asano, 1951, Ill. Cat. Jap. Tert. Small. Foram., pt. 10, p. 5, figs. 14, 15.

This species is often found in the Miocene formations of Japan, but not so common as *C. japonica* Asano.

Family TEXTULARIIDAE

Genus TEXTULARIA DeFrance, 1824

*Textularia* sp.

Plate 2, figure 4.

A single and poorly preserved specimen occurs in the Ainuzawa (Loc. no. 2704).

Family VALVULINIDAE

Genus MARTINOTTIELLA Cushman, 1933

*Martinottiella communis* (d'Orbigny)

Plate 2, figures 5a, b.

*Clavulina communis* d'Orbigny, 1826, Ann. Sci. Nat., 7, p. 268, no. 4.

*Martinottiella communis* Cushman, 1933, Cushman. Lab. Foram. Res., Contrib., vol. 9, p. 37, pl. 4, figs. 6—8 ; 1937, idem, Special Pub., no. 8, p. 148, pl. 17, figs. 4—9.

*Martinottiella communis* Cushman, 1950, Foraminifera, 4th ed., p. 138, pl. 8, figs. 6—8.

*Martinottiella communis* Asano, 1950, Ill. Cat. Jap. Tert. Small. Foram., pt. 4, p. 3, figs. 16, 17.

*Martinottiella communis* Tai, 1954, Jour. Sci. Hiroshima Univ., Ser. 6, vol. 1, no. 4, pl. 1, fig. 7.

*Martinottiella communis* Fujita and Itō, 1957, Jour. Geol. Soc. Japan, vol. 63, no. 744, pl. 10, figs. 5a, b.

This species is very common in the Miocene formations of Japan.

Family LAGENIDAE

Genus NODOSARIA Lamarck, 1812

*Nodosaria* cf. *carinata* (Neugeboren)

Plate 2, figures 6a, b.

*Dentalina carinata* Neugeboren, 1856, K. Akad. Wiss., Math.-Naturw. Cl., Denkschr., Wien, Österreich, Bd. 12, Abth. 2, p. 91, pl. 4, figs. 7a—c.

This form resembles to *N. carinata* (Neugeboren), but is so poorly preserved that it is difficult to determine it definitely.

*Nodosaria* (?) sp.

Plate 3, figure 1.

The figured specimen shows clearly a few longitudinal raised costae on the surface of wall, but too rare specimens for the definite identification.

Genus *LAGENA* Walker and Jacob, 1798

*Lagena acuticosta* Reuss

Plate 3, figure 2.

*Lagena acuticosta* Reuss, 1861, Sitz. Akad. Wiss. Wien, vol. 44, pt. 1, p. 305, pl. 1, fig. 4.

*Lagena acuticosta* Cushman, 1931, Jou. Pal., vol. 5, p. 308; 1932, vol. 6, p. 337,

*Lagena acuticosta* Cushman and Ponton, 1932, Cushman Lab. Foram. Res., Contrib., vol. 8, pt. 3, p. 59, pl. 7, figs. 20a, b.

*Lagena acuticosta* Kleinpell, 1938, Mio. Stra Calif., p. 224, pl. 7, fig. 13,

*Lagena acuticosta* Asano, 1951, Ill. Cat. Jap. Tert. Small. Foram., pt. 15, p. 29, fig. 127.

This species is common from the Neogene to Recent deposits of Japan. The figures specimen is very small, attaining about 0.3mm. in length, and 0.25mm. in diameter.

Family HETEROHELICIDAE

Genus *PECTOFRONDICULARIA* Liebus, 1903

*Plectofrondicularia toyokoroensis* Yoshida, sp. nov.

Plate 3, figure 3.

Test elongate, tapering, much compressed, periphery acute, sharply keeled; chambers numerous, distinct, early ones coiled, biserial, later ones uniserial, inverted V-shaped; sutures distinct, slightly limbate, almost straight except peripheral margin, slightly depressed; wall thin except for earlier chambers where a few, raised longitudinal costae and weak spines are developed. Width 0.6mm., length 1.1mm.

