GEOL. CROAT.	53/1	199 - 207	1 Fig.	1 Tab.	3 Pls.	ZAGREB 2000

Salpingoporella donatae n.sp. (Dasycladales) from Upper Cretaceous Limestone of the Environs of Primošten (Dalmatia, Croatia)

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Key words: Calcareous alga (Dasycladales), Upper Cretaceous, Dalmatia, Croatia.

Abstract

A new species of the dasyclad genus *Salpingoporella*, *S. donatae*, is characterized by wavy primary ramifications, which makes it easily distinguishable from other species of the genus. It derives from platy algal pelletal packstones and grainstones from the Lower Coniacian to Campanian deposits of the environs of Primošten, Dalmatia. *Uragiella matzi* SOKAČ & VELIĆ has already been described from the same deposits.

1. INTRODUCTION

The sample of algal limestone, containing, among other species, also numerous sections of the species described herein, had been collected more than 20 years ago by Pavao Mamužić and Boško Korolija. They were involved in geological mapping of the area around Primošten and devoted their particular attention to Upper Cretaceous deposits. The first samples were collected from a partly investigated cross-section of platy limestones near the gas station at the entrance to Primošten. Later the same locality was revisited and more samples collected, which contained enough sections for the new dasyclad species to be described, in addition to the earlier established *Uragiella matzi* SOKAČ & VELIĆ.

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2. SYSTEMATIC DESCRIPTION

Order Dasycladales

Tribe Salpingoporellae BASSOULLET et al., 1979

Genus *Salpingoporella* PIA, 1918

***Salpingoporella donatae* n.sp.**

Plates I-III

?1995 *Salpingoporella ubaiydhi* RADOIČIĆ.- OKLA, p. 479, fig. 3/8.

Origin of name: The species is dedicated to the memory of the late Donata NEDÉLA-DEVIDÉ who was the teacher of geological mapping for many generations of geology students at the Faculty of Science, University of Zagreb.

Type-locality: Outcrop of platy limestone in the road cutting near the gas station at the entry to Primošten, 43°35'17"N, 15°54'08"E (Fig. 1).

Type stratum: Very well-bedded, light brown to brown platy limestones, algal-peloidal packstone to grainstone, which, in addition to calcite cement, also contains some matrix recrystallized into microsparite. The sediment was deposited in a shallow subtidal low energy environment. A Lower Coniacian to Campanian age is based on superposition.

Holotype: Tangential-longitudinal-oblique section figured in Pl. I, Fig. 2, in thin section labelled PR-79-1/37. Paratypes are other, variously oriented, sections figured in Pls. I-III. The material is stored at the Institute of Geology in Zagreb.

Diagnosis: The new species includes the general characteristics of the genus *Salpingoporella*. The species-specific feature is the wavy (humpy) shape of the primary branches, which are arranged in densely packed whorls. The branches are widened at their distal end and circular or slightly depressed in cross sections.

Dimensions in mm: See Table 1.

Description: The alga has a slender, cylindrical skeleton with a comparatively narrow central cavity and occasionally a more or less curved thallus (Pl. I, Fig. 1; Pl. II, Fig. 4). The inner surface (wall of the axial cavity) is even and uninterrupted, clearly and sharply delin-

