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COMPARATIVE STUDY OF SOME TRIASSIC
DASYCLADACEAE IN YUGOSLAVIA

With 15 plates and 1 text-figure

New dasyclad species *Physoporella likana* is described. *Diplopora hexaster* is emended. New data are given for several species of the genera *Teutloporella*, *Macroporella*, *Gyroporella*, *Oligoporella*, *Physoporella*, and *Diplopora*. For some of the described species the stratigraphical range is enlarged.

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INTRODUCTION

Very intensive explorations of Triassic sediments, especially in the Dinaric Alps, resulted in collecting a rich flora of dasyclad algae of the Middle Triassic age. While some of the forms are completely new, and some new within the Yugoslav territory, the others, although already known in the Yugoslav Triassic, were collected at new important localities.

The described specimens have been selected from an abundant flora. The rest have been already described or have not been clarified for publication yet.

Besides the author, in collecting the samples were active the colleagues Ž. Babić, Z. Bešić, I. Grimani, M. Malez, B. Marković, A. Ramovš, D. Šikić and M. Sušnjari. The photographs were prepared by Ž. Majcen. To all of them I wish to thank cordially for their assistance.

SYSTEMATIC DESCRIPTIONS

The taxonomical interpretations of the known forms are mainly based on the work of J. Pia. Wherever he contributed the first description to the already established taxa, or emended the existing descriptions, his name will be added. As to the synonyms, I shall cite only basic and recent works important for the circumscription of a taxon. Other synonyms may be found in the papers cited below.

Family DASYCLADACEAE

Tribus TEUTLOPORELLEAE Pia, 1927

Genus TEUTLOPORELLA Pia, 1912

Teutloporella herculea (Stoppani, 1857) ex Pia, 1920

Plate, 5, figures 1-2

Teutloporella herculea (Stoppani). - Pia, 1920, Abh. zool.-botan. Ges. Wien, vol. 11, no 2, pp. 40-43, pl. 2, figs. 16-18 (here the older synonyms).

Teutloporella herculea (Stoppani). - Herak, 1950, Rad Jugosl. akad., 280, pp. 129-130, pl. 1, fig. 4; pl. 4, figs. 1, 4.

Teutloporella herculea (Stoppani). - Bystrický, 1957, Geol. sbor. Slov. akad., vol. 8, no 2, pp. 227-228, pl. 3, figs. 4, 5, 6-8.

The thallus is cylindrical without any segmentation. Branches are distributed without a visible order («aspondyl»). Widest at the basis, coming out of the calcareous wall, they pass into thin assimilators. Their position to the main stem is oblique.

Localities: 1. Crna Gora (Montenegro), Popov Do, Ljubišnja; the Ladinic limestone. Figured is only a fragment of an incomplete specimen (plate 5, figure 1).

The whole fragment measures 126 mm. in length.

D (widest) = 4.9 mm.

d (widest) = 2.8 mm.

p = 0.07 mm.

The same slide contains a specimen with the following dimensions:

D = 6.3 mm.

d = 4.3 mm.

2. Hrvatsko Zagorje (Northern Croatia), 800 m W of the railway station at Očura, near Golubovec. The Ladinic limestone is redeposited in the Younger Mesozoic flysch.

Dimensions of the figured specimen (plate 5, figure 2), which is not complete:

L (incomplete) = 193 mm.

D = 4.1 mm.

d = 2.8 mm.

p = 0.10 mm.

It is to be noticed that the branches were not completely parallel.

On the same slide there is one more specimen with the following dimensions:

D = 4.3 mm.

d = 2.8 mm.

p = 0.10-0.14 mm.

Teutloporella aequalis (Guembel, 1872) ex Pia, 1920

Plate 14, figures 7-8

Teutloporella aequalis (Guembel). - Pia, 1920, Abh. zool.-botan. Ges. Wien, vol. 11, no 2, pp. 39-40 (here the older synonyms).

Teutloporella aequalis (Guembel). - Bystřický, 1957, Geol. sbor. Slov. akad., vol. 8, no 2, pp. 228-229, pl. 3, figs. 1-3.