This form is very close to *P.* sp. (Kleinpell, R. M., 1938, p. 242, pl. 4, fig. 12), but differs from it by the slightly limbate sutures, shorter longitudinal costae and has short spines.

Holotype: HGKT 48102. Loc. no. 3008. Ogawa, Toyokoro Village, Tokachi Province, Hokkaidō. Tōberi formation.

Family BULIMINIDAE

Genus *UVIGERINELLA* Cushman, 1926

*Uvigerinella* cf. *californica* Cushman

Plate 3, figure 4.

*Uvigerina* (*Uvigerinella*) *californica* Cushman, 1926, Cushman Lab. Foram. Res., Contrib., vol. 2, pt. 3, p. 58, pl. 8, figs. 2a, b; 5.

*Uvigerinella californica* Cushman and Parker, 1931, idem, Contrib., vol. 7, pt. 1, p. 10, pl. 2, fig. 3.

*Uvigerinella californica* Kleinpell, 1938, Mio. Str. Calif., p. 287, pl. 7, fig. 9, ; pl. 9, fig. 13.

A single broken specimen occurs in the present material.

*Uvigerinella* (?) sp.

Plate 3, figures 5a, b.

A single specimen was found and more specimens are needed to give a definite specific name.

Genus UVIGERINA d'Orbigny, 1826

*Uvigerina* (?) sp.

Plate 4, figures 6a, b.

A poorly preserved specimen was only found.

Genus BULIMINA d'Orbigny, 1826

*Bulimina* sp.

Plate 4, figure 5.

A single and deformed specimen occurs in a sample from the Ogawa (Loc. no. 3006).

Family ROTALIIDAE

Genus ROTALIA Lamarck, 1804

*Rotalia nipponica* Asano

Plate 3, figures 6a, b, c.

*Rotalia nipponica* Asano, 1936, Jour. Geol. Soc. Japan, 43, 515, p. 614, pl. 31, figs. 2a—c.

*Rotalia nipponica* Asano, 1938, Contr. Inst. Geol. Pal. Tōhoku Imp. Univ., no. 31, p. 52, pl. 4, figs. 2a—c.

*Rotalia nipponica* Asano, 1951, Ill. Cat. Jap. Tert. Small. Foram., pt. 14, p. 15, figs. 112—114.

The type of this species are from the Pliocene Tomioka formation, but usually occurs also in the Miocene formations of Japan. Specimens from the Ikushina formation (Yoshida, S., 1955, p. 14, pl. 1, figs. 2a—c.) appear to be very close to this species, but has 7 chambers in last whorl with somewhat rounded periphery. Diameter 0.46mm., thickness 0.20mm.

Genus EPONIDES Montfort, 1808

*Eponides* sp.

Plate 4, figures 1a, b, c.

The present form is close to *E. haidingerii* d'Orbigny, but differs from it by less number of chambers (6 chambers in last whorl) and slightly limbate sutures. It may represent a distinct species, but is found only a single specimen, and it is difficult to determine it definitely. Diameter 0.22mm., thickness 0.09mm.

Family CASSIDULINIDAE

Genus CASSIDULINA d'Orbigny, 1826

*Cassidulina ōkawaensis* Yoshida, sp. nov.

Plate 4, figures 2a, b, c.

Test small, biconvex, symmetrical, umbonate, circular in outline, periphery subacute or

slightly rounded, not lobulate ; chambers wide, inflated, distinct, 4 pairs in last formed coil ; sutures not depressed, slightly curved, not limbate ; wall smooth, finely perforate ; aperture elongate, comma-shaped, nearly parallel to axis of coiling. Diameter 0.16mm., thickness 0.09mm.

The subacute or slightly rounded periphery of this species may be easily distinguishable from *C. laevigata carinata* Cushman. It differs from *C. galvinensis* Cushman and Frizzell by the peripheral and sutural characters.

