

**Fanesella anae n. sp., a new calcareous alga (Dasycladaceae)  
from the Lower Lias of Velebit Mountain (Croatia)**

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A new species of the calcareous algae (Dasycladaceae) from the Lower Liasic deposits of Velebit Mountain is described. On the basis of the morphology of its ramifications it has been assigned to the genus *Fanesella*. It is characterized by bulbous (knob-like) primary ramifications bearing short-nipple-like projections which continue into long, slender tertiary ramifications, articulated or divided in their distal part.

Opisana je nova vrsta vapnenačke alge (Dasycladaceae) koja je na osnovi oblika i građe ogranaka uvrštena u rod *Fanesella*, *Fanesella anae* n. sp. odlikuje se gomoljičastim oblikom primarnih ogranaka s kojih se izravno izvlače kratki bradavičasti nastavci od kojih se nastavljaju dugi tanki tercijarni ogranaci člankovito prekinuti ili podijeljeni u vršnom dijelu.

In the course of the detailed investigation of the Jurassic deposits of Velebit Mountain on the profile along the road crossing the Mali Alan pass and continuing further in the direction to Obrovac, a large number of samples for sedimentary-petrographic and micropaleontological analysis has been collected. During the field work, in the lower part of the Lias several beds of skeletal-intraclastic grainstone (biointrasparite) have been noticed to contain numerous sections and fragments of calcareous algae, occasionally accompanied by equally numerous gastropods. In thin sections, field observations indicating abundant presence of different forms of the genus *Palaeodasycladus* have been confirmed and somewhat more rare remains of the genus *Fanesella* have been identified. In addition to *Fanesella dolomitica* Cros & Lemoine, the only species of the genus described so far, a new form of the same general morphology but with differently shaped primary ramifications has been identified. Further analyses, performed on several tens of thin sections have shown the justified possibility of establishing a new species within the genus *Fanesella*, which has been named *Fanesella anae* n. sp.

Genus *Fanesella* Cros & Lemoine, 1966

*Fanesella anae* n. sp.

Pls. I—III, pl. IV, figs. 2—4

Origin of the name: the species is dedicated to my wife Ana.

Type locality: on the road Sv. Rok-Obrovac, about 100 m from the Mali Alan pass to Obrovac, on the ridge of Velebit Mountain.

**Type stratum:** beds of skeletal-intraclastic grainstone, alternating with micrites with occasionally developed stromatolitic laminae, of Lower Liassic age.

**Holotype:** longitudinal-oblique section figured in Pl. I, fig. 3, slide VT-26. This, as well as the entire material, is stored with the Institute of Geology, Zagreb.

**Diagnosis:** Euspondyle dasyclad alga with cylindrical thallus, its main characteristic being the morphology and shape of the ramifications. Primary ramifications have a bulbous, irregularly knob-like or, less frequently, rounded shape. They continue directly, with no visible constrictions, into short nipple-like projections, which, in turn, continue into long, slender ramifications, articulated or divided and somewhat widened in their final part.

**Description:** This new alga is represented by large, cylindrical thalli, bearing comparatively densely packed whorls of primary ramifications. The narrow central cavity (»main stem«) has a smooth and clearly delineated inner surface, pierced by minute but variously sized pores at the places where the primary ramifications grow out (Pl. I, figs. 1, 3). The central cavity occupies 17—25% of the outer diameter. The outer surface of the thallus seems to be originally smooth, but secondarily often micrite-coated or with shallow indentations due to wearing.

Primary ramifications are arranged into successive, more or less densely packed whorls (which depends on their shape). They vary in both their shape and dimensions, but most frequently they acquire a bulbous, or knoblike, shape (Pl. I, figs. 1, 3). On the distal side of the primary ramifications, there are 3—5 short, irregular, nipple-like projections, which grow out directly out of the primary ramifications, with no visible constrictions in between. Sometimes these projections may be slightly longer and acquire a finger-like shape. These projections continue into long, slender secondary or tertiary ramifications, respectively (depending on how the nipple-like projections are referred to), which are in their most distal part broken into an articulated pattern or divided into short tertiary or quaternary ramifications. In some cases, the long and slender ramifications grow out directly out of the bulbous primary ramifications, without the intervening nipple-like projections (Pl. I, central part of the fig. 1). The nipple-like projections, or secondary ramifications (as they are referred to by Cros & Lemoine, 1966, for *Fanesella dolomitica*) bear two to three long, slender ramifications each, so that each primary ramifications gives raise to a bundle of 6—12 long and slender »tertiary« ramifications (Pl. I, fig. 2; Pl. II, figs. 3, 5). The ramifications are slightly inclined upward with regard to the central cavity or »main stem«. The long and slender »tertiary« ramifications are gently arched, bending slightly down, nearer to the horizontal position. Due to the varying and irregular shape of the primary ramifications, caused by their irregular bulbous swelling and more or less inclined position, the entrance pores shift from the center to the lower part of the primary branches.

