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CYMOPOLIA LONGISTILA N. SP., A NEW CALCAREOUS ALGA (DASYCLADACEAE) FROM THE LOWER CRETACEOUS OF THE DINARIC MOUNTAINS

With 2 figs. in text and 2 plates

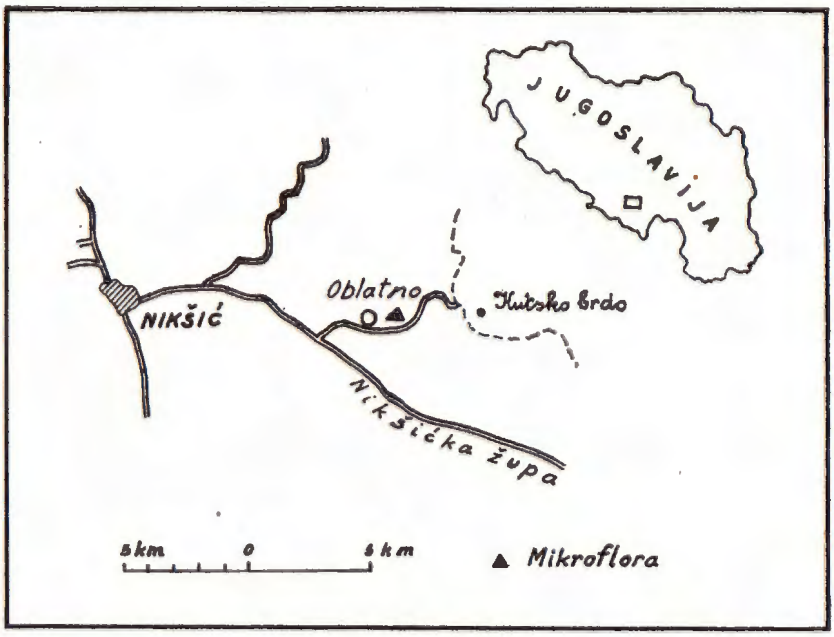
A new species of the genus *Cymopolia*, deriving from the Lower Cretaceous of Nikšić Župa, Crna Gora (Montenegro), is described. It is characterized by having the primary branches thickened at their distal ends, wherefrom secondary branches issue laterally, following the direction of the primary branches. A pear-shaped sporangium grows out of the thickened part of the primary branch.

The species described below was found in a sample of the Lower Cretaceous algal limestone, taken during the stratimetric surveying of the rock series at Nikšić Župa, made by the geologic group of the Industroprojekt firm.

In the course of micropaleontologic determinations of collected materials, made by Mrs. V. Bauer and Mrs. Z. Velimirović, sections of peculiar and well preserved calcareous algae were noticed and later forwarded to us for further treatment. We take this opportunity to address once again our cordial thanks to Mrs. Bauer and Mrs. Velimirović for the materials they put at our disposal, enabling us in this way to give the description of the new species. Other calcareous algae, the presence of which has been recorded as found in this sample, are now under treatment, so the results that will be obtained will be published later.

In recent years more detailed descriptions of the genus *Cymopolia* were published by I. Gušić (1967) and G. F. Elliott (1968), so no need exists to repeat it here.

Family: Dasycladaceae
Tribe: Neomereae Pia, 1927
Subtribe: Cymopoliinae Pia, 1927
Genus: *Cymopolia* Lamouroux, 1816



Text – fig. 1. Locality map of species *Cymopolia longistila* n. sp., Nikšićka Župa.
Sl. 1. Geografska skica nalazišta vrste *Cymopolia longistila* n. sp. u Nikšićkoj Župi.

Cymopolia longistila n. sp.

Plate I–II

Origin of name (Derivatio nominis): The species has been named after very easily noticeable long and thin primary branches.

Type locality (Locus typicus): Oblatno, Nikšićka Župa, Montenegro (Crna Gora).

Type stratum (Stratum typicum): poorly recrystallized organogenic algal limestone of the Lower Cretaceous.

Syntypes: Specimens numbered NŽ – 122, stored at the Institute of Geology, Zagreb.

Diagnosis: Fragments of cylindrically shaped calcareous thallus built up of fine-grained cryptocrystalline calcite. From their very base the thin primary branches gradually thicken towards their distal parts and enlarge at once to form a thickening with four secondary branches. These secondary branches being half as long as the primary branches are either vertical to the thallus or slightly bent to each other and have thickened terminations. Pear-shaped sporangia come out of the distal parts of the primary branches, inbetween the secondary branches.

