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ON SOME ORDOVICIAN SCLERACTINIA-LIKE CORALS FROM THE SOUTH TIEN-SHAN

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Morphological features of corals from the genus *Sumsarophyllum* Lavrusevitch, *Tjanshanophyllia* gen. n., as observed in the Ordovician of the South Tien-Shan, hardly allow a rugosan diagnosis. They display numerous septal cycles with perforated septa having a chain-like (bead-like) structure. The absence of epitheca is also characteristic in some cases. The study of morphology of the corals investigated makes it possible to regard them as the most ancient representatives of scleractinian order Fungiida Verril, as its new family Tjanshanophylliidae. The new genus, with *Tjanshanophyllia apekini* sp. n. as its type species, is described.

K e y w o r d s: corals, Scleractinia, Ordovician, taxonomy.
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Contemporary knowledge of a historical sequence in the appearance and evolution of the Rugosa and Scleractinia is based on comprehensive statistical data concerning their world-wide geological distribution. This enabled a revision of the earlier understanding of that problem: the entire data testifying to the presence of Scleractinia in the Paleozoic has been discarded; the corals that used to be classed with the Scleractinia have been attributed to the Rugosa, with the only possible exception of the genus *Omphalophyllia* (Minato 1955). Similarly, all corals which used to be taken for the Mesozoic Rugosa have been transferred to the Scleractinia (Wells 1956; Hill 1960). Thus, now nobody will take up an earnest discussion of Scleractinia as Paleozoic corals, for such considerations would disagree with the commonly accepted theory. The late Ordovician of the Zeravshan-Ghissar Mountains (western part of the South Tien-Shan) (Erina 1978) together with the early Silurian of many regions of the world yield corals of the genus *Calostylis* whose representatives display unusually porous septa and a radial type of septal apparatus development. These features, entirely alien to the Rugosa, account for a unique position of calostylids within the order. Their internal morphology suggests, first of all, a comparison with the Scleractinia. This was probably the reason why Lindström (1868) who had

been the first to describe the genus *Calostylis*, referred them to Zoantharia perforata, an equivalent to the recent notion of Scleractinia. However, Roemer (1880—1897) followed by Smith (1930) insisted that calostylids should be referred to the Rugosa and not to the Scleractinia. Their point of view has been shared by many coral-workers (Iwanowski 1963, 1975, 1978; Kaljo, Reiman 1958; Sokolov 1955; Sytova, Ulitina 1966; Hill 1956; Sanford 1939 and others), though there are no more arguments in its favour than for believing calostylids to be Scleractinia. In view of this, Lecompte (1952) placed them into the section Rugosa *incertae sedis*.

It should be noted that including calostylids in Streptelasmatina is a mere response to the necessity to find a place for them within the rugosan phylogenetic tree once they have been ascribed there. So, calostylids are referred to Streptelasmatina, but, as Iwanowski (1975) points out, "they are the most peculiar representatives of Streptelasmatina". Iwanowski considers the septal porosity in calostylids to be a manifestation of proterogenesis in respect of Scleractinia without regarding, however, this phenomenon as evidence of calostylids' belonging to the Scleractinia or of their earlier appearance in the evolutionary history of Anthozoa.

Krasnov (1970) indicates though that Calostylidae stand out as the most probable ancestor of Fungiida. He believed that "the fungiid line of Scleractinia had separated from the Rugosa as far back as the end of the early or the middle Paleozoic". In fact, the genus *Calostylis* appeared to be by no means the only Paleozoic coral having some features of Mesozoic scleractinians from the order Fungiida so strongly pronounced.

During the last 15 to 20 years the late Ordovician of the Zeravshan-Ghissar region yielded unique corals, both solitary and colonial. Their morphological features can hardly be diagnosed as rugosan. They have exceptionally numerous cycles of septa, bead- or chain-like septal structure, well-developed pores and no epitheca. The first such coral in the late Ordovician of the South Tien-Shan was described by Lavrusevitch (1971) under a generic name of *Sumsarophyllum* with *S. patella* Lavrusevitch as a type species within the family Paliphyllidae Soshkina. Erina (1978) described *S. patella* together with another species, *S. ellipsoidum* Erina, on the basis of a large and well preserved material. She established that representatives of the genus *Sumsarophyllum* features a chain-like morphology of septa which are arranged in many cycles and extremely numerous (up to 400). They also display a fan-like coalescence of axial margins of septa of higher orders associated with the lack of an epitheca. According to Erina, all this is characteristic of scleractinians of the order Fungiida and not at all of Rugosa. However, in defining the systematic position of the genus *Sumsarophyllum*, she formally adhers to Lavrusevich, describing those corals as belonging to Paliphyllidae Soshkina, though the two have nothing in common except for purely external similarities. *Sumsarophyllum* is distinguished from typical paliphyllids as it is from all the Rugosa, first of all, by having its septa arranged in many orders with chain-like and punctate structure when observed in cross section as well as by the absence of an epitheca.