## Dimensions in mm:

Maximum observed length (L)	12.4
Outer diameter (D)	1.48—2.85
Inner diameter (d)	0.34—0.48
Distance between two consecutive whorls (h)	0.35—0.48
Length of the primary ramifications (l')	0.29—0.43
Length of the nipple-like projections (= secondary ramification?) (l'')	0.08—0.20
Length of the tertiary ramifications (l''')	0.35—0.75
Number of primary ramifications in a whorl (w)	6 —9

**Similarities and differences:** The new species is assigned to the genus *Fanesella* Cros & Lemoine (1966) which had been established on the basis of the peculiar ramification morphology, including quaternary ramifications. *Fanesella anae* n. sp. is obviously related to *F. dolomitica* Cros & Lemoine, as can be seen from the pattern of ramification, their overall morphology etc. The main differences are visible in the detailed ramification morphology and they can be described as follows. In *F. dolomitica* the primary branches are comparatively regular, having a slightly elongated, somewhat bent rectangular shape, tightly packed and separated from each other by thin, more or less regular calcareous sheaths. In tangential section, primary branches in *F. dolomitica* also appear as regular, sub-squarely shaped forms. In contrast to that, in *F. anae* the primary branches are more or less irregularly rounded or swollen, thus acquiring a bulbous, or knob-like, shape. In spite of their being densely packed in successive whorls, they are not as tightly compressed to each other as in *F. dolomitica*; due to their rounded-swollen shape, they touch mutually only at points of their maximum swellings. In connection with that, the calcareous sheaths (or »partitions«) separating the consecutive whorls are thicker and more irregular. Next, the difference in the shape and length of the secondary ramifications is visible, which are in *F. dolomitica* regular and finger-like (like sheaths for individual fingers of a glove, as stated by Cros & Lemoine, 1966). As distinct from that, in *F. anae* these secondary ramifications (if indeed they may be termed that) are irregular, of varying length and often only nipple-like. The difference in the shape of the tertiary ramifications is also obvious, which in *F. dolomitica* are also regular and not much longer, if at all, than the finger-shaped secondaries, while in *F. anae* they are very thin, slender and long. The above mentioned differences in the ramification morphology are best displayed in longitudinal but also in both deep and shallow tangential sections, and, generally, by the smaller pores of the tertiary and quaternary ramifications in *F. anae*. All these differences make a clear and easily recognizable distinction between the two species of the genus *Fanesella* possible.

**Stratigraphic position:** In the continuous sequence of beds, which has been sampled from the Upper Triassic throughout the Lias, *Fanesella anae* n. sp. occurs (on its type locality) about 50 m above the Upper Triassic-Liassic boundary and about 100 m below the first occurrences of the Middle Liassic fossils. In addition to *Fanesella anae* n. sp. the same

contains: *Fanesella dolomitica* Cros & Lemoine, *Palaeodasycladus mediterraneus* (Pia), *P. barrabei* Lebouche & Lemoine, *P. buseri* (Radoičić), and ?*P. elongatulus* Praturlon. Both the dasyclad association and the superpositional position at the type-locality undoubtedly prove the Lower Liassic age of the new species, *F. anae*.

Received: 15. 12. 1987.

