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LATE JURASSIC-EARLY CRETACEOUS DASYCLADALES (GREEN ALGAE) FROM THE WESTERN PONTIDES, TURKEY

Dasycladalean algae are described from the Northern Anatolian carbonate shelves. Pontides are considered belonging to the European plate, nevertheless no important differences are present comparing late Jurassic-Early Cretaceous algae with those developed on the shelves considered as belonging to the Northern margin of the African plate.

The absence of the great number of *Clypeina jurassica* specimens at the Jurassic-Cretaceous boundary is the only important difference, but it is unknown if this absence is due to a sedimentary gap or to an unsuitable environment for its development.

Moreover, the presence of new species of *Clypeina*, *Actinoporella* and *Salpingoporella* beside the poorly represented species of these genera, so much developed on the African margin shelves, suggests a reasonable implication of not so good conditions for the African species in the Pontides. In any case cosmopolitan species are also present and a long list of Dasycladales is been compiled; 3 new species, 1 emendation and 1 new combination are been erected and described.

KEY WORDS: *Dasycladales, Late Jurassic, Early Cretaceous, Turkey.*

INTRODUCTION

The shelf facies in the Jurassic of the Western Pontides started from Oxfordian-Kimmeridgian age, and Dasycladalean algae began their development explosively.

Previously in the earlier Jurassic, the facies were characterized by clastic deposits, sand and clay, and by Rosso Ammonitico type lithology. There, calcareous algae, even if the shallow sea could permit their life, nevertheless they did not thrive, because of the turbidity conditioning on the bathimetry.

Following up the change of the environment after the last widespread extension of the calcareous algae, on the uppermost early Cretaceous carbonate shelf, the Dasycladalean algae disappeared, because of water turbidity.

AREAL SPREADING

Sedimentary facies of Jurassic and Cretaceous of the Western Pontides are the results of the instability caused by geodynamic events. It is very difficult to find a sedimentary sequence in which modified environments and in continuous evolution in the time did not follow one upon the other. Also inside the time interval of the Dasycladalean presence, shelf carbonates can sometimes replace clastic deposits and viceversa, and moreover in pelagic environments the sedimentation can be slightly or strongly influenced by the proximity of the different parts of the shelf: open, close or restricted lagoons and margins. Therefore upper and lower slope environments much extensively enlarged in north-western Turkey, can be recognized by algal and foraminiferal reworking. In fact, Dasycladalean algae are abundant not only on the carbonate shelf, but more and more penecontemporaneously redeposited in the pelagic deposits of the upper external slope. Except the A, Ai, ÇDS, ÇS, DÜM and AB sections having, during the range of the Dasycladalean presence, the algal deposition in situ inside the shelf, in AÇ and BÇT sections of upper slope the reworked, enough well preserved algae are abundantly represented. On the contrary, on the lower slope it is very difficult to find reworked algae, also if there are reworked foraminifers from the shelf. In fact it is different the reworking possibility of the foraminifers developed in high energy environment and Dasycladalean algae normally grown inside quiet lagoons; the first supporting better than algae the transport, also by long way, and arriving in good condition, on the lower slope and beyond.

In Dasycladalean algae, often their verticils are disjointed or reduced into small debris, a disintegration of the carbonate skeleton easily occurs, till aragonite needles and grains widespread to form the lagoon carbonate mud. Therefore a good preservation of the verticils, also if disjointed, is a function of the distance from the growth place.

In the Western Pontides slope sedimentation was well developed, keeping in consideration the size of the area where algae and foraminifers are redeposited, continuously dismantled from the growth place and resedimented over a wide expanse area together with the pelagic fauna in situ.

Foraminifers of high energy, being the most easy transportable to very long distance, provide some informations on the extent of the influence of the slope sedimentation, that is about the redeposition of the shelf fauna. On the contrary the shelf, by its facies with algal and faunal assemblages in situ, was very much limited: the abundance of the shelf organisms without pelagic ones, towards the open sea shows the shelf boundary, but the presence of reworked algae together with pelagic fauna outlines the upper slope, and the presence of benthonic foraminifers of high energy environments, together with pelagic fauna shows the lower slope till the more distal influence of the skeletal deposits and at last their disappearance.

PALEONTOLOGICAL DESCRIPTIONS

Dasycladalean algae, here described, come from Kimmeridgian-Neocomian carbonate sequences of shelf and upper slope environments where algal assemblages occur.

Besides the majority of well known taxa, 3 new species, 1 emendation, and 1 new combination are been observed and described.

Dasycladalean algae list

? Actinoporella geredeensis n. sp.
Actinoporella podolica (Alth) Conrad, Praturlon & Radoičić
Clypeina cf. *catinula* Carozzi
Clypeina cf. *jurassica* Favre
Clypeina cf. *marteli* Emberger
Clypeina aff. *marteli* Emberger
Clypeina parasolkani n. sp.
Clypeina solkani Conrad & Radoičić
Cylindroporella cf. *arabica* Elliott
Falsolikanella campanensis (Azema & Jaffrezo) Granier
Heteroporella lemmensis (Bernier) Bassoullet, Bernier, Conrad, Deloffre & Jaffrezo
Gyroporella cf. *lukicae* Sokač & Velić
Linoporella cf. *gigantea* (Carozzi) emend.
Linoporella svilajaensis Sokač & Velić
Macroporella praturloni Dragastan
Pseudoclypeina sp.
Pseudocymopolia jurassica Dragastan
"Pseudoepimastopora - Epimastopora" group
Radoiciciella bartheli (Bernier) Granier
Salpingoporella annulata Carozzi
Salpingoporella circassa n. sp.
Salpingoporella aff. *enay* Bernier
Salpingoporella cf. *etalloni* Bernier
Salpingoporella johnsoni Dragastan
Salpingoporella aff. *johnsoni* Dragastan
Salpingoporella cf. *pygmaea* (Gümbel) Pia
Salpingoporella steinhauseri Conrad, Praturlon & Radoičić
Salpingoporella sp. 1
Salpingoporella sp. 2
Salpingoporella sp. 3
"Sarfatiella - Cylindroporella" group
Teutloporella sp.
?Triploporella embergeri (Bouroullet & Deloffre) n. comb.

DESCRIPTIONS

Gen. **Actinoporella** Gümbel in Alth, 1882 emend. Conrad *et alii*, 1974

?Actinoporella geredeensis n. sp.
Pl. 1, figs 1-6
(Holotype fig. 1)

Diagnosis: Thallus bears not dense verticils, consisting of 16-20 (?22) branches inclined towards the main axis with an angle of about 50-60 degrees. In the basal part branches are spherical or slightly oval and this portion is about 1/3 of their length. After the spherical part the branches are enlarged towards the outer surface, forming a narrow funnel-like part of each branch.

Dimensions: External diameter of the calcareous

envelope	0.54-0.715 mm
Main axis diameter	0.225-0.32 mm
Diameter of the basal spherical part of the branches	0.75 mm
Number of branches	16-20 (?22)

Remarks: The calcareous envelope occupies the proximal and middle part of the verticils. In the studied material there are scattered poorly preserved verticils. In transversal oblique section of the verticils this species is easy recognizable for its characteristic feature of the branches (Pl. 1, fig. 5). Also if these sections, shown in Pl. 1, figs. 1-6, are similar to the sections cutting the corona of *Actionoporella*, nevertheless this new species is only provisionally considered as *Actinoporella*.

Derivatio nominis: After Gerede, village of the Western Pontides, Northern Turkey.

Depository: Museo di Paleontologia, Università La Sapienza, Roma.

Holotype: NS 33-1 from sample ÇS 13, figured in Pl. 1, fig. 1.

Isotypes: figured in Pl. 1; NS 33-2 (fig. 2), NS 33-3 (fig. 3), NS 33-4 (fig. 4), NS 33-5 (fig. 5), NS 33-6 (fig. 6) Figs. 2-4, 6 from sample ÇS 13, fig. 5 from sample ÇS 8.

Type locality: Çerkeş-Sekinindoruk, ÇS section, near Çerkeş village, Western Pontides.

Age: Early Neocomian (Berriasian).

Actinoporella podolica (Alth)
emend. Conrad, Praturlon & Radoičić
Pl. 1, figs. 7-11

The specimens of *Actinoporella podolica* show different dimensions in the same assemblage.

In the Pontide sequences it ranges from the Berriasian-Valanginian in ÇS and ÇDS section where they are well developed, being more abundant in ÇS section, together with *Heteroporella lemmensis, Falsolikanella campanensis, Salpingoporella steinhauseri* and *Radoicicella bartheli.*

Gen. **Clypeina** Michelin, 1845, emend. Rezak, 1957

Clypeina parasolkani n. sp.
Pl. 2, figs 1-18
(Holotype fig. 3)

Diagnosis: *Clypeina* with a minute thallus morphologically very similar to *Cl. solkani* Conrad & Radoicic. The verticils have stretched oval fertile branches. Branches are slightly in lateral contact at the half or at 2/3 of their length, subhorizontal and a little asymmetrical in vertical section.

The verticils are incompletely calcified, except the last external portion of the branches. The main axis between consecutive verticils is very poorly calcified.

Dimensions: *Clypeina parasolkani* has considerably constant dimensions.

External diameter mm 0.38 - 0.44, the smallest verticils (D = about 0.24 mm) are very rare and considered as apical verticils, rare too are the larger verticils (D= about 0.55mm). Main axis diameter = 0.14 - 0.16 mm (in the smallest verticil = 0.08 mm, in the largest one = 0.22). The distance between consecutive verticils from the centre to the next centre = about 0.19. The number, of the branches per verticil 8 - 13, prevailing 10 - 11.

Remarks:- As suggested by its name, *Cl. parasolkani* has a near similarity and relationship with *Cl. solkani*, being very much smaller. The dimensions of the two species are clearly distinct, excluding the smaller apical verticils. Moreover as distinct from *Cl. solkani, Cl, parasolkani* has less variable dimensions.

