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ON ORBITOLINID FORAMINIFERA FROM THE LOWER APTIAN (CRETACEOUS) OF HOKKAIDO, JAPAN

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ABSTRACT

Five orbitolinid foraminifera from the Lower Aptian Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group, Hokkaido, Japan are described and illustrated, and one is described as a new species. An Early Aptian age is assigned to the assemblage.

Keywords: *Palorbitolina lenticularis, Mesorbitolina parva, M. libanica, M. minuta, Paleodicytoconus conica* Matsumaru, n. sp., Lower Aptian, Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group, Hokkaido

INTRODUCTION

The *Orbitolina*-bearing limestone samples were collected from Kirigishi 17 km SSW of Takisato (Shimanoshita) No. 3, Ashibetsu City, Hokkaido (Matsumaru, 2005, fig. 1) and Ikushunbetsu 4 km south of Kirigishi, by the authors in 2004 and 2005 (Fig. 1). Stratigraphically, the *Orbitolina* limestone of both the localities in the Takisato area, of Ashibetsu City can be recognized as the southern extension of the Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group (Hashimoto, 1936; Yoshida and Kanbe, 1955; Matsumaru, 1971, 2005), on the basis of, lithology of the similar light gray colored limestone. The study of *Orbitolina* from both the localities of Kirigishi and Ikushunbetsu has not been properly carried out. The purpose of this study is to describe *Orbitolina* and to assign the geological age to the fossil yielding horizon.

AGE OF THE *ORBITOLINA* ASSEMBLAGE

The orbitolinid-yielding limestone studied in this paper is located at Takisato (Kirigishi; 43°16' 1" North Lat., 142°14' 3" East Long.) and (Ikushunbetsu; 43°13' 52" North Lat., 142°13' 28" East Long.), Ashibetsu City (Fig. 1). Judging from the geological map of Hashimoto (1936) and the lithofacies characters, the *Orbitolina* limestone at Kirigishi and Ikushunbetsu is regarded as the extension of the *Orbitolina*-bearing limestone exposed at Shimanoshita in the Shimanoshita Mudstone, Lower Yezo Group (Matsumaru, 2005). The *Orbitolina* bearing limestone is known as the Takisato *Orbitolina* Population Carrying Limestone (Matsumaru, 1971) or shortly the Takisato *Orbitolina* Limestone. At the Locality Kirigishi this limestone yields *Palorbitolina lenticularis* (Blumenbach), *Mesorbitolina parva* (Douglass), *M. libanica* (Henson), *Paleodicyoconus japonica* Matsumaru, n. sp., and *Iraqia simplex* Henson (Matsumaru, 2005, MS), in addition to *Palaeodictyoconus conica* Matsumaru, n. sp. According to Moullade *et al.* (1985), the occurrence together of *Palorbitolina lenticularis, Mesorbitolina parva and Iraqia simplex* is known from the Lower Aptian (Bedoulian). Zhang (1986) reported *Palorbitolina lenticularis* from the lower Aptian Mayoro Formation to the upper Aptian Langshan Formation and *Eorbitolina lentiformis* Zhang, from the upper Aptian Langshan Formation to lower Albian Langshan Formation in Xainza and Baingoin, Xizang (Tibet). As stated later, *Palaeodictyoconus conica,* n. sp. from Kirigishi resembles *Eorbitolina lentiformis.* As a result, the Takisato *Orbitolina* Limestone at Kirigishi is assigned to the Early Aptian.

The Takisato *Orbitolina* Limestone exposed at locality Ikushunbetsu yields *Mesorbitolina parva, M. libanica, Praeorbitolina japonica* Matsumaru, n. sp., and *M. minuta* (Douglass, 1960)(Matsumaru, 2005, MS). According to Moullade *et al.*, (1985), the joint occurrence of *Mesorbitolina parva, M. libanica* and *M. minuta* is indicative of the middle and/or upper Aptian (Gargasian). On this basis the Takisato *Orbitolina* Limestone at Ikushunbetsu will be younger than the Takisato *Orbitolina* Limestone at Takisato (Shimanoshita) and Kirigishi, (Matsumaru, 1971, 2005). In this study, the age of the Takisato *Orbitolina* Limestone is, however, considered to be the early Aptian.