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### Nova vapnenačka alga (Dasycladaceae) iz donjeg lijasa Velebita

B. Sokač

Prilikom detaljne analize jurskih naslaga Velebita u profilu cestom preko Malog Alana pa dalje smjerom za Obrovac prikupljen je znatan broj uzoraka namijenjenih sedimentno-petrografskoj i mikropaleontološkoj obradi. Već prilikom kolektiranja i odabira uzoraka u nižem dijelu donjeg lijasa zapaženi su mjestimično intervali sa slojevima skeletno intraklastičnog grainstona (biointrasparita) koji su sadržavali brojne presjeke i fragmente vapnenačkih alga uz povremeno veće i manje učešće gastropoda. Prvi preparati potvrdili su terenska zapažanja brojnosti različitih forma roda *Palaeodasycladus* kao i prisutnost nešto rjedih ostataka roda *Fanesella*. Uz dosada jedino poznatu vrstu ovog roda *Fanesella dolomitica* Cros & Lemoine uočena je i jedna forma jednako građenih ali u odnosu na genotipsku vrstu različito oblikovanih ogranaka. Daljnje analize provedene na više desetaka preparata pokazale su opravdanu mogućnost da se unutar roda *Fanesella* uspostavi nova vrsta *Fanesella anae* n. sp.

Genus: *Fanesella* Cros & Lemoine

*Fanesella anae* n. sp.

Podrijetlo imena: vrsta posvećena mojoj supruzi Ani.

Tipičan lokalitet: bilo Velebita cca 100 m udaljeno od prevoja Mali Alan u smjeru prema Obrovcu, na cesti Sv. Rok — Obrovac.

Tipični slojevi: slojevi skeletno intraklastičnog grainstona koji se nalaze u izmjeni s mikritima unutar kojih su sporadično razvijene stromatolitne lamine. Ove naslage pripadaju donjem lijasu.

Holotip: uzdužno kosi presjek prikazan na Tab. I, sl. 3 sadržan u preparatu VT-26. Cjelokupni materijal čuva se u Geološkom zavodu, Zagreb.

Dijagnoza: Euspondilna alga cilindričnog talusa koje je osnovna karakteristika prezentirana građom i oblikom ogranaka. Primarni ogranci varijabilnog su gomoljičastog, nepravilnog ili rjeđe okruglastog oblika. Iz njih se izravno bez vidljivog prekida izvlače kratki bradavičasti nastavci iz kojih izrastaju dugi tanki ogranci člankovito prekinuti ili podijeljeni i nešto prošireni u vršnom dijelu.

Opis: Nova vapnenačka alga predstavljena je krupnim cilindričnim talusom unutar kojega su smješteni relativno gusto pakovani pršljeni primarnih organaka. Uska matična stanica ravne je i jasno ocrtane unutrašnje površine koju probijaju sitne ali ne uvijek jednako dimenzionirane pore na mjestu izrastanja primarnih ogranaka (Tab. I, sl. 1, 3). Matična stanica zaprema 17—25% od ukupnog dijametra. Vanjska površina talusa čini se primarno približno ravnom ali sekundarno često obavijena mikritom ili plitko nagrižena trošenjem. Primarni ogranci smješteni su u sukcesivne međusobno najčešće, ovisno o njihovom obliku, više ili manje gusto stisnute pršljene. Ovi ogranci (primarni) nejednako dimenzionirani i generalno nepravilni oblikom variraju, premda najčešće poprimaju gomoljičastu formu (Tab. I, sl. 1, 3). S vanjske površine primarnih ogranaka izravno se bez vidnog prekida izvlače 3 do 5 kratka također nepravilna bradavičasta nastavka ili u pojedinim slučajevima nešto duža prstolika nastavka. Na ovima izrastaju dugi tanki ogranci drugog odnosno trećeg reda (ovisno o shvaćanju bradavičastih nastavaka), koji se u vršnom dijelu člankovito prekidaaju ili dijele u kratke ogranke trećeg odnosno četvrtog reda. U pojedinim slučajevima izrastanje dugih tankih ogranaka moguće je izravno iz primarnih ogranaka bez postojanja bradavičastih nastavaka (Tab. I, središnji dio sl. 1). Bradavičasti nastavci — sekundarni ogranci? (u smislu kako slične nastavke za vrstu *F. dolomitica* označavaju Cros & Lemoine, 1966), nose dva do tri duga tanka ogranaka, pa se uz svaki primarni ogranak veže grupa 6—12 tercijskih ogranaka (Tab. I, sl. 2, Tab. II, sl. 3, 5). Ogranci su postavljeni lagano koso prema gore u odnosu na uzdužnu os biljke s tendencijom laganog lučnog povijanja tercijskih ogranaka na niže. Varijabilnost oblika primarnih ogranaka uvjetovana nepravilnošću njihovog gomoljičastog proširivanja te više ili manje izraženog kosog rasta locira pomicanje ulazne pore od središnjeg prema donjem dijelu ogranaka.