Considering the average values of a large number of specimens of *Cl. solkani* and of *Cl. parasolkani*, the ratio is at least of 1/2 or more. Moreover the calcification of *Cl. parasolkani* is uniformly thin.

The verticils of *Cl. parasolkani* are very similar to the verticils of the Neocomian *Cl. radici* Sokač, with almost the same number of branches. However *Cl. radici*, having much greater distance between adjacent verticils and entirely coated by a solid calcareous sheet, cannot be confused with the smaller *Cl. parasolkani.*

From late Tithonian-Berriasian sequence of the Plassen Limestones of the Northern Alps, Steiger & Wurm (1980, Pl. 6, fig. 29) have named as *Salpingoporella annullata* a very good vertical section, with 16 verticils, of *Cl. parasolkani.*

Comparison among dimensions of *Cl. solkani* and *Cl. parasokani*:

	solkani after Bassoullet *et alii*	*solkani* from Çerkeş	*parasolkani* from Çerkeş
D=	0.52-1.2 mm	0.66-1.045 mm	0.24-0.44 (0.55) mm
d=	0.15-0.31 mm	0.22-0.38 mm	0.08-0.22 mm
h=	0.32-0.56 mm	0.35-0.38 mm	0.19 mm about
w=	8-16	8-18	8-13 (10-11)

Tab. 1 — Comparison among dimensions of *Cl. solkani* and *Cl. parasolkani*

Derivatio nominis: Greeck: *para* = close to *solkani* (from Solkan village near Gorizia, the type locality of the species *solkani*).

Depository: Holotype: NS 33-7 from sample AB 42, figured in Pl. 2, fig. 3.

Isotypes: figured in Pl. 2: NS 33-8 (fig. 1), NS 33-9 (fig. 2), NS 33-10 (fig. 4), NS 33-11 (fig. 5), NS 33-12 (fig. 6), NS 33-13 (fig. 7), NS 33-14 (fig. 8), NS 33-15 (fig. 9), NS 33-16 (fig. 10), NS 33-17 (fig. 11), NS 33-18 (fig. 12), NS 33-19 (fig. 13), NS 33-20 (fig. 14), NS 33-21 (fig. 15), NS 33-22 (fig. 16), NS 33-23 (fig. 17), NS 33-24 (fig. 18).

Figs. 1,4,7 from sample ÇS 6, figs. 2,5,6,8-16 from sample ÇS 10, fig. 17 from sample ÇS 7.

Type locality: Aktaş-Bunus, AB section (holotype); Çerkeş-Sekinindoruk, ÇS section (isotypes), near Çerkeş village, Western Pontides.

Age: Early Neocomian (Berriasian).

Occurrence: In studied limestones the verticils of *Cl. parasolkani* are found scattered, consequently on the weak calcification between adjacent verticils.

By facies analysis the life environment of *Cl. parasolkani* was localized in a closed lagoon, since the verticils are enveloped by mud and penecontemporaneously resedimented.

Clypeina cf. **jurassica** Favre, **Cl. marteli** Emberger
Cl. aff. **marteli** Emberger, **Cl. catinula** Carozzi,
Cl. solkani Conrad & Radoicic
Pl. 4, figs 1-8

The genus *Clypeina* is represented by other known species in addition to *Clypeina parasolkani.*

Clypeina jurassica which normally has a large geographical distribution with abundant presence of specimens in the late Jurassic, here in the Pontide sequence is very rare and uncertain.

Always rarely other species have been found such as *Cl. marteli, Cl.* aff. *marteli, Cl.* cf. *catinula. Cl. solkani* is more frequent, nevertheless *Cl. parasolkani* n. sp. is dominant among all *Clypeina* species.

Gen. **Cylindroporella** Johnson, 1954

Cylindroporella cf. **arabica** Elliot
Pl. 7, fig. 6

This is related to *C. arabica* from its shape and dimensions: D = 0.52, d = 0.137, ds = 0.11.

Gen. **Falsolikanella** Granier, 1986

Falsolikanella campanensis (Azema & Jaffrezo) Granier
Pl. 7, figs 1, 2, 4, 5

It shows poorly preserved verticils only in the sample C 10.

Gen. Heteroporella (Praturlon), 1966 emend. Ott. 1968

Heteroporella lemmensis (Bernier) Bassoullet *et al.* (see list)
Pl. 8, figs 1, 2, 6

Its presence has been observed in few thin sections of the samples ÇS 11 and ÇDS 11.

Gen. **Gyroporella** Gümbel, 1872 emend. Benecke, 1878

Gyroporella aff. **lukicae** Sokač & Velić
Pl. 12, fig. 4

The figure Pl. 12, fig. 4 has a close resemblance to *Epimastopora* group, nevertheless is more close to *G. lukicae*.

?Gyroporella sp.
Pl. 12, figs 1, 3

It is not unfrequent to find wall fragments as shown in Pl. 12, figs. 1,3, closely resembling to *Gyroporella* sp. debris.

Gen. **Linoporella** Steinmann, 1899 emend. Bassoullet *et alii*, 1978

Linoporella cf. **gigantea** (Carozzi) emend.
Pl. 9, fig. 5, text-fig. 1

Macroporella gigantea is rightly considered to be a species of the genus *Linoporella* by Bassoulet *et alii* (1975), but it is not justified to be regarded as a junior synonym of *Linoporella capriotica* (Oppenheim). Comparing the original figure of *Macroporella gigantea* Carozzi with the figure of *Linoporella capriotica* published by Steinman (1889), both republished by Bassoullet *et alii* (1978, Pl. 17, figs. 4, 3) is clear they are two different species. Therefore the species *gigantea* is a valid species of the genus *Linoporella* and here is emended as follows:

Fig. 1 — *Macroporella gigantea* Carozzi, holotype, × 20, after Carozzi 1955. In the upper verticil, at the top on the left, tertiary branches are evident.

Diagnosis: The regularly spaced verticils consist of about 24 branches. The relatively thin tubular branches bear, probably 4, shorter and thinner second order branches. Tertiary branches are of the same length or a little longer than the secondary branches.

Calcification is massive. Though often in the worn calcareous tubes there are no pores of the third order, being the original calcification developed also in the tertiary branches.

Remarks: Linoporella gigantea differs from *L. capriotica* by its smaller number of branches per verticil, and by its greater inclination. The two species have primary branches with a diameter somewhat unvarying throughout its length, longer than the secondary ones, the tertiary branches are equal or longer than the secondary ones. The presence of tertiary branches in *L. gigantea* is evident in the original fig. 4, (Carozzi 1955) here reproduced in fig. 1. Also in

L. capriotica in the Steinmann's figure, a secondary branch is subdivided in third order branches.

Linoporella svilajaensis Sokač & Velić
Pl. 6, figs 1-8

svilajensis was erroneously named by the authors, here the correct name is given by latinization of the name Svilaja (mount in Jugoslavia) = *svilajaensis*.

This species was known only at the type locality in the Dinarids, now has been found also in the Pontides at Aktaş (A sequence).

The calcareous tubes are recrystallized and micritized; consequently some characters of the tube are lost, that is those of the external part and those around the main axis; about twenty thin sections have shown the following features.

Long, cylindrical thallus, brings verticils with first and second order branches; the distal part of the calcareous tube is not preserved, consequently the tertiary pores are not evident. Primary branches are inclined towards the main axis with an angle of 50-60 degrees. Each primary branch is subdivided in secondary thin branches. The thallus was calcified from the main axis till the distal part of the secondary branches; which part now is more or less subsequently lost. The calcification around the main axis is often limited to a narrow part around the base of the primary branches.

Causing the high dissolution around the base and along the proximal part of the primary pores, the axial cavity often shows an appearance falsely necklace-shape or irregular (Pl. 6, fig. 1).

Therefore to this characteristic Sokač and Velić (1976) gave a different explanation considering the primary branches with "more or less pronounced inflection at the base" and "basal swelling in the primary branches, which must be regarded as new characteristic, affecting otherwise typically *Linoporella*-shape branches". This is the reason for which this species is doubtfully attributed to the genus *Linoporella*.

One must take into consideration the fact that the moniliform contour of the main axis in some dasyclad species is frequently a secondary feature, for istance in *Jodotella veslensis* L. & J. Morellet, sometimes also in *Montiella elitzae* (Bakalova) and in *Acroporella radoicicae Praturlon.*

In the original diagnosis of this species the «primary branches are arranged in verticils approximately perpendicular to the longitudinal axis of the thallus, or only slightly inclined, thus forming very small angle with the horizontal plane». From the sections of the figured type specimens (Pl. 1, figs 1, 2; pl. 2, figs 1, 2, 4, 5) the angle to the horizontal plane seems to be about 30-35 degrees.

Linoporella svilajaensis is similar to *L. gigantea* (Carozzi), which is emended here in this paper, but *L. svilajaensis* is different for a greater interval between the diameters of the primary and secondary branches and for the increasing of the primary branch diameter towards the outside.

Moreover the specimens from Capri island (Italy), considered *Dissocladella intercedens* Bakalova by Barattolo & Pugliese (1987) for similarity, probably belong to *Linoporella svilajaensis*, its preservation is clearly better.

Dimensions: Max length observed = mm 1.10
External diameter of the calcareous tube = mm 0.67-2.75
Axial cavity diameter = mm 0.825-1.10
Max axis diameter = mm 0.66-0.77
Distance between consecutive verticils from the centre to the next centre = mm 0.32-0.44
Length of the primary branches = mm 0.275-0.37
Diameter of the primary branches = mm 0.08-0.11
Diameter of the primary branches immediately below the branching point = mm 0.055 (Pl. 6, fig. 8)
Length of the secondary branches (preserved portion) = mm 0.27-0.32
Diameter of the secondary branches = 0.050-0.060
Number of the primary branches per verticil = (?18) 20-26. After Sokač & Velić last values are higher (28-35). About 30 branches per verticil also occurr in the specimens from Capri.

