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Stylophyllopsis veneta (Airaghi), a Liassic coral from the northern Dinaric Carbonate Platform (Slovenia)

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Zusammenfassung

Die Koralle *Stylophyllopsis veneta* (Airaghi 1907) wird aus den mittelliassischen Kalken (Domerium) von Südslowenien beschrieben und revidiert. Sie ist die einzige liassische Koralle, die man bis heute von Slowenien und der gesamten Dinarischen Karbonat-Plattform kennt.

Abstract

The coral *Stylophyllopsis veneta* (Airaghi 1907) from middle Liassic (Domerian) limestone of southern Slovenia is described and revised. This species is hitherto the only Liassic coral known from Slovenia and the entire Dinaric Carbonate Platform.

1 INTRODUCTION

During the geological mapping, STANKO BUSER found a branching coral in the lithiotid limestone at Gorenja Brezovica near Podpec. He sent it to Professor OTMAR KÜHN in Vienna for determination. In BUSER's doctoral thesis (1965) we read that Prof. KÜHN identified this coral as "*Thecosmilia veneta* Airaghi". This name later appeared in some other Slovenian publications (BUSER 1974, RAMOVS 1974, JURKOVSEK & KOLAR-JURKOVSEK 1992). The coral was illustrated several times but has never been paleontologically studied in detail. Because the specimen are well preserved and because this coral is so far the only known Liassic coral in Slovenia as well as on the entire Dinaric Carbonate Platform, we describe and revise it in this paper.

2 LOCALITY DESCRIPTION

The outcrop is situated southeast of Gorenja Brezovica near Podpec on the slope of Lopata below Krim (Fig. 1). The coral buildup is a small patch reef within the lithiotid limestone. It is 35 m long, a few meters wide and 5 m thick and laterally passes into oolitic limestone (BUSER & DEBELJAK 1996, 37). On the basis of bivalves and foraminifers in the lithiotid horizon, the reef limestone is assigned to the upper part of middle Liassic (Domerian), for all lithiotid bivalves in Slovenia disappeared at the end of the Pliensbachian (BUSER & DEBELJAK, 1996, 27; DEBELJAK & BUSER 1998, 42). BUSER & DEBELJAK (1996) and DEBELJAK & BUSER (1998) explain that the term "lithiotid bivalves" has no taxonomic value, because it comprises several bivalve species belonging to different families and that the term "lithiotid limestone" is used

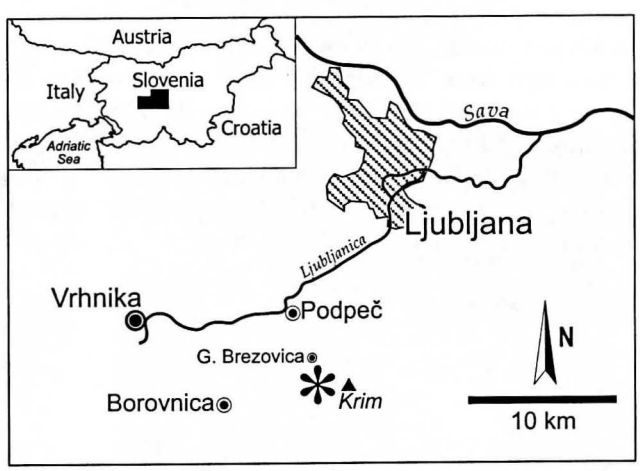

Fig. 1. Location map of the coral studied.

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principally in the sense of facies. Both terms are well known in the geological literature and therefore not abandoned. Lithiotid limestone from Podpe_ was mentioned also by GEYER (1977) in his study on the distribution of this facies in the Tethys.

Paleoegeographically, the patch-reef with the corals described was situated on the northern part of the Dinaric Carbonate Platform. The environmental conditions of this area in the Domerian were discussed in detail by BUSER & DEBELJAK (1996). The corals inhabited niches within bivalve-dominated lagoons and formed small and short-lived patch-reefs. In the stratigraphic record, these middle Liassic corals do not exhibit an extensive coral-reef development.

