

BRANKO SOKAČ and LEON NIKLER

TEUTLOPORELLA ELONGATULA
(PRATURLON, 1966) SOKAČ & NIKLER,
CALCAREOUS ALGA FROM THE MIDDLE LIASSIC
OF VELEBIT

With 6 plates

Species of calcareous alga from the genus *Teutlopora* has been discovered. *Teutlopora elongatula* (Praturlon) Sokač & Nikler comes from the central part of Velebit Mountain. Its calcareous wall is apparently of a tubular structure, derived from branches almost parallel to the main stem. Microfossils with which it was found, as well as the superposition of layers, point to its inclusion into the Middle Liassic.

Deposits of the Middle Liassic in the Velebit Mountain area, by their numerous and variegated fossil remains, represent the most fossiliferous part of Jurassic sediments. In addition to macrofossils, including mostly Lithiotidae, brachiopods and gastropods, which compose the rock of biocalcirudite type, microfossil contents are also copious. Microfossils are regularly found in the calcarenites and algal limestones. In addition to various small foraminifers in biocalcarenes, calcareous algae are regularly found in the calcarenites and algal limestones. In addition greater or smaller number of layers with predominantly phytogenic fossil remains which build algal limestones. In these limestones, besides the genus *Palaeodasycladus mediterraneus* (Pia) (pl. V), which here and there may be the only form, in the recent time another, regularly smaller calcareous alga has been noticed, which has deluded immediate determination. In the course of last two years, an extensive gathering of samples has enabled to find in a greater number of thin-slides section favourable for the description of the species, included, on the basis of its main characteristics, into the genus *Teutlopora*. We feel it our pleasant duty to thank Professor dr M. Herak for his suggestions on the occasion of the preparation of the text for printing.

Genus: *Teutloporella* Pia, 1912

Teutloporella elongatula (Praturlon) Sokač & Nikler

1966. *Palaeodasycladus mediterraneus* (Pia) *elongatulus* n. var. Praturlon, p. 169-170, fig. 1.

The thallus is mostly bent, consisting of a number of segments narrowly leaning against each other. Each segment has the form of a deep cup, with negligently oblique sides, with the brim slightly and irregularly bent downwards. Segments enter deep each other; thus tightly leaning against each other, they give the impression of a whole, cylindrical thallus. The existence of segments is hard to perceive because of a great number of tubular channels of branches, their connection and probable tapering in the external part. In spite of this, they have been noticed in the minimal number of longitudinal sections, the most typical being represented on pl. I, fig. 1, manifesting itself by a shallow wedge-shaped incision into the surface of the thallus.

The segmentation of the thallus is more expressed in transversal or transversal-oblique sections, where it is represented, as it appears, by the disintegration of the thallus (pl. IV, fig. 1, 2, 3) with the maximum of four cut segments. However, in some samples, the segments are perhaps at some parts of the thallus, or along the whole thallus, connected to the extent that it is impossible to distinguish them (pl. II, fig. 4).

As to the preservation of segments, it has to be noted that in the majority of the material examined they have been represented either individually or seldom two or more together, which, as it appears, diminished the diameter of the thallus, or increases the diameter of the main stem. In this, almost regular, case the contour of the segment is usually indistinct and wore out. In longitudinal sections, because of the wearing of the inner edge, it cannot be surely determined whether the main stem is of a regular cylindrical shape, or a mild inner thickening corresponds to each segment, which some sections suggest. The central cavity occupies approximately a little less than 1/3 of the total diameter of the thallus, with a sharp edge in transversal section.