Gen. **Macroporella** Pia, 1912 emend Bassoullet *et alii*, 1978

Macroporella praturloni Dragastan
Pl. 7, fig. 3

It is very rare, only in the shelf facies (Ai 6 - Aktaş-Gölcük).

Gen. **Pseudoclypeina** Radoičić, 1969

? **Pseudoclypeina** sp.
Pl. 8, fig. 7

Very rare doubtful specimens.

Gen. **Pseudocymopolia** Elliott, 1970

Pseudocymopolia jurassica Dragastan
Pl. 9, fig. 6

Rare specimens in the late Jurassic of the shelf sequence (Ai 6 and Ai 11 - Aktaş-Gölcük).

Pseudoepimastopora Endo, 1960 - **Epimastopora** (Pia, *1923* Johnson, *1964* group
Pl. 12, figs 1-3, 5-9

Calcareous wall fragments of different species of these two genera have been grouped (ÇDS 19, A 20, A 48).

Gen. **Radoiciciella** Dragastan, 1971

Radoiciciella bartheli (Bernier) Granier
Pl. 9, figs 1-4

The thallus is poorly calcified, and is known only in debris, as in other species of this genus (Granier 1986).

The fragments are represented by the primary branches with tufts of secondary branches sometimes broken, but are very easily recognized, even when they are badly preserved as in ÇS 10 of Early Neocomian.

At some levels some debris of *Radoiciciella* sp. seem to be another species.

Gen. **Salpingoporella** Pia, in Trauth, 1918

This is represented by a great number of species, besides the new species *S. circassa*, described below. They are known and unknown species, but insufficiently represented to be described. They are:

S. annulata Carozzi (Pl. 5, figs 3, 4) ÇS 11, AB 44, ÇDS 5 and 18.

S. aff. *enay* Bernier (Pl. 10, figs 4, 7, 8) ÇDS 5 and 18.

S. etalloni Bernier (Pl. 10, figs 1-3) ÇS 30, A 27, Düm special.

S. johnsoni (Dragastan) Conrad, Praturlon & Radoičić (Pl. 11, figs 1, 2) A 33 ...

S. aff. *johnsoni* (Dragastan) (Pl. 11, figs 4, 5) A 33.

S. cf. *pigmaea* (Gümbel) Pia (Pl. 10, figs 5, 6) ÇDS 18.

S. steinhauseri Conrad, Praturlon & Radoičić (Pl. 5, figs 5, 6, 10) ÇS 6 and 12, ÇDS 14 and AB 30.

S. sp. 1 (Pl. 5, fig. 8) AB 40.

S. sp. 2 (Pl. 5, fig. 6) ÇS 6.

S. sp. 3 (Pl. 5, fig. 7) ÇS 6.

Salpingoporella circassa n. sp.
Pl. 4, figs 1-18, Pl. 5, figs 1, 2
(Holotype Pl. 4, fig. 1)

Diagnosis: *Salpingoporella* with close verticils of a few branches, flattened and horizontally enlarged. The branches are regularly alternate in the neighboring verticils. The calcification is well developed around the main axis as far as the distal part of the branches, where branches are in contact with each other.

Dimensions: External diameter of the calcareous tube = 0.165-0.38 mm
Main axis diameter = 0.06-0.14)
Height of verticils (distal part) = 0.05-0.07 mm
Number of branches per verticil = 5-6.

Remarks: S. circassa together with *S. steinhauseri*, *S. milovanovici* and *S. johnsoni* belong to the group of the smallest *Salpingoporella*. *S. circassa* differs from the others in having branches perpendicular to the axis, different shape and low number of branches per verticil.

In the late Jurassic and early Cretaceous, other small *Salpingoporella* are known, but not described, with a low number of branches and a common weak calcification (pro parte *S. hispanica* group, Radoičić 1986). Recently Granier (1986) erected the new genus *Apinella* with a low number of branches. But the alone character of the low number of branches is considered inadequate for the erection of the new genus *Apinella*. For this reason the new species *circassa* is considered belonging to the genus *Salpingoporella*.

Derivatio nominis: The name of the new species is related to the Çerkeş village, which name derived from the Circassian people; latin feminine adjective: *circassa*.

Depository: Museo di Paleontologia, Università La Sapienza, Roma.

Holotype: NS 33-25 from sample ÇS 6, figured in Pl. 4, fig. 1.

Isotypes: figured in Pl. 4: NS 33-29 (fig. 2), NS 33-26 (fig. 3), NS 33-30 (fig. 4), NS 33-31 (fig. 5), NS 33-32 (fig. 6), NS 33-27 (fig. 7), NS 33-33 (fig. 8), NS 33-28 (fig. 9), NS 33-24 (fig. 10), NS 33-38 (fig. 11), NS 33-35 (fig. 12), NS 33-39 (fig. 13), NS 33-40 (fig. 14), NS 33-41 (fig. 15), NS 33-42 (fig. 16), NS 33-36 (fig. 17), NS 33-37 (fig. 18); and in Pl. 5: NS 33-43 (fig. 1), NS 33-44 (fig. 2).

All isotypes are from sample ÇS 6.

Type locality: Çerkeş-Sekinindoruk, ÇS section, near Çerkes, village, Western Pontides.

Age: Early Neocomian (Berriasian).

Occurrence: *S. circassa* is found abundantly together with *Clypeina solkani*, *Cylindroporella arabica*, *Actinoporella podolica* and *Salpingoporella steinhauseri*.

Gen. **Sarfatiella** Conrad & Peybernes, 1963 -
Gen. **Cylindroporella** Johnson, 1954

"**Sarfatiella - Cylindroporella**" group
Pl. 7, fig. 7

In the same stratigraphical level containing *Cylindroporella* cf. *arabica*. Rarely found specimens as shown in Pl. 7, fig. 7, are characterized by small spherical fertile ampullae upon a peduncle a little inclined.

Dimensions of the figured specimen: D = 0.37, d = 0.16, ds = 0.08.

Gen. **Triploporella** Steinmann, 1880
emend. Bassoullet *et alii*, 1978

?Triploporella embergeri (Bouroullec & Deloffre)
Pl. 2, figs 3, 4

"Dasycladacea" *nisi* has been described in 1969 as a valid taxon. Because in the meantime the authors found this species having secondary branches, the species *nisi* has been typified provisionally as *Triploporella nisi* (Radoičić 1972). Contemporaneously Pecorini (1972) presented the same species as *?Heteroporella* sp., showing three transversal sections (figs 4 e, f, g) with clearly secondary branches.

Indeed *Triploporella nisi* is a junior synonym of *Macroporella embergeri* Bouroullec & Deloffre. The generic attribution of this species is a still open question. Probably it is a new genus in which may be included also *Macroporella espichelensis* Delofre & Ramalho. Now its provisional attribution to *Triploporella embergeri* seems more suitable.

In the Western Pontides its presence has been observed as rare specimens only in the sample AB 42 of the AB section (Aktaş-Bunuş).

Some species have not been named because they are uncompletely documented. Some of them are figured in Pl. 11, figs 3, 6-8 and Pl. 8, fig. 5.

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For other references see in: BASSOULLET *et alii*, 1978.

PLATE 1

Figs 1- 6 — *?Actinoporella geredeensis* n. sp., × 80.
1) Longitudinal oblique section. Holotype.
2, 6) Transverse slightly oblique sections through the lower and middle part of the branches. Isotypes.
3, 4) Oblique sections through the proximal part of the verticils. Isotypes.
5) Transverse oblique section with sphaerical part of the branches, clearly visible, and relatively large connection between branches and main axes. Isotype.

Figs 7-11 — *Actinoporella podolica* (Alth) Conrad, Praturlon & Radoičić, × 30.
Different oblique (8-10), tangential (7) and vertical (11) sections.

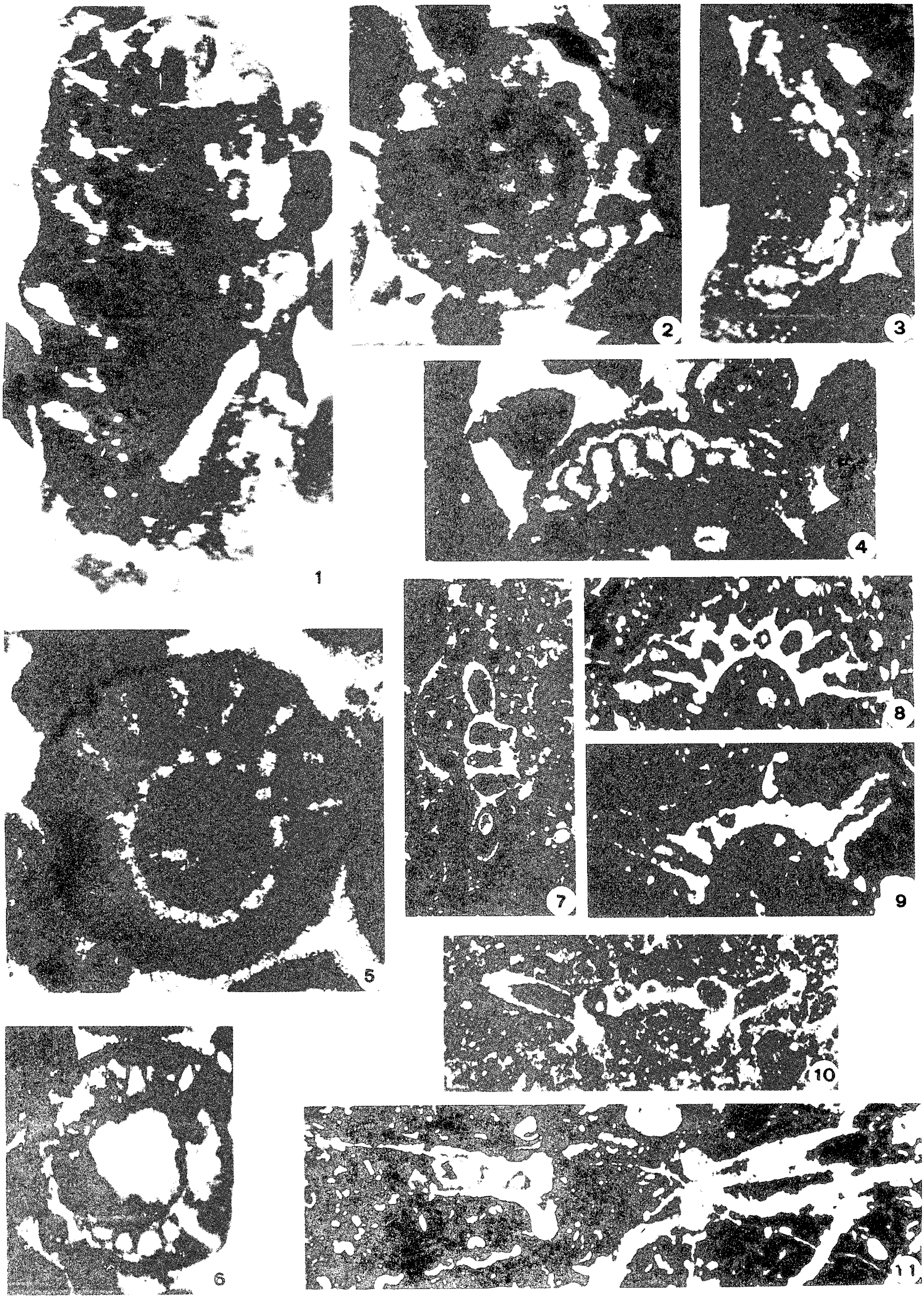
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PLATE 2

