
Original article

***Acervoschwagerina endoi* Hanzawa from the Uokaneyama Limestone, Mino Terrane, central Japan**

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Abstract

Acervoschwagerina endoi is systematically described based on two samples from the Midori Valley north of Mt. Uokane, Motosu City, Gifu Prefecture. This species is commonly contained in the pelloid limestone and not associated with any other large-sized fusulines. *Acervoschwagerina endoi* is one of the diagnostic late Early Permian schwagerinid fusulines in the Jurassic terranes of Japan, especially in the Mino Terrane. All the test characters of the material studied are variable, and show wide morphologic variation that represents the intraspecific variation of this species.

Key words: *Acervoschwagerina endoi*, morphologic variation, late Early Permian, Mt. Uokane, Mino Terrane

Introduction

Paleozoic and Mesozoic rocks of the Mino Terrane, central Japan are largely divided into greenstone-limestone facies and sandstone-chert facies (Figure 1). Both facies were previously referred to the Upper Paleozoic geosynclinal deposits (e.g., Fujimoto et al., 1962). They are now considered to be the Early Jurassic to Early Cretaceous accretionary complex by radiolarian fossils from mudstone (e.g., Wakita, 1988).

Association of the Permian greenstone-limestone, which is originated in the mid-ocean seamount in the Permian Panthalassa (e.g., Kobayashi, 1999), is distinguished lithologically as the Nyukawa Facies (Igo, 1961; Fujimoto et al., 1962) and tectonostratigraphically as the Funafuseyama Unit (Wakita, 1988). Huge limestone blocks in this facies are exposed in Mts. Funafuse, Ibuki and Ryozen (Figure 1). They are common in: (1) close association with thick and altered basaltic rocks, (2) their deposition started as old as the first appearance of *Acervoschwagerina*, (3) massive

limestone secondarily dolomitized in part, (4) prolific occurrence of fusulines and dasycladacean algae, and others (Fujimoto et al., 1962).

Permian fusulines of the Mino Terrane and the Chichibu Terrane are paleobiogeographically important because of their faunal composition more similar to those of western North American terranes with Tethyan fusulines than to the Permian Akiyoshi Terrane of Japan (Kobayashi, 1997; 2005). *Acervoschwagerina* was originally proposed by Hanzawa (1949) as the subgenus of *Paraschwagerina* Dunbar and Skinner, 1936. This genus is diagnostic in the Circum-Pacific Jurassic terranes, and is characteristic in its strongly and extremely irregularly fluted septa that produce many various-sized and -shaped vesicular chamberlets. These features are easy to distinguish from other schwagerinid fusulines (Thompson, 1954; Kobayashi, 2005). Kobayashi (2005) showed wide morphologic variation of *Acervoschwagerina endoi* Hanzawa, 1949 in the material from the Kanto Mountains. Morphologic variation of this species from the Mino Terrane, however, has been left uncertain in spite of its

occurrence in many localities.

The aim of this paper is to describe *Acervoschwagerina endoi* based on the material collected from the Uokaneyama Limestone, Mino Terrane, with special emphasis of its wide

morphologic variation. Twenty-one limestone thin sections were made about 40 years ago, and are stored in the collection of the Museum of Nature and Human Activities, Hyogo, Japan (Fumio Kobayashi Collection, MNHAH).