Dimenzije su navedene u engleskom tekstu.

Sličnosti i razlike: Ova nova vapnenačka alga pribrojena je rodu *Fanesella* Cros & Lemoine (1966), koji je uspostavljen na osnovi specifične građe ogranaka i njihove podjeljenosti do zaključno ogranaka četvrtog reda. Evidentna srodnost *Fanesella anae* n. sp. s vrstom *Fanesella dolomitica* Cros & Lemoine izražena u građi ogranaka nalaže njihovu međusobnu usporedbu s ciljem definiranja njihovih razlika, a time i mogućnosti njihove specifične determinacije. Bitne razlike prepoznatljive su u obliku ogranaka. Kod vrste *F. dolomitica* primarni ogranci su relativno pravilni, produženog i ponešto zakrivljenog četvrtastog oblika, gusto stješnjeni i međusobno su odvojeni tankim više-manje pravilnim vapnenačkim stjenkama. Tangencijalni presjek primarnih ogranaka daje također pravilne subčetvrtaste forme. U *F. anae* n. sp. primarni ogranci više su ili manje zaobljeni i nepravilni, pa poprimaju gomoljičastu formu. Unatoč gustom pakovanju primarnih ogranaka u sukcesivne pršljene uvjetovano oblikom ogranaka oni nisu međusobno tako stješnjeni kao što je to slučaj u *F. dolomitica*, pa se dodiruju samo na točkama ili dijelovima maksimalnog napuhnuća. S ovim u vezi stoji deblja i nepravilna vapnenačka stjenka između ogranaka susjednih pršljena. Daljnja razlika ovih vrsta vidljiva je u obliku i dužini sekundarnih ogranaka koji su u *F. dolomitica* pravilni i kako to navode Cros & Lemoine (1966) izgledaju poput prstiju na rukavici, što nije slučaj u *F. anae* kod koje su nepravilni, nejednake dužine i često bradavičastog izgleda. Uočljiva je razlika i u usporedbi tercijskih ogranaka koji su također pravilni i ne duži od prstolikih nastavaka u *F. dolomitica*, izrazito tanki i dugački u *F. anae*. Spomenute razlike u građi ogranaka manifestiraju se u dubljim ili plićim tangencijalnim presjecima te općenito sitnijim porama tercijskih i ogranaka četvrtog reda u *F. anae*. Prethodno navedeno omogućuje jasnu diferencijaciju ove dvije vrste roda *Fanesella*.

Stratigrafski položaj: U kontinuiranom slijedu naslaga uzorkovanih od gornjeg trijasa kroz lijas vrsta *Fanesella anae* n. sp. na tipskom lokalitetu leži u poziciji oko 50 m prave debljine iznad granice gornji trijas — lijas i oko 100 m

ispod prvih nalaza fosilnih ostataka karakterističnih za srednji lijas. Uz ovdje opisanu *F. anae* u istom uzorku utvrđena je zajednica zastupana slijedećim vrstama: *Fanesella dolomitica* Cros & Lemoine, *Palaodasycladus mediterraneus* (Pia), *P. barrabei* Lebouche & Lemoine, *P. buseri* (Radoičić) i ?*P. elongatus* Praturlon. Navedena zajednica kao i spomenuti položaj uzorka u analiziranom stupu determinira na tipičnom lokalitetu pripadnost vrste *F. anae* donjem lijasu.

#### PLATE — TABLA I

##### 1—3. *Fanesella anae* n. sp.

1. Longitudinal section (uzdužni presjek);  $\times 36$   
Detail of fig. 3 (lower part) /detalj sl. 3, donji dio/.
2. Tangential section (tangencijalni presjek);  $\times 18$
3. Longitudinal — tangential section — Holotype  
(uzdužno-tangencijalni presjek — holotip);  $\times 14$