Figs 1-18 — *Clypeina parasolkani* n. sp., × 80.
1) Longitudinal oblique section. Holotype.
1), 5), 6) 8), 15), 18) Different transverse more or less oblique sections. Isotypes.
4), 7) Tangential oblique and subaxial sections. Isotypes.
13), 14), 16 on the left) Vertical sections. Isotypes.
2), 9), 10)-12), 16 on the right), 17) Different tangential oblique sections. Isotypes.

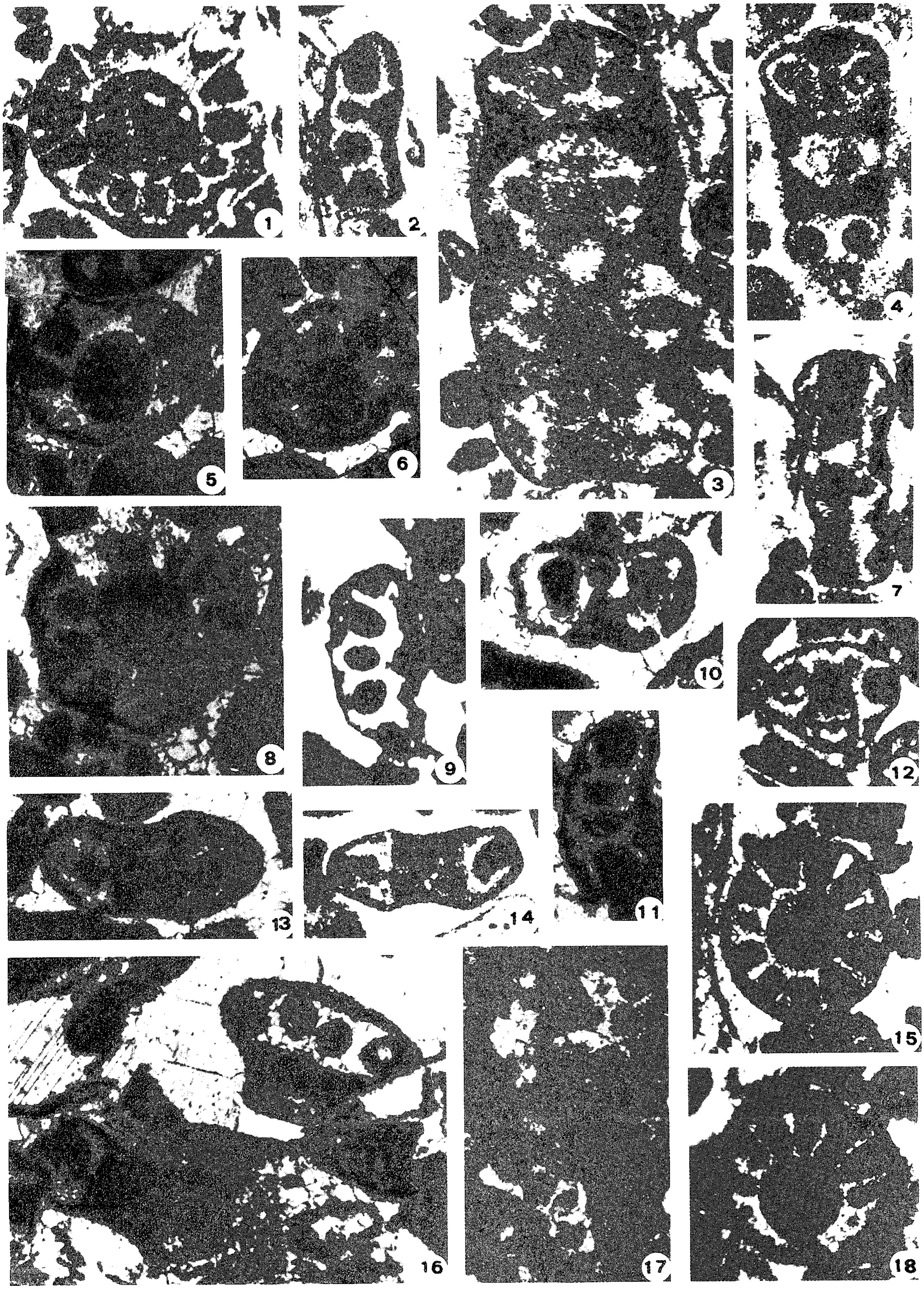
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PLATE 3

Figs 1-4 — *Clypeina solkani* Conrad & Radoičić. × 80.
1, 4) Different oblique sections.
2, 3) Transverse sections.
Fig. 5 — *Clypeina* aff. *marteli* Emberger. Vertical section. × 80.
Fig. 6 — *Clypeina* cf. *jurassica* Favre. Oblique section. × 35.
Fig. 7 — *Clypeina* cf. *marteli* Emberger. Trasnsverse oblique section. × 80.
Fig. 8 — *Clytpeina* cf. *catinula* Carozzi. Trasnsverse oblique section. × 80.

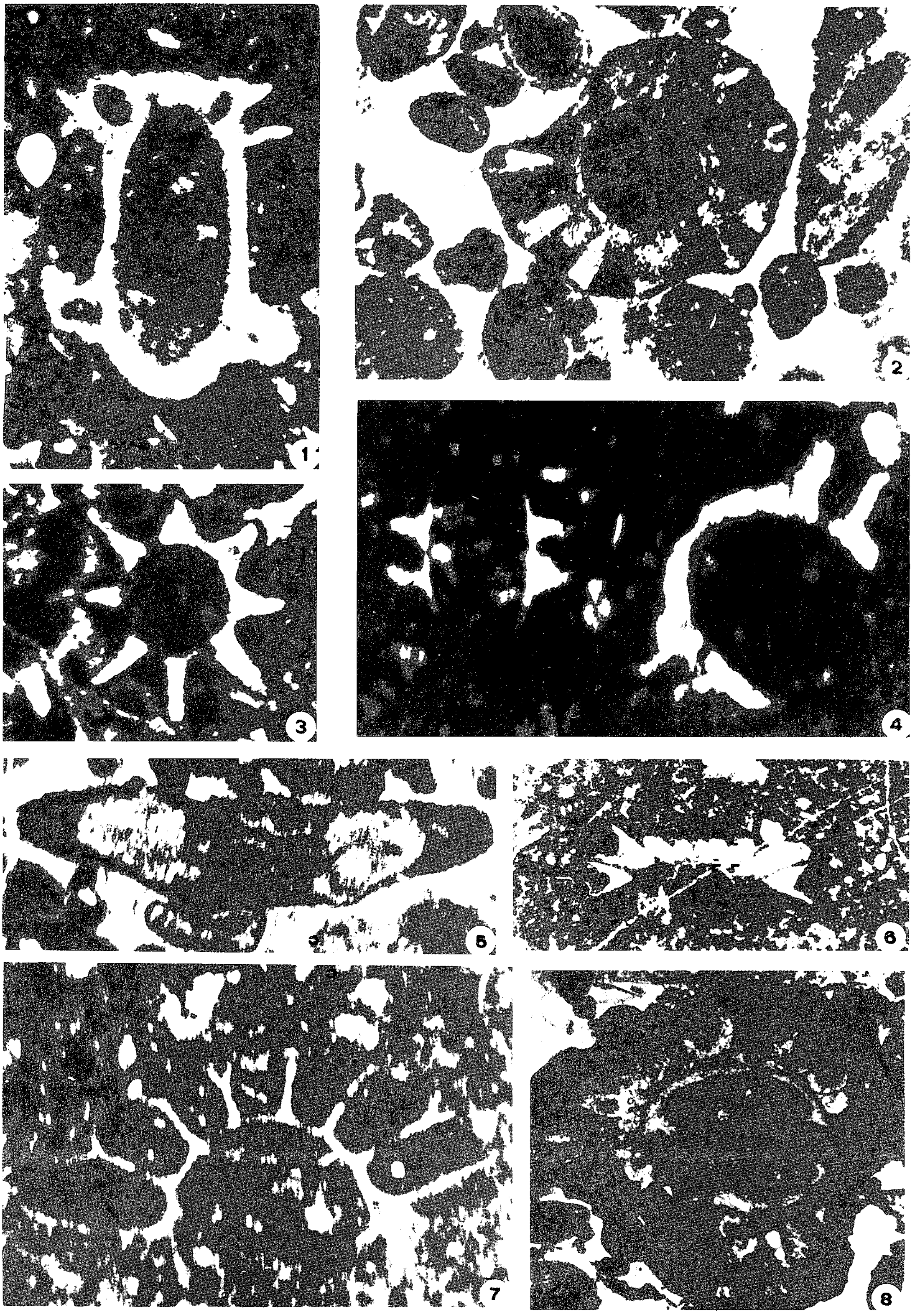
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PLATE 4

Figs 1-18 — *Salpingoporella circassa* n. sp., × 80.
1) Longitudinal oblique section. Holotype.
2-4, 7, 8) Longitudinal sections. Isotypes.
5, 16-18) More or less oblique sections. Isotypes.
11, 12, 14, 15) Tangential sections. Isotypes.
9, 10, 13) Transverse slightly oblique sections. Isotypes.