SYSTEMATIC DESCRIPTION

Superfamily **Orbitolinoidea** Martin, 1890
Family **Orbitolinidae** Martin, 1890
Subfamily **Orbitolininae** Martin, 1890
Genus ***Mesorbitolina*** Schroeder, 1962
Mesorbitolina parva (Douglass)
(Pl. I, fig. 7; Pl. II, fig. 5)

Orbitolina parva Douglass, 1960, p. 39, figs. 1-14.
Orbitolina (Mesorbitolina) parva Douglass. – Moullade and Saint-Marc, 1975, p. 832-833, pl. 12, figs. 10-11. – Schroeder, 1979, p. 291, pl. 1, figs. 4-5.- Matsumaru, 2005MS, pl. 1, fig. 7, pl. 3, fig. 8.

Description: Test small, conical; megalospheric embryonic chambers consisting of subspherical protoconch and reniform deuteroconch with vertical septula, followed by subembryonic chambers with endoskeletal vertical septula, underlying protoconch; later chambers uniserial and discoidal with marginal, radial and central complex zones; wall agglutinated particules with calcite grains.

Dimension: Two specimens from Ikushunbetsu, Diameter of test, 1.42 and 1.44 mm, Thickness of test, 0.53 and 0.89 mm, and Form ratio of diameter/thickness, 1.60 and 2.72; Diameter of protoconch, 77 and 110 micron, and Diameter of deuteroconch, 167 and 220 micron; Diameter of subembryonic chambers, 188 and 230 micron.

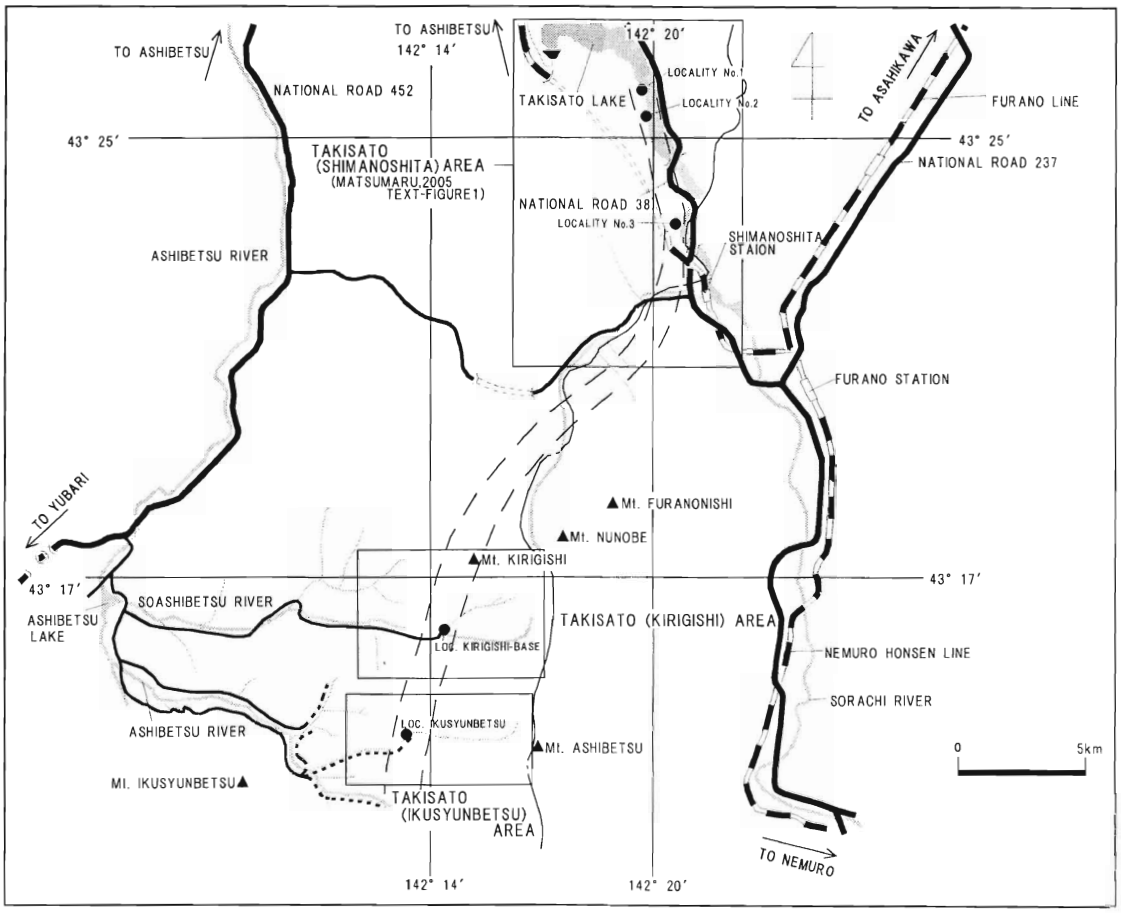

Fig. 1. Map showing the fossil localities at Takisato (Kirigishi) and Takisato (Ikushunbetsu) treated in this study. The horizon of the *Orbitolina* containing limestone is indicated by the dashed lines.