Description:

The presented material and the one we disposed with for our determination suggest short fragments of a cylindrical calcareous thallus. The calcareous thallus is made up of cryptocrystalline yellowish calcite. The main stem makes one third of the entire diameter (D), showing solid and sharp edges in its sections (pl. I, fig. 1 and 2). Nothing exact can be told about the shape of the main stem and eventual alterations along the longitudinal axis, as no longitudinal section was available. The completely calcified wall of the calcareous tube displays two calcification layers which are more or less clearly distinguishable, i. e.: the inner brighter layer with its thickness corresponding to the length of the primary branches, and the outer darker layer, much thinner, the thickness of which corresponds to the length of the secondary branches (pl. I, fig. 1, 2 and 4). The outer darker layer is due to four times as many secondary branches as the primary ones, whereby it contains much more organic substance. No great differences in size have been noticed to make possible a distinction between the analysed specimens.

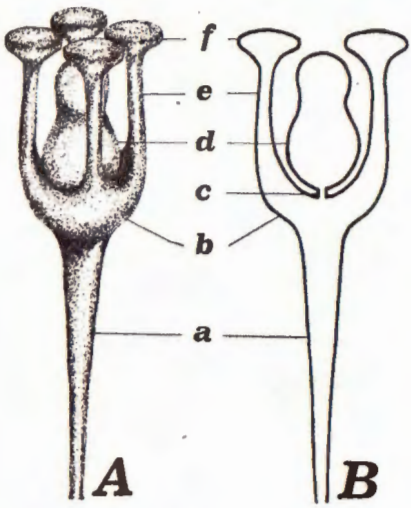
Dimensions in mm:

Outer diameter of the thallus (D)	1.56–2.37
Inner diameter of the thallus (d)	0.56–0.82
Thickness of calcareous wall (s)	0.48–0.96
Distance betwen whorls (h)	0.07–0.10
Length of primary branches	0.29–0.63
Length of secondary branches	0.18–0.33
Diameter of primary branches at the base (p)	cca 0.01
Diameter of primary branches in distal part (p_1)	0.03–0.05
Diameter of sporangia (ds)	cca 0.15

What this new species is characterized by is the structure and the shape of its branches, whereby it is a member of the genus *Cymopolia* and can be easily distinguished from other species of that genus.

Since only oblique sections were available for our determination, the position of branches in relation to the main stem could not have been perfectly established though it appears to be vertical to the surface of the calcareous tube, or at least very close to that position. Through very fine pores (pl. I, fig. 1) primary branches come out and gradually thicken (pl. I, fig. 2, 4 and 5) towards their distal parts. In the peripheral parts of the second third of the wall thickness, the primary branches get thickened suddenly to make forms depending upon the section, i. e. from roundish to the shape of a knuckle calix. From that thickening the secondary branches grow out laterally following the direction of the primary branches (pl. I, fig. 1, 2, 4 and 5). Thus, when looking at the sections of the thickening of the primary branches, and in particular where

the mentioned thickening reminds of a knuckle calix, the secondary branches growing out of such thickening display an U-shaped form. Sporadically, the secondary branches bend gently towards each other, thus straitening the U-form in the apex (pl. I, fig. 2). It is probable that four secondary branches come out of a primary branch; however, this cannot be said for sure, because the longitudinal and cross sections are missing, and only these sections could show the true position of the branches, namely whether they are exactly opposite each other, or not. The terminations of the secondary branches appear thickened. This may be seen in the section of individual branches, sometimes in certain parts of the section only (pl. I, fig. 4, 5, pl. II, fig. 4), in the peripheral zone of the



Text – fig. 2. A – Shape of branches in the species *Cymopolia longistila* n. sp.
B – Cross-section through a branch

a primary branch
b distal widening of the primary branch
c handle of sporangia
d sporangium
e secondary branch
f distal widening of the secondary branch

Sl. 2. A – oblik ogranka kod vrste *Cymopolia longistila* n. sp.
B – presjek kroz ogranak

a primarni ogranak
b distalno proširenje primarnog ogranka
c držak sporangija
d sporangij
e sekundarni ogranak
f distalno proširenje sekundarnog ogranka

Drawn by – Crtala: J. Dujić

calcareous wall, where a funnel-shaped thickening can be sometimes seen. This, the shape of the terminations of the secondary branches, approaches the shape described by L. Morellet and J. Morellet (1913, p. 11, fig. 1, p. 12, fig. 2) and G. F. Elliott (1968, p. 100, fig. 15) for some species of *Cymopolia*. If the density of branches is taken into account, then it appears quite possible that due to the issuing of the secondary branches outside the calcareous wall, the soft parts of the plant come into touch with each other; therefore, the calcareous wall would be entirely covered with organic substance, thus producing an almost maximal surface available for assimilation.