In addition to Gorenja Brezovica, Liassic corals have been mentioned at Globocec near Zagradec and in surroundings of Col (BUSER 1965, 1974, 1996). These corals will be the subject of our future investigations.

3 GLOBAL DISTRIBUTION OF LIASSIC CORALS

Coral faunas significantly changed across the Triassic – Jurassic boundary. Several taxa became extinct and others newly appeared. In the literature on Liassic corals we find some genera, which are known also from the Upper Triassic, but almost no species survived the end-Triassic extinction event. STANLEY & BEAUVAIS (1994, 37) estimate that the survival rate of corals from the Triassic to the Liassic is only about 0.4 to 0.6 %. A great change is observed also in the growth form of corals. Reef-building corals, common in the Late Triassic, were replaced by solitary corals or isolated phaceloid and massive colonies in the Liassic.

An overview of almost all Jurassic coral species was given by LATHUILIERE (1989). The analysis of his work shows that Liassic corals are abundant in northwestern Europe (England, Belgium, France, Luxembourg) and in Spain, and less common in Germany, Austria and Hungary. They are very abundant in Morocco and were also mentioned from Algeria, Madagascar, Crimea, Iran, Japan, Canada, Argentina and Chile (see also: BEAUVAIS (1976) and NEGUS (1991) for England; TURNSEK et al. (1975) for Spain; ALOITEAU (1958) for Madagascar; BEAUVAIS (1986) for Morocco; MELNIKOVA (1975) for Pamir; PRINZ (1991) for Chile; and others). An overview of Liassic coral occurrences was also presented by BEAUVAIS (1980, 595).

Our present investigation led us to recover AIRAGHI's (1907) work on Liassic corals from "Calcari Grigi del Veneto" in Italy that has never been cited in the literature dealing with coral taxonomy.

If we consider only the branching phaceloid corals, the Liassic forms are mainly assigned to the genera *Stylophyllopsis*, *Pinacophyllum*, *Araiophyllum*, "*Phacelostylophyllum*", *Parathecosmilia*, ?*Margarosmilia*, *Retiophyllia*, ?*Volzeia* (which continue from the Upper Triassic), to *Archaeosmiliopsis*, *Duncanosmilia*, *Thecactinastraea*, *Phacelophyllia* (so far known from the Liassic only), and to some other genera as *Thecosmilia*, *Cladophyllia*, *Calamophyllia*, *Stylosmilia*, *Goniocora*, *Rhabdophyllia* (which have a wide stratigraphic range and all need a revision).

Figs. 2-5. Stylophyllopsis veneta (Airaghi 1907)

2. Surface of the phaceloid colony from above. Specimen G.Br-1, x 1.5.

3. Polished transverse surface of the phaceloid colony. Note thick wall and well developed endotheca. Specimen G.Br-1, x 1.5.

4. Transverse section of several corallites. Note axial septal spines, but there is no endotheca to be seen. Thin section G.Br-1a, x 4.

5. Longitudinal and oblique sections through two corallites. Note corallite without septal spines but well seen large dissepiments. In comparison with Fig. 4 a completely different structure but the thin section was made from the same colony. Thin section G.Br-1d, x 4.