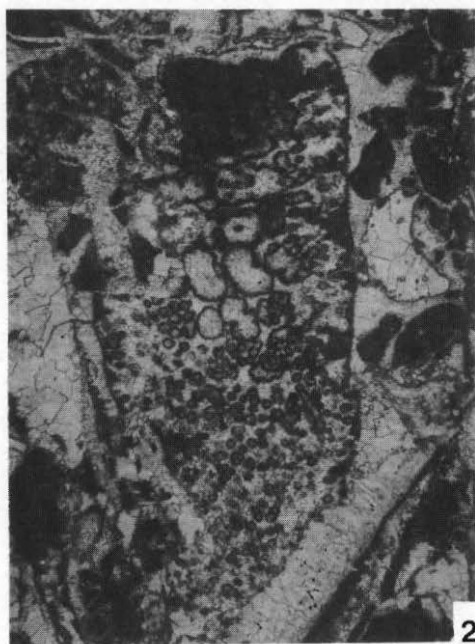
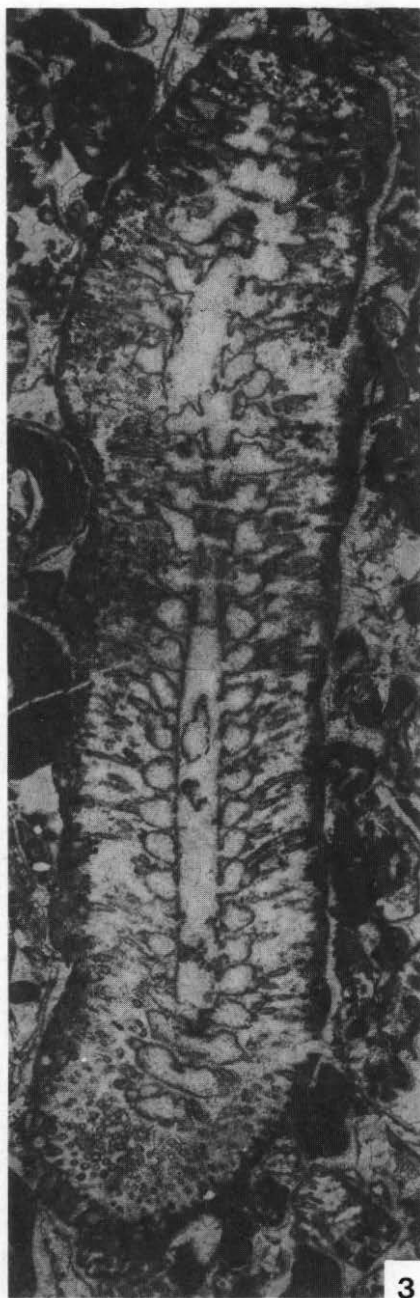
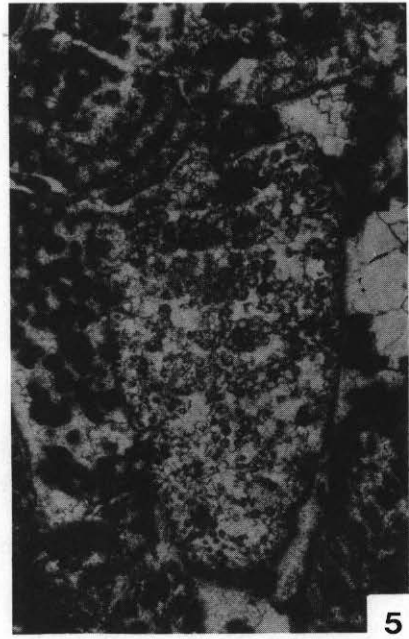
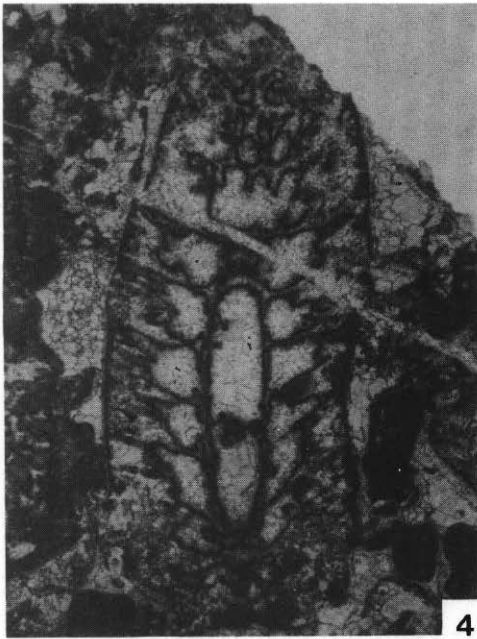
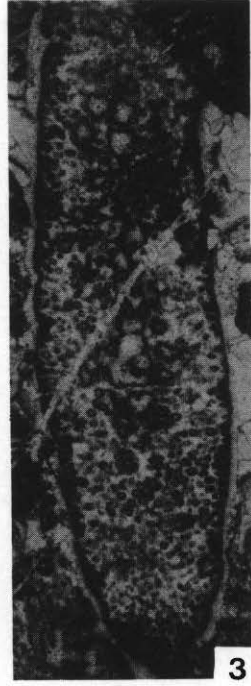