Pear-shaped thickenings, on a short and thin handle, supposed to be sporangia, grow out of the bottom that makes the base of the distal thickening of the primary branches (pl. II, fig. 1). This, however, can be seen only if the section is cut through the very middle of a primary branch. Any differently made section evading the center would show knuckles, calices or bulbs without that short and thin handle with a pear-shaped thickening on the top. This thickening is elongated and somewhat squeezed in the middle, so that it appears pear-shaped, and not round as in other *Cymopoliae*.

The primary branches are within a whorl; they alternate with those of the next coming whorl (pl. I, fig. 1, 2, pl. II, fig. 2).

Similarities and differences:

According to the structure and shape of the primary branches *Cymopolia longistila* n. sp. belongs to the genus *Cymopolia*, whereby at the same time it clearly differs from other species. The new species is clearly distinguishable from all other described species by its long primary branches bearing the secondary ones of half their own length. This species is somewhat more similar to the Tertiary species *C. zitteli*, better to say, to the reconstruction of its branches, as presented by L. Morellet & J. Morellet (1913, p. 12, fig. 2). However, the length of the primary branches and the pear-shaped sporangia of *Cymopolia longistila*, if compared with the elongated sporangia of *Cymopolia zitteli* and the rounded sporangia of other species, are obviously different.

Stratigraphic position:

Cymopolia longistila n. sp. was found in a sample of algal, partially recrystallized, limestone, taken at a locality East of Nikšić, about 1 km East of the village of Oblatno in Nikšić Župa. In addition to the above described species, some other species have also been found in the same rock sample, i. e. *Coptocampylodon fontis* Patrulius, 1965 and *Triploporella fracasi* Steinmann, whereby it can be said that the sample belongs to the Lower Cretaceous.

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B. SOKAČ i L. NIKLER

CYMOPOLIA LONGISTILA N. SP., NOVA VAPNENAČKA ALGA (DASYCLADACEAE) IZ DONJE KREDE DINARSKOG GORJA

Opisana je nova vrsta roda *Cymopolia* iz donje krede Nikšićke Župe. Karakterizirana je dugim primarnim ograncima koji završavaju odebljanjem iz kojega postrano slijedeći smjer primarnih rastu sekundarni ogranci. Iz središta ojačanog dijela primarnog ogranka na kratkom držku izrasta kruškoliki sporangij.

Vrsta koja će biti prikazana potječe iz uzorka algalnog vapnenca donje krede prikupljenog tokom stratimetrijskog snimanja serija u Nikšićkoj Župi, koje je izvršila ekipa Industroprojekta. Tokom mikropaleontološke analize cjelokupnog materijala u obradi V. Bauer i Z. Velimirović zapaženi su i presjeci vrlo interesantnih i dobro očuvanih vapnenačkih alga koje su nam ustupljene na daljnju obradu. Koristimo ovo mjesto i priliku da se ponovno zahvalimo kolegicama V. Bauer i Z. Velimirović na materijalu koji nam je omogućio opis nove vrste. Ostale vapnenačke alge prisutne uz ovu u istom uzorku nalaze se u obradi pa će rezultati toga rada biti izneseni drugom prilikom.

Opširniji prikaz roda *Cymopolia* u posljednje vrijeme su dali I. Gušić (1967) i G. F. Elliott (1968) pa za ponovni opis ovdje nema potrebe.

Familia: Dasycladaceae
Tribus: Neomereae Pia, 1927
Subtribus: Cymopoliinae Pia, 1927
Rod: *Cymopolia* Lamouroux, 1816

Cymopolia longistila n. sp.

Tabla I–II

Derivatio nominis: Ime vrste dano je prema lako uočljivim dugim i tankim primarnim ograncima (longus – dug, stilus – držak).
Locus typicus: Oblatno, Nikšićka Župa, SR Crna Gora.
Stratum typicum: Slabo rekristalizirani organogeni algalni vapnenci donje krede.

Sintipovi: Preparati pod brojem NŽ-122 čuvaju se u Institutu za geološka istraživanja, Zagreb.