According to Lavrusevitch, "the punctate septal structure is due to an incomplete distribution of trabeculae together with a poor development or, very often, an almost

complete absence of binding stereoplasm". We believe that this explanation does not rule out the existence of pores the physical presence of which is beyond doubt (fig. 1).

Apart from *Sumsarophyllum*, the Upper Ordovician of the Zeravshan-Ghissar Mountains yielded a new patelloid multiseptal coral identified as the genus *Tjanshanophyllia* gen. n. with *T. apekini* sp. n. being the type species. For all the outer resemblance to *Sumsarophyllum*, the new coral is distinguished by a chain-like morphology of septa and their extremely regular porosity, by horizontal carinae regularly spaced along the entire septal lateral surface as well as by a more distinct cyclic arrangement of septa (from 5 to 7) and by vertical dissepiments. Not unlike *Sumsarophyllum*, *Tjanshanophyllia* has no epitheca (pl. 18: 1, 3, 5; pl. 19: a, b).

The figures show that the newly identified coral displays a still greater difference from all known Rugosa than *Sumsarophyllum* does; instead it has characteristic features of Fungiida.

In our opinion, the above evidence proves the appearance of Scleractinia in the Paleozoic.

Subclass **Sclerocorallia** Iwanowski, 1966
Order **Fungiida** Verril, 1865
Family **Tjanshanophylliidae** fam.n.

Diagnosis: as for the genus *Tjanshanophyllia* nov.

Genus *Tjanshanophyllia* gen.n.

Type species: *Tjanshanophyllia apekini* sp.n.

Derivation of the name: from the Tien-Shan, mountains in Central Asia.

Diagnosis: Solitary corals with numerous regularly porous septa that are arranged in several cycles and display horizontal carinae. The septal structure chain-like.

Species included: Type species.

Comparison. — Differs from the genus *Sumsarophyllum* Lavrusevitch, 1971 by chain-like septal structure, their regular porosity and by the development of horizontal carinae on lateral surface of septa.

Tjanshanophyllia apekini gen. et sp.n.
(pl. 20: 1—4; pl. 21: 1—2)

Holotype: specimen No. A-63; fig. 1; pls 20 and 21.
Type locality: north vicinity of the village Farab, Zeravshan Mts, South Tien-Shan.
Type horizon: Upper Ordovician; equivalent of the Archalyk beds in Shakhriomon.
Derivation of the name: after Yu. N. Apekin who was the first to collect this coral.

Description. — Solitary patelloid corals with a maximum diameter of up to 120 mm and a height of 60 mm without epitheca. Numerous (up to 290) septa arranged in several cycles (up to seven cycles) and reaching the centre of coral to be twisted there. Septal structure chain-like in cross section. Numerous horizontal carinae spaced regularly (at 0.16 to 0.16 mm) along the entire lateral surfaces of septa. Pores in the septa numerous and regularly spaced. Interseptal space occupied by straight vertical dissepiments forming no vesicular tissue.

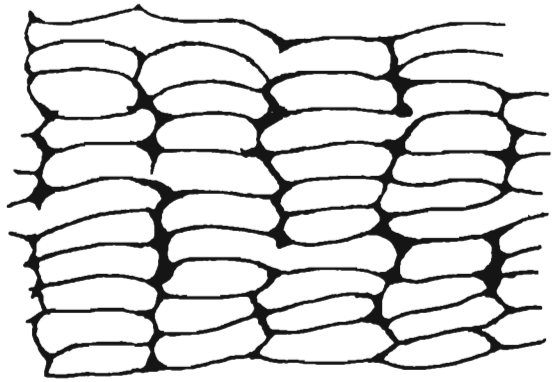

Fig. 1. *Tjanshanophyllia apekini* gen. et sp.n. Holotype. Longitudinal tangential section, ×25.

