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A new species of *Durhamina* (Rugosa) from the "Fujiwaradake Limestone", Suzuka Mountains, Central Japan

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Abstract A new rugose coral species, *Durhamina suzukensis* is described in this paper. It was collected from the "Fujiwaradake Limestone", Suzuka Mountains, Central Japan. Judging from the Paleontological data, the age indicates Early Permian.

Introduction

A new rugose coral species, *Durhamina suzukensis* was collected by the second author (ISOBE) from a gray limestone lens in the "Fujiwaradake Limestone", Fujiwara-cho, Inabe-gun, Mie Prefecture, Central Japan. The limestone lens is located about 1000 m SSE of the Kurakake Pass and about 1800 m NNE of the Oikedake Mt. (see Fig. 1).

The geology of the "Fujiwaradake Limestone" distributed in the Suzuka Mountains has been studied by MURATA (1960), MIYAMURA *et al.* (1976), OKIMURA *et al.* (1984) and HARAYAMA *et al.* (1989). According to OKIMURA *et al.*, it consists mainly of greenstone and limestone and belongs to the Lower Permian.

The present new coral species was found in association with fusulinids such as *Rugosofusulina serrata* RAUSER-CERNOUSSOVA, *Pseudofusulina tschernyschewi* (SCHELLWIEN) and *Acervoschwagerina* sp. indet.. It is similar to *Durhamina kitakamiensis* MINATO and KATO (1965) discovered and described from the Lower Permian Sakamotosawa Series, South Kitakami Mountains, Northeast Japan. It also resembles *Durhamina uddeni* (ROSS and ROSS, 1963) discovered and described from the Wolfcampian Gaptank Formation, Texas, U. S. A.. Judging from the paleontological data mentioned above, the age indicates Early Permian.

Acknowledgements

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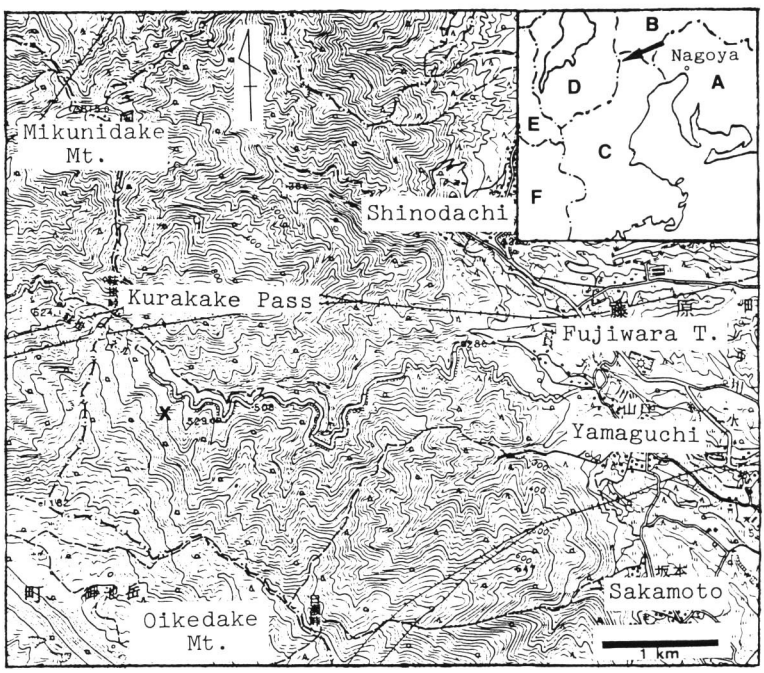

Fig. 1. Map showing the fossil locality. X: Fossil locality. A: Aichi Prefecture B: Gifu Prefecture C: Mie Prefecture D: Shiga Prefecture E: Kyoto Prefecture F: Nara Prefecture.

Systematic description

Family Durhaminidae MINATO and KATO, 1965

Genus *Durhamina* WILSON and LANGENHEIM, 1962

Durhamina suzukensis YAMAGIWA and ISOBE, n. sp.