Diagnosis: Vrsta zastupana fragmentima cilindričnog vapnenačkog talusa izgrađenog od sitnozrnog kriptokristalastog kalcita. Od same baze tanki primarni ogranci distalno postupno lagano odebljavaju do naglog proširenja od kojeg se odvajaju 4 sekundarna ogranka. Sekundarni ogranci, kojih je dužina pola vrijednosti primarnih, okomiti su na površinu ili blago povijeni jedan ka drugom, te su proširenog završetka. Iz distalnog dijela primarnih ogranaka, okružen sekundarnim ograncima na tankom i kratkom dršku izrasta kruškoliki sporangij.

Opis:

Prikazani materijal, kao i onaj koji nam je tokom obrade stajao na raspolaganju, upućuje na kratke fragmente cilindričnog vapnenačkog talusa. Vapnenački talus izgrađen je od kriptokristalastog žućkastog kalcita. Matična stanica zaprema trećinu ukupnog dijametra (D) i u promatranim presjecima cjelovitog je i oštrog ruba (tab. I, sl. 1 i 2). Nedostatak uzdužnih presjeka ne omogućuje siguran zaključak o obliku matične stanice i eventualnih promjena smjerom uzdužne osi. Na podpuno kalcificiranoj stijenci vapnenačkog cilindra manje-više jasno se ocrtavaju dva sloja kalcifikacije: unutarnji svjetliji u debljini vrijednosti dužine primarnih ogranaka i vanjski tamniji, znatno tanji, koji odgovara dužini sekundarnih ogranaka (tabla I, sl. 1, 2 i 4). Tamniji vanjski ovoj uvjetovan je učetverostručenim brojem sekundarnih u odnosu na primarne ogranke a time primarno i znatno većom količinom organske supstance. Promatrani primjerci ne pokazuju znatniju varijabilnost dimenzija u odnosu jedan prema drugom.

Glavna karakteristika nove vrste sadržana je u građi i obliku ogranaka što omogućuje da je uvrstimo u rod *Cymopolia* i jasno razlikujemo od drugih vrsta ovoga roda.

Obzirom da smo prilikom obrade imali na raspolaganju samo kose presjeke, položaj ogranaka u odnosu na os matične stanice nije moguće u potpunosti definirati, premda se on čini okomit na površinu vapnenačkog cilindra ili barem vrlo blizu ovom položaju. Primarni ogranci odvajaju se od matične stanice kroz vrlo sitne pore (tab. I, sl. 1) i distalno postupno više ili manje izrazito odebljavaju (tab. I, sl. 2, 4 i 5). Pri završetku približno dvije trećine vapnenačke stijenke, primarni ogranci naglo odebljavaju u formu koja ovisno o presjeku, varira od približno okruglaste do oblika zglobne čašice. Od ovog proširenja postrano se nastavljaju sekundarni ogranci, slijedeći smjer rasta primarnih ogranaka (tab. I, sl. 1, 2, 4 i 5).

Dimenzije u mm:

Vanjski promjer talusa (D)	1,56–2,37
Unutarnji promjer talusa (d)	0,56–0,82
Debljina vapnenačke stijenke (s)	0,48–0,96
Udaljenost između pršljena (h)	0,07–0,10
Duljina primarnih ogranaka (l)	0,29–0,63
Duljina sekundarnih ogranaka (l_1)	0,18–0,33
Promjer primarnih ogranaka u bazi (p)	cca 0,01
Promjer primarnih ogranaka u distalnom dijelu (p_1)	0,03–0,05
Promjer sporangija (ds)	cca 0,15

Na ovaj način od distalnog proširenja primarnih ogranaka osobito u presjecima gdje je ovo vidljivo u formi zglobne čašice, odvajanje sekundarnih ogranaka u presjeku daje formu slova U. Mjestimično se zapaža blago povijanje sekundarnih ogranaka jednog ka drugom čime se forma U u vrhu blago sužuje (tab. I, sl. 2). Broj sekundarnih ogranaka koji rastu iz primarnih vjerojatno iznosi 4. Međutim ovo nije moguće utvrditi obzirom na nedostatak uzdužnih i poprečnih presjeka gdje bi bilo moguće