Distribution. — Upper Ordovician-Lower Silurian (Lower Llandovery); Zeravshan-Ghissar Mountains, South Tien-Shan.

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EXPLANATION OF THE PLATES 18—21

Plate 18

Sumsarophyllum patella Lavrusevitch

1. Transverse section, ×1.5. Outcrop 361, Shakhriomon Pass, U. Ordovician, Archalyk beds.
2. Longitudinal section, ×1.5. Same locality and age.
3. Outer view as seen from the side of calice, nat. size. Outcrop 333, Novabak, U. Ordovician, Archalyk beds.
4. Transverse section, ×2. Same locality and age.

Sumsarophyllum ellipsoidum Erina

5. Transverse section, ×2. Outcrop 53, Khodzhukurgan, U. Ordovician, Archalyk beds.

Plate 19

Sumsarophyllum patella Lavrusevitch

Outer view from the calicular (*a*) and from the basal side (*b*) of the corallite, nat. size. Outcrop 361, Shakhriomon Pass, U. Ordovician, Archalyk beds

Plate 20

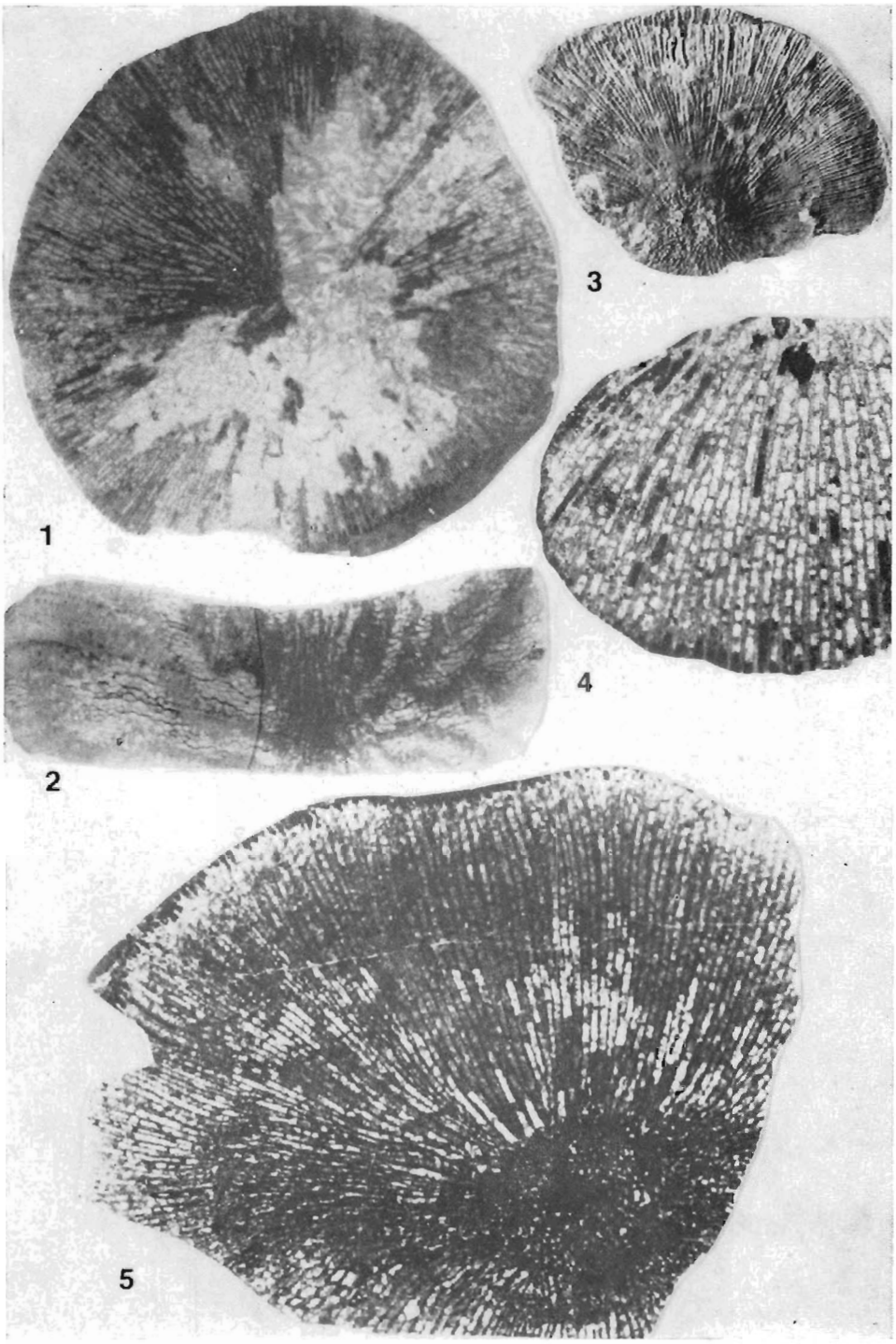
Tjanshanophyllia apekini gen. et sp.n.