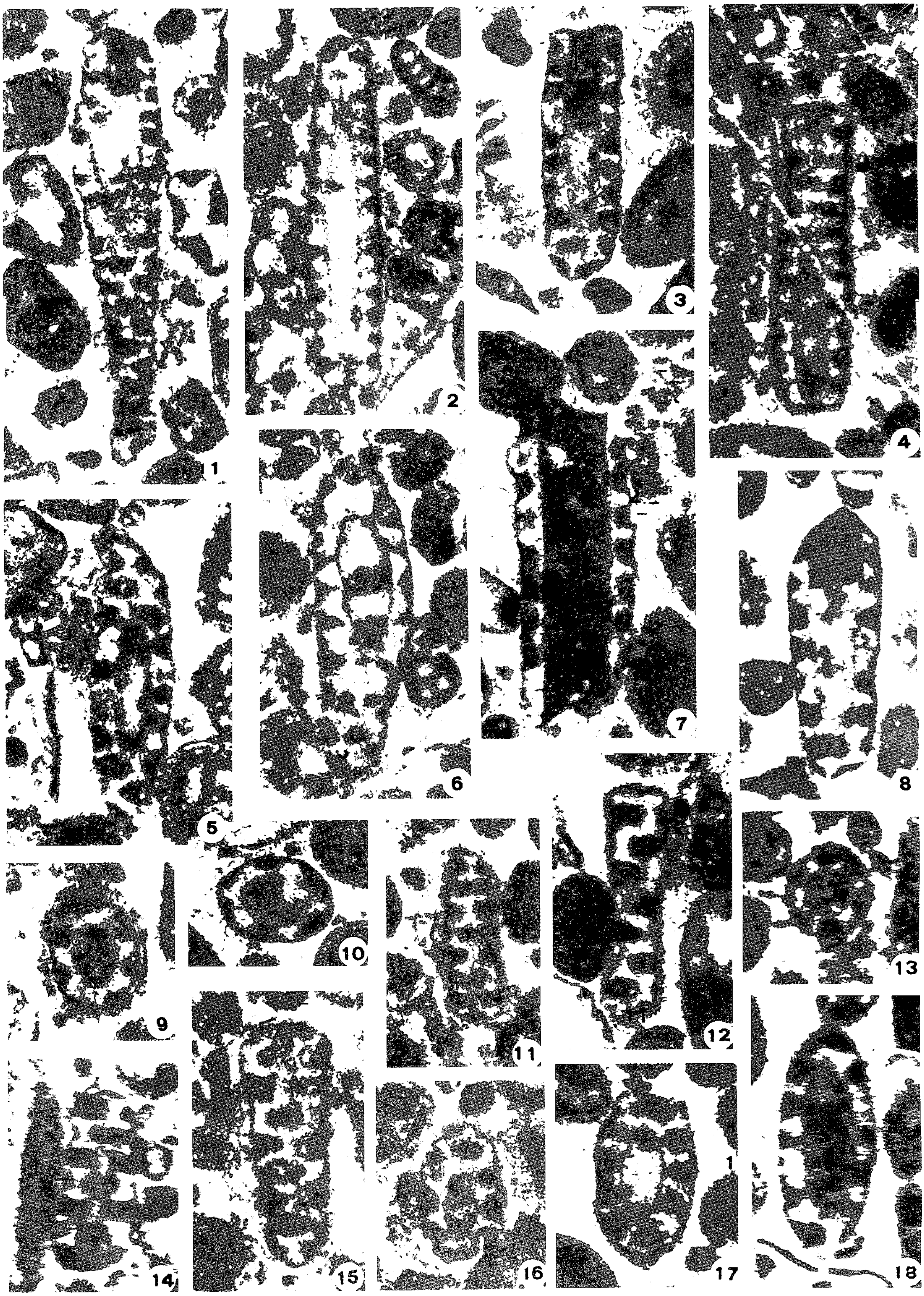
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PLATE 5

Figs 1-2 — *Salpingoporella circassa* n. sp. Transversal oblique sections. Isotypes, × 80.
Figs 3-4 — *Salpingoporella annullata* Carozzi. × 20.
Figs 5, 9, 10 — *Salpingoporella steinhauseri* Conrad, Praturlon & Radoicic. Longitudinal more or less oblique sections. × 80.
Fig. 6 — *Salpingoporella* sp. 2. Tangential section. × 85.
Fig. 7 — *Salpingoporella* sp. 3. Transverse section. × 80.
Fig. 8 — *Salpingoporella* sp. 1. Longitudinal oblique section. × 80.

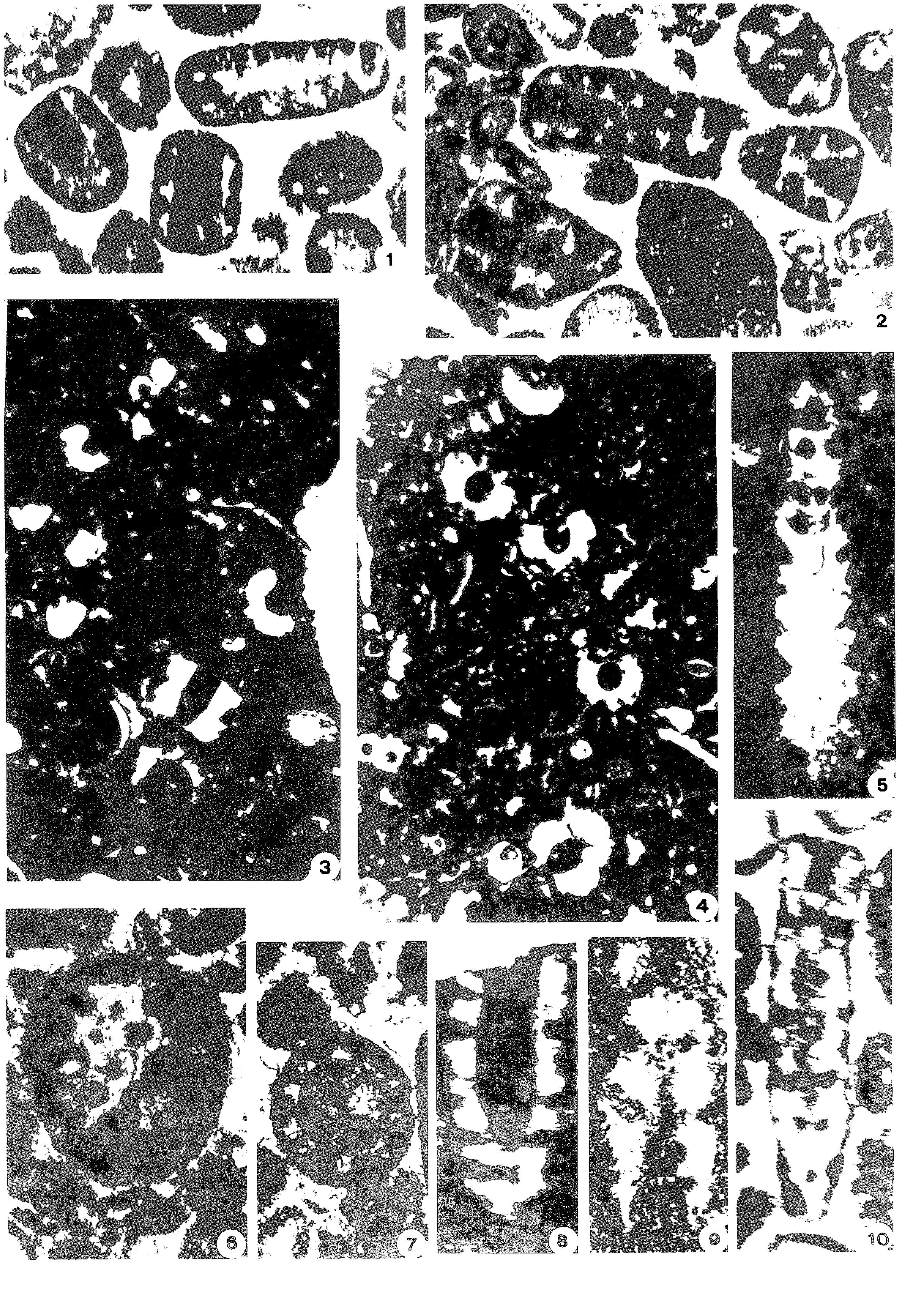
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PLATE 6

Figs 1-8 — *Linoporella svilajaensis* Sokač & Velić.

1) Longitudinal oblique section. Moniliform aspect of the axial cavity is due to the dissolution. The progressive enlargement of the primary branches is clearly shown in the lower part of the figure. × 15.

2) Tangential section. × 15.

4) Oblique section. × 15.

3, 5) Oblique sections with four secondary branches. × 35.

6) Tangential section of a fragment with two tufts of secondary branches. × 35.

7) Detail of a transverse section. × 35.

8) Detail of a poorly preserved specimen in tangential oblique section where are shown inside the squares: a) transverse section of the middle part of the primary branches, b) transverse section of the upper parts of the primary branches immediately below the brancing, c) a tuft of the tertiary branches. × 60.