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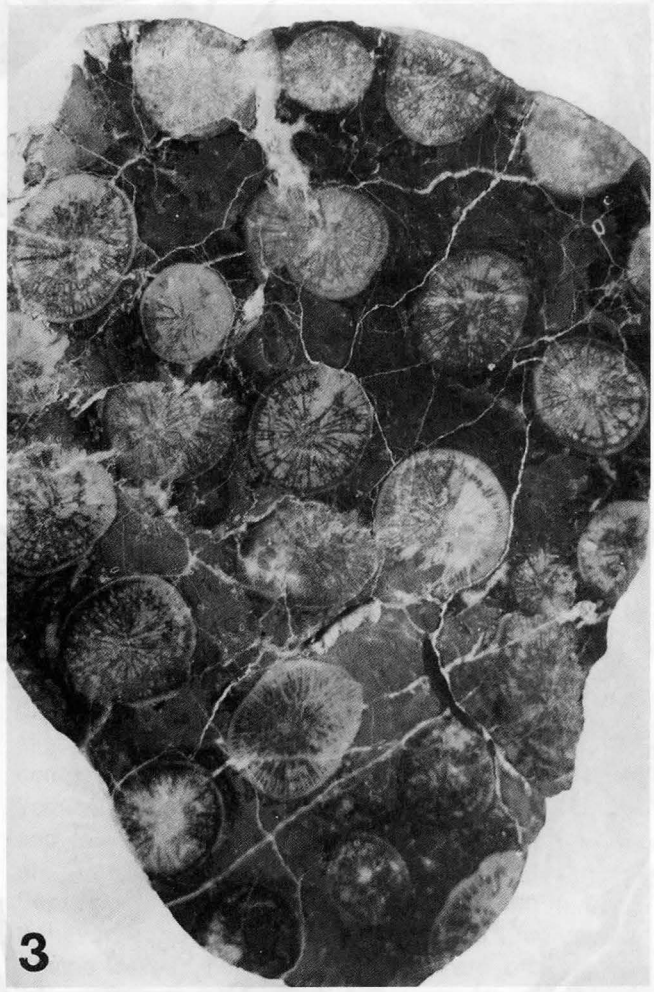
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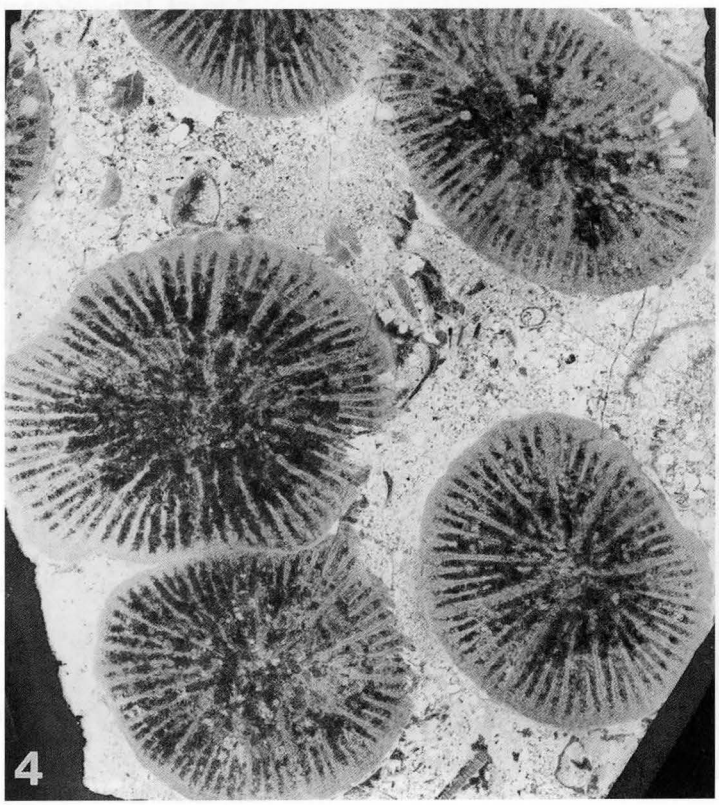
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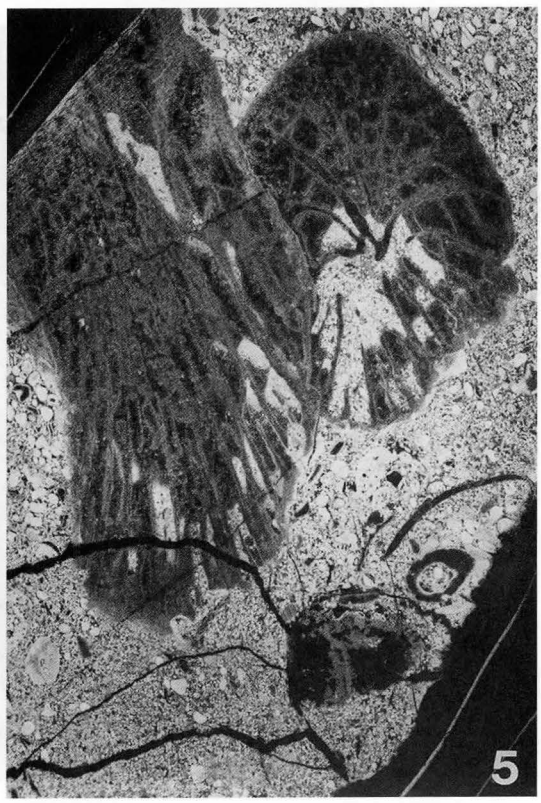
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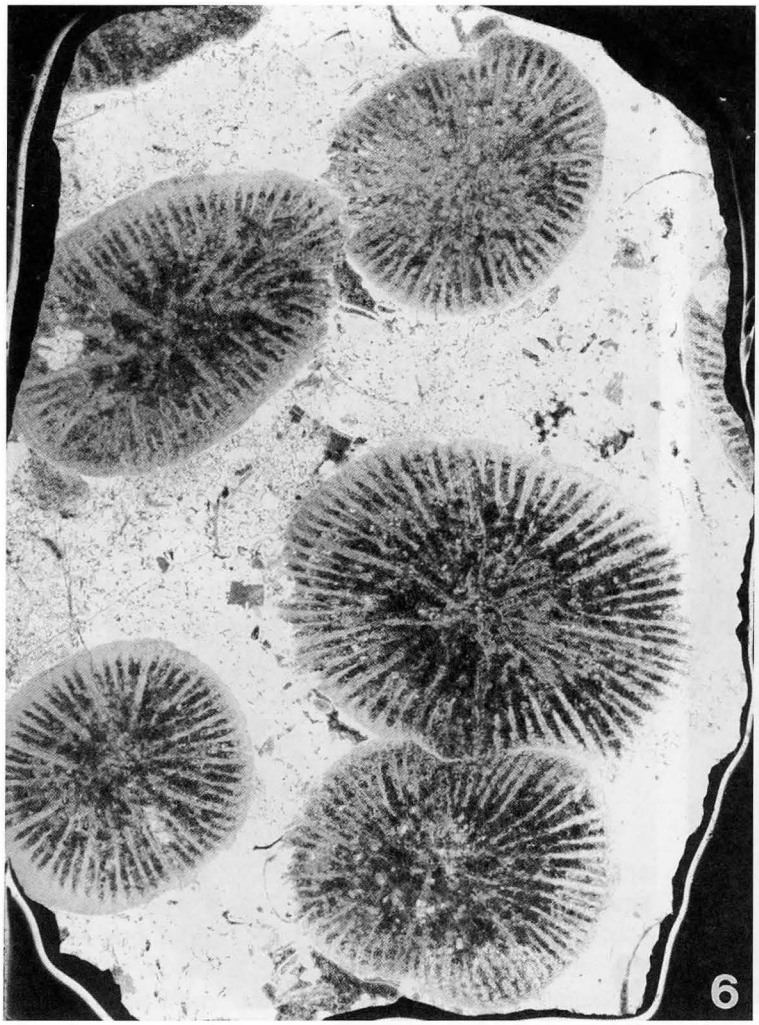