Pl. 1, figs. 1–2; Pl. 2, figs. 1–2; Pl. 3, figs. 1–2; Pl. 4, figs. 1–2

Derivation of the specific name:– After the Suzuka Mountains in Central Japan.

Material:– Four fasciculate colonies.

Diagnosis:– *Durhamina* with well developed peripheral–, periaxial– and clinotabellae in late immature and mature stages. Short minor septa are occasionally (to frequently) observed in mature stage, but are lacking in immature stage.

Description:– Corallum is compound, fasciculate and phaceloid. Corallites are subcylindrical and subparaller. Sometimes they are in contact with each other. The corallites of immature and mature stages are observed.

Transveres section: Corallites are subround. Corallite wall is moderately thick. Relationship between the number of major septa and the diameter of corallite is shown in Fig. 2.

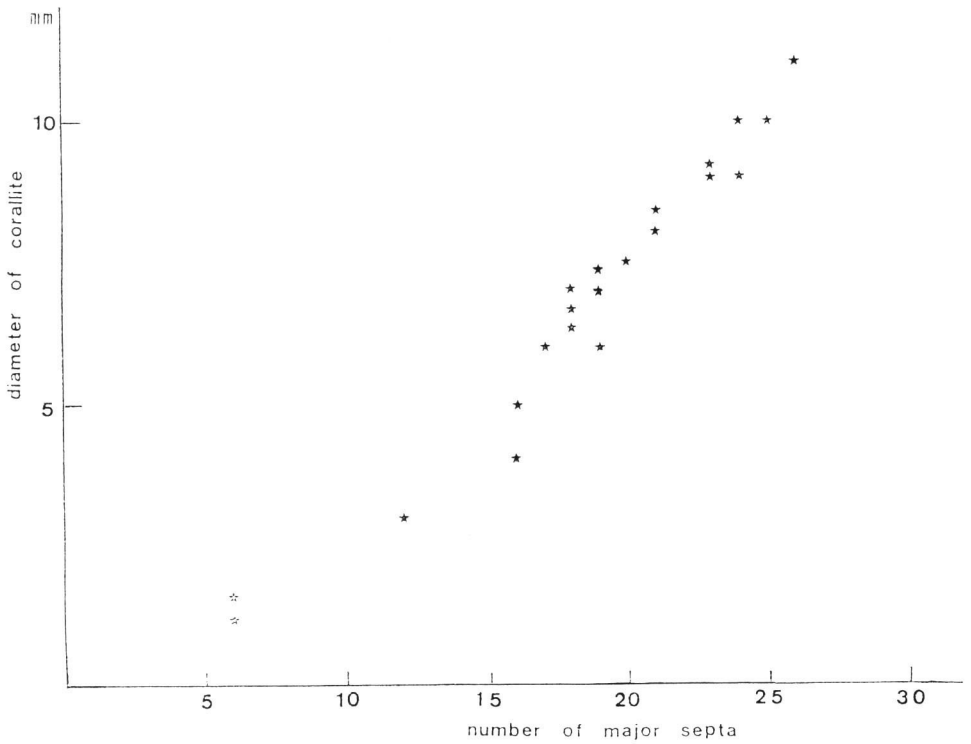

Fig. 2. Relationship between number of major septa and diameter of corallite in *Durhamina suzukensis* YAMAGIWA and ISOBE, n. sp..

In mature stage, corallites (Pl. 1, fig. 1–A, fig. 2–A; Pl. 2, fig. 1–A, B, fig. 2–A; Pl. 3, fig. 1–A, B; Pl. 4, fig. 1–A) are 8.0 to 11.0 mm in shortest diameter. Dissepimentarium is relatively narrow. It is composed of several rows of herringbone, pseudo-herringbone, concentric and angulo-concentric dissepiments. Lonsdaleoid dissepiments are only rarely developed. Inner wall is indistinct, but the boundary between the dissepimentarium and tabularium is rather clear. Septa of two orders, major and minor in alternation. They are thin, straight or sinuous. Septal fine structure is fibro-normal. Major septa are 21 to 26 in number; they are slightly thickened in middle portion. A number of major ones are often extended to the axial part of corallite. General speaking, short minor septa are occasionally observed in mature stage. However, they are only frequently observed, when a corallite reaches full grown mature stage (see Pl. 1, fig. 1–A). They are confined within dissepimentarium. Axial structure is large, occupuing about 1/3 the diameter of corallite. It consists of a thin median plate, axial tabellae and septal lamellae which are the axial prolongation of major septa. The median plate is straight or sinuous; it is sometimes indistinct. Fossula is indistinct.