zapaziti da li ogranci stoje, kao što se to pretpostavlja, jedan nasuprot drugom. Završetak sekundarnih ogranaka čini se proširen što se može zapaziti u presjeku pojedinih ogranaka ili djelovima pojedinih presjeka (tab. I, sl. 4, 5; tab. II, sl. 4) na samoj periferiji vapnenačke stijenke, gdje se, ne uvijek, izrazito zapaža forma ljevkastog proširenja. Ovim bi se završetak sekundarnih ogranaka približio obliku ogranaka kakav su za neke vrste roda *Cymopolia* prikazali L. Morellet & J. Morellet (1918, tab. 11, sl. 1; tab. 12, sl. 2) i G. F. Elliott (1968, tab. 100, sl. 15). Obzirom na gustinu ogranaka objektivno je moguće, da je proširenjem sekundarnih ogranaka izvan vapnenačke stijenke došlo do međusobnog kontakta mekih dijelova biljke pa bi vapnenačka stijenka bila u potpunosti prekrivena organskom supstancom što odgovara gotovo maksimalnoj površini sposobnoj za asimilaciju.

Iz dna udubljenja distalnog proširenja primarnih ogranaka na vrlo kratkom i tankom držku što se može vidjeti tek kod idealnih presjeka kroz središte primarnih ogranaka (tab. II, sl. 1) izrasta mješinasto proširenje kojem se pripisuje funkcija sporangija. Svaki drugi presjek koji leži izvan središta daje sliku zgloba, čašice ili glavice bez kratkog i tankog drška koji nosi mješinasto proširenje. Oblik ovog proširenja za razliku od većine ostalih vrsta roda *Cymopolia* nije okruglast već produžen i u središnjem dijelu lagano stisnut uslijed čega poprima neizrazit kruškolik oblik.

Primarni ogranci smješteni su u pršljene, a u odnosu na primarne ogranke pršljena koji slijedi, stoje u alternirajućem položaju (tab. I, sl. 1, 2, tab. II, sl. 2).

Sličnosti i razlike:

Cymopolia longistila n. sp. svojim osnovnim karakteristikama građe i oblika ogranaka pripada rodu *Cymopolia*, na osnovu čega se istovremeno jasno razlikuje od ostalih vrsta ovog roda. Od svih opisanih vrsta ovog roda nova se vrsta jasno diferencira dugim primarnim ograncima, koji nose sekundarne za polovinu kraće od primarnih. Nešto više sličnosti pokazuje sa tercijarnom vrstom *C. zitteli* odnosno rekonstrukcijom njezinih ogranaka kako su to prikazali L. Morellet & J. Morellet (1918, p. 12, sl. 2) no razlika je uočljiva u dužini primarnih ogranaka i kruškolikom obliku sporangija kod ove vrste naprama produženom kod vrste *C. zitteli* i okruglim sporangijima kod ostalih vrsta.

Stratigrafski položaj:

Cymopolia longistila utvrđena je na jednom lokalitetu u uzorku algalnog dijela rekristaliziranog vapnenca istočno od Nikšića, oko 1 km istočno od mjesta Oblatno u Nikšićkoj Župi. U istom uzorku sa novo opisanom vrstom uz ostalo nađeni su i presjeci vrste *Coptocampylodon fontis* Patrulius i *Triploporella fraasi* Steinmann što dokazuje da uzorak s ovim sadržajem pripada naslagama donje krede.

PLATE – TABLA I

1 – 5. *Cymopolia longistila* n. sp.

1. Oblique section
   Kosi presjek x 25
2. Oblique section
   Kosi presjek x 24
3. Fragment of on oblique section
   Fragment kosog presjeka 26
4. Oblique section
   Kosi presjek x 28
5. Oblique section
   Kosi presjek x 25

Locality (nalazište): Oblatno, Nikšićka Župa — Foto: V. Matz


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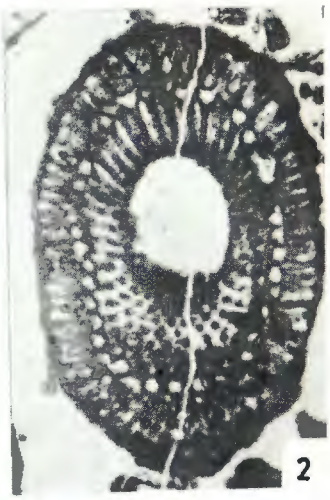
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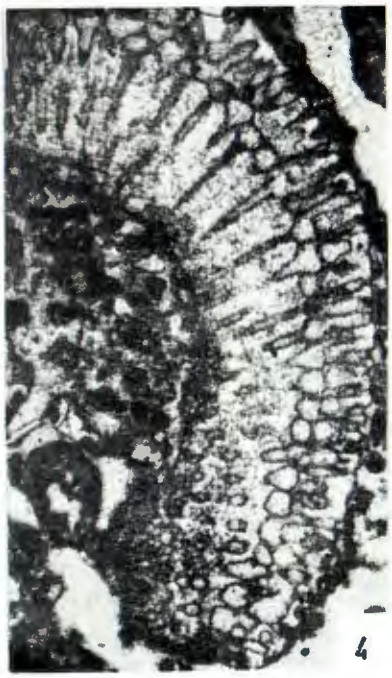
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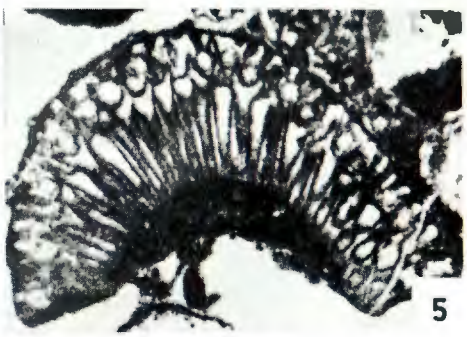
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PLATE – TABLA II