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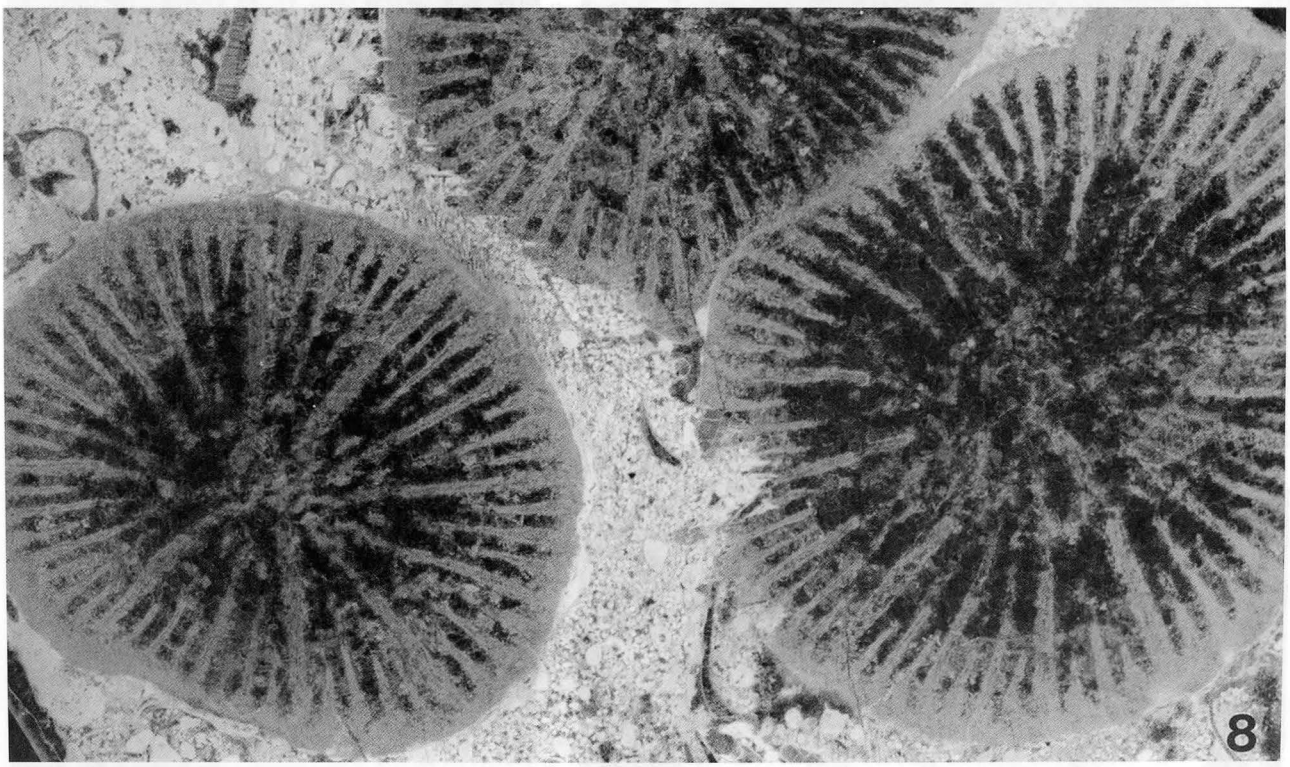