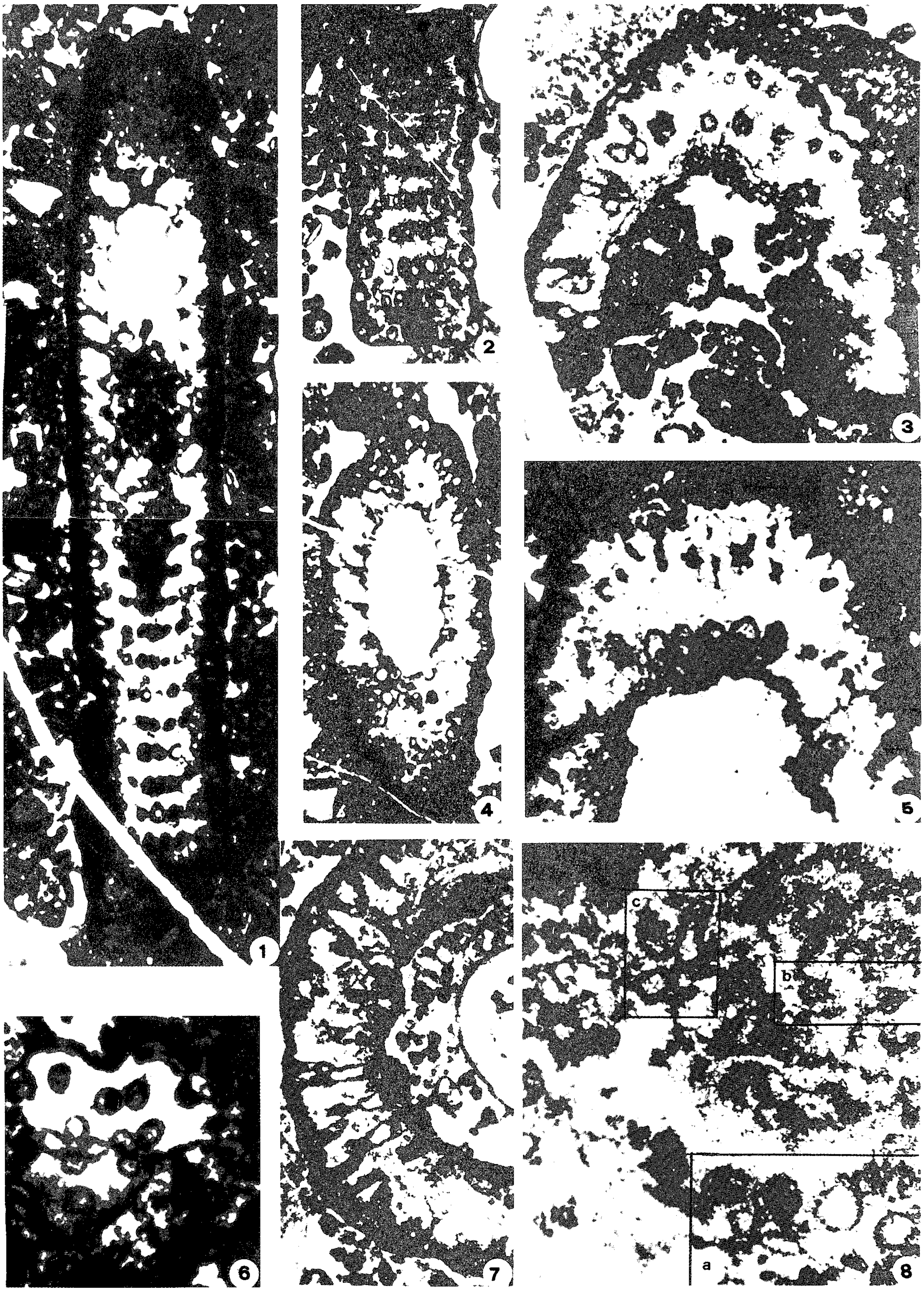
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PLATE 7

Figs 1, 2, 4, 5 — *Falsolikanella campanensis* (Azema & Jaffrezo) Granier.
1) Transverse section. × 95.
2) Slightly oblique vertical section. × 80.
4, 5) Oblique sections. × 80.

Fig. 3 — *Macroporella praturloni* Dragastan. Recristallized specimen. × 22.

Fig. 6 — *Cylindroporella* cf. *arabica* Elliot. Oblique vertical section. × 85.

Fig. 7 — *"Sarfatiella - Cylindroporella"* Longitudinal section. × 85.

Fig. 8 — *Teutloporella* sp. Vertical oblique section. × 80.

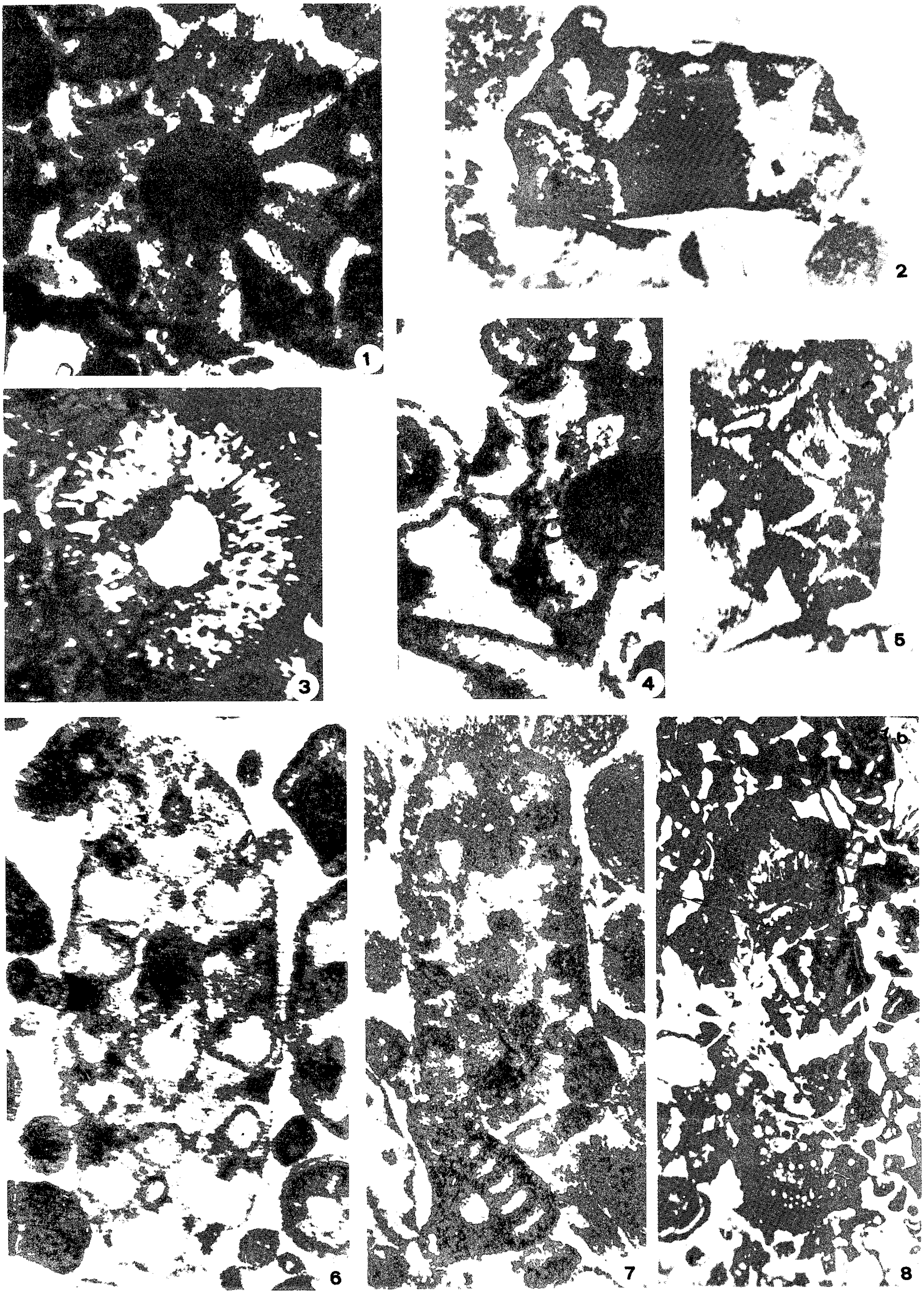
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PLATE 8

Figs 1, 2, 6 — *Heteroporella lemmensis* (Bernier) Bassoullet, Bernier, Conrad, Deloffre & Jaffrezo. × 70.
1) Tangential section.
2) Vertical oblique section.
6) Transverse section.

Figs 3, 4 — *?Triploporella embergeri* (Bouroullec & Deloffre) n. comb. × 35. (3) Transverse section, (4) Vertical oblique section.

Fig. 5 — Indetermined Dasyclad in oblique section × 35.

Fig. 7 — ? *Pseudoclypeina* sp. Section through a branch. × 75.