PLATE — TABLA II  
1—5. *Fanesella anae* n. sp.

1. Oblique section (kosi presjek);  $\times 18$
2. Oblique-tangential section (koso-tangencijalni presjek);  $\times 18$
3. Tangential section (tangencijalni presjek);  $\times 14$
4. Oblique section (kosi presjek);  $\times 18$
5. Tangential section (tangencijalni presjek);  $\times 22$





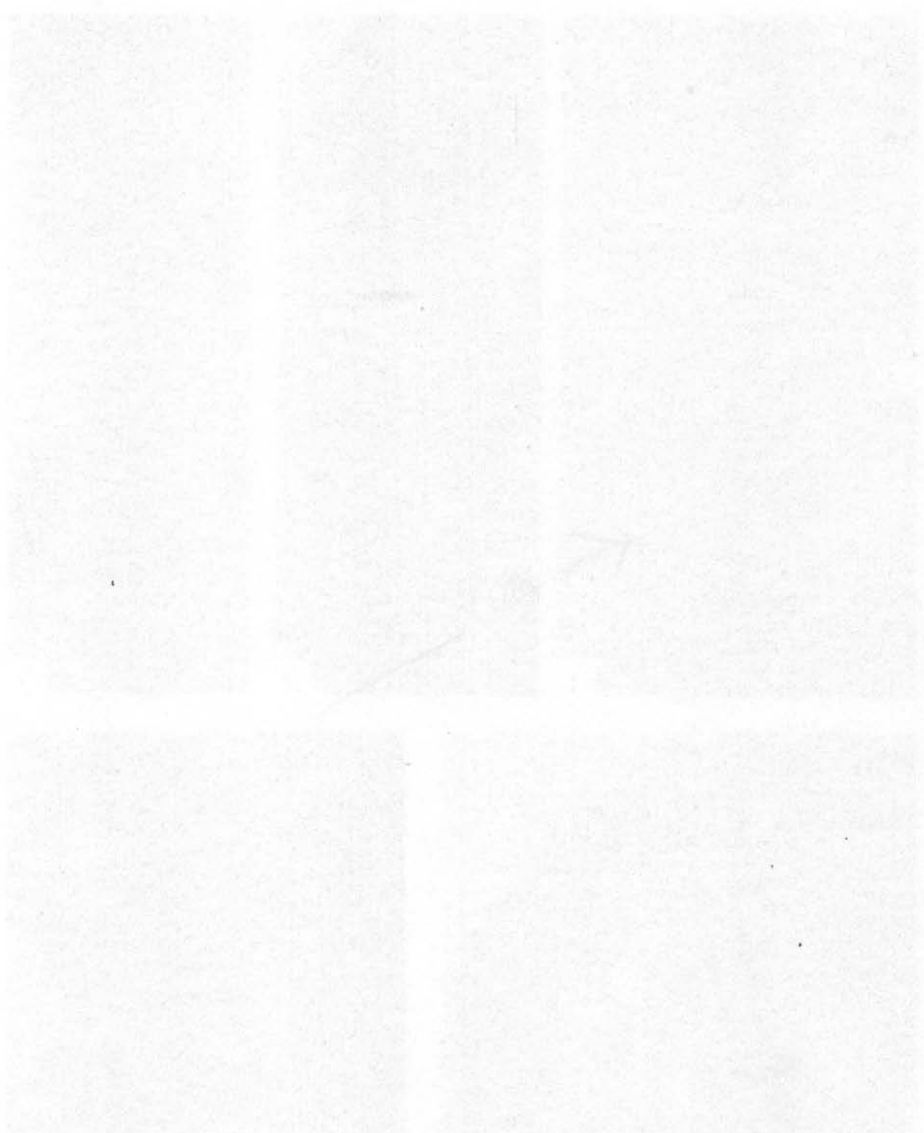


PLATE — TABLA III

1—4. *Fanesella anae* n. sp.