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4 SYSTEMATICS

Order: Scleractinia Bourne 1900
Suborder: Stylophyllina Beauvais 1981
Family: Stylophyllidae Frech 1890

Genus: *Stylophyllopsis* Frech 1890
Type species: ?*Stylophyllopsis polyactis* Frech 1890 (see Roniewicz 1989, 123). Cuif (1977, 15) proposed *S. zitteli* as a type species.

Last revision of *Stylophyllopsis* was made by Roniewicz (1989, 123-124). She gave an exact relationship between *Stylophyllum* and *Stylophyllopsis* and did not recognize the genus *Phacelostylophyllum* introduced by Melnikova (1972) on the basis of phaceloid forms of both above mentioned genera.

Roniewicz (1989, 123) completed diagnosis of *Stylophyllopsis* as follows: "Solitary and colonial, phaceloid. Budding intracalicular of variable pattern. Septal spines long and linked by stereome to form subcompact septa blades with isolated pores. The internal septal edges dissociated into the septal spines. Distal edge denticulate with large spines. Wall fibrous. Columella papillar, composed of septal spines. Endotheca formed by large, densely packed dissepiments. Microstructure homogenous: skeleton composed of bundles of fibres. Septal spines with an axial rod or lamella. Stereome links the septal spines with each other and passes into the upper dissepimental layer."

In our opinion, the majority of species assigned to the genus *Stylophyllopsis* are colonial, branching. The species described as solitary are probably fragments or detached larger corallites of larger colonies (see *Stylophyllopsis rudis*, *S. lindstroemi*, ? *S. polyactis*, *S. mojsvari* in Frech 1890, Pls. 12, 13, 15; and Roniewicz 1989, Pls. 36, 39, 40).