Branches are wider than in *Teutloporella herculea*, especially in their basal portion. Otherwise there are no essential differences between this species and *T. herculea*. This is the reason why Pia was not convinced that this form had to be definitely separated as a species. For a definite decision more specimens allowing a statistical treatment are needed.

Localities: 1. Lika (Central Croatia), the surroundings of Sv. Rok, near Vrbanj, NNW of Pečina ponor. The limestone belongs to the Middle Triassic (possibly to the Ladinian stage?). The fragment (plate 14, figure 8) is partially damaged.

D = 2.1 mm. (incomplete)

d = 2.2 mm.

p = ca. 0.104 mm.

The same slide contains several specimens of *Physoporella likana* n. sp.

2. NW Slovenia, Spodnja Radovna-Krnica. The specimens are larger. The figured fragment (plate 14, figure 7) has the following dimensions:

D = 4.2 mm.

d = 2.2 mm.

p (basal) = ca. 0.14 mm.

On the same slide there is an oblique-longitudinal section characterized by relatively larger pores and irregular inner and outer surfaces.

Dimensions:

D = 4.9 mm.

d = 2.8 mm.

p (basal) = ca. 0.21 mm.

Though the dimensions of the Slovenian specimens are much larger than those of Lika, the proportionally large diameter of pores is common. Therefore they were put together.

Teutloporella triasina (Schauroth, 1859) ex Pia, 1912

Plate 1, figures 1-4; plate 2, figure 3

Teutloporella triasina (Schauroth). - Pia, 1912, Beitr. Pal. Geol., 25, pp. 39-41, pl. 4, figs. 12-19.

The thallus can be straight or possibly a little curved. The whorls of branches are dense. Pia (1912) noticed the vertical changes of series of whorls with differing dimensions of branches, especially along their proximal enlarged parts. But he mentioned that some specimens might lack the feature.

The branches come out obliquely from the central stem and they curve against the upper part of the thallus.

A very important characteristic of this species is rich variability of outer »segmentation« due to the furrows of different shapes and dimensions. The age of the so far known specimens should be Anisian.

High variability is also apparent in our specimens found at the following localities:

1. Slovenia, Brdo W of Tržič; the Ladinian limestone. The specimens are very numerous. Some of them are partially figured. The general organization is typical for the species, only the formation of series of whorls is not evident. The partially incomplete calcification among the branches should be noticed.

The specimen figured on plate 1, figure 1, is cut tangentially. The photograph is only partial. The whole fragment is over 14 mm. long. The mode of segmentation is obvious.

The second specimen (plate 1, figure 2) is also tangentially cut in order to show the distribution of the whorls. The whole fragment (not completely taken) measures 22 mm. in length.

The next specimen (plate 1, figure 3) represents a cross-section. The incomplete calcification is visible especially in the proximal (basal) parts of the branches. The lime among them is deficient, but the calcification of the membranes of the branches is clearly visible.

Dimensions: D = 6.7 mm.
d = ca. 4.4 mm.
p (basal) = ca. 0.26 mm.

At the same locality *Teutloporella nodosa* was registered.

2. Lika, surroundings of Sv. Rok, Velika Vršina; the Ladinian limestone. The specimen on plate 1, figure 4, shows a very distinctive curving of the branches and possibly some traces of the building of series.

Dimensions: D = 5.5 mm.
d = 2.6 mm.
p (basal) = ca. 0.21 mm.

On the same slide *Gyroporella* cf. *ampleforata* is to be found.

The specimen figured on plate 2, figure 3, also derives from the surroundings of Sv. Rok. But the locality is unknown, as well as the true stage of the Middle Triassic. The outer segmentation is especially variable. The curving of the branches is distinctive.

Dimensions: D = ca. 3 mm.
d = over. 1.2 mm.
p = 0.12 mm.

The specific determination of this specimen may not be considered definite.

Teutloporella cf. triasina (Schauroth, 1859) ex Pia, 1912

Plate 2, figure 2

A collection of specimens deriving from the Ladinian limestone of Dalmatia is very close to *Teutloporella triasina*, especially according to outer segmentation. But the arrangement of pores is not visible and calcification is more complete. The figured specimen was taken partially. But even this part of the fragment shows a slight curving of the thallus. This feature is clearly visible on account of the thallus, which is missing in the photograph. The section is longitudinal-oblique, but partially tangential. Therefore the basal parts of pores (probably less calcified) are not visible. The question whether we have to do with a subspecies of *Teutloporella triasina* should be the subject of further investigations on new specimens. The length of the whole fragment is over 9 mm. Other dimensions:

D = 2.1 mm.
d = 0.6 mm.