eated, and perforated by entrance pores of the branches. The outer surface, originally probably smooth or even slightly bulging, becomes finely indented in fossil material (Pl. II, Figs. 3-4) as a result of distally funnel-shaped (widened) branches and the destruction of the outer surface. The inner cavity occupies, on average, 25-30% of the outer thallus diameter. Simple primary branches are arranged in clearly defined and comparatively densely packed whorls. There are 14-18 branches per whorl, usually slightly inclined upwards (Pl. I, Figs. 2-3 and 8), though, in some specimens, branches may be inclined both upwards and downwards (Pl. I, Fig. 4). The most characteristic feature of the primary branches is their single or multiple bending resulting in their wavy shape (Pl. I, Figs. 2-3; Pl. III, Fig. 12), or their changing diameter - slight swellings and narrowings - resulting in their humpy shape (Pl. II, Fig. 5; Pl. III, Figs. 10 and 13). In some specimens, the branches are in their proximal parts inclined downwards, whereas distally they are directed upwards, which gives them a knee-bend shape (Pl. III, Fig. 11). Some specimens show a slight swelling in the proximal part of branches, near to the wall of the axial cavity, which results in an elliptical or bladder-shaped widening, as shown in the sections illustrated in Pl. III, Figs. 2, 4 and 11. In consecutive whorls, the branches are arranged in an alternating position, though such an arrangement in deeper tangential sections becomes less clear, due to dense packing, and appears irregular, so that only in shallow tangential (cortical) sections does the alternate arrangement becomes clear (Pl. I, Figs. 2, 4 and 6; Pl. III, Figs. 1 and 6). At their distal ends, the branches are funnel-shaped (phloiophorous branches) and often more or less vertically compressed, i.e. elongated along a plane perpendicular to the growth direction of the thallus. Therefore, in vertical sections the pores appear circular (Pl. I, Figs. 1-2 and 6; Pl. II, Figs. 5-7), or, if depressed, elliptical in outline (Pl. III, Figs. 1 and 6-7).

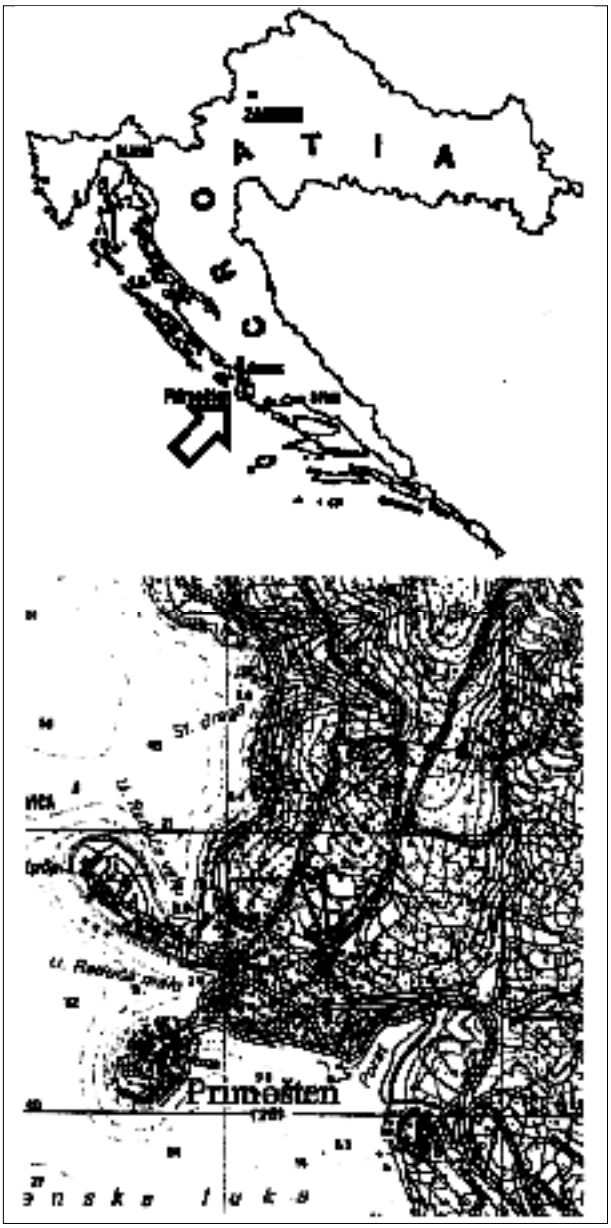

Fig. 1 The type locality of *Salpingoporella donatae* n. sp.