In late immature stage, corallites (Pl. 1, fig. 1–B, fig. 2–B; Pl. 2, fig. 1–C, fig. 2–B, C; Pl. 4, fig. 1–B, C?) look similar to those of mature stage. The formers, however, differ from the latters in the following characters, 1) smaller corallites (5.0? to 7.5 mm in shortest diameter), 2) less numberous major septa (16? to 20 in number), 3) no minor septa, 4) no lonsdaleoid dissepiment. Besides, the axial structure is more simple than that of mature stage in having less numerous axial tabellae and septal lamellae, and the boundary between the dissepimentarium and tabularium is generally indistinct.

In middle immature stage, corallites (Pl. 1, fig. 1–C; pl. 2, fig. 2–D) are smaller than those of late immature stage. Besides, the formers are more simple than the latters in structure. Corallites are 3.0 to 4.0 mm in shortest diameter, and major septa are 12 to 16 in number. Dissepimentarium consists of one or two rows of dissepiments.

In early immature stage, corallites (Pl. 2, fig. 1–D; Pl. 3, fig. 2–C) are smaller than those of middle immature stage; the formers are 1.2 to 1.6 mm in shortest diameter. Six thin protosepta are seen. Axial structure consists of only a thin plate-like columella, commonly connected to both cardinal and counter septa. Other protosepta are often extended to the axial part and are in contact with the columella. No dissepiment is seen.

Longitudianl section (see Pl. 3, fig. 2 and Pl. 4, fig. 2): Corallite wall is moderately thick and somewhat undulated.

In mature stage, dissepimentarium is relatively narrow. It is composed of small and occasionally medium vesicles of dissepiments. Dissepiments are arranged in several rows. Their convex sides facing upwards as well as ineards. Elongate dissepiments are present. The boundary between the dissepimentarium and tabularium is clearly obserable. Tabularium is wide. It consists of axial and peripheral portions. A thin median plate, dome-like axial tabellae and edges of septal lamellae are observed in the axial portion. The median plate is straight or sinuous; it is sometimes indistinct. Yet no definite axial column is formed. Peripheral portion consists of well developed peripheral–, periaxial– and clinotabellae.

In late immature stage, corallites resemble those of mature stage in structure.

In middle immature stage, corallites (Pl. 3, fig. 2–A; Pl. 4, fig. 2–A) are distinguished from those of late immature stage in the following characters, 1) vesicular dissepiments are generally arranged in one or two rows, 2) tabulae are mostly complete, subhorizontal or ascending towards the axial structure; they may be locally incomplete, 3) more simple axial structure.

In early immature stage, corallites (Pl. 3, fig. 2–B; Pl. 4, fig. 2–D) differs from those of middle immature stage in the following characters, 1) dissepiment is lacking, 2) axial structure consists of only a thin columella, 3) tabulae are wholly complete and subhorizontal.