Stylophyllopsis veneta (Airaghi, 1907)
Figs. 2-14

1907 *Thecosmilia veneta* n. sp. Airaghi, 15, Pl. 6, Fig. 35.
1965 *Thecosmilia veneta* Airaghi. Buser, 45, Pl. 5, Fig. 1, not Fig. 2.
?1974 *Thecosmilia veneta*. Buser, 25.
1974 *Thecosmilia veneta*. Ramovš, 75, Fig. 116.
1992 *Thecosmilia veneta* Airaghi. Jurkovšek & Kolar-Jurkovšek, 24, Fig. 25.

Material: Five fragments of colonies, 7 thin sections, 2 polished surfaces.

Original description by Airaghi (1907; translated from Italian): "Polyp consists of large corallites, even, subcylindric, which divide into two or three short branches standing close to each other. Calices are subcircular, diameter 3-15 mm, septa strong, even, upper margin granulated. Length of septa different, depending on the cycle to which they belong. Only first-cycle septa reach center, in large calices 5 cycles are recognized in total. Wall is very strong, traverses numerous".

Description of our specimens: Colony phaceloid, budding extracalicinal, marginal. Corallites round to slightly oval, standing close to each other. Septa compact to subcompact, in 4 to 5 cycles, built of ?continuous septal blades. The first cycle is thicker and reaches the central part. All younger cycles are gradually shorter, all of the same thickness. Septa have axial spines which are well seen in some transverse sections, forming "papillar" columella. Costae lacking. Septal lateral faces are ornamented with irregular sharp granulae or smooth. Endotheca of large and vesicular dissepiments which are well visible in transverse polished surface and in some longitudinal or oblique thin sections. Wall is thick, fibrous, built of bundles of fibres at the very edge of the corallite. Microstructure of septa is the same, built of boundles of fibres, rather recrystallized, septal spines with axial rods.

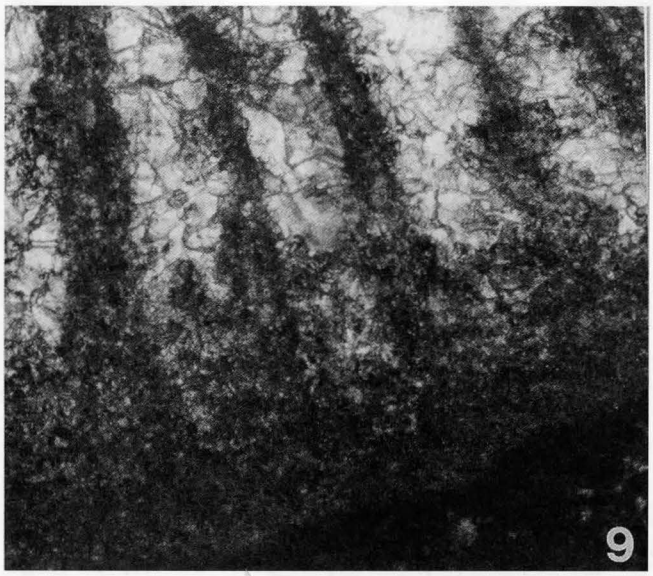
Dimensions (in mm):		Airaghi's (1907) specimen	our specimen
	d	3-15	(7)8-12(13)
	s	5 cycles (=96)	86-96

Figs. 6-8 *Stylophyllopsis veneta* (Airaghi 1907)

6. Transverse section of some corallites, rather recrystallized. Thin section G.Br-1f, x 4.

7. Longitudinal and oblique sections of two corallites. Here septal spines and dissepiments are well seen. Thin section G.Br-1c, x 4.