Similarities and differences: *Salpingoporella donatae* n. sp. belongs to that group of the *Salpingo - porella*-species which is characterised by a narrow central cavity and more or less circular pores in tangential sections of their distal ends. *S. adriatica* (GUŠIĆ) also has a narrow central cavity and clearly phloiophorous branches (DE CASTRO & DE ROSA, 1977) but *S. donatae* is smaller and has more slender, more irregu-

			Holotype	Most frequent	%
Maximum observed length of thallus	L	10.70	5.00		_
Outer diameter	D	0.74-1.52	0.96	0.90-1.10	(60%)
Inner diameter	d	0.17-0.34	0.22	0.20-0.30	(91%)
d/D ratio		0.161-0.304	0.228	0.250-0.300	(56%)
Distance between whorls	h	0.09-0.20	0.095	0.09-0.20	(72%)
Maximum diameter of branches	p	0.06-0.14	0.08	0.08-0.10	(68%)
Length of branches	l	0.21-0.51	0.46	0.35-0.45	(56%)
Number of branches per whorl	w	14-18			

Table 1 Dimensions of *Salpingoporella donatae* n.sp. (in mm). Measurements were made on 30 specimens.

larly shaped and frequently upwards directed branches. *S. pygmaea* (GÜMBEL) PIA has about the same dimensions, but its branches gradually and uniformly widen from their proximal to their distal ends, whereas in *S. donatae* n. sp. the branches are wavy, more irregularly shaped, and funnel-shaped only at their distal ends. With regard to two small-sized species, *S. istriana* (GUŠIĆ) and *S. johnsoni* (DRAGASTAN), *S. donatae* n. sp. differs in having different values of individual parameters and differently shaped branches and in being somewhat larger (this being particularly clear with regard to *S. johnsoni*). Similar differences also exist with regard to the equally small-sized *S. verticillata* (SOKAČ & NIKLER), in which, however, the central cavity is somewhat wider and with an uneven wall and the branches are more steeply directed upwards and only distally inclined downwards. With regard to *S. turgida* (RADOIČIĆ), the new species is considerably smaller, has a narrower central cavity and, consequently, a different d/D ratio. The Lower Cretaceous *S. piriniae* KARAS & RADOIČIĆ, though being somewhat smaller, is visually similar but has differently shaped branches. The two species with a similar stratigraphic position, *S. milovanovici* RADOIČIĆ and *S. polsaki* SOKAČ & JELASKA are, in general, smaller and have differently shaped branches giving differently shaped pores in tangential sections. A more detailed comparison, however, with the contemporaneous *S. ubaiydhi* RADOIČIĆ is needed. The latter is, indeed, 2-3 times smaller but has similar values of individual parameters (with a slightly larger d/D ratio). The most important difference between the two species concerns the shape of the branches, which, in *S. ubaiydhi*, have a short stalk and then widen uniformly or, sometimes, acquire a bellows-like shape (RADOIČIĆ, 1979, pl. I, figs. 3-4; pl. II, figs. 1, 3), and are situated more or less perpendicular to the growth axis. Moreover, in *S. ubaiydhi* the branches in consecutive whorls are not arranged in an alternating position, which is clearly visible in outer tangential sections in *S. donatae*, particularly in specimens with elliptically elongated pores. Another stratigraphically similar species, *S. arumaensis* OKLA, is considerably larger, has short, funnel-shaped and perpendicularly arranged branches - as distinct from the longer, slimmer, and irregular branches in *S. donatae* - and has a much broader central cavity which may occupy up to 50% of the outer diameter. Other *Salpingoporella*-species may also show similar values of some parameters (see SOKAČ, 1996), but the main characteristic feature of *S. donatae* n. sp. - wavy, irregular, and/or bent branches - makes it clearly distinguishable from all other *Salpingoporella*-species.