These dimensions are below the real value because of the partially tangential section.

On the same slide there is another specimen, with the following dimensions:

D = 4.5 mm.
d = ca. 2.1 mm.
p (basal) = ca. 0.175 mm.

Locality: Dalmatia (Southern Croatia), NW of Knin, Debelo brdo; the Ladinian limestone; accompanying alga: *Teutloporella nodosa*.

Teutloporella nodosa (Schaffhäutl, 1863) ex Pia, 1920

Plate 2, figure 1; plate 3, figures 1-4; plate 4, figures 1-4

Teutloporella nodosa (Schaffhäutl). - Pia, 1920, Abh. zool.-botan. Ges. Wien, vol. 11, no 2, pp. 43-45, pl. 2, figs. 11-13 (here the older synonyms).

Funnel-shaped segments of the thallus are commonly feebly connected. Therefore detached segments occur very often.

The arrangement of pores is not completely regular, but according to Pia (1920), they should form whorls (nevertheless, he suggests reexamination of this feature). The pores are enlarged on the proximal part and thinner on the surface. They continue into assimilators.

In my collection there are very numerous specimens. Among them there are to be found typical forms as well as aberrant ones. Only a few of them show an arrangement of pores, but I am not convinced that we have to do with ordinary whorls.

It was very difficult to decide whether the entire material belonged to the same species or had we to describe new forms. After a long hesitation I have been finally convinced that we have really to do with one species only, which is very variable in its outer form.

Localities: 1. Slovenia, Brdo W of Tržič; the Ladinian limestone; accompanying alga: *Teutloporella triasina* (plate 1, figures 1-3). The whole length of the partially figured fragment (plate 2, figure 1) measures over 14 mm. The specimen is very instructive in showing variability in calcification. Great differences are to be noticed between the lower and the upper segments. Pores are visible, but without an arrangement into whorls.

Dimensions: D = ca. 4.6 mm.
d = ca. 1.4 mm.
H = 1.4-1.9 mm.
p (basal) = 0.07 mm.

2. Dalmatia (Southern Croatia), Orlovica near Knin; the Lower Ladinian limestone; accompanying alga: *Macroporella beneckeii*. The remains of *Teutloporella nodosa* are generally in the form of separated segments (in different sections) with visible pores. Their arrangements seem not to be in whorls.

The specimens on plate 3, figures 1 and 3, are typical representatives.

Dimensions: D = 2.2-3.1 mm.
H = ca. 1 mm.
p (basal) = 0.056-0.07 mm.

The specimen on plate 3, figure 2, belongs to the same group, but it shows irregular calcifications in the connection zone between the two segments. The diameter (D) measures ca. 3.4 mm.

3. Lika, Velika Popina-Šuplje brdo; the Ladinian limestone. The mode of preservation (specimens on plate 4, figures 1-4) is different from that at the foregoing locality. Calcification is more complete, and

because of recrystallization only traces of pores are visible. The shapes of segments vary in a high degree, which is a common feature of the species. The outer parts of some segments show thornlike prolongations, which enrich the variability of the shape.

Dimensions: D = 2.6—4.9 mm.
d = 1—2 mm.
H = 1—1.3 mm.

4. Dalmatia, Debelo brdo NW of Knin; the Ladinian limestone; accompanying flora: *Teutloporella* cf. *triasina* and possibly *Diplopora annulata*. The only specimen belonging to this species is figured on plate 3, figure 4. The mode of preservation is the same as at the preceding locality. The upper segments of the specimen are typical, but the lower ones are completely irregular, with numerous thornlike prolongations on the surface. In this case the variability of the outer form is extremely emphasized.

Dimensions: D = 4.7—5.3 mm.
H = ca. 1 mm.

Teutloporella sp. indet.