8. Transverse section of three corallites (detail of section from Fig. 4). Homogeneous fibrous structure of septa and wall. Thin section G.Br-1a, x 8.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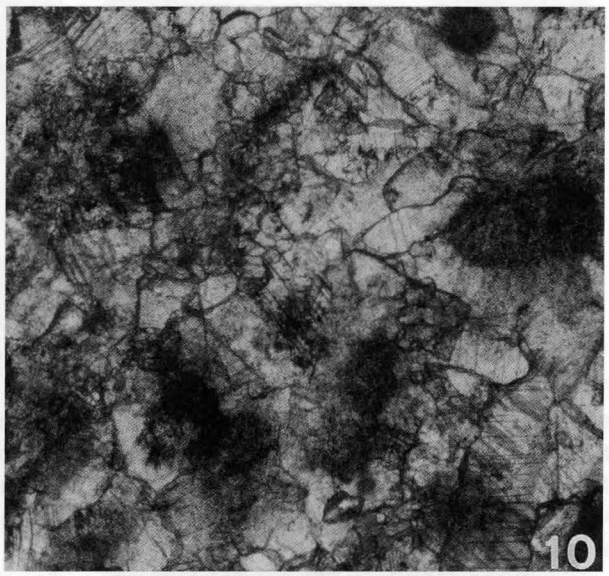
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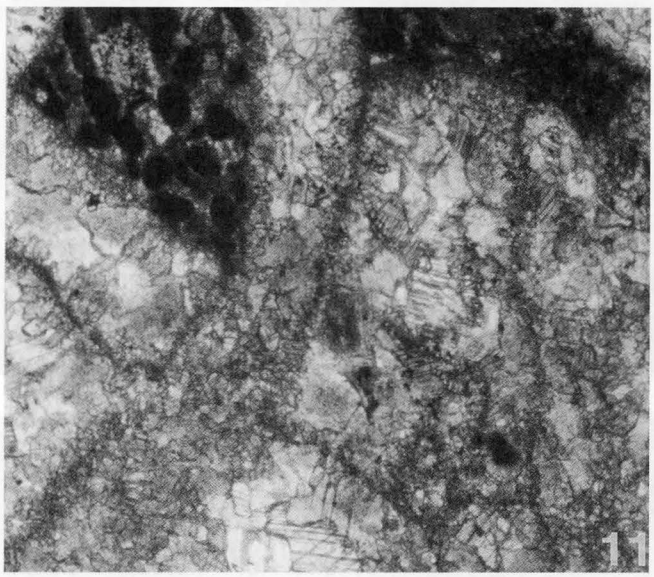
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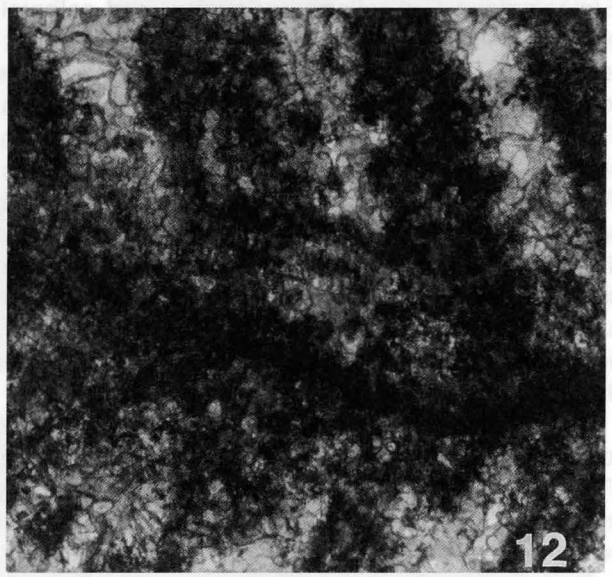
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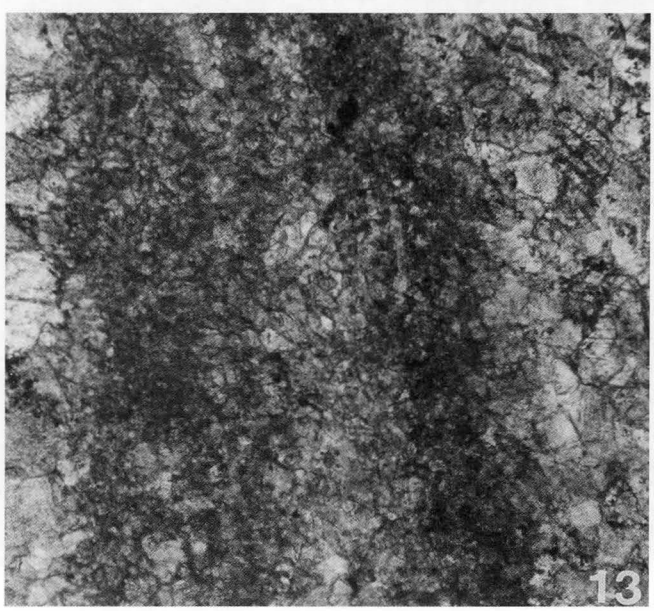
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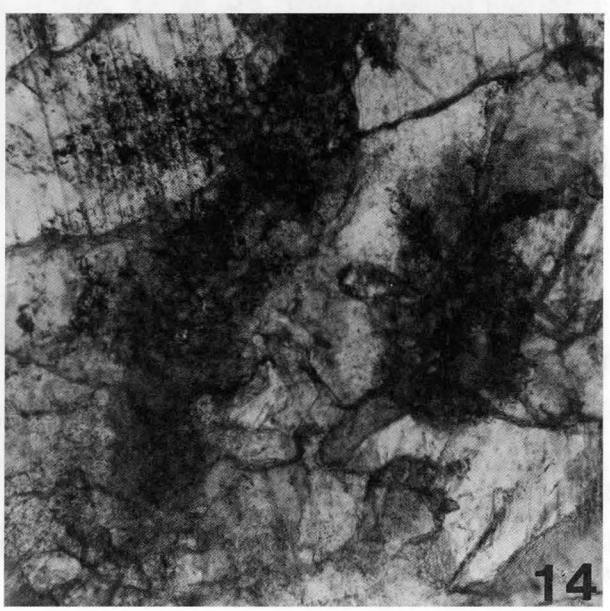
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Comparison: The main characteristics of our specimens fit into the description of "*Thecosmilia veneta*" described by AIRAGHI (1907), so we agree with the determination of Prof. KÜHN. The "strong wall" excludes the species from *Thecosmilia*. Structure of septa with septal spines and microstructure of boundles of fibres is the same as in genus *Stylophyllopsis*. AIRAGHI (1907) did not mention septal spines, but in the figure we can recognize "papillar" axial structure which corresponds to axial septal spines.