Remarks: The present form is assigned to *Mesorbitolina parva,* based on the similar size of protoconch and subembryonic chambers with Moullade and Saint-Marc (1975, fig. 2)'s diagram.

Stratigraphic horizon: Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group.

Geological age: Early Aptian.

Mesorbitolina libanica (Henson)
(Pl. I, figs. 2-3, and 5.)

Orbitolina conoidea Gras var. *libanica* Henson, 1948, p. 55-56, pl. 2, figs. 10, 12.

Orbitolina (Mesorbitolina) libanica Hensosn.- Moullade and Saint-Marc, 1975, p. 833-834, pl. 14, figs. 3-12.

Description: Test moderate, conical; embryonic chambers consisting of subspherical protoconch and reniform deuteroconch with vertical septula, followed by subembryonic chambers with endoskeletal vertical septula; later chambers uniserial and discoidal with marginal, radial and central complex zones; wall agglutinated.

Dimension: One specimen each from Kirigishi and Ikushunbetsu, Diameter of test, 1.21 and 1.62 mm, Thickness of test, 0.89 and 0.54 mm, and Form ratio of diameter/thickness, 1.35 and 3.0; Kirigishi specimen, Diameter of protoconch, 112 micron, Diameter of deuteroconch, 248 micron, and Diameter of subembryonic chambers, 250? micron.

Remarks: The present form is assigned to *Mesorbitolina libanica,* based on the similar size of protoconch and subembryonic chambers with Moullade and Saint-Marc's diagram (op. cit.).

Stratigraphic horizon: Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group.

Geological age: Early Aptian.

Mesorbitolina minuta (Douglass)
(Pl. I, figs. 1, 4 and 6)

Orbitolina minuta Douglass, 1960, p. 36-38, pl. 7, figs. 6-9, 24-25.
Orbitolina oculata Douglass, 1960, p. 39-41, pl. 10, figs. 13-15.
Orbitolina gracilis Douglass, 1960, p. 42-43, pl. 12, fig. 14.
Orbitolina crassa Douglass, 1960, p. 43-44, pl. 13, fig. 14.

EXPLANATION OF PLATE I

1, 4, 6. ***Mesorbitolina minuta*** (Douglass)
1. Tangential section. Ikushunbetsu-2. x 45. 4, 6. Axial sections. 4. Ikushunbetsu-25. x 45. 6. Ikushunbetsu-93. x 120.

2, 3, 5. ***Mesorbitolina libanica*** (Henson)
2, 5. Axial sections. 2. Kirigishi-30. x 45. 5. Ikushunbetsu-28. x 120.
3. Oblique section. Ikushunbetsu-71. x 120.