Remarks:– The present new coral species resembles *Durhamina kitakamiensis* MINATO and KATO (1965, p. 38, Pl. 5; text-figs. 7–8: MINATO, 1955, Pl. 2, figs. 1–3) described from the Lower Permian Sakamotosawa Series, South Kitakami Mountains,

Northeast Japan in having similar characters of dissepiments, tabellae and axial structure, relatively narrow dissepimentarium and wide tabularium. The former, however, differs from the latter in having weakly developed short minor septa in mature stage and no minor septa in immature stage. Further, in mature stage, the former has smaller corallites and more numerous major septa than the latter. It is also similar to *Durhamina uddeni* (Ross and Ross, 1963, p. 415, Pl. 49, figs. 5–9: Minato and Kato, 1965, p. 38) described from the Wolfcampian Gaptank Formation, Texas, U. S. A., but can be distinguished from the latter in having well developed clinotabellae in longitudinal section. Besides, the former has smaller corallites and less numerous septa than the latter in mature stage. It is distinguishable from *Durhamina hasimotoi* (Nagao and Minato, 1941, p. 102, Pl. 27, figs. 1–6: Minato, 1955, p. 123, Pl. 22, figs. 3–4, 6: Minato and Kato, 1965, p. 35, Pl. 2, figs. 1–3; text-figs. 5–6) described from the Lower Permian near Tosayama, about 14 km north of Kochi City, Shikoku, Southwest Japan in having almost no remarkable lonsdaleoid dissepiments and well developed vesicular tabellae in the peripheral portion of tabularium in longitudinal section. It also differs from *Durhamina ampfereri* (Heritsch, 1936a, p. 152, Pl. 14, figs. 11–17; text-fig. 48: Heritsch, 1936b, p. 135, Pl. 2, fig. 16–17: Minato and Kato, 1965, p. 42) described from the Lower Permian in Carnic Alps in having elongate dissepiments in longitudinal section. It is similar to "*Palaeosmilia*" *schucherti* described by Heritsch (1936b, p. 137, Pl. 1, figs. 1–7; Pl. 2, figs. 10–15) from the Lower Permian Saddle Creek Limestone, Texas, U. S. A.. However, the latter is clearly a solitary form. Therefore, the latter can be reasonably viewed to be a member of *Amandophyllum* than *Durhamina*, as Minato and Kato (1965, p. 33, 42) once pointed out.

The present corallites of early immature stage may be similar to immature corallites of *Lithostrotion* (*Siphonodendron*) in structure. Besides, the present corallites of middle immature stage also look similar to mature corallites of *Yatsengia*, but differ from the latters in having no minor septa. Therefore, the formers may be assignable into a little primitive form than *Yatsengia*. These data will be important in consideration of the ontogeny and phylogeny of *Durhamina*.

Occurrence:– The present new coral species was collected from a gray limestone lens in the "Fujiwaradake Limestone", Fujiwara-cho, Inabe-gun, Mie Prefecture, Central Japan. The limestone lens is located about 1000 m SSE of the Kurakake Pass and about 1800 m NNE of the Oikedake Mt.

Collector:– Katsu Isobe.

Geological age:– Early Permian.

Repository:– Reg. nos. NSM PA 12857 (Holotype), 12858–12860 (Paratypes) (National Science Museum, Tokyo).

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Explanation of Plates

Plate 1. *Durhamina suzukensis* YAMAGIWA and ISOBE, n. sp.

1. Transverse section—— ×5.0 (NSM PA 12857a (upper section)): A (mature stage); B (late immature stage); C (middle immature stage).
2. Transverse section—— ×5.0 (NSM PA 12857b (middle section)): A (mature stage); B (late immature stage).

Plate 2. *Durhamina suzukensis* YAMAGIWA and ISOBE, n. sp.