Branches of an expressly trichophorous type, mildly thickened in the base, would be almost identical with the branches of the species *Teutloporella obsoleta* Carozzi (A. Carozzi, 1955, fig. 4). They are steeply bent upwards, almost parallelly, to the main stem. In segments branches are arranged in whorls, which stand vertically one above the other (pl. III, fig. 4). The position of branches changes with their distance from the main stem: from an alternating arrangement they pass into an irregular one which is clearly visible in transversal sections (pl. II, fig. 3, 4; pl. IV, fig. 3). Segments pushed more asunder at the base, give in a deeper tangential section, an exchange of zones with branches and without them (pl. III, fig. 3). A segment contains one to

maximally four whorls, in so far as in the latter case it is not the matter of two neighbouring segments grown together, which cannot be exactly determined. In one-whorl segments, a very mildly wavy surface has been noticed; its bulgings correspond to branches, and slightly indicated depressions to the interspace between branches (pl. IV, fig. 1). It is a question whether this is a general characteristic of all segments.

Dimensions in mm.

maximal examined length (L)	11,10
outer diameter (D)	0,55—1,18
inner diameter (d)	0,18—0,40
number of branches in whorl (w)	30—40
maximal examined length of branches	2,17
width of branches in base (measured on one specimen)	1,10
width of branches in external part	0,02—0,07
thickness of segments	0,14—0,20
width of zone with branches (measured on one specimen)	0,215
width of zone without branches (measured on one specimen)	0,18

Localities: North-eastern slopes of Šarić-duplje, Samari (point 1386) on the way to Panas, south of Kubus

STRATIGRAPHICAL POSITION

The described species *T. elongatula* (Praturlon) Šokač & Nikler, by the greatest number of the samples examined, derives from Middle Liassic algal limestones from the locality Šarić duplje. In thin-slides from the area, it has been found together with *Palaeodasyclaetus mediterraneus* (Pia), *Thaumatoporella parvovesiculifera* (Raineri); *Uidalina martana* Farinacci, *Pseudocyclammia* sp., and numerous small foraminifers of negligent stratigraphical value. In a continuous profile, limestones with this alga lie between two levels with *Lithiotis problematica* Gumbel. At the neighbouring locality, south of Kubus, besides this alga there were found the following fossils: *Orbitopsella praecursor* (Gumbel), *Lituosepta recoarensis* Cati and *Boueina hochstetteri* Toulal. At the finding place of the clift where the way to Panas goes, it lies almost directly under the Upper Liassic spotty limestones.

The whole fossil association, as well as the superpositional relations, show clearly that alga belongs to the Middle Liassic.

TAXONOMICAL REMARKS

The species *T. elongatula* belongs to the group of segmented species of the genus *Teutloporella*, which are characterized by the exchange of zones with branches and with out them.

By the manner of the structure, *T. elongatula* in relation to the hitherto known species of the genus, approaches most, and is related to the Upper Jurassic species, *T. obsoleta* Carozzi and *T. socialis* Praturlon, as well as to the Middle Triassic species *T. hirsuta* Pia. *T. elongatula* differs from the species *T. hirsuta* in smaller dimensions, the number of whorls in a segment, the inclination of branches and in a number of other elements. In relation to this, our species generally shows a more complex structure. *T. elongatula* since it is considerably smaller, regarding the dimensions of the outer and inner diameters, differs, moreover, from Upper Jurassic species. By the maximal number of whorls in a segment, it is related to the species *T. obsoleta*, and by one-whorl segments to the species *T. socialis*. The number of pores in a transversal section is identical with the species *T. obsoleta*, which approximately also corresponds to the species *T. socialis*, if a two-whorl segment (A. Praturlon, 1963) is taken as the basis, but it differs by almost half the number of pores which Bystricky & Borza (1964) stated in *T. socialis*.

All the three species, *T. obsoleta*, *T. socialis* and *T. elongatula* manifest an almost identical structure of segments, a mildly undulating upper and lower surface, which in this species is most expressed in one-whorl segments. The tapering of segments towards the distal part is also common to them. The greatest differences appear in the position of segments and, therefore, branches, in relation to of the main stem. In the species *T. obsoleta*, the position is almost regularly inclined under the angle of 30–40°, while in the species *T. socialis* segments bend in the form of letter S. Thus branches of the last species, at least by their proximal part, which stands more or less parallelly to the main stem, approaches the general position of branches of the species *T. elongatula*. While segments in the species *T. obsoleta* and *T. socialis* are the more removed from each other the more they to their distal end, bringing about an clear annulation, in the species *T. elongatula* they are very steep, to almost parallel to the main stem, tightly sticking to each other, which gives the effect of a whole, cylindrical calcareous tube. The steepness of segments causes the extension of branches, by which this species clearly differs from all the hitherto known species of the genus *Teutloporella*.