7. ***Mesorbitolina parva*** (Douglass)
Axial section. Ikushunbetsu-30. x 45

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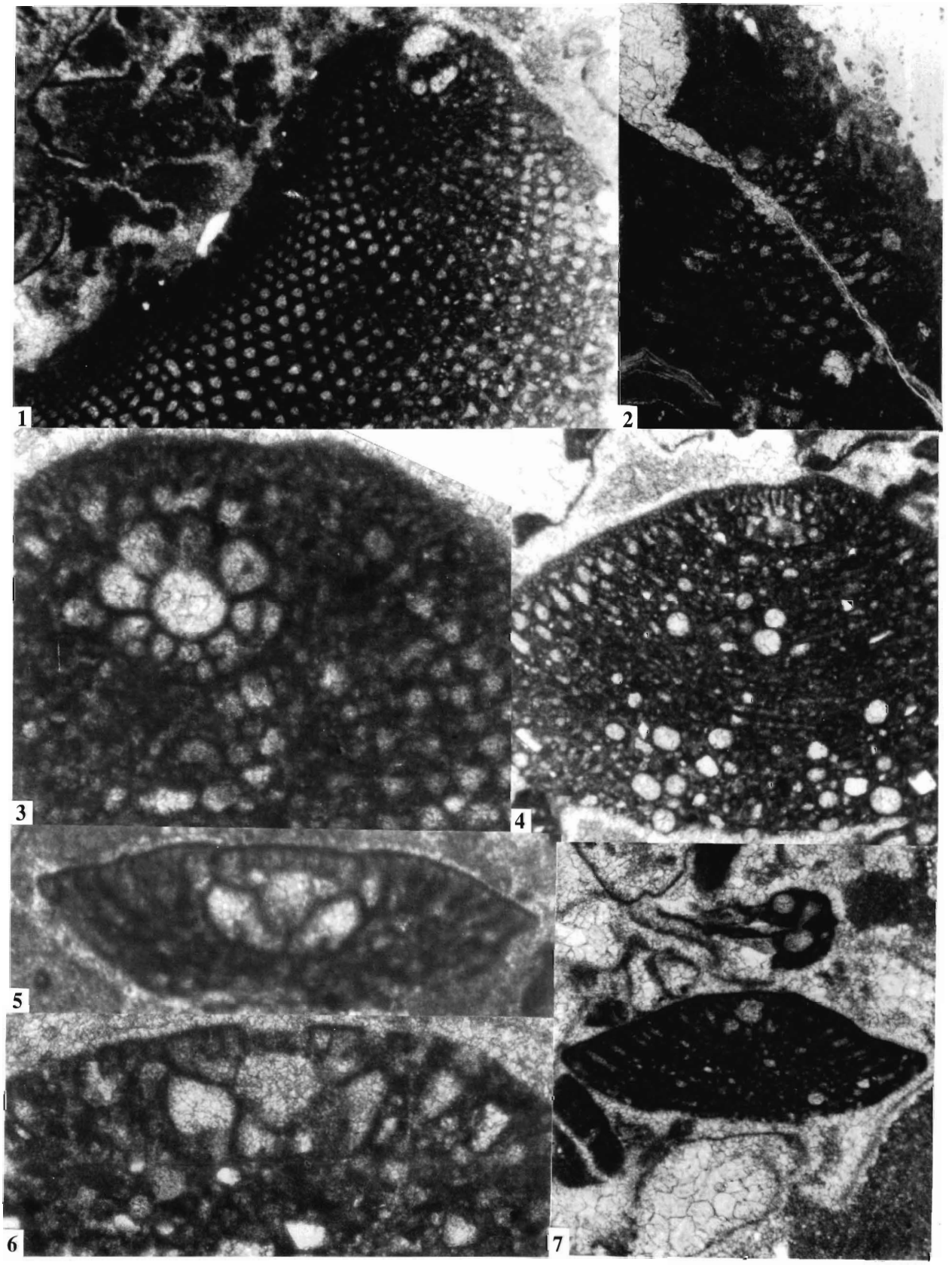
Plate I



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Orbitolina (Mesorbitolina) minuta Douglass. - Moullade and Saint-Marc, 1975, p. 834, pl. 12, figs. 12-16; pl. 13, figs. 1-6.

Description: Test large, high concavo-convex; embryonic chambers consisting of subspherical protoconch and reniform deuteroconch with vertical septula, followed by large subembryonic chambers with endoskeletal vertical septula; later chambers uniserial and discoidal with marginal, radial and central complex zones; wall agglutinated.

Dimension: Two specimens from Ikushunbetsu, Diameter of test, 3.08 and 3.12 mm, Thickness of test, obscure due to oblique sction and 1.44 mm, and Form ratio of diameter/ thickness, 2.14; Diameter of protoconch, probably 133 micron, Diameter of deuteroconch, 440 micron, and Dameter of subembryonic chambers, 370 micron; Number of chambers, 16 per mm.

Remarks: The present form is assigned to *Mesorbitolina minuta,* based on the similar size of protoconch diameter and subembryonic chambers with Moullade and Saint-Marc's diagram (op. cit.).

Stratigraphic horizon: Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group.

Geological age: Early Aptian.