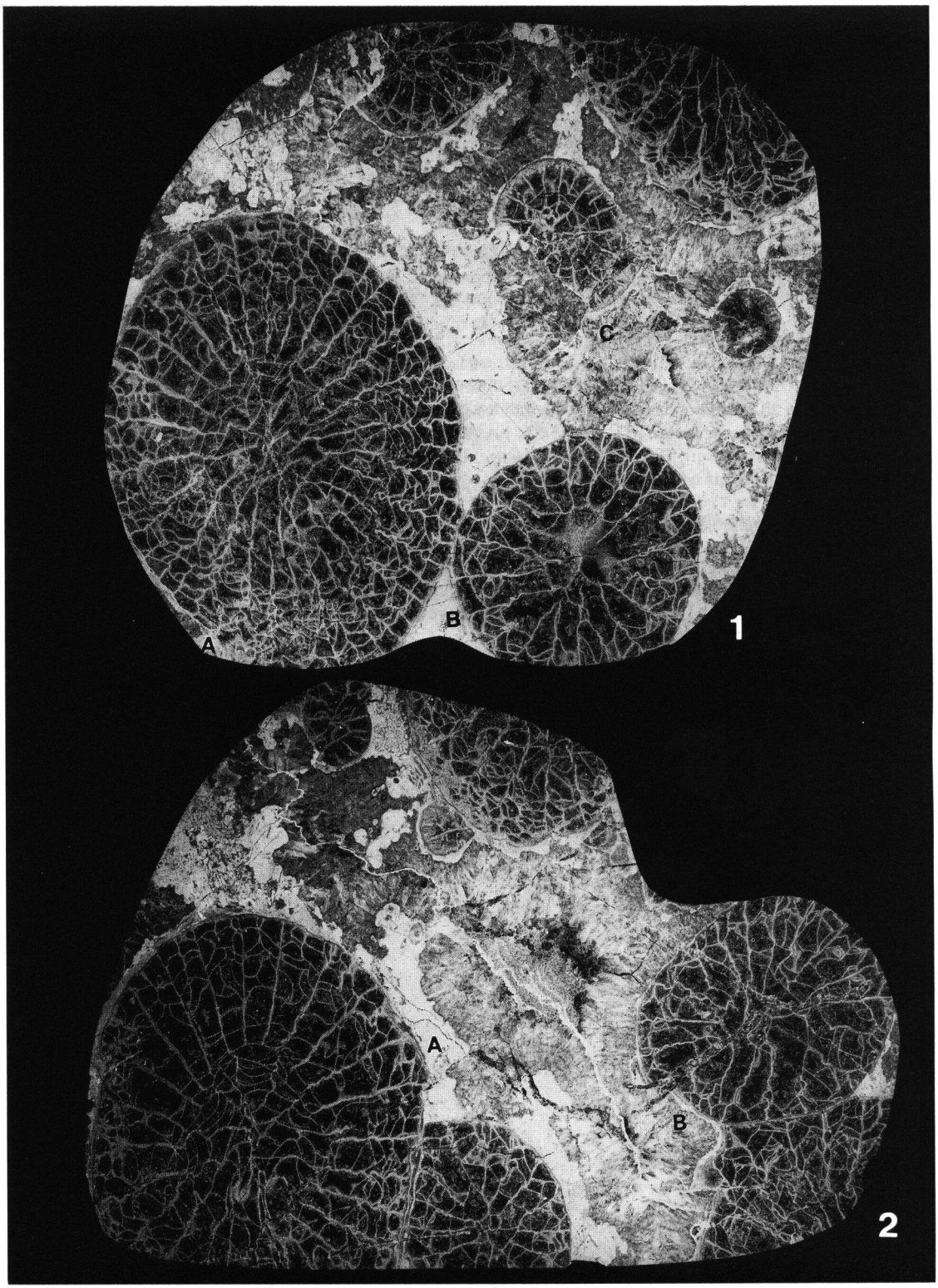
1. Transverse section—— ×5.0 (NSM PA 12857c (lower section)): A (mature stage); B (mature stage); C (late immature stage); D (early immature stage).
2. Transverse section—— ×5.0 (NSM PA 12858): A (mature stage); B (late immature stage); C (late immature stage); D (middle immature stage).

Plate 3. *Durhamina suzukensis* YAMAGIWA and ISOBE, n. sp.

1. Transverse section—— ×5.0 (NSM PA 12859): A (mature stage); B (mature stage).
2. Longitudinal section of corallites showing immature to mature stages and transverse section—— ×5.0 (NSM PA 12857d): A (middle immature stage) (Longitudinal section); B (early immature stage) (Longitudinal section); C (early immature stage) (Transverse section).

Plate 4. *Durhamina suzukensis* YAMAGIWA and ISOBE, n. sp.