- 1—2. Longitudinal-tangential sections (uzdužno-tangencijalni presjeci); fig. 1;  $\times 18$ ;  
fig. 2;  $\times 14$
3. Oblique sections (kosi presjeci);  $\times 18$
4. Slightly oblique cross section (malo kosi poprečni presjek);  $\times 14$

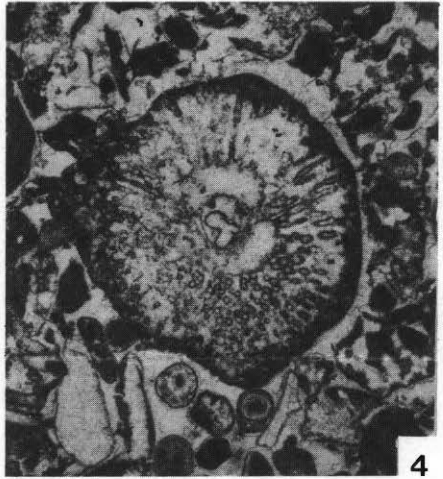
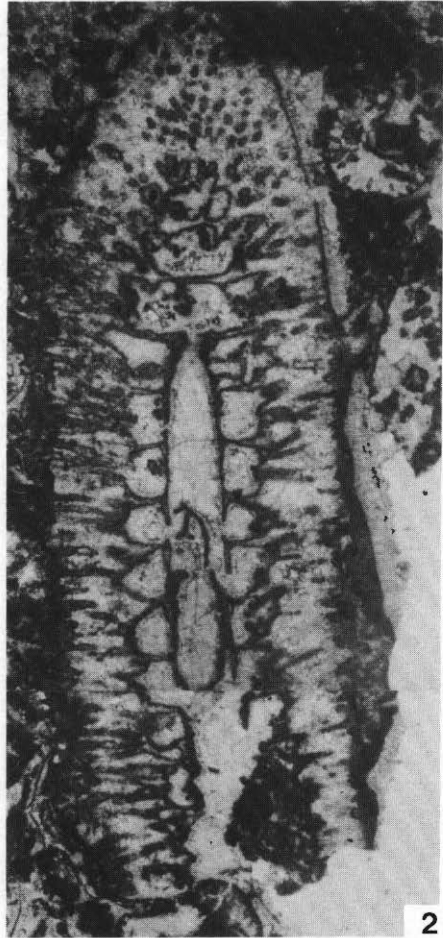
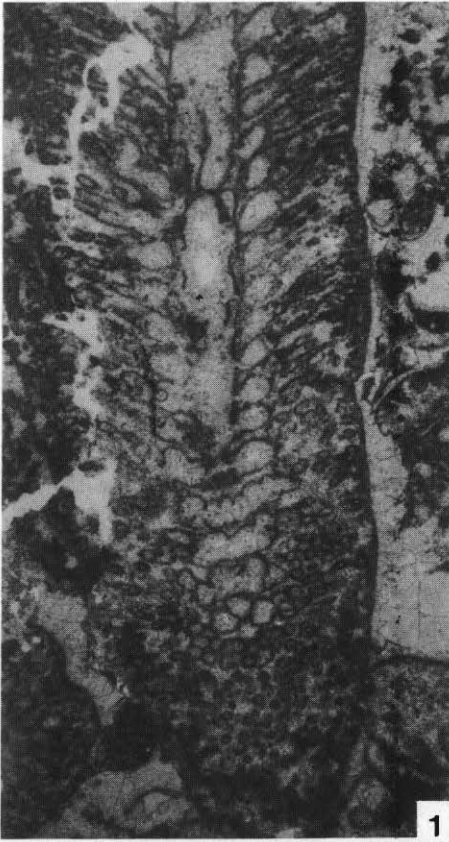


PLATE — TABLA IV

1. *Fanessela dolomitica* Cros. & Lemoine, oblique section (kosi presjek);  
× 14
- 2—4. *Fanesella anae* n. sp.
- 2—3. Oblique sections (kosi presjeci); fig. 2; × 22; fig. 3; × 18
4. Oblique-tangential section (koso-tangencijalni presjek); × 22