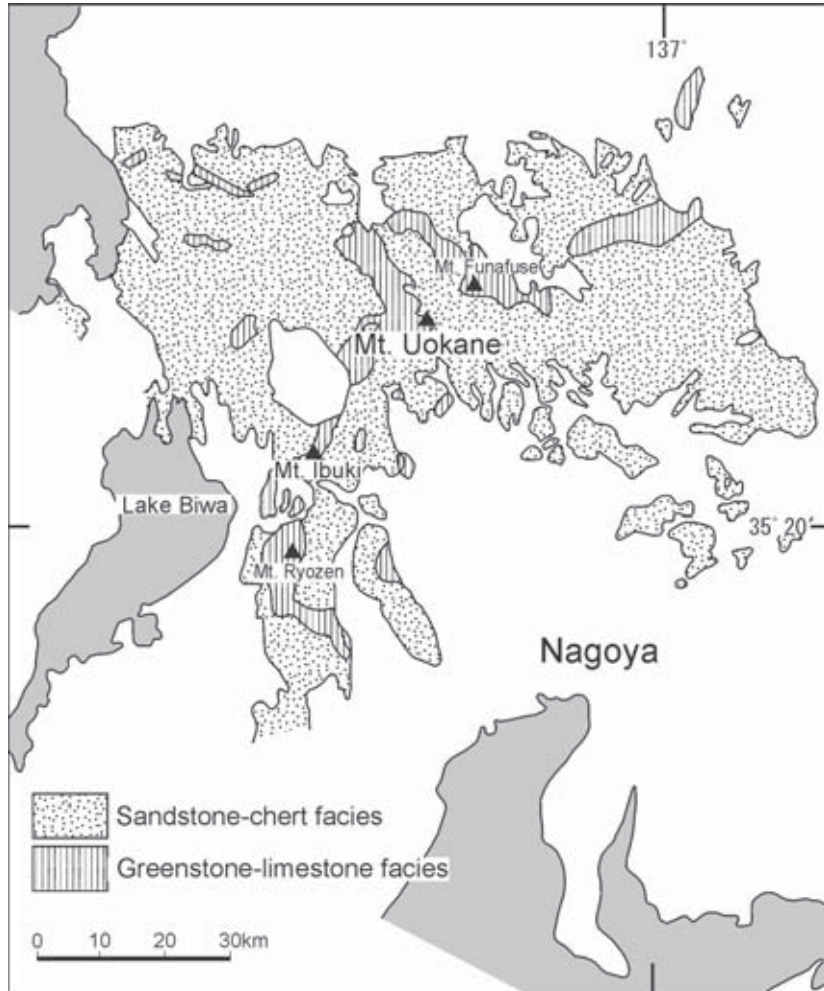


Figure 1. Distribution of greenstone-limestone facies and sandstone-chert facies in the western half of the Mino Terrane, central Japan (simplified from Igo, 1961).

Material, Fauna and Age

K. Kumagai collected many fossiliferous limestones from the Uokaneyama area, Motosu City, Gifu Prefecture, in his graduation thesis of Tokyo Gakugei University in 1971. Of them, he gave me two limestone samples including many, more or less deformed, large fusulines from the Midori Valley north of Mt. Uokane (Figure 2).

One sample (UO-1) is light gray, pelloid lime-mudstone slightly dolomitized in part and containing small amount of tuffaceous materials. The other sample (UO-2) is gray, fine-grained, pelloid

wackestone. It is lithologically similar to UO-1, but has more tuffaceous materials than UO-1. Foraminifers distinguished in these materials are abundant *Acervoschwagerina endoi*, and very rare *Biwaella?* sp., schubertellid? fusulinine, palaeotextulariid, nodosariid and biseriamminid foraminifers. Other fossils rarely contained are algal fragments in UO-1 and -2, ostracodes in UO-1, and crinoid fragments in UO-2.

Foraminifers of these two samples are common to those of the Ome-Itsukaichi area (Kobayashi, 2005) in their low taxonomic diversity and absence of large-sized fusulines except for *Acervoschwagerina*. The

Uokaneyama and Ome-Itsukaichi materials are also common in their limestone composition of pelloid lime-mudstone and pelloid wackestone.

Ten specimens of *A. endoi* from UO-1 and three from UO-2 are illustrated (Plates 1–3). Though details are unknown due to the small number, specimens from UO-2 appear to be somewhat different in having smaller proloculus, and more tightly coiled and more elongate inner whorls than those from UO-1.

Field information of these two samples is almost lacking except for their locality in the Midori Valley. Approximate locality and stratigraphic level of them, however, are presumable from the later works. Limestones of several-tens of meter thick are exposed in close association of altered basaltic rocks in the Midori Valley according to the geological map of

Yamamoto (1985) (Figure 2). Pyroclastic rocks and lava with limestone and seven beds of limestone are shown in the columnar section of the Uokaneyama area by Sashida (1980). *Acervoschwagerina endoi* is restricted to the basal part and three levels of the lower limestone in the columnar section, all of which are biostratigraphically lower than the first occurrence of *Misellina* sp. (Sashida, 1980).