1. Transverse section—— ×5.0 (NSM PA 12860): A (mature stage); B (late immature stage); C (late immature stage?).
2. Longitudinal section of corallites showing immature to mature stages—— ×5.0 (NSM PA 12857e): A (middle immature stage); B (early immature stage).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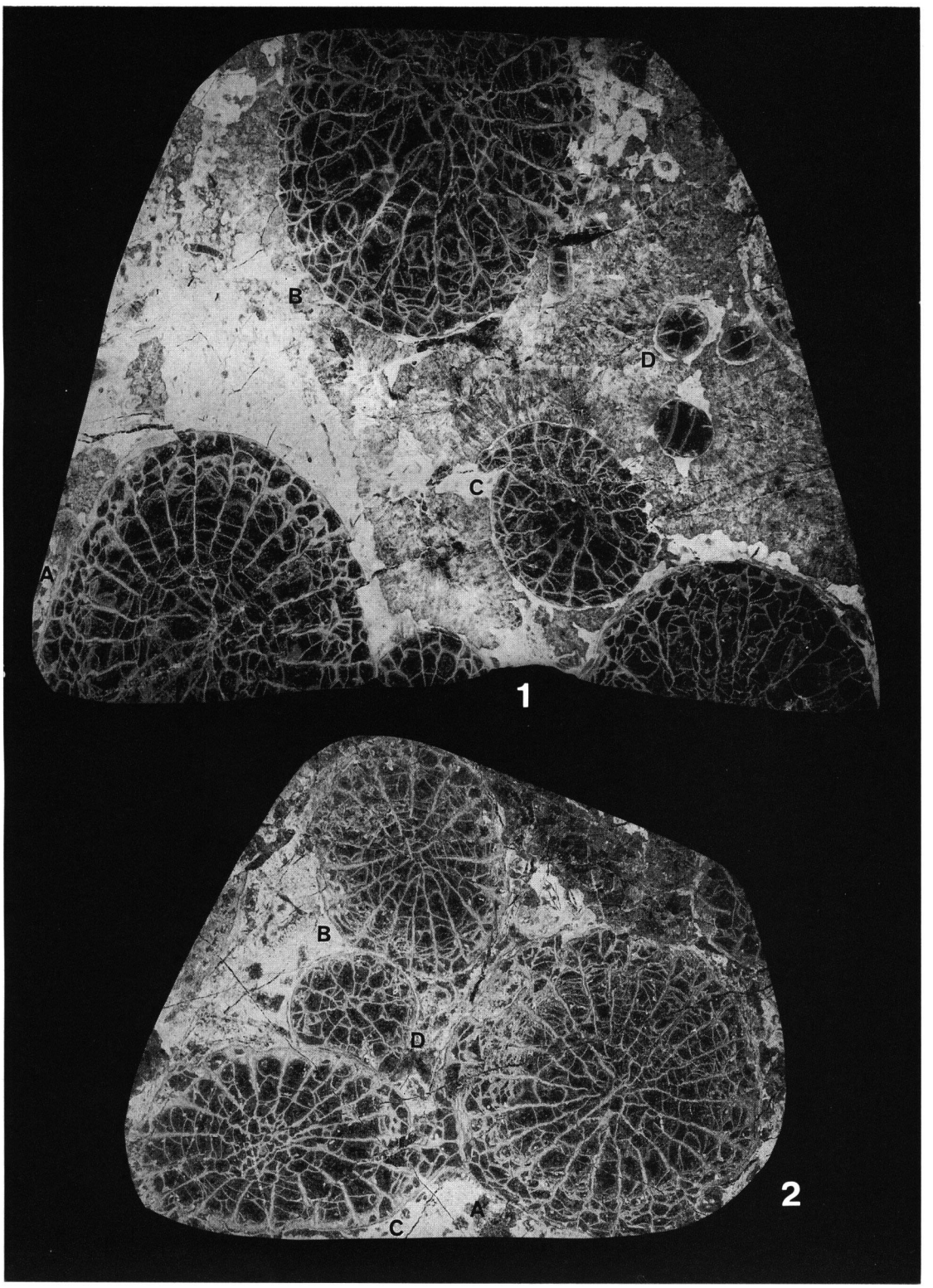
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