1 – 4 *Cymopolia longistila* n. sp.

1. Oblique section
   Kosi presjek x 24

2. Oblique section
   Kosi presjek x 25

3. Fragment of an oblique section
   Fragment kosog presjeka x 16

4. Oblique section
   Kosi presjek x 25

5 – 7. Coptocampylodon fontis PATRULIUS

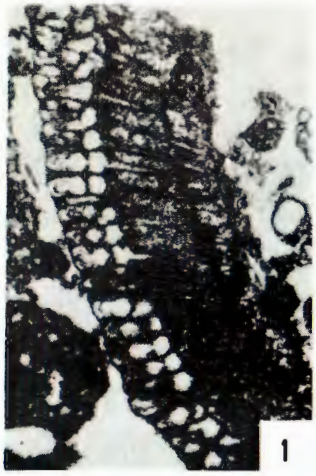
5. Cross-sections
   Poprečni presjeci x 27

6. Oblique section
   Kosi presjek x 27

7. Cross-section
   Poprečni presjek x 48

Locality (nalazište): Oblatno, Nikšićka Župa

Foto: V. Matz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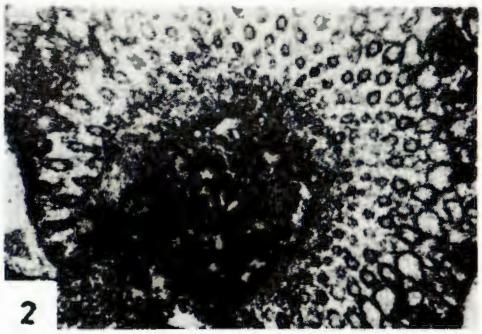
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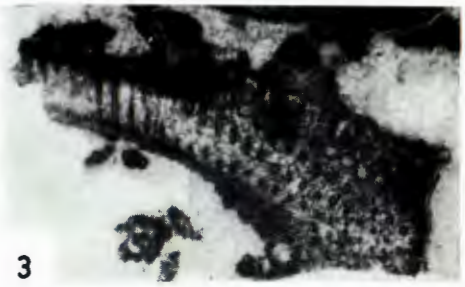
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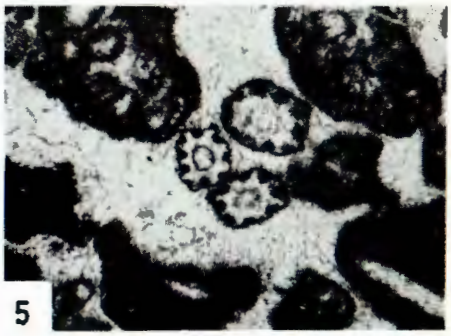
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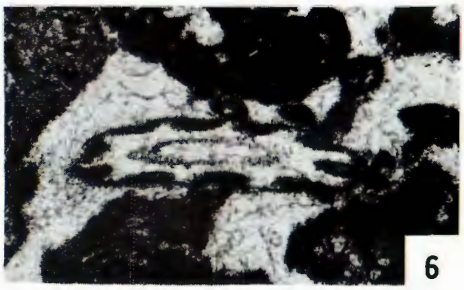
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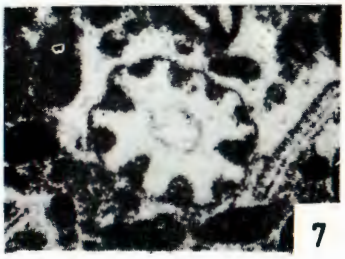
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