Plate 12, figure 8

The inner arrangements of pores, as well as their proximal terminations, remind of *Teutloporella triasina* and *T. nodosa*. A kind of segmentation is also visible, but it is different from that in the common specimens of the mentioned species. New specimens are needed for specific determination.

Locality: Lika, Sv. Rok, Rukavinska gradina; the Anisian limestone.

Dimensions: D = 2.4 mm.
d = ca. 1.4 mm.
p (basal) = 0.14—0.24 mm.

Tribus DIPLOPOREAE Pia, 1927

Subtribus MACROPORELLINAE Pia, 1927

Genus MACROPORELLA Pia, 1912

Macroporella alpina Pia, 1912

Plate 9, figures 1—2

Macroporella alpina Pia, 1912, Beitr. Pal. Geol., 25, p. 34, pl. 2, figs. 13—15.

Macroporella alpina Pia, 1935, Geol. anali, 12, pp. 196—198, pl. 1, figs. 1—5; pl. 2, figs. 1—2.

The thallus is cylindrical and mostly more or less curved, with an irregular surface. No segmentation can be found. The branches are dense, simple and progressively widened from the proximal part to the distal one («phloioform»). They are a little curved and oblique in relation to the main stem. The density of the branches determines whether their cross-sections are rounded (very often) or polygonal (rarely). As to the dimensions of pores, it is to be pointed out that their diameter is greater than the space between two neighboring pores. There are no traces of real whorls.

Localities: 1. Dalmatia, Plavno-Plešivica, NW of Knin; the Anisian limestone; accompanying flora: *Physoporella pauciforata*, *Ph. varicans*, *Diplopora hexaster*. The figured specimen (plate 9, figure 1a) represents a section of a curved thallus. Therefore, the branches are cut more or less longitudinally and obliquely. The outer diameter measures approximately 2.4 mm. The pores in the terminal part have the diameter of over 0.1 mm.

2. Bosnia, Deralo near Bosansko Grahovo; the Anisian limestone; accompanying flora: *Physoporella pauciforata*, *Ph. cf. minutula*, *Oligoporella pilosa*, and *Diplopora hexaster*. The figured specimen on plate 9, figure 2, is curved, cut more or less tangentially.

Dimensions: D = ca. 4.5 mm.
d = over 1.7 mm.
p (terminal) = over 0.1 mm.

Consequently, the central stem is smaller than the calcareous wall. The pores are very dense and therefore partially polygonal. Because of the irregular shape of the thallus some pores are cut longitudinally, the others across at their proximal, the rest across at their distal parts.

Macroporella beneckeii (Salomon, 1895) ex Pia, 1920

Plate 9, figure 3; plate 10, figures 1-4

Macroporella beneckeii (Salomon). - Pia, 1920, Abh. zool.-botan. Ges. Wien, vol. 11, no 2, pp. 31-32, pl. 1, figs. 24-26 (here the older synonyms).

The thallus is cylindrical and curved. The branches are simple, phloioform, arranged without whorls. They are oblique in relation to the main stem, a little curved, rounded in cross-section and abruptly enlarged at the proximal end. The last feature, together with the dimensions, is most characteristic for the species.

Localities: 1. Dalmatia, Orlovica N of Knin; the Lower Ladinian limestone; accompanying alga: *Teutloporella nodosa*.

The figured specimens (plate 10, figure 2) show high variability in details (thickness of wall, density of pores, degree of calcification, outer surface of the thallus, etc.), but the main specific features are clearly visible (terminal enlargement of the pores and dimensions in general).

The most characteristic specimen (plate 9, figure 3), measures in length over 10.5 mm. The general form of the thallus is very variable (regular, knotty, and again regular), which indicates how careful we have to be before the shape of a fragment of a thallus is to be considered characteristic for a taxon. The pores are rounded and polygonal; their distribution is not in whorls. The outer diameter (D) in the lower and the upper portions of the specimen measures ca. 1 mm., the inner diameter (d) ca. 0.6 mm.

The specimen on plate 10, figures 2 and 3, are quite identical with the original Pia's material (Pia, 1920).

Dimensions: D = 1.3—1.4 mm.
d = 0.6—0.8 mm.