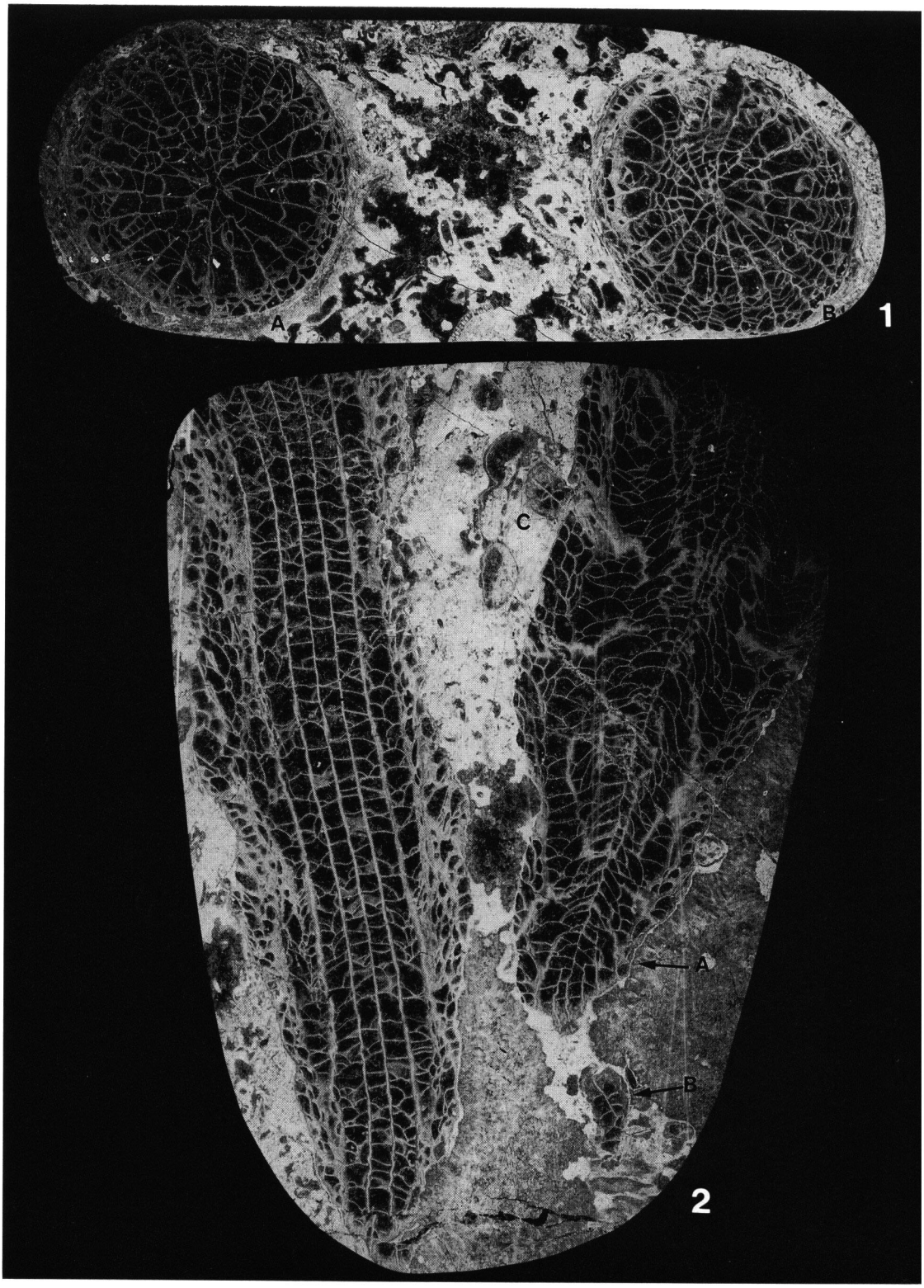
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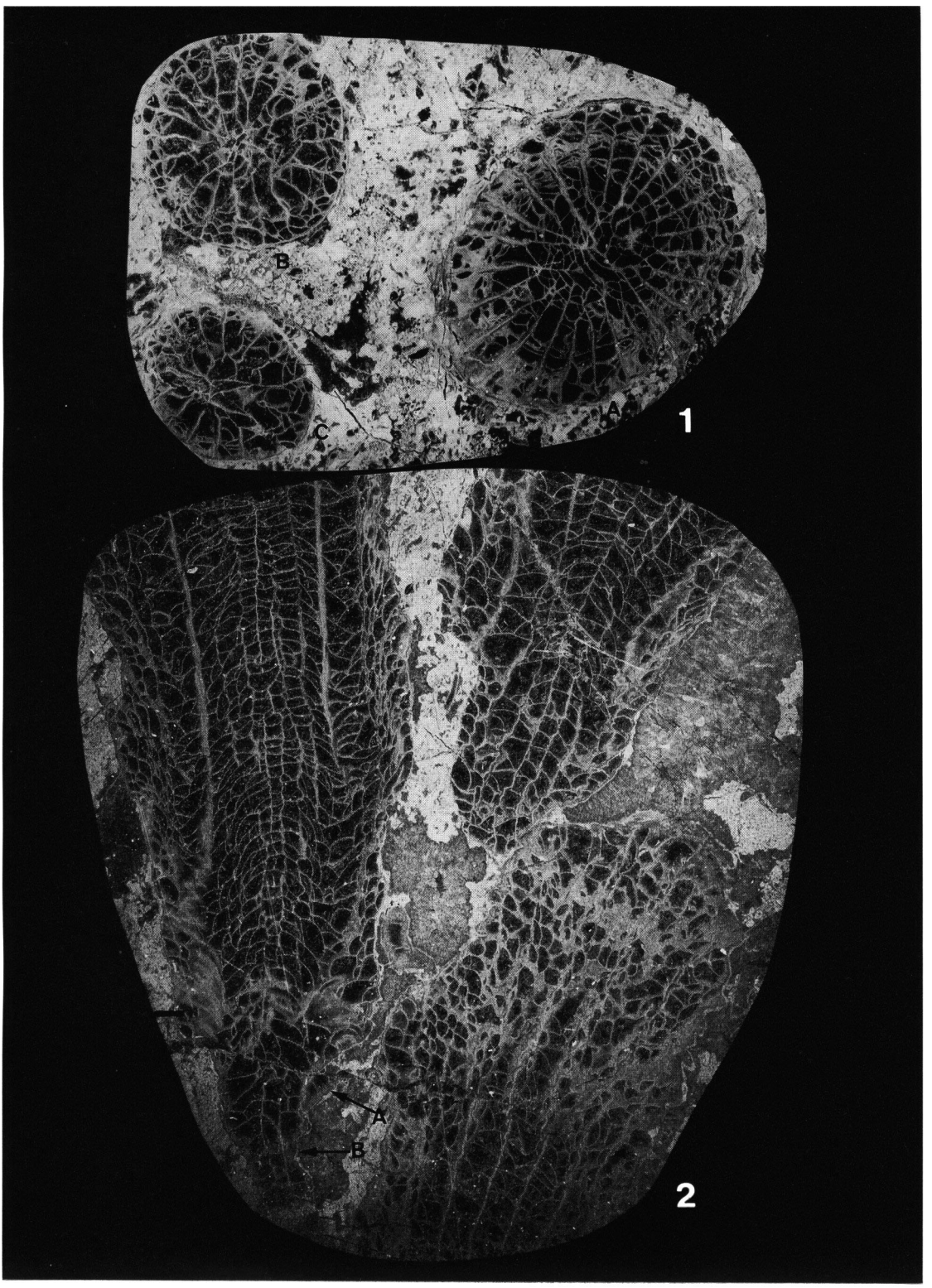
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