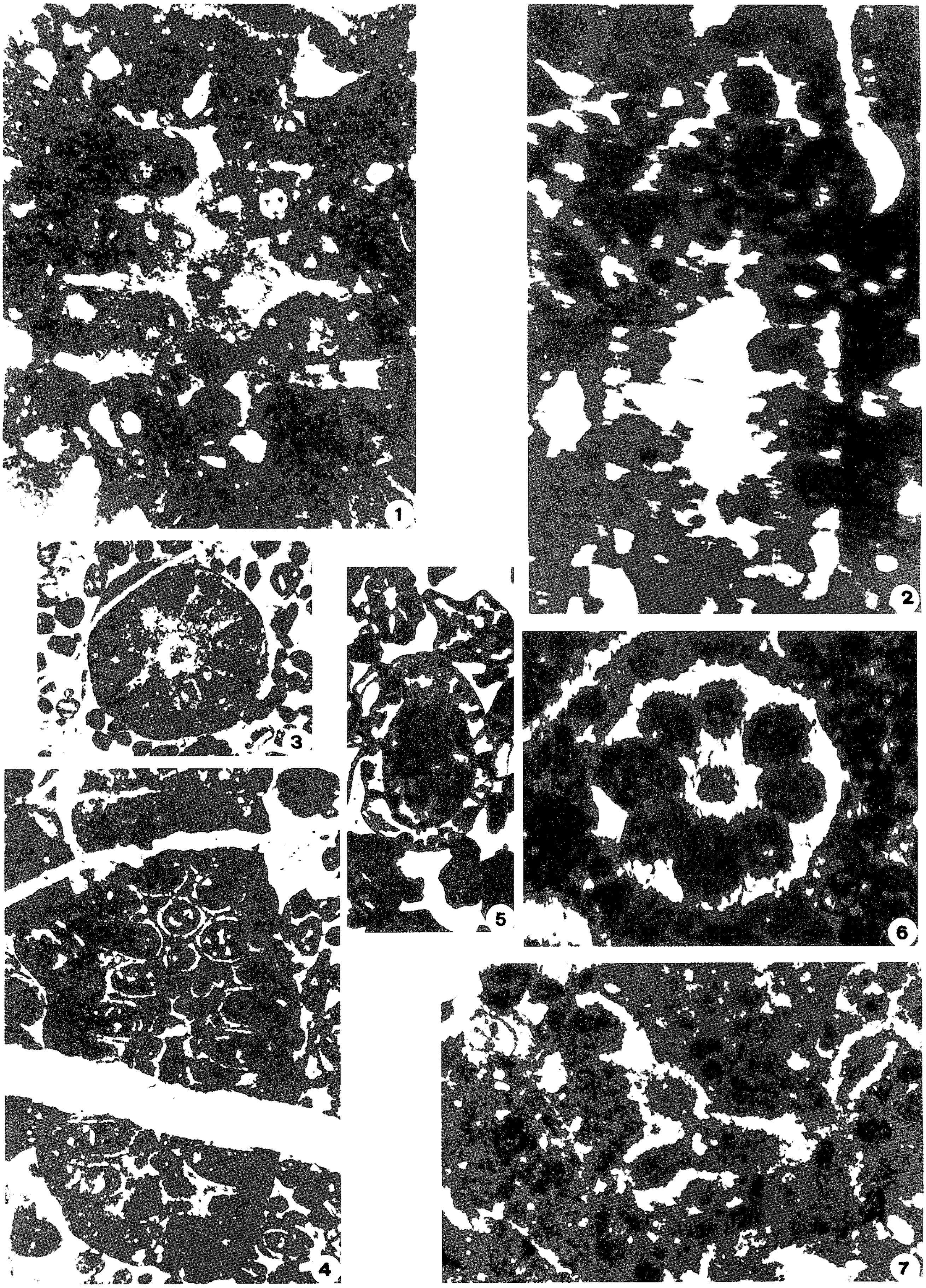
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PLATE 9

Figs 1-4 — *Radoiciciella bartheli* (Bernier) Granier. Oblique sections. × 90.
Fig. 5 — *Linoporella* cf. *gigantea* (Carozzi) emend. Vertical section of a recristallized specimen. Only the ghosts of the branches are visible. × 25.
Fig. 6 — *Pseudocymopolia jurassica* Dragastan. Tangential oblique section through three verticils. × 25.

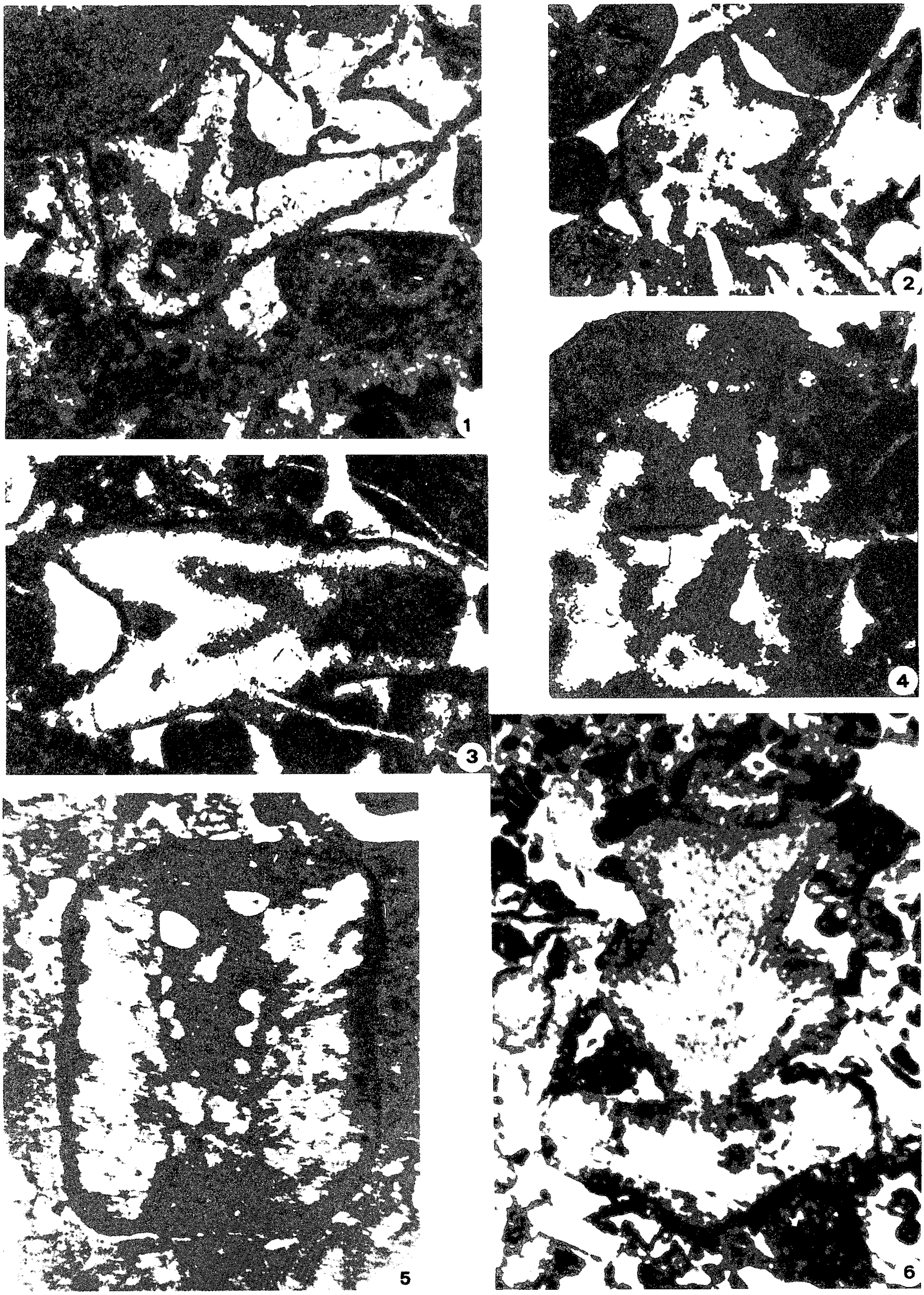
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PLATE 10

Figs 1-3 — *Salpingoporella* cf. *etalloni* Bernier. × 80.
1) Longitudinal oblique section.
2, 3) Oblique transverse sections.
Figs 4, 7, 8 — *Salpingoporella* cf. *enayi* Bernier. × 30.
4, 8) Longitudinal slightly oblique sections.
7) Transverse section.
Figs 5, 6 — *Salpingoporella* cf. *pigmaea* (Gümbel) Pia. × 40.
5) Tangential section.
6) Vertical oblique section.

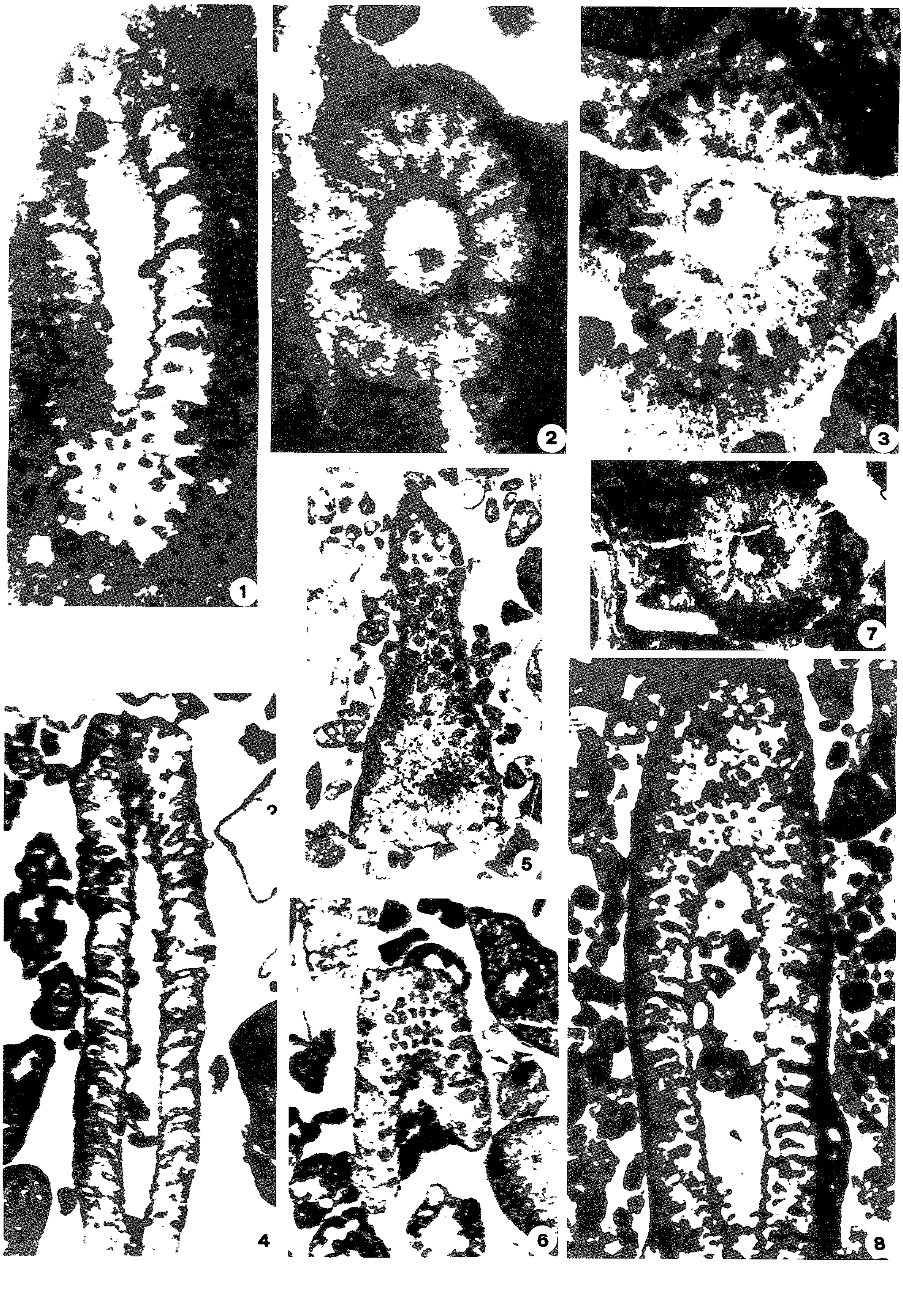
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PLATE 11