Therefore, two limestone samples of the Midori Valley collected by K. Kumagai are thought to be biostratigraphically equivalent with the *Acervoschwagerina endoi* Zone by Sashida (1980). They are thought to be late Artinskian to early Kungurian in the standard Permian time-scale and late Yakhtashian in the Tethyan based on the first appearance of *Misellina* (e.g., Wardlaw et al., 2004).

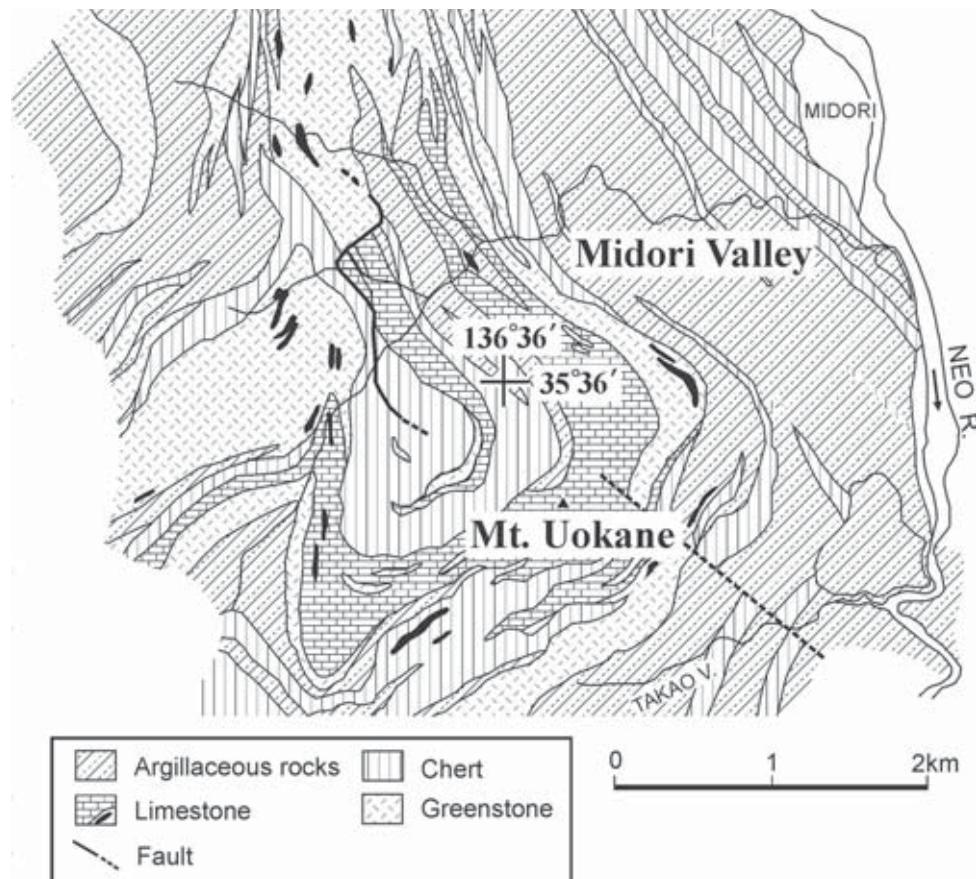


Figure 2. Geological map around Mt. Uokane (simplified from Yamamoto, 1985). Argillaceous rocks in this map were originally subdivided into mudstone and two kinds of slump facies consisting of chaotic rocks with argillaceous matrix by Yamamoto (1985). Though the exact locality is unknown, two limestone samples with *Acervoschwagerina* were collected by K. Kumagai possibly from the limestone and greenstone in the lowermost streamside of the Midori Valley north of Mt. Uokane.