The specimen figured on plate 10, figure 1, is characterized by relatively rare pores and high calcification. The dimensions are within the range of those of the species:

L = 5 mm.
D = 1.2 mm.
d = over 0.5 mm.
p (terminal) = ca. 0.06 mm.

Specimens 4a and 4b on plate 10 show all the typical features, but a little deficient calcification. Besides, the tangential part of specimen 4a shows in the diameter differences of pores.

Dimensions: D = 1.4 mm.
d = 0.7 mm.
p = 0.065 mm.

Macroporella sp. indet.

Plate 11, figure 1

The specimen from Lika is a fragment which differs from all the described specimens by showing an irregular inner diameter. The shape of branches is typical; their distribution without whorls. We have to wait for new specimens to decide whether this is an irregular fragment of *Macroporella alpina* or of another (perhaps new) form.

Dimensions: D = ca. 2.1 mm.
d = over 1.5 mm.

The problem arises with the age of this fragment, which is registered together with *Physoporella likana* and *Teutloporella aequalis* (on the same slide). This latter species implies the Ladinic age, while the representatives of the genus *Physoporella* have not been found after the Anisian age. Therefore, the question whether we have to do with the Anisian or Ladinian ages will remain unsolved.

Locality: Lika, NNW of Pečina ponor, near Sv. Rok.

Genus GYROPORELLA (Guembel, 1872) Benecke, 1876

Gyroporella cf. *ampleforata* Guembel, 1874

Plate 15, figure 1-4

There is a number of Ladinian specimens which remind of the Anisian species *Gyroporella ampleforata*, published by Pia (1912), which may contain heterogeneous material. For the time being it is impossible to give an emended description, so I shall describe only the new Ladinian specimens which seem to belong to the mentioned species, in order to offer an opportunity for comparison.

(a) The specimens on plate 15, figures 1 and 4, are most typical. Intusannulation is clearly visible in figure 4, as well as the shape of the branches, which are in fact divided into a handle and a bladder. The form of the main stem is not visible. In the future it will be necessary to find specimens which should give possibility to determine the real form of the main stem, and then, perhaps, it will be possible to find some connexion between the outer surface of the main stem and the intusannulation. Pia's reconstruction (Pia, 1912, p. 36) in this respect may hardly be considered reliable.

Dimensions: D = 4 mm.
d = ca. 3 mm.
p (max.) = 0.247 mm.

The specimen in figure 1 is in cross-section, and therefore the intusannulation is not visible. The shape of the branches corresponds to Pia's original material, and only this was the reason for its attribution to *Gyroporella* cf. *ampleforata*.

Dimensions: D = 4.7 mm.
d = 3.3 mm.
p (max.) = 0.212 mm.

Locality: Lika, Velika Vršina, near Sv. Rok; the Ladinian detrital limestone; accompanied by *Gyroporella maxima*; in the same horizon *Diplopora annulata* and *Teutloporella triasina* are to be found.

(b) The specimen on plate 15, figure 2, is also a cross-section without traces of intusannulation. The shape of branches corresponds to *Gyroporella ampleforata*, as well as to *Diplopora annulata* subsp. *dolomitica*. Only because of no visible grouping of pores do we consider it nearer to *Gyroporella ampleforata*.

Locality: Lika, Gradina at Vrkljanski ponori, near Sv. Rok; the Ladinian detritical limestone; accompanying alga: *Diplopora annulata*.

(c) The specimen on plate 15, figure 3, shows some traces of intusannulation, which was the reason for our taxonomical determination. The shape of pores differs from those described above, but it is within the ratio of normal variability.

Dimensions: D = 5.6 mm.
 d = ca. 4.3 mm.
 p = ca. 0.28 mm.

Nevertheless, it is possible that we have to do with an aberrant form of *Diplopora annulata*, which accompanies abundantly the mentioned specimen.

Locality: Lika, Vracc near Gračac; the boulder of the Ladinian limestone within the Upper Triassic calcareous conglomerates; accompanied by *Diplopora annulata*.

Gyroporella maxima Pia, 1920

Plate 2, figure 4

Gyroporella maxima Pia, 1920, Abh. zool.-botan. Ges., Wien, vol. 11, no 2, pp. 37-38, pl. 1., figs 27-33.