Stratigraphic position: *Salpingoporella donatae* n. sp. was first observed, in a smaller number of sections, in the same sample which yielded the earlier described *Uragiella matzi* SOKAČ & VELIĆ, for which the stratigraphic position was stated as Upper Turonian - Lower Coniacian. In the samples from the investigated locality no significant fossils have been found, and consequently their stratigraphic position is based on superposition. Repeated collecting at the same outcrop yielded numerous sections of *S. donatae* (which enabled the above description), accompanied also by not so abundant sections of *S. ubaiydhi*. This allows for a possibly broader stratigraphic range than previously considered. In the original description of *S. ubaiydhi*, RADOIČIĆ (1979) reports its finding from the bottom of the well, from an interval for which a Campanian, possibly Uppermost Santonian, age has been ascribed. In the text of the more detailed description of the well stratigraphy, for the lower part KH-1/7 it is said that it is represented by sediments of partly Santonian? and also possibly Coniacian age, lying at the top of the formation that may be of Upper Turonian and Coniacian age. OKLA (1995), in the description of *S. arumaensis*, also gives some illustrations of *S. ubaiydhi* (OKLA, 1995, figs. 3/7-3/9), among which there is one section (OKLA, 1995, fig. 3/8) which possibly belongs to *S. donatae*. It should be mentioned, admittedly, that the section in question is not completely clear, but it nevertheless shows some obvious differences with regard to the remaining two sections labelled *S. ubaiydhi*. The occurrence of *S. ubaiydhi* associated with *S. donatae* and *Uragiella matzi* at the Primošten locality and the joint occurrence of *S. ubaiydhi*, *S. arumaensis* and possibly *S. donatae* at the top of the Hajajok Member (part of the Azuma Formation, central Saudi Arabia), to which the range Campanian - Maastrichtian is ascribed, suggests a broader range of their occurrence, covering a Coniacian - Lower Maastrichtian time span.

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PLATE I

1-9 *Salpingoporella donatae* n. sp.

1 Oblique-tangential section, slide PR-79-1/70, x17.
2 Tangential-oblique section, Holotype, slide PR-79-1/37, x22.
3 Oblique section, slide PR-79-1/27, x22.
4 Oblique section, slide PR-79-1/36, x22.
5 Tangential-longitudinal -section, slide PR-79-1/24, x22.
6 Oblique section, slide PR-79-1/34, x22.
7 Cross section, slide PR-79-1/33, x22.
8 Oblique section, slide PR-79-1/40, x14.
9 Tangential-slightly oblique section, slide PR-79-1/30, x22.

Age and location:

Lower Coniacian - Campanian, Primošten (Dalmatia, Croatia).