Systematic Paleontology

Superfamily Fusulinoidea von Möller, 1878
Family Schwagerinidae Dunbar and Henbest, 1930

Genus *Acervoschwagerina* Hanzawa, 1949
Acervoschwagerina endoi Hanzawa, 1949
Plate 1, Figures 1–4; Plate 2, Figures 1–4; Plate 3,
Figures 1–5

Paraschwagerina (Acervoschwagerina) endoi Hanzawa, 1949, p. 208, 209, pl. 42, figs. a–d.
Acervoschwagerina endoi Hanzawa, 1949: Kobayashi, 2005, p. 427, Fig. 6.1–6.5.

Material.—Illustrated six axial, three sagittal, and one tangential sections from UO-1, and two axial and one tangential sections from UO-2, and others.

Description.—Test fusiform with broadly arched periphery, slightly convex lateral slopes and rounded to bluntly pointed poles. Mature test with six to seven, rarely eight whorls. Approximate length varies from 15 to 19 mm and sometimes over 20 mm, the width approximately from 6 to 7.5 mm, giving form ratio about 2.3 to 3 in UO-1. Specimens with more than 20 mm in length and more than 8 mm in width are recognized in UO-2, even though taking the deformation of the test into account. Proloculus spherical, 0.14 to 0.24 mm in outer diameter. Beyond tightly coiled inner 2 to 3 whorls in UO-1 and inner 3 to 5 whorls in UO-2, later whorls expanding rapidly and the last whorl decreasing its height and length.

Septa thin, numerous and strongly fluted throughout whorls, and extremely irregularly fluted in outer whorls where septal folds reach the tops of chambers producing many various-sized and -shaped vesicular chamberlets. These septal folds are obscure in the recrystallized part of the test. Phrenotheca or phrenotheca-like structure more or less developed in the loosely coiled whorls.

Wall 0.09 to 0.15 mm in the last whorl and consists of a tectum and fine alveolar keriotheca. It is extremely thin in comparison with large chamber heights in the middle whorls, as well as thin septa.

Indistinct chomata present on proloculus and in juvenile whorls where narrow tunnel is recognizable. Tunnel path becomes obscure in outer rapidly expanding whorls.

Discussion.—Much more wide morphologic variation is distinguished in the present material than in the Ome—Itsukaichi one recognized by Kobayashi (2005). These materials are apparently identified to *Acervoschwagerina endoi*, of which morphologic characters and generic diagnosis of the genus *Acervoschwagerina* were made clear by Thompson (1954) based on the topotype specimens from Gombo in the northern part of the Mino Terrane.

In the Uokaneyama material, variable characters among specimens are most conspicuous in proloculus size, the number and shape of juvenile whorls and chamber heights in the middle to late whorls.

Specimens in UO-2 appear to be distinguishable from those in UO-1 by their more elongate and more number of juvenile whorls, and smaller proloculus. These different appearances are apparently due to small number of specimens in UO-2. Wide morphologic variation not only in the juvenile whorls and proloculus size but also in other characters are recognized in the illustrated ten and other specimens in the UO-1. Wide morphologic variation recognized in the Uokaneyama specimens, accordingly, is considered to only represent the intraspecific variation of *Acervoschwagerina endoi*.

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小林文夫：美濃テレーン魚金山石灰岩産 *Acervoschwagerina endoi* Hanzawa

岐阜県本巣市魚金山北方水鳥谷の石灰岩から産したペルム紀前期後葉の大型フズリナ化石, *Acervoschwagerina endoi* Hanzawa を記載した。本種は細粒のペロイド石灰岩に産し、他の大型フズリナ化石と共存しない。個体間の殻諸形質の幅広い形態変異は本種の種内変異を表しているに過ぎないと考えられる。

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Plate 1

Figs. 1-4. *Acervoschwagerina endoi* Hanzawa.

1: D2-004846; 2: D2-004848; 3: D2-004841; 4: D2-004839, 1, 2: Sample UO-2; 3, 4: Sample UO-1, 1a, 2a, 3, 4:×10; 1b, 2b:×20.

Plate 2

Figs. 1-4. *Acervoschwagerina endoi* Hanzawa.

1: D2-004840; 2: D2-004842; 3: D2-004845; 4: D2-004843, 1, 2, 4: Sample UO-1; 3: Sample UO-2, 1a, 2a, 3a, 4:×10; 1b, 2b, 3b:×20.