Genus ***Palorbitolina*** Schroeder, 1963
Palorbitolina lenticularis (Blumenbach)
(Pl. II, fig. 4)

Madreporites lenticularis Blumenbach, 1805, p. 1-2, pl. 80, figs. 1-6.
Orbulites lenticulata Lamarck, 1816, p. 197.
Orbitolina lenticulata (Lamarck).- d'Orbigny, 1850, p. 143, no. 342.
Orbitolina concave (Lamarck). – Martin, 1890, p. 209-231, pl. 24, figs. 1-13; pl. 20, figs. 14-20.
Orbitolina lenticularis (Blumenbach). – Douglass, 1960, p. 30-32, pl. 1, figs. 1-26. – Hofker, 1963, p. 220-228, pl. 1, figs. 1-17; pl. 2, figs. 1-15; pl. 3, figs. 1-15; pl. 4, figs. 1-13; pl. 5, figs. 1-8; pl. 6, figs. 1-17; pl. 7, figs. 1-6; pl. 21, figs. 10, 20-21; text-fig. 17. – Hofker, 1966, p. 10-11, pl. 1, figs. 2-4, 7, 9-10, text-figs. 1-2, 4. – Hashimoto and Matsumaru, 1974, p. 97-98, pl. 11, figs. 10-28; pl. 12, figs. 26-32, 35; pl. 13, fig. 8. – Hashimoto and Matsumaru, 1977, p. 54-56, pl. 6, figs. 1-15; pl. 7, figs. 1-21.
Orbitolina (Palorbitolina) lenticularis (Blumenbach). – Schroeder, 1963, p. 349-357, pl. 23, figs. 1-9; pl. 24, figs. 1-10.
Palorbitolina lenticularis (Blumenbach). – Matsumaru, Yoshida and Hayashi, 2005, p. 58-60, pl. 1, figs. 1-4. – Matsumaru, 2005MS, pl. 1, figs. 3-6, 8; pl. 2, figs. 1-3; pl. 3, figs. 1, 4-5, 7; pl. 4, figs. 1-2; pl. 5, fig. 6right; pl. 7, figs. 1-3; pl. 8, figs. 2-3.

Description: Test large, concavo-convex, with form ratio of 3.29 of diameter of 4.48 mm for height of 1.36 mm; embryonic chambers not observed; later chambers uniserial and discoidal with thin marginal zone, well developed radial zone, and central complex zone; wall agglutinated.

Remarks: The present form from Ikushunbetsu is assigned to *Palorbitolina lenticularis,* based on both similar test shape and form ratio such as *Orbitolina lenticularis* from Borneo (Hashimoto and Matsumaru, 1974, pl. 12, figs. 30, 35) and West Sarawak (Hashimoto and Matsumaru, 1977, pl. 5, figs. 1-15; pl. 6, figs. 7-21).

Stratigraphic horizon: Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group.

Geological age: Early Aptian.

Subfamily Dictyoconinae Moullade, 1965
Genus ***Paleodictyoconus*** Mollade, 1965
Paleodictyoconus conica Matsumaru, n. sp.
(Pl. II, figs. 1-3.)

Material: Thin sections, Takisato (Kirigishi) 19, 23 and 30, Ashibetsu City, Hokkaido. Holotype. A megalospheric specimen of tangential section, Saitama Univ. Coll. no. 8924 (Plate 2, figs. 3a, b).

Description: Test high conical, with form ratio of 1.04 to 1.68 of basal diameter of 0.92 to 2.68 mm to height of 0.64 to 2.16 mm; trochospiral early coil; embryonic chambers consisting of subspherical proloculus, 83 x 75 micron in diameter and reniform deuteroconch with vertical septula, 70 x 50 micron in diameter; later chambers discoidal and rectilinear, with marginal zone subdivided by radial vertical beams and horizontal rafters, forming many small chamberlets, and with central zone filled with small pillars; wall agglutinated particles with calcite grains.

Remarks: The present form from Kirigishi is resemble to *Palaeodictyoconus barremianus* (Moulade, 1960) and *P. cuvillieri* (Foury, 1963), but is different from the latter in having very high conical test. The present form is also similar to *Eorbitolina (= Dictyorbitolina) lentiformis* Zhang, 1986 from the upper Aptian to lower Albian Langsham Formation at Baingoin, Xizang (Tibet), but is different in its very high conical test and trochospiral early coil.

Stratigraphic horizon: Takisato *Orbitolina* Limestone, Shimanoshita Mudstone, Lower Yezo Group.

Geological age: Early Aptian.