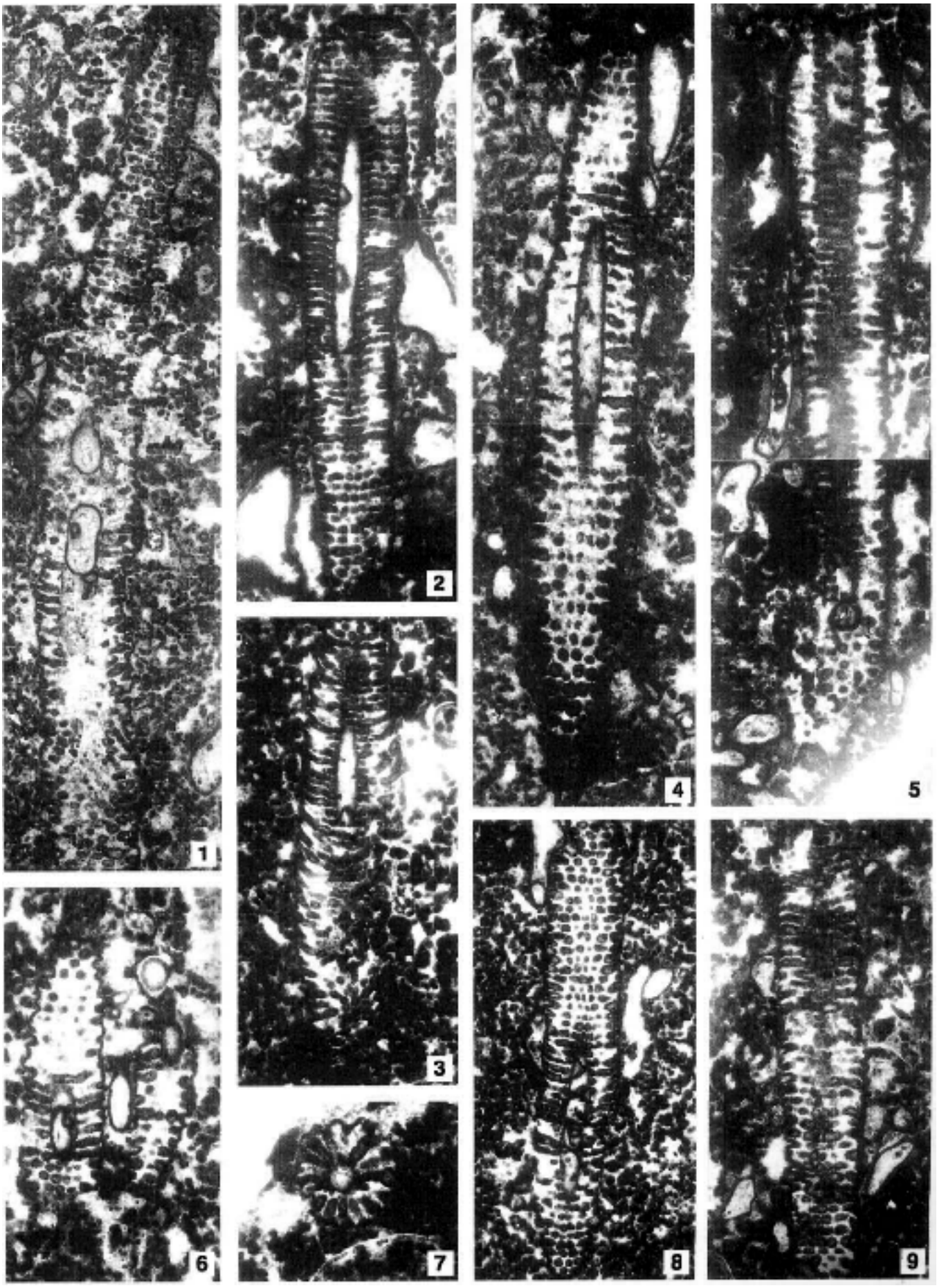
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PLATE II

1-10 *Salpingoporella donatae* n. sp.

1 Oblique and cross sections, slide PR-79-1, x17.

2 Oblique sections, slide PR-79-1/62, x22.

3 Oblique sections, slide PR-79-1/48, x22.

4 Tangential-oblique section, slide PR-79-1/20, x17.

5-7 Oblique sections, Fig. 5, slide PR-79-1/40; Fig. 6, slide PR-79-1/71; Fig. 7, slide PR-79-1/14, x22.

8-10 Cross sections, Fig. 8, slide PR-79-1/45; Fig. 9, slide PR-79-1/41; Fig. 10, slide PR-79-1/29, x22.

Age and location:

Lower Coniacian - Campanian, Primošten (Dalmatia, Croatia).