Immediately before this work has been ready for print and this alga already having been described under its new name, the opportunity was given to us to see A. Praturlon's work (1966), which gave us the possibility to identify compare the species we had described, with *Palaeodasycladus mediterraneus* (Pia) var. *elongatulus* Praturlon.

Thus, the impression is got that the author of the above mentioned variety of *P. mediterraneus* (Pia) did not have – in the course of studies reliable material and, hence, some of the conclusions he made were based exclusively on his own speculations. As the branches are deviating from the general line, and due to their frequent crossing, an apparent separation of the branches becomes evident in the sections, but easily it is noticed that there is no connection between the two fragments. It seems that exactly on the basis of this, A. Praturlon made his conclusion about the branches being ramified, but this has been refuted by the evidence and the material we had at disposal. Probably, due to such a conclusion, this species was referred to *P. mediterraneus* (Pia) var. *elongatus* Praturlon, though even the author himself speaks about a similarity to the genus *Teutlopora*. The entire description we have given, as well as the photos in the tables I–IV, exclude any connection with the genus *Palaeodasycladus*.

Received 10th November 1966.

Institute of Geology,
Zagreb, Kubška 2.

REFERENCES

- Bystricky, J. & Borza, K. (1964): Die Algenkalken des Jura in den »Uphöhlav« Konglomeraten. Geol. sbornik 15/2. Bratislava.
- Carozzi, A. (1955): Dasycladacées du Jurassique supérieur du bassin de Genève. Ecl. Geol. Helv. 48/1. Basel.
- Nikler, L., Sokač, B. & Ivanović, A. (1964): Die Gesellschaften der Mikrofossilien der Jura und Kreide des südöstlichen Velebit. Bull. Scient. Cons. Acad. RSF Yougosl. 9/3. Zagreb.
- Pia, J. (1912): Neue Studien über die triadischen Siphoneae verticillatae. Beitr. Paläont. Geol. Osterr.-ungar. Orients. 25. Wien.
- Pia, J. (1920): Die Siphoneae verticillatae vom Karbon bis zur Kreide. Abh. zool. bot. Ges. 11/2. Wien.
- Pia, J. (1935): Die Diploporen der anisischen Stufe Bosniens. Geol. anali 12/2. Beograd.
- Praturlon, A. (1963): Una nuova *Teutlopora* (alga calcarea) nel' Giurese superiore di M. Corno (Parco nazionale d'Abruzzo). Geologica romana 2. Roma.
- Praturlon, A. (1966): Algal Assemblages from Lias to Paleocene in Southern Latium – Abruzzi: a Review. Boll. Soc. Geol. It. 85, Roma.

B. SOKAČ i L. NIKLER

TEUTLOPORELLA ELONGATULA (PRATURLON, 1966) SOKAČ & NIKLER VAPNENAČKA ALGA IZ SREDNJEG LIJASA VELEBITA

Naslage srednjeg lijasa u Velebitu predstavljaju najfosiliferniji dio jurskih sedimenata. Osim makrofosila, zastupanih litiotidima, brahiopodima i gastropodima, veoma su česti i brojni mikrofosilni ostaci. Ovi posljednji vezani su za biokalkarenite i algalne vapnence. Dok biokalkareniti redovito sadrže malobrojne presjeke vapnenih alga, nekoliko slojeva vapnenaca u različitim nivoima srednjeg lijasa pretežno su s fitogenim sadržajem. U ovim vapnencima uz *Palaeodasycladus mediterraneus* (Pia) zapažena je jedna znatno manja vapnenačka alga, koju osnovne karakteristike uvrštavaju u rod *Teutlopora*.