Holotype : HGKT 48103. Loc. no. 2701. Ainuzawa, Ōkawa, Toyokoro Village, Tokachi Province, Hokkaidō. Ōkawa formation.

Family CHILOSTOMELLIDAE

Genus PULLENIA Parker and Jones, 1862

*Pullenia asanoi* Yoshida, sp. nov.

Plate 4, figures 3a, b.

Test small, symmetrical, involute, umbilicus sometimes excavated, periphery broadly rounded, somewhat lobulate ; chambers distinct, slightly inflated, six in last formed coil ; sutures distinct, slightly depressed, nearly straight ; wall coarsely perforate ; aperture indistinct. Length 0.30mm., thickness 0.20mm., breadth 0.25mm.

This form is close to *P. miocenica* Kleinpell, but differs from it by nearly straight sutures, broadly rounded periphery and coarsely perforate wall. This may be distinguished from *P. puentepiedyaensis* Galloway and Morrey by less number of chambers and not limbate sutures.

Holotype : HGKT 48104. Loc. no. 3006. Ogawa, Toyokoro Village, Tokachi Province, Hokkaidō. Oikamanai formation.

Family ANOMALINIDAE

Genus CIBICIDES Montfort, 1808

*Cibicides* sp.

Plate 4, figures 4a, b, c.

Only two poorly preserved specimens are found in a sample from the Ōkawa formation of the Ainuzawa (Loc. no. 2701).

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EXPLANATION OF PLATE 1.

Figs.

1. *Bathysiphon* sp.  
a, x 60 ; b, x 52 ; c, x 100 ; d, x 57.
- 2, 3, 4. *Haplophragmoides compressum* LeRoy.  
2, x 52 ; 3, x 46 ; 4, x 54.  
2a, 3a, 4a ; 2b, 3b, 4b, Opposite sides ; 2c, 3c, peripheral views.
5. *Haplophragmoides* sp., x 90.  
a, Side view ; b, peripheral view.

EXPLANATION OF PLATE 2.

1. *Cyclammina japonica* Asano, x 30.  
a, Side view ; b, peripheral view.
2. *Cyclammina japonica* Asano, x 28.  
a, Side view ; b, peripheral view (deformed one.).
3. *Cyclammina canclata* Brady x 41.  
a, Side view ; b, peripheral view.
4. *Textularia* sp., x 71.
5. *Martinottiella communis* (d'Orbigny).  
a, x 121 ; b, x 96.
6. *Nodosaria* cf. *carinata* (Neugeboren), x 138.  
a, Side view ; b, apertural view.