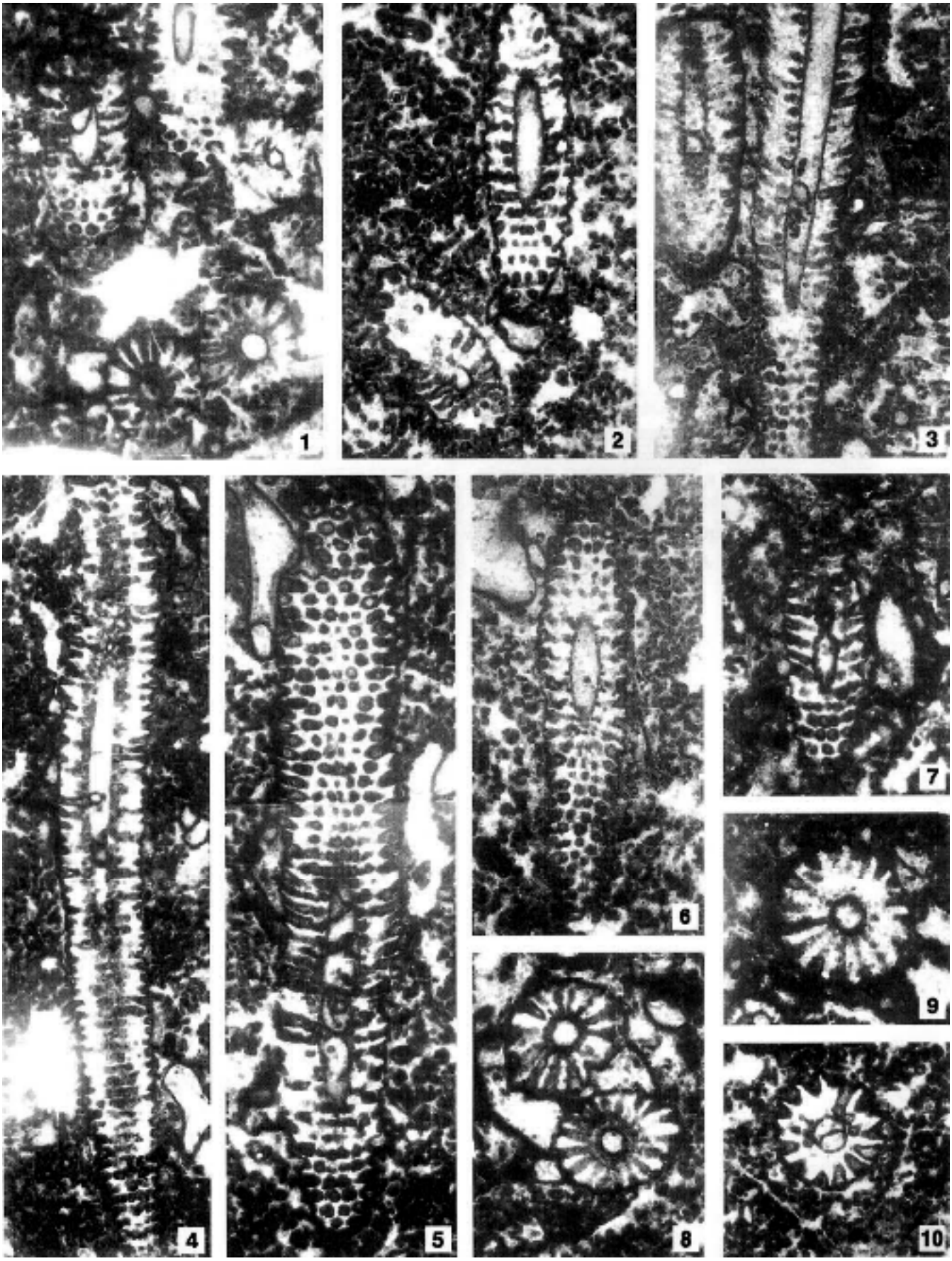
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PLATE III

1-16 *Salpingoporella donatae* n. sp.