Teutloporella elongatula, mala vapnenačka alga s gotovo redovito savijenim talusom, predstavljena je na našem nalazištu velikim brojem individua. Izgrađena je od niza segmenata koji tijesno priljubljeni zalaze duboko jedan u drugoga. Zbog teško uočljivih segmenata najčešće se dobija dojam cjelovitog cilindričnog talusa. Segmentacija talusa jasnije je izražena u poprečnim presjecima, gdje su maksimalno presječena četiri segmenta. Međutim, segmenti su najčešće sačuvani pojedinačno, a rijetko dva ili više zajedno. Matična stanica zaprema nešto manje od $\frac{1}{3}$ ukupnog dijametra.

Ogranci izrazito trihofornog tipa smješteni su u pršljene, koji navjerojatnije ne alterniraju. Svaki segment sadrži 1-2, a moguće i 4 pršljena. Ogranci su, kao i segmenti, oštro povijeni prema gore i gotovo paralelni uzdužnoj osi matične stanice. U bazi razmaknuti segmenti uvjetuju smjenjivanje zona sa i bez ogranaka. Zbog jako ustrmljenog položaja i izduženosti ogranaka ova alga u uzdužnim presjecima daje sliku cjevaste grade.

Dimenzije, kao i ostali elementi dani su uz opis u prethodnom tekstu.

Teutloporella elongatula nađena je na više lokaliteta u centralnom dijelu Velebita u zajednici sa slijedećim mikrofossilima: *Palaedasycladus mediterraneus* (Pia), *Boueina hochstetteri* Toulou, *Thaumtoporella parvovesiculifera* (Raineri), *Orbitoporella praecursor* (Gumbel), *Lituosepta recoarensis* Cati, *Uidalina martana* Farinacci, te ostalim dosta brojnim, ali slabo provodnim mikroforaminiferama. Navedena zajednica, kao i superpozicijski položaj određuje joj pripadnost srednjem lijasu.

Ova vrsta pripada grupi segmentiranih teutloporela, srodna je, a i sličnošću se približava gornjojurskim vrstama *T. obsoleta* Carozzi i *T. socialis* Praturlon, te srednjetrojaskoj vrsti *T. hirsuta* Pia. Od ove posljednje potpuno odstupa dimenzijama, te kompliciranijom građom. S gornjojurskim vrstama postoji više sličnosti, premda se i od njih razlikuje dimenzijama uz gotovo identične vrijednosti za neke elemente. Najveća razlika između ove vrste i vrsta *T. obsoleta* i *T. socialis* izražena je upoložaju segmenata, a time i samih ogranaka prema uzdužnoj osi matične stijenice. Dok se segmenti kod gornjojurskih vrsta distalno udaljuju jedan od drugoga, čime dolazi do izrazite anulacije, kod *T. elongatula* oni su tijesno prislonjeni jedan uz drugoga i gotovo paralelni uzdužnoj osi, što uvjetuje prividno cjeloviti cilindrični ovoj. Ogranci koji slijede položaj segmenata u uzdužnom presjeku daju algi izgled cjevaste grade, čime se ona jasno razlikuje od svih do sada poznatih teutloporela.