Plate 3

Figs. 1-5. *Acervoschwagerina endoi* Hanzawa.

1: D2-004836; 2: D2-004838; 3: D2-004829; 4: D2-004837; 5: D2-004832, all: Sample UO-1, 1, 2a, 3, 4, 5a:×10; 2b, 5b:×20.

Plate 1.

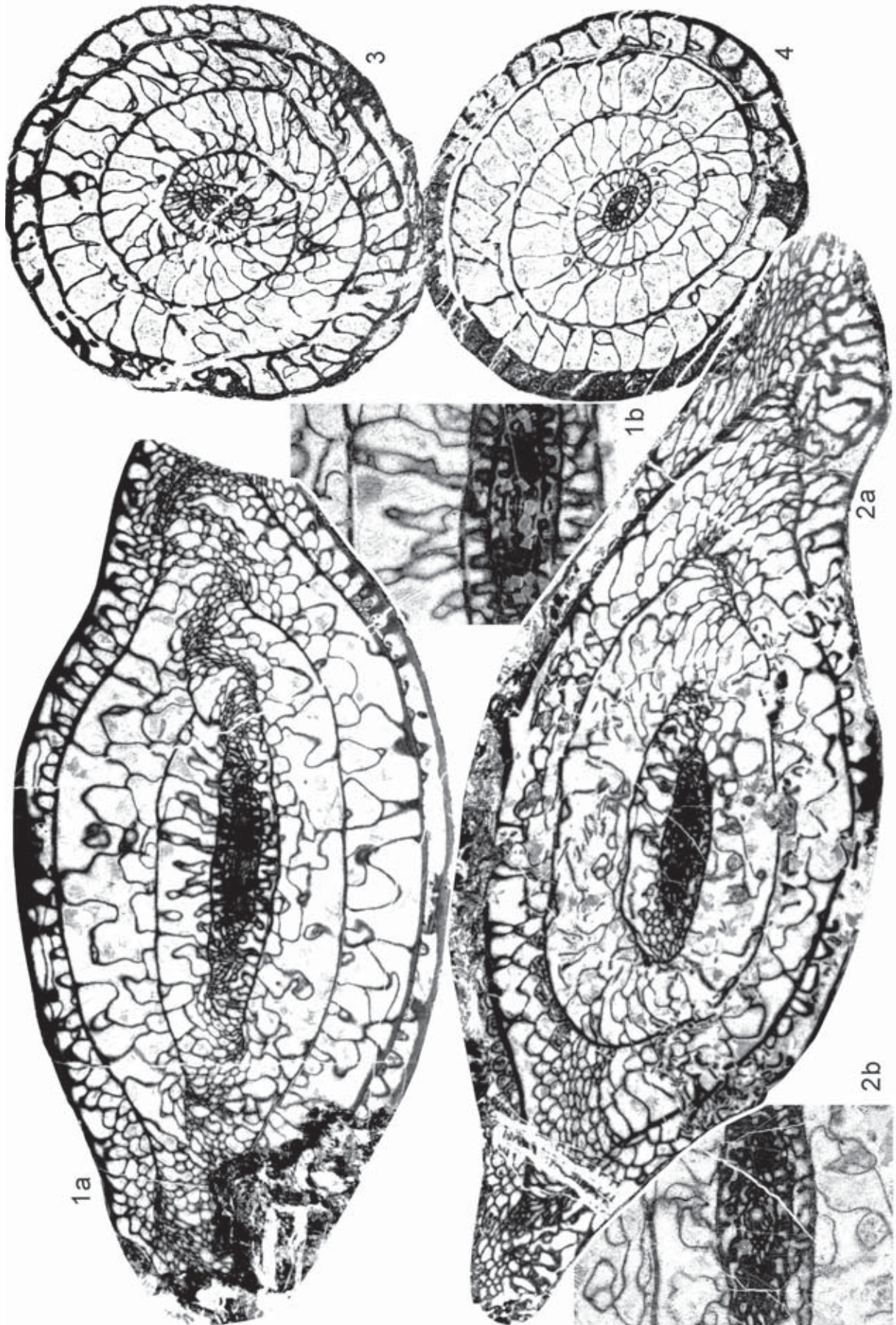


Plate 2.