1. *a* Transverse section, ×2; *b* longitudinal tangential section, ×10; *c* fragment of longitudinal section, ×10; *d* longitudinal section through the centre of corallite, ×2. Holotype, No. A-63, north of Farab, U. Ordovician — L. Silurian (Lower Llandovery)

Plate 21

Tjanshanophyllia apekinin gen. et sp.n.

1. *a* Transverse section of central part of corallite, ×1.5; *b* transverse section, ×10; *c* fragment of the section *a*, ×3. Holotype, No A-63, north of Farab, U. Ordovician — L. Silurian (Lower Llandovery)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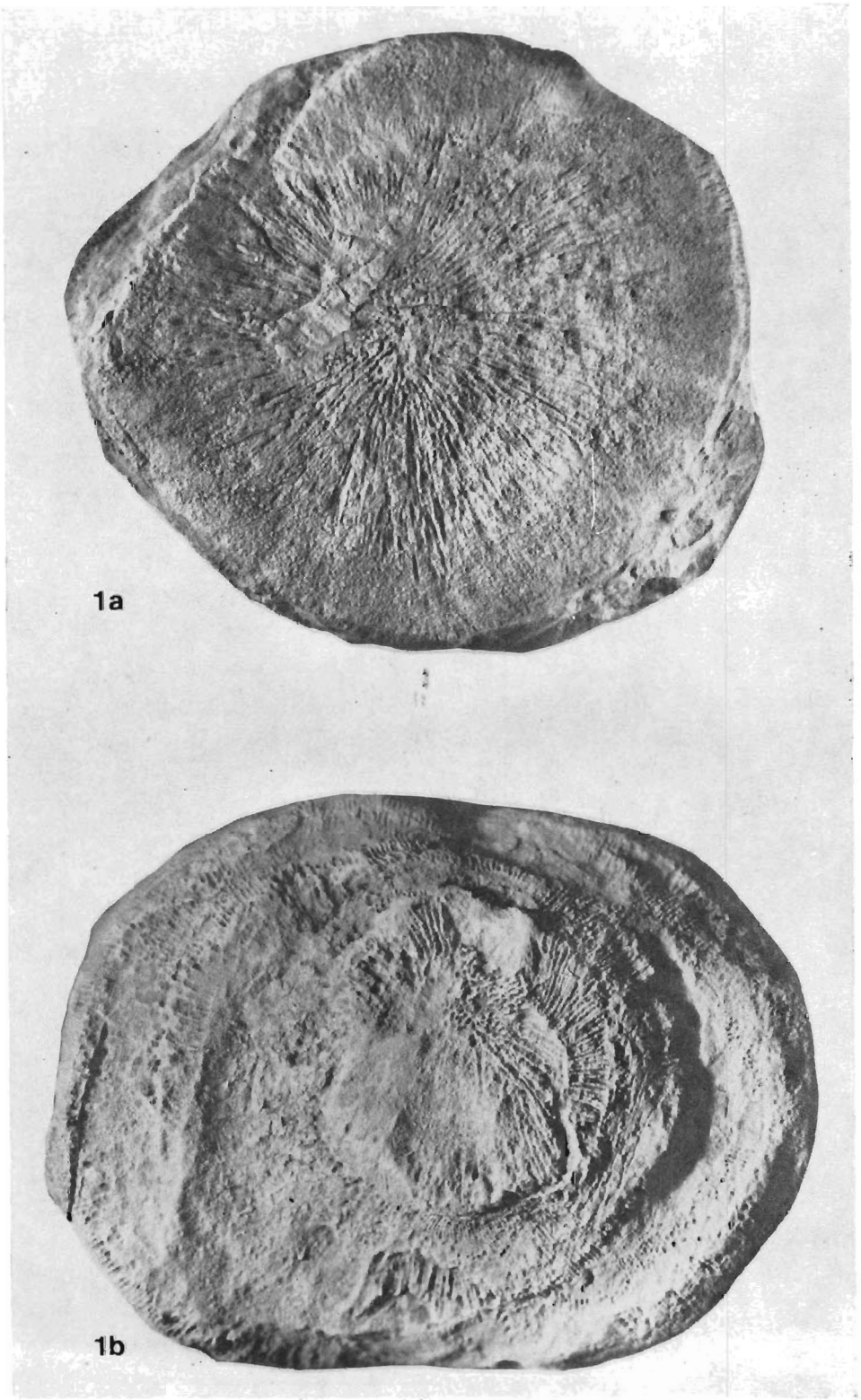
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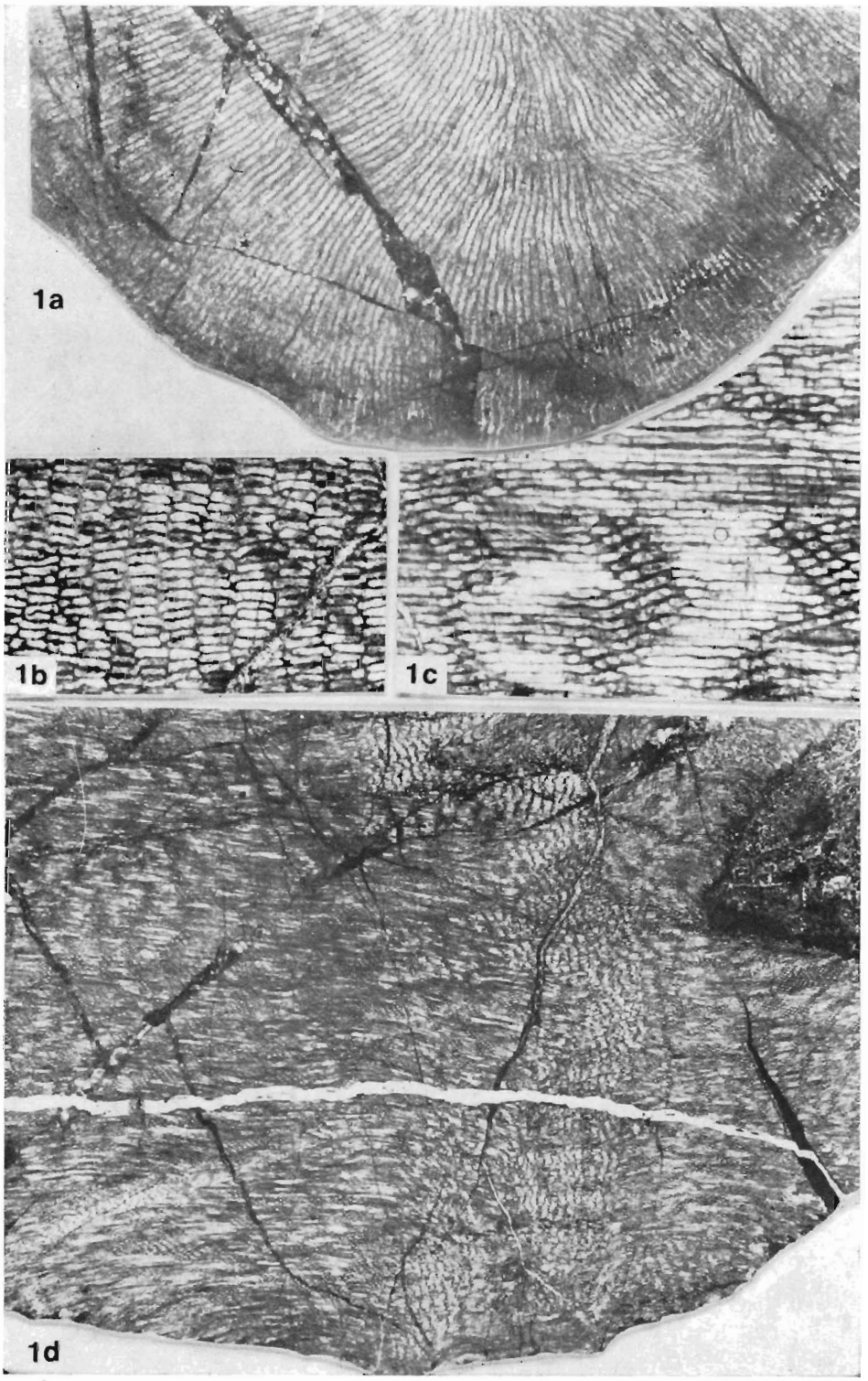
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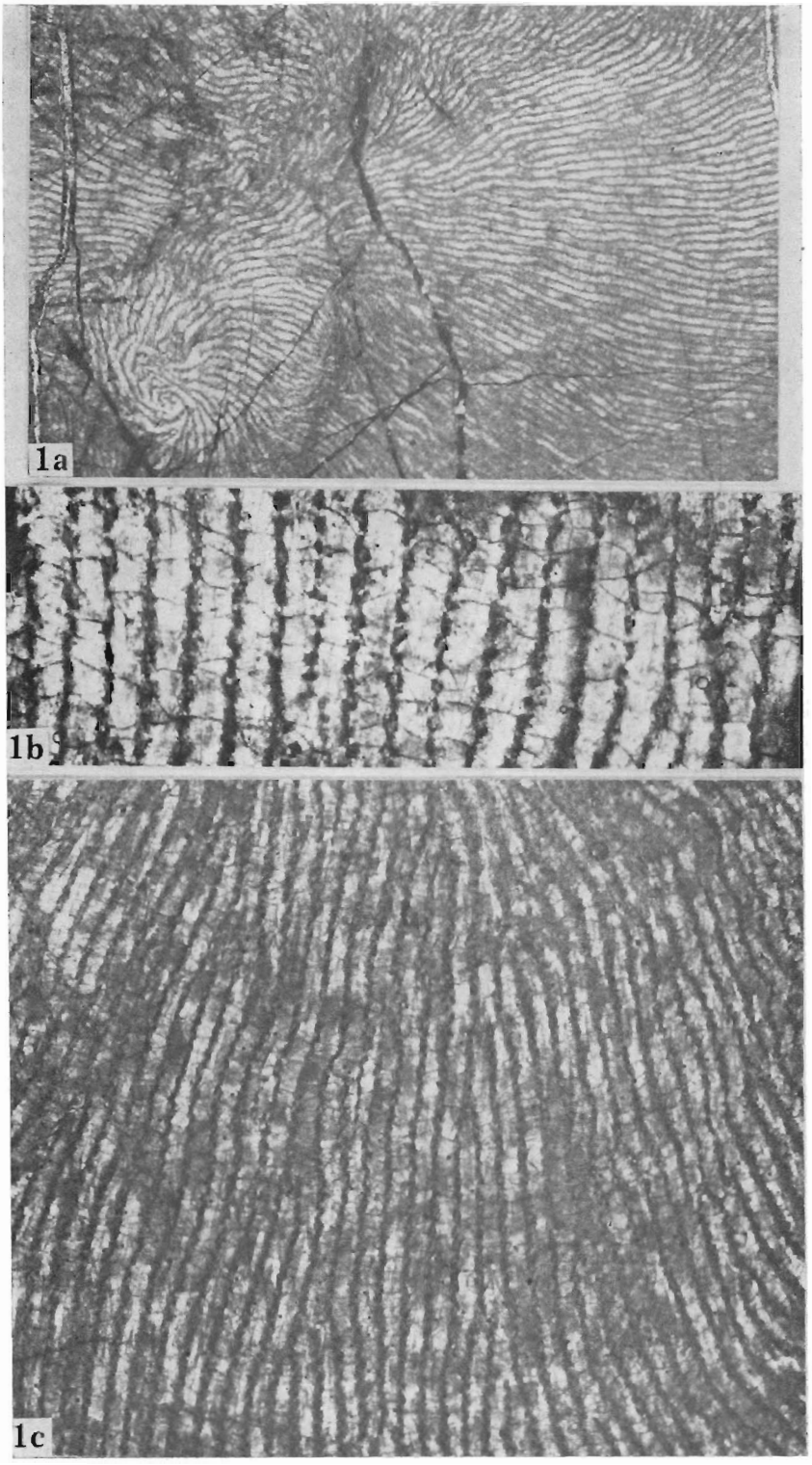
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