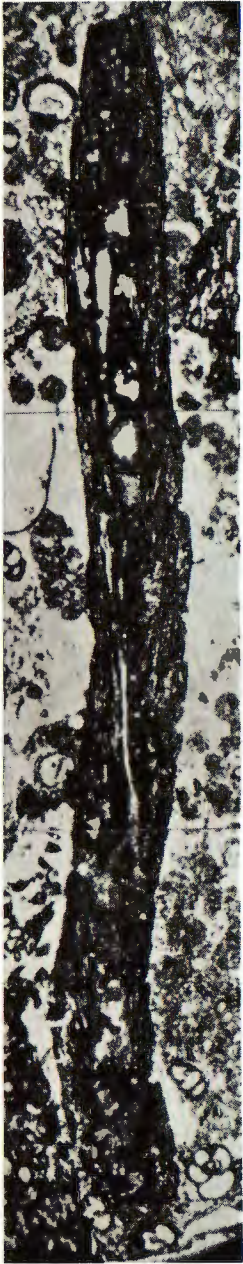
Neposredno prije predaje ovog rada u štampu, kada je ova vrsta već bila opisana pod novim imenom, primili smo rad A. Praturlona (1966), pa smo našu vrstu mogli usporediti s oblikom, koji je spomenuti autor opisao kao *Palaedasycladus mediterraneus* (Pia) var. *elongatulus* Praturlon. Vjerojatno je autor kod svoje interpretacije bio zaveden ukrštavanjem ogranaka, koje je shvatio kao podijeljene. Naš prikaz, kao i priložene fotografije dovoljno jasno isključuju bilo kakovu vezu s rodnom *Palaedasycladus*.

PLATE - TABLA I

1-4. *Teutloporella elongatula* (Praturlon) Sokač & Nikler

1. Tangential section. Tangencijalni presjek. Slide (izbrusak) GO-3831/1 \times 18,8
2. Longitudinal-tangential section. Uzdužno-tangencijalni presjek. Slide (izbrusak) GO-3831/22 \times 26,8
3. Longitudinal slightly tangential section. Uzdužni, malo tangencijalni presjek. Slide (izbrusak) GO-3831/13 \times 25
4. Longitudinal section. Uzdužni presjek. Slide (izbrusak) GO-3831/20 \times 27

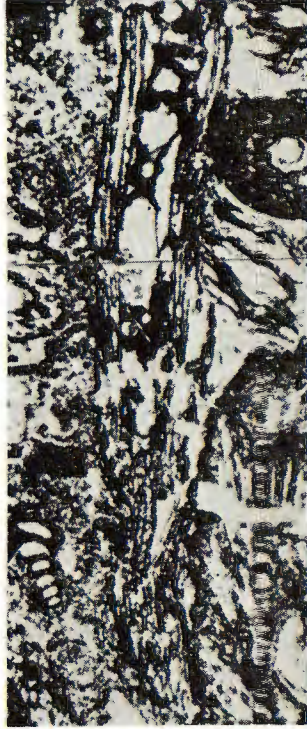
Stratigraphical position (stratigrafski položaj): Middle Liasic (srednji lijas).



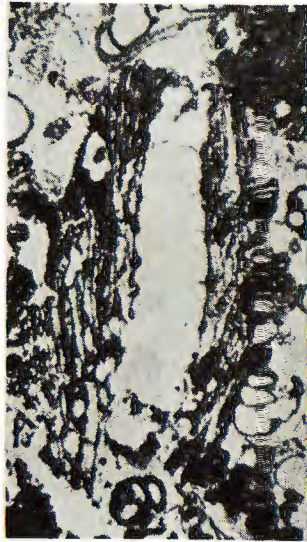
1



2



3



4

PLATE - TABLA II

1-4. *Teutloporella elongatula* (Praturlon) Sokač & Nikler

1. Slightly oblique longitudinal section. Malo kosi uzdužni presjek.
Slide (izbrusak) GO-3831/25 × 23
2. Oblique-longitudinal section. Koso-uzdužni presjek.
Slide (izbrusak) GO-3831/10 × 24,4
3. Cross-section. Poprečni presjek.
Slide (izbrusak) GO-3831/10 × 23,9
4. Cross-section. Poprečni presjek.
Slide (izbrusak) GO-3831/15 × 46,7

Stratigraphical position ((stratigrafski položaj):

Middle Liassic (srednji lijas)