The thallus is cylindrical, without segmentation. The branches are vesiculiferous, perpendicular towards the main stem, distributed without visible order. Generical determination is very difficult if there are only cross-sections, because of similarities, in the shape of pores, with *Diplopora annulata* subsp. *dolomitica*.

Locality: Lika, Velika Vršina, near Sv. Rok; the Ladinian detritical limestone; accompanied by *Diplopora annulata*, *Gyroporella* cf. *ampleforata* and *Teutloporella triasina*. There is only one typical cross-section with the following dimensions:

D = 4.2 mm.
 d = 3.3 mm.
 p (terminal) = 0.281 mm.

Genus OLIGOPORELLA Pia, 1912

Oligoporella pilosa Pia, 1912

Plate 11, figures 4-9

Oligoporella pilosa Pia, 1935, Geol. anali, vol. 12, no 2, pp. 205-219 (here the older synonyms).

Oligoporella pilosa Pia. - Bystričký, 1957, Geol. sbor. Slov. akad., vol. 8, no 2, pp. 229-231, pl. 4, figs. 1-7; pl. 5, figs. 1-5.

The thallus is cylindrical; the branches rare, relatively large, tapering towards the distal end; distributed in whorls.

Variability is rather emphasized (intusannulation, different position of the branches, protuberances on the surface of the thallus, etc.). But all the mentioned features are infraspecific. Therefore, several varieties can be distinguished which are represented in our collection itself.

(a) *Oligoporella pilosa* Pia var. *varicans* Pia, 1935, is figured on plate 11, figures 4, 8, 9. All specimens are characterized by the diverging of branches of the same whorl.

The specimen 4a is cut a little obliquely through two whorls.

Dimensions: D (max.) = 2.3 mm.
D (min.) = 1.7 mm.
d = 1.5 mm.
p = 0.17 mm.

Specimen 4b represents more or less a cross-section of only one whorl.

Dimensions: D (max.) = 1.4-1.5 mm.
d (max.) = 1 mm.
p = up to 0.17 mm.

The section of the specimen on figure 8 is also a little oblique in relation to the main stem, through two whorls. It is visible that the surface of the calcareous wall is not smooth but »thornlike« because of the individualized terminal parts of the calcified branches.

Dimensions: D = 2.8-3.2 mm.
d = ca. 1.5 mm.
p = 0.14 mm.

The specimen on figure 9 also represents an oblique section through two whorls. The surface of the calcareous wall is more or less smooth.

Dimensions: D (max.) = 2.8 mm.
D (min.) = 2.4 mm.
d = 1.6 mm.
p = 0.175 mm.

Locality: Lika, WSW of Klanac Pucalovića, near Sv. Rok; the Anisian limestone.

(b) *Oligoporella pilosa* Pia var. *semivaricans* Pia, 1935, is figured on plate 11, figure 6. It is oblique section showing a moderate diverging of the branches and partially thornlike terminations of the calcified branches.

Dimensions: D = 3.1 mm.
d = 1.8 mm.
p (basal) = 0.248 mm.

Locality: Lika, WSW of Klanac Pucalovića, near Sv. Rok; the Anisian limestone.

(c) *Oligoporella pilosa* Pia var. *irtusannulata* Pia, 1935, is represented by specimens figured on plate 11, figures 5 and 7. Both are cut obliquely. Intusannulation is especially clear in the specimen in figure 5.

Dimensions:	figure 5	figure 7
D =	2.3 mm.	2.6 mm.
d =	1.4 mm.	1.6 mm.
p =	0.14—0.17 mm.	0.175 mm.

Locality: Lika, WSW of Klanac Pucalovića, near Sv. Rok; the Anisian limestone.

Genus *PHYSOPORELLA* Steinmann, 1908

Physoporella pauciforata (Guembel, 1872) ex Pia, 1912

Plate 9, figure 1b; plate 12, figure 4; plate 13, figures 3 and 5

Physoporella pauciforata (Guembel). — Pia, 1920, Abh. zool.-botan. Ges. Wien, vol. 11, no 2, pp. 51–52, pl. 3, figs. 10–15 (here the older synonyms).

Physoporella pauciforata (Guembel). — Pia, 1935, Geol. anali, pp. 221–226.