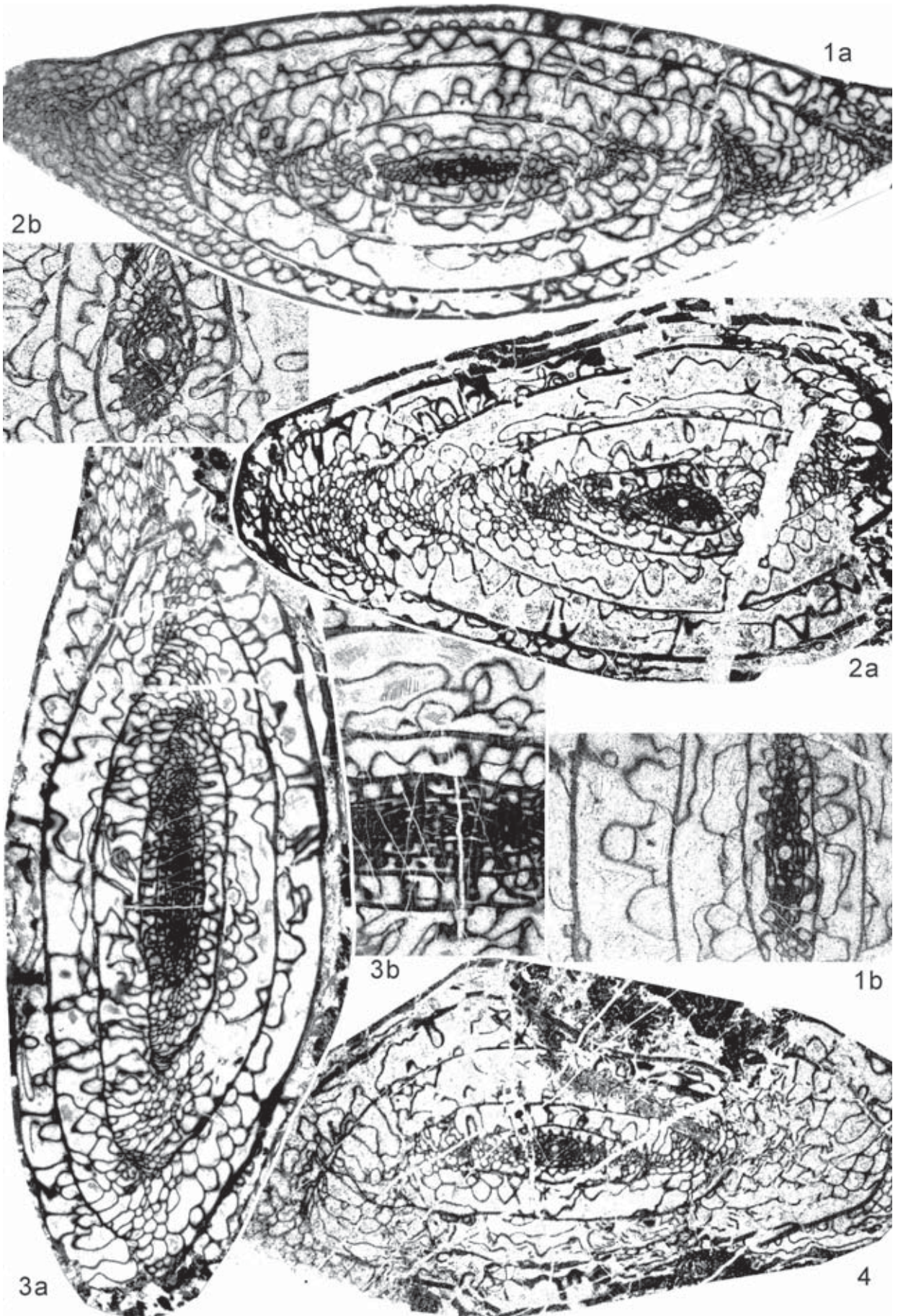


Plate 3.