Locality (nalazište): Šarića duplje

Foto: V. Matz

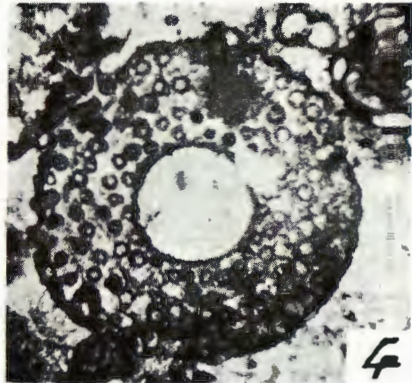
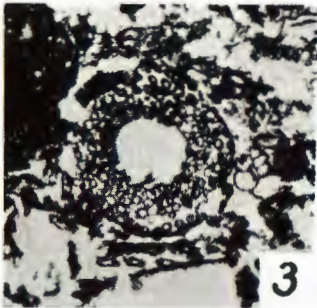


PLATE - TABLA III

1-4. *Teutloporella elongatula* (Praturlon) Sokač & Nikler

1. Oblique-longitudinal and cross-section. Koso-uzdužni i poprečni presjek.
Slide (izbrusak) GO-3831/8 \times 24,7
2. Slightly oblique longitudinal section. Malo kosi uzdužni presjek.
Slide (izbrusak) GO-3831-/23 \times 26,3
3. Tangential section. Tangencijalni presjek.
Slide (izbrusak) IP-61/1 \times 20,7
4. Tangential-oblique section. Tangencijalno-kosi presjek.
Slide (izbrusak) GO-3831/10 \times 22,7

Stratigraphical position (stratigrafski položaj):

Middle Liassic (srednji lijas)

Locality (nalazište): Fig. 1, 2, 4 Šarića duplje; Fig. 3 On the way to Panas
(na putu za Panas).

Foto: V. Matz

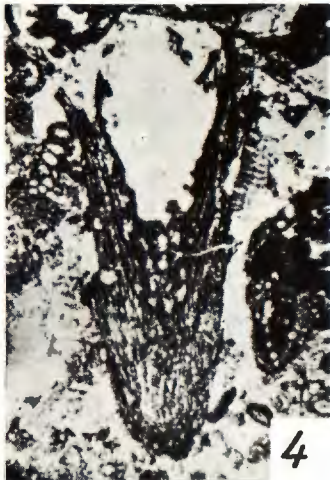


PLATE - TABLA IV

1-6. *Teutloporella elongatula* (Praturlon) Sokač & Nikler

1. Oblique section. Kosi presjek.
Slide (izbrusak) GO-3831/2 \times 50
2. Slightly oblique cross-section. Malo kosi poprečni presjek.
Slide (izbrusak) GO-3831/1 \times 60
3. Cross-section. Poprečni presjek.
Slide (izbrusak) GO-3831/2 \times 50
4. Oblique section. Kosi presjek.
Slide (izbrusak) GO-3831/3 \times 38
5. Oblique section. Kosi presjek.
Slide (izbrusak) GO-3831/3 \times 47,3
6. Oblique section only one segment. Kosi presjek jednog segmenta.
Slide (izbrusak) GO-3831/3 \times 19,3

Stratigraphical position (stratigrafski položaj):
Middle Liassic (srednji lijas).
Locality (nalazište): Šarića duplje.