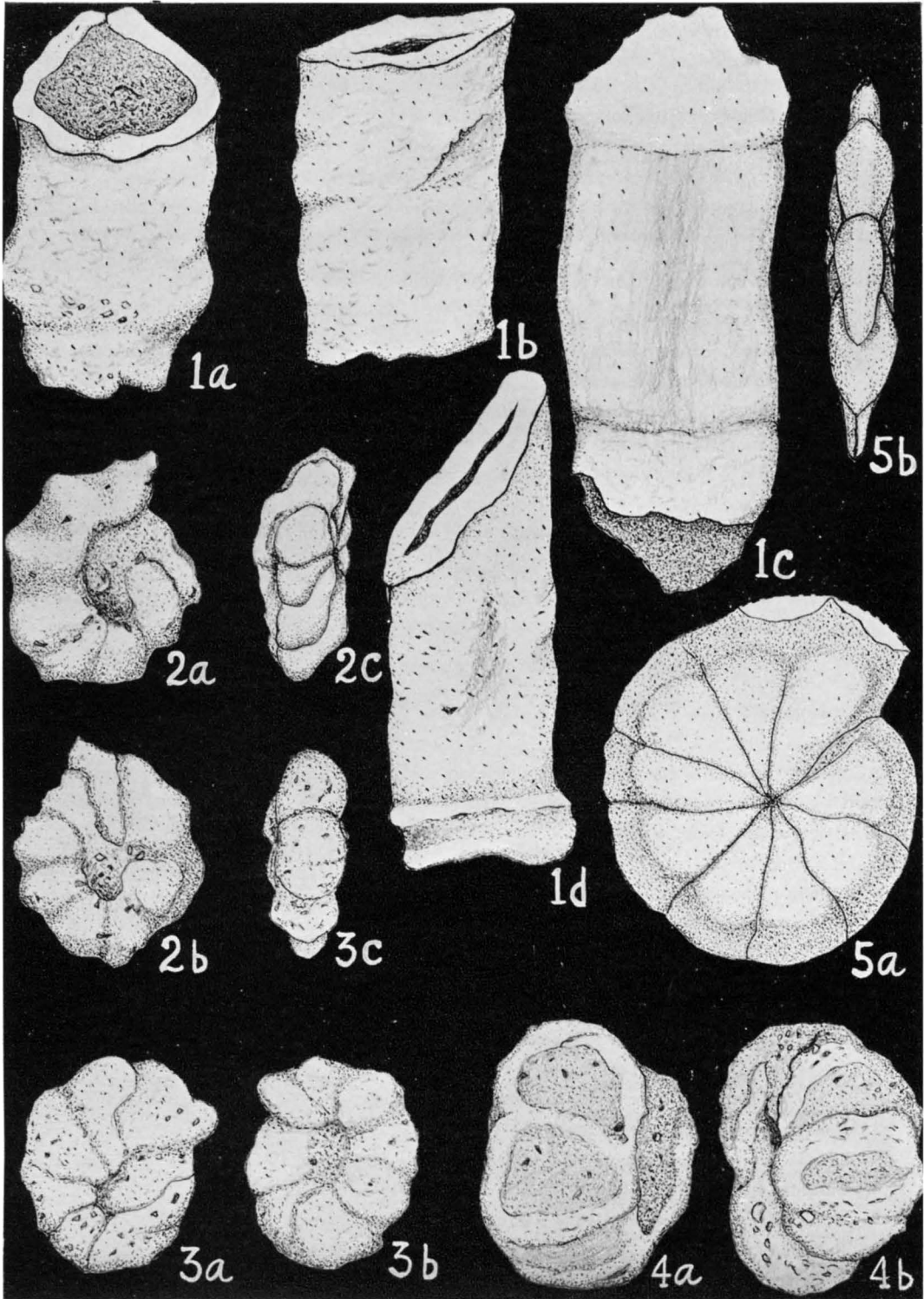
EXPLANATION OF PLATE 3.

1. *Nodosaria* (?) sp., x 90.
2. *Lagena acuticosta* Reuss, x 173.
3. *Plectofrondicularia toyokoroensis* Yoshida, sp. nov., x 75 of holotype.
4. *Uvigerinella* cf. *californica* Cushman, x 115.
5. *Uvigerinella* (?) sp., x 164.  
a, b, Opposite sides.
6. *Rotalia nipponica* Asano, x 126.  
a, Dorsal side ; b, ventral side ; c, peripheral view.

EXPLANATION OF PLATE 4.

1. *Eponodes* sp., x 232.  
a, Dorsal side ; b, ventral side ; c, peripheral view.
2. *Cassidulina okawaensis* Yoshida, sp. nov., x 218.  
a, b, Opposite sides ; c, peripheral view of holotype.
3. *Pullenia asanoi* Yoshida, sp. nov., x 143.  
a, Side view ; b, peripheral view of holotype.
4. *Cibicides* sp., x 154.  
a, Dorsal view ; b, ventral view ; c, peripheral view.
5. *Bulimina* sp., x 63.
6. *Uvigerina* (?) sp., x 65.  
a, Side view ; b, apertural view.

PLATE 1.