Figs 1, 2 — *Salpingoporella johnsoni* Dragastan. Vertical oblique sections. (1) × 30. (2) × 45.
Fig. 3 — Indetermined Dasyclad in transverse oblique section. × 80.
Figs 4, 5 — *Salpingoporella* aff. *johnsoni* Dragastan.
4) Transverse section. × 80.
5) Longitudinal section. × 80.
Figs 6-8 — Fragments of a relatively large indeterminated Dasyclad. 6) × 75. 7, 8) × 85.

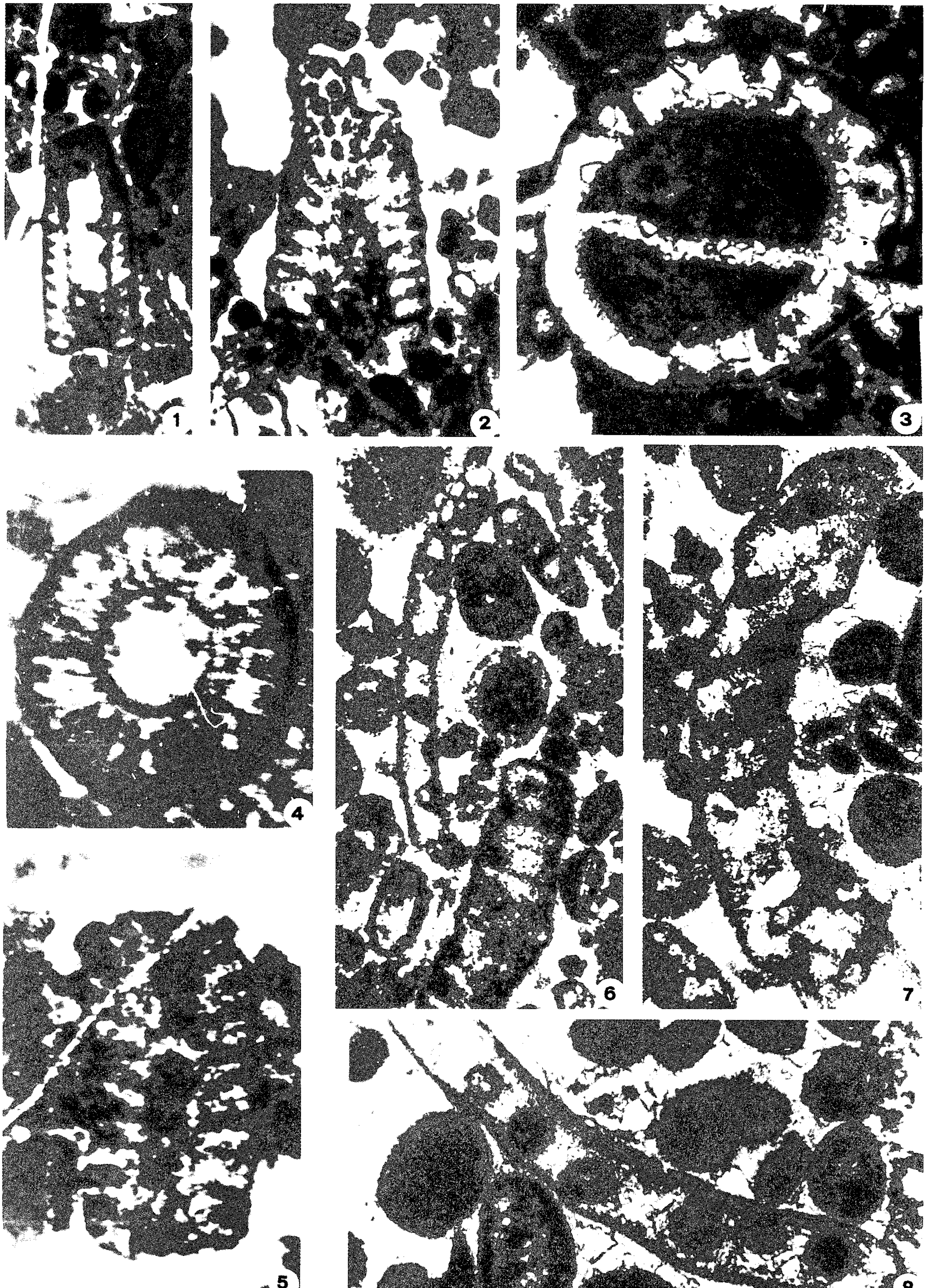
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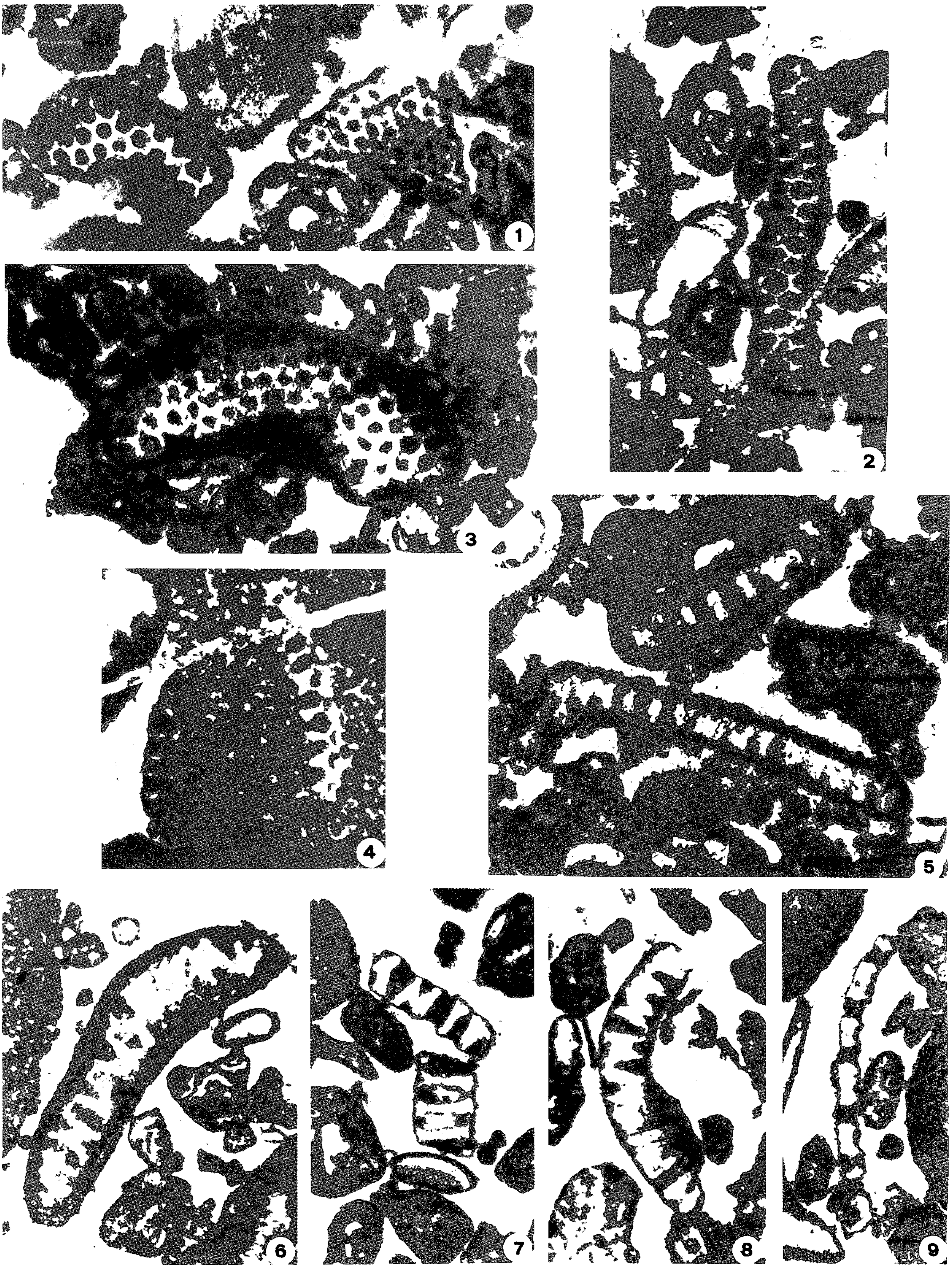
PLATE 12

Figs 1, 3 — *?Gyroporella* sp. Tangential section. Wall fragments corresponding to vertical oblique sections. × 40.
Figs 2, 5-9 — «*Pseudoepimastopora - Epimastopora*» group, fragments. × 40.
Fig. 4 — *Gyroporella* aff. *lukicae* Sokač & Velić. Vertical oblique section. × 40.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