Foto V. Matz

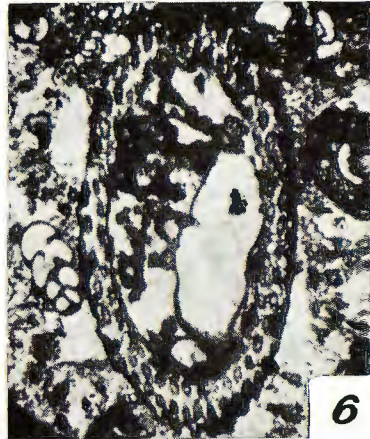
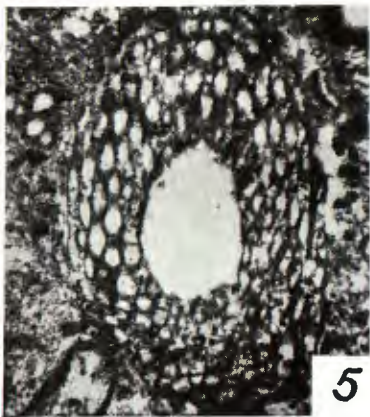
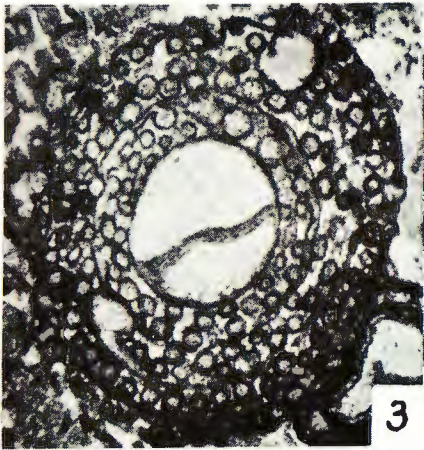
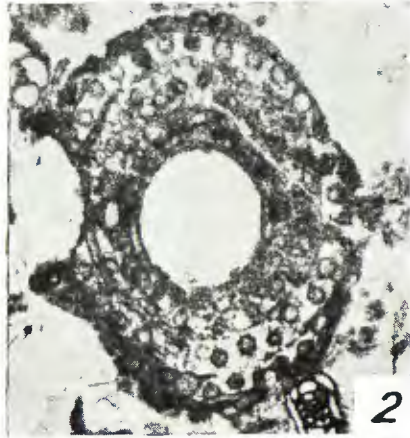
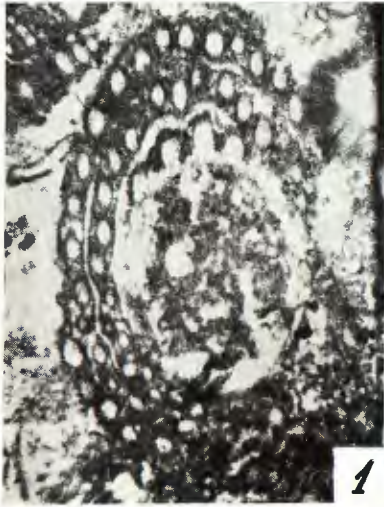


PLATE - TABLA V

1-4. *Palaeodasycladus mediterraneus* (P i a)

1. Oblique section. Kosi presjek.
Slide (izbrusak) GO-3831/7 \times 23,2
2. Tangential section. Tangencijalni presjek.
Slide (izbrusak) GO-3831/27 \times 22,9
3. Slightly oblique cross-section. Malo kosi poprečni presjek.
Slide (izbrusak) GO-3831/16 \times 23,8
4. Cross-section. Poprečni presjek.
Slide (izbrusak) GO-3831/28 \times 19,6

Stratigraphical position (stratigrafski položaj):
Middle Liasic (srednji lijas).
Locality (nalazište): Šarića duplje.