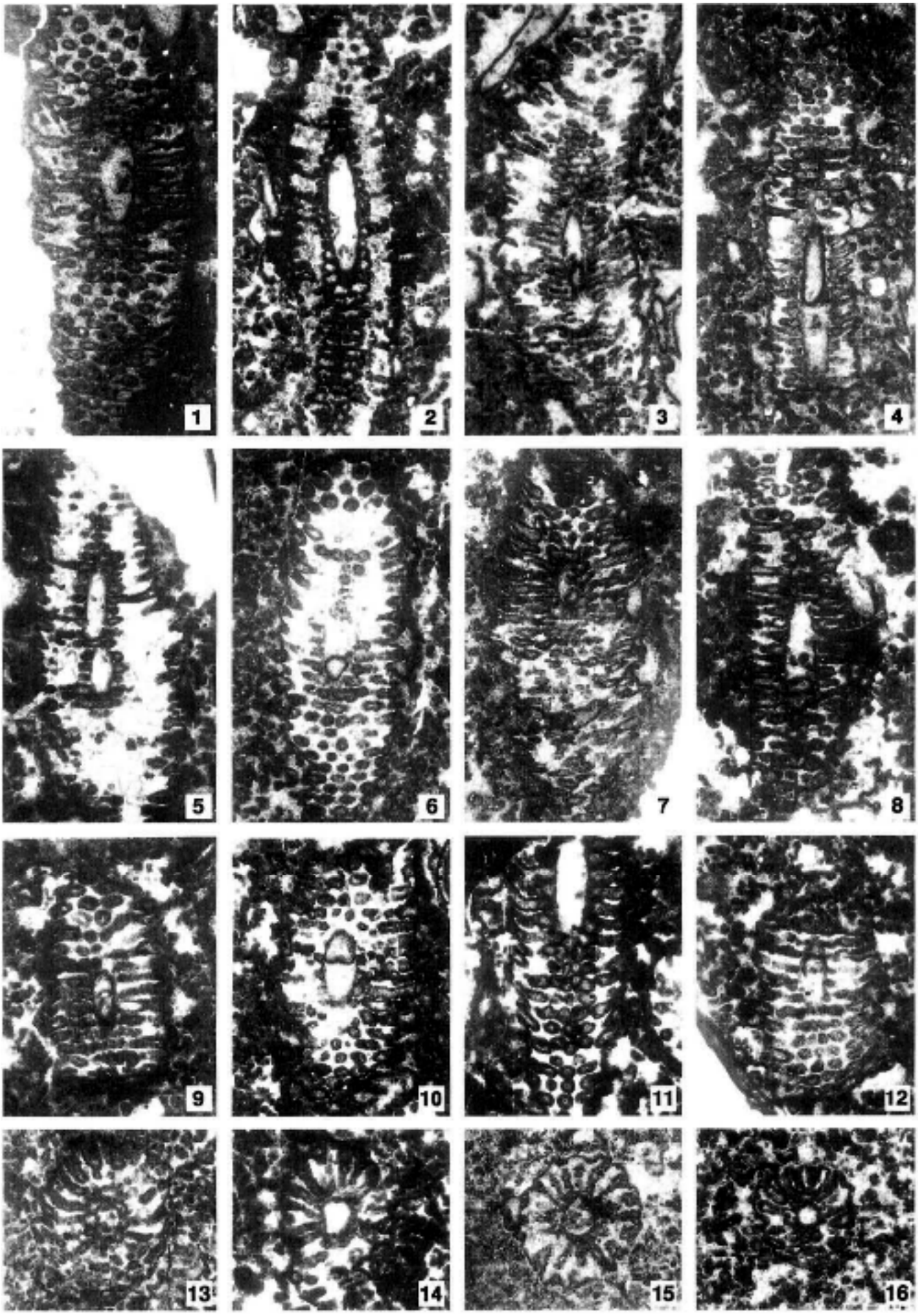
1-12 Oblique sections, Fig. 1, slide PR-79-1/69, x22; Fig. 2, slide PR-79-1/31, x17; Fig. 3, slide PR-79-1/14, x22; Fig. 4, slide PR-79-1/67, x22; Fig. 5, slide PR-79-1/39, x22; Fig. 6, slide PR-79-1/67, x22; Fig. 7, slide PR-79-1/49, x22; Fig. 8, slide PR-79-1/35, x22; Fig. 9, slide PR-79-1/18, x22; Fig. 10, slide PR-79-1/21, x22; Fig. 11, slide PR-79-1/21, x22; Fig. 12, slide PR-79-1/34, x22.

13-14 Cross, slightly oblique sections, Fig. 13, slide PR-79-1/11, x22; Fig. 14, slide PR-79-1/27, x22.

15-16 Cross sections, Fig. 15, slide PR-79-1/55, x22; Fig. 16, slide PR-79-1/17, x22.

Age and location:

Lower Coniacian - Campanian, Primošten (Dalmatia, Croatia).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