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EXPLANATION OF PLATE II

1-3. ***Paleodictyoconus conica*** Matsumaru, n. sp.
1-2. Axial sections. 1. Kirigishi-19. x 120. 2. Kirigishi-23. x 25.
3a-b. Tangential sections. Kirigishi-30. Holotype. Saitama Univ. Coll. no. 8924. 3a. x 45., 3b. x 120.
4. ***Palorbitolina lenticularis*** (Blumenbach) Axial section. Kirigishi-22. x 25.
5. ***Mesorbitolina parva*** (Douglass) Tangential section. Ikushunbetsu-43. x 45.

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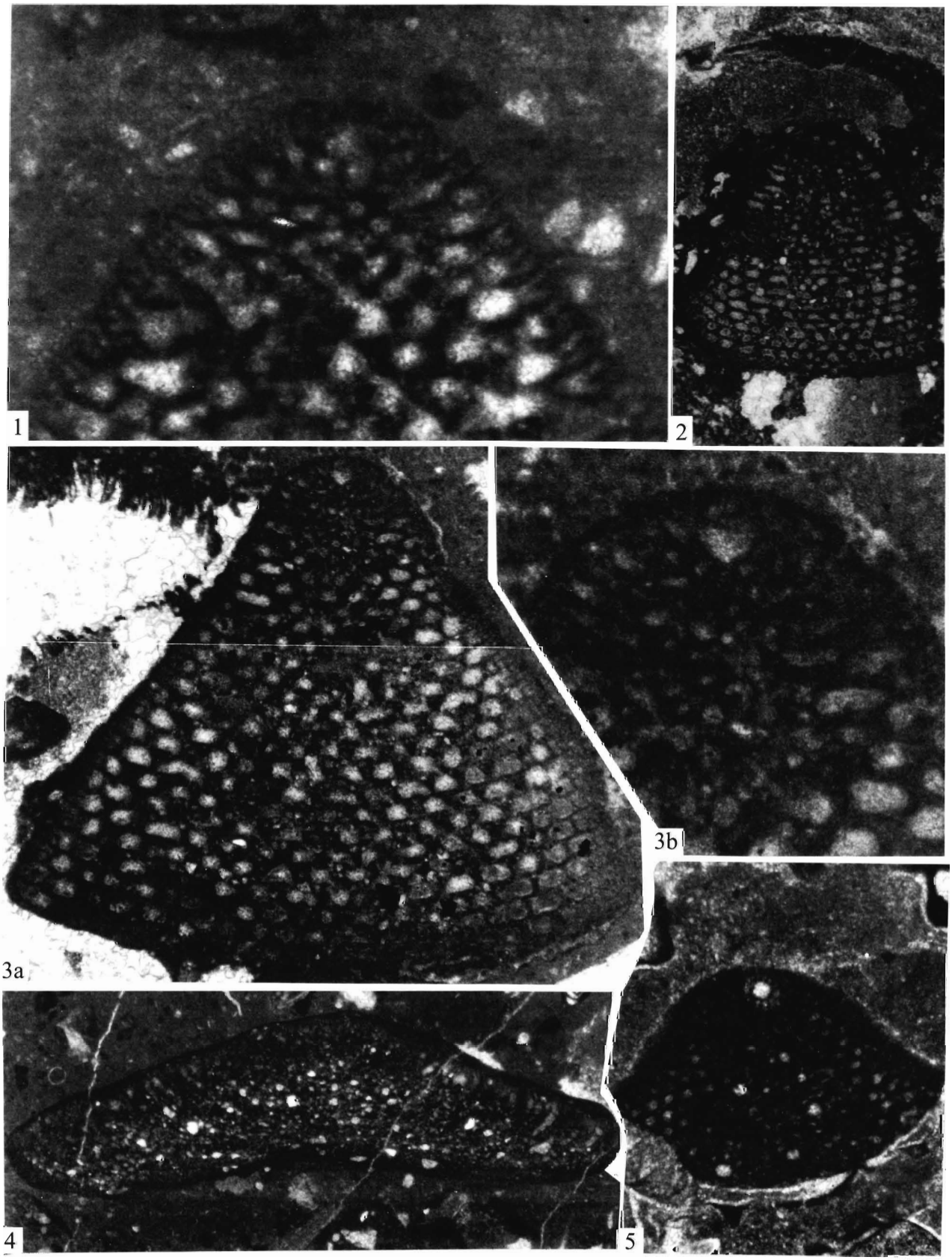
Plate II



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