Our specimens resemble *Phacelostylophyllum rugosum* (Laube), found in the Liassic of British Columbia by STANLEY & BEAUVAIS (1994). *P. rugosum* differs from *S. veneta* by having fewer number of septa (40-60). AIRAGHI (1907) compared *Thecosmilia veneta* with "*Thecosmilia martini* From. and *T. magna* Th." from which he distinguished it by the shape of calices and the dimensions.

Remarks: The study of our specimens and the analysis of their structure shows that the appearance of septa, septal spines, dissepiments as well as of the wall, depends upon the state of preservation and upon the orientation of the section through the corallite. Septa can be more or less subcompact, septal spines present or not, depending on the position of sections. Thin dissepiments are not visible in transverse sections whereas they are well seen in polished surfaces and in oblique or longitudinal thin sections. Only a detailed comparison of several sections and different preparation techniques enable a correct reconstruction of morphology and structure of the genus.

Occurrence: Liassic Calcari grigi at the type locality Corno d' Acquilio Veronese, northern Italy; Gorenja Brezovica below Krim southwest of Ljubljana, Domerian (Upper Pliensbachian) lithiotid limestone, Slovenia.

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Figs. 9-14. *Stylophyllopsis veneta* (AIRAGHI 1907)

9. Fibrous microstructure of wall and peripheral septa in transverse thin section G.Br-1f, x 50.

10. Microstructure of axial ends of septa and septal spines in transverse thin section G.Br-1f, x 50.

11. Microstructure of septa and dissepiments in oblique thin section G.Br-1d, x 50.

12. Microstructure of the unique wall between two corallites just after budding. Bundles of fibres run in opposite dirrection. Septa are wider because they are cut obliquely. Thin section G.Br-11, x 50.

13. Fibrous microstructure of two septa in transverse section. Thin section G.Br-1d, x 100.

14. Bundles of fibres in septum and in axial septal spine. Transverse thin section G.Br-1a, x 100.

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