Foto: V. Matz

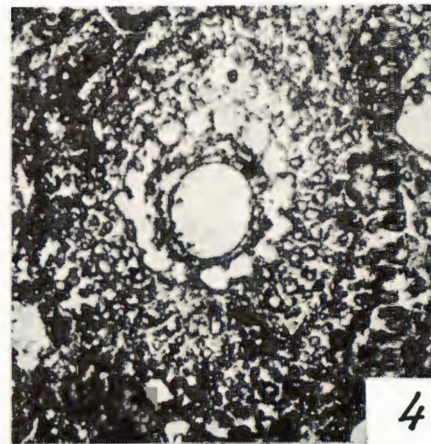
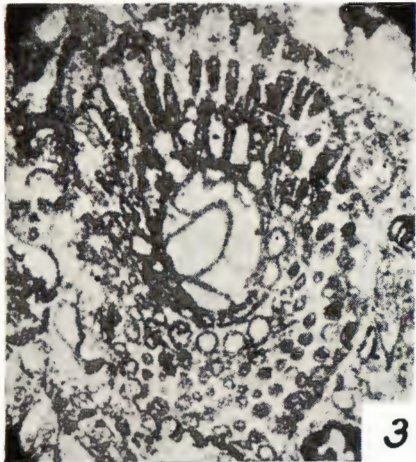
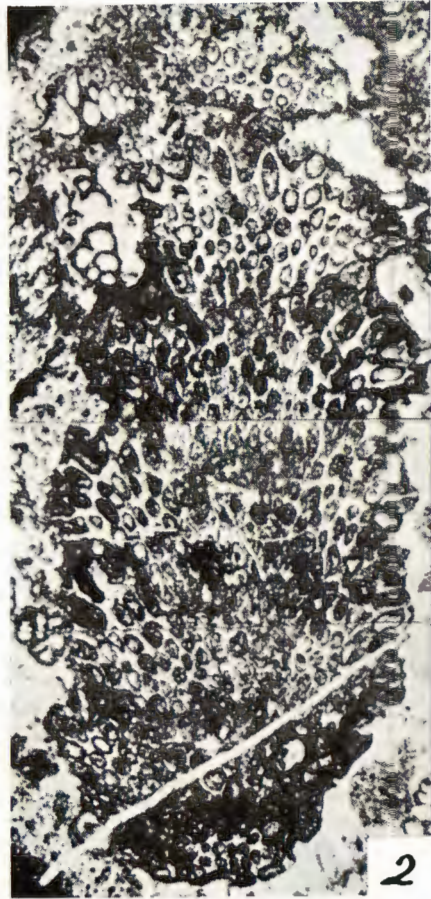
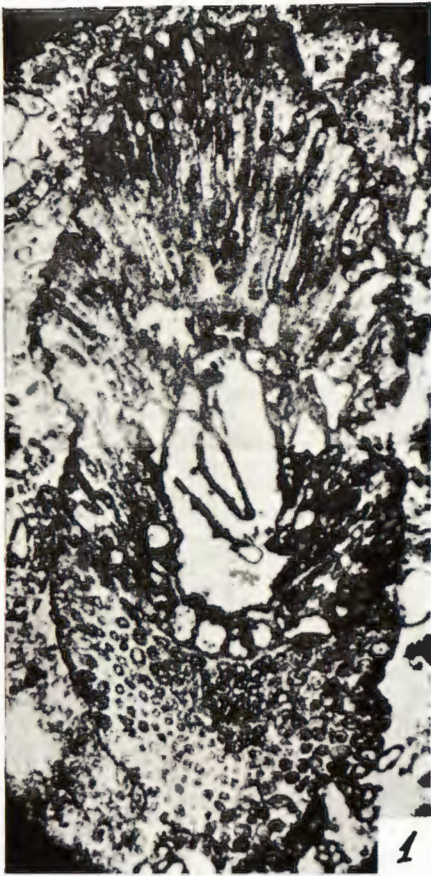


PLATE – TABLA VI

1. Algal limestone with P – *Palaeodasycladus mediterraneus* (Pia), T – *Teutloporella elongatula* (Praturlon) Sokač & Nikler, *Thaumatoporella parvovesiculifera* (Raineri) and small foraminifers.
Algalni vapnenac s P – *Palaeodasycladus mediterraneus* (Pia), T – *Teutloporella elongatula* (Praturlon) Sokač & Nikler, *Thaumatoporella parvovesiculifera* (Raineri) i mikroforaminiferama.
Slide (izbrusak) GO-3831/7. × 6
2. Algal limestone with P – *Palaeodasycladus mediterraneus* (Pia), T – *Teutloporella elongatula* (Praturlon) Sokač & Nikler and small foraminifers.
Algalni vapnenac s P – *Palaeodasycladus mediterraneus* (Pia), T – *Teutloporella elongatula* (Praturlon) Sokač & Nikler i mikroforaminiferama.
Slide (izbrusak) GO-3831/25 × 6,7

Stratigraphical position (stratigrafski položaj): Middle Liassic (srednji lijas).
Locality (nalazište): Šarića duplje.

Foto: V. Matz