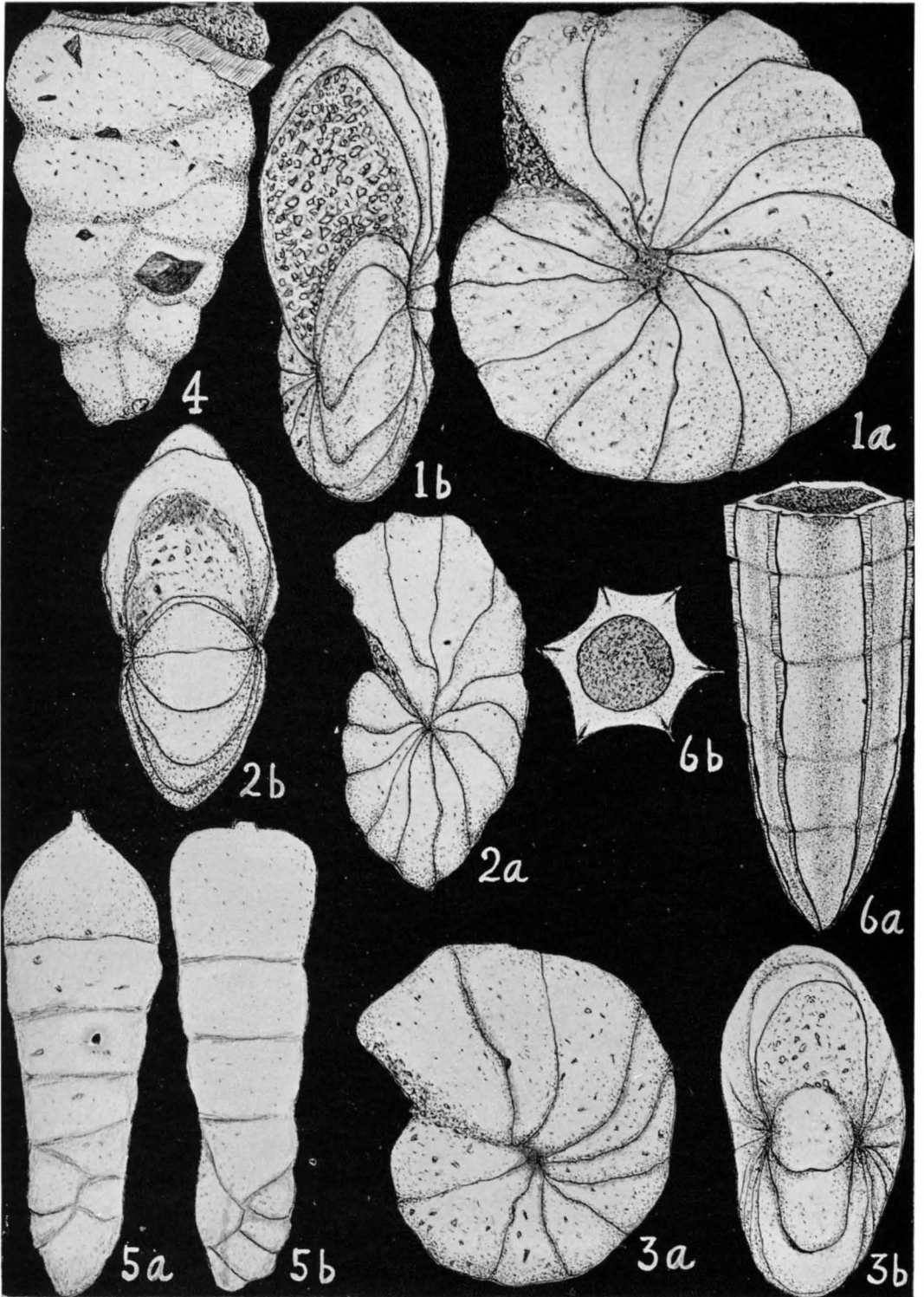


PLATE 3.