Physoporella pauciforata (Guembel). — Herak, 1958, Journ. Pal. Soc. India, 3, pp. 59–60, pl. 13, figs. 1–5.

Physoporella pauciforata (Guembel). — Bystrický, 1962, Geol. sbor. Slov. akad., vol. 13, no 2, pp. 232–233, pl. 4, figs. 2–6.

The thallus is cylindrical, without any evident segmentation. Only oblique fissuration can be noticed. The branches are distributed in whorls. They are pyriferous in shape, mostly closed within the calcareous wall, but not without exceptions. The variability of many features has enabled the creation of different varieties. Some of them are represented in our material.

(a) *Physoporella pauciforata* (Guembel) var. *simplex* Pia, 1935, is figured on plate 9, figure 1b and plate 13, figure 5. The first represents

a fragment in cross-section, the second an oblique-longitudinal section. In the last mentioned specimen an evident fissuration makes the thallus funnel-shaped. Its dimensions are:

D = 2.8 mm.
d = 1.4 mm.
H = 0.8 mm.
p (basal) = 0.31 mm.

Locality: Dalmatia, Plavno-Plešivica; the Anisian limestone; accompanying algae: *Diplopora hexaster* and *Physoporella varicans*.

(b) *Physoporella pauciforata* (Guembel) var. *undulata* Pia, 1935, is represented by an oblique-cross section (plate 12, figure 4). The above part shows individualized branches cut close to their middle. The lower part is cut near the periphery of the whorl. The number of branches 16-18.

Dimensions: D = 2.6 mm.
d = 1.2 mm.
p (basal) = 0.21 mm.

Locality: Dalmatia, Plavno-Plešivica; the Anisian limestone; accompanying algae: *Physoporella varicans* and *Diplopora hexaster*.

(c) *Physoporella pauciforata* (Guembel) cf. var. *gemerica* Bystrický, 1962, is figured on plate 13, figure 3 (oblique section). Pores are very similar to the original specimens of the variety, but the distance between them is greater and grooves at the surface broader.

Dimensions: D = 2.2 mm.
d = 1.8 mm.
h = ca. 0.8 mm.
p (basal) = 0.32-0.35 mm.

Locality: Bosnia, Deralo-Bosansko Grahovo; the Anisian limestone; accompanied by *Physoporella* cf. *minutula*, *Oligoporella pilosa*, *Macroporella alpina*, and *Diplopora hexaster*.

Physoporella minutula (Guembel, 1872) ex Pia 1912

Plate 12, figure 6

Physoporella minutula (Guembel). - Pia, 1920, Abh. zool.-botan. Ges. Wien, p. 56, pl. 2, figs. 19-22 (here the older synonyms).

The thallus is small, segmented by annulation. The shape of pores is »sausage-like« and they are distributed in whorls.

Dimensions: D = 1.1 mm.
d = 0.35 mm.
H = ca. 1.1 mm.
p = ca. 0.14 mm.

Locality: Lika, WSW of Klanac Pucalovića; the Anisian limestone; accompanying algae: *Oligoporella pilosa* and *Diplopora annulatisima* (?).

Physoporella cf. *minutula* (Guembel, 1872)

Plate 12, figure 3

The specimen possesses an undulated thallus with fissuration between two neighboring segments; pores are »sausage-like«.

Dimensions: D = 1.4 mm.
d = 0.6 mm.
p = 0.175 mm.

Several branches seem to be open. Moreover, the figured specimen most probably possesses only one set of branches in each segment (whorl). New specimens are needed to see whether this is a constant feature or an expression of variability. In the first case it will be necessary to create a new species.

Locality: Bosnia, Deralo-Bosansko Grahovo; the Anisian limestone; accompanying flora: *Oligoporella pilosa*, *Physoporella pauciforata*, *Diplopora hexaster*, and *Macroporella alpina*.

Physoporella cf. *praealpina* Pia, 1920

Plate 12, figure 5

The main features of the species *Physoporella praealpina* are the closely crowded whorls consisting of two sets of branches oblique to the main stem and the lack of calcification among their proximal portions. Pores are more rounded at their distal ends.

Our specimen (oblique section) shows crowding of pores, lack of calcification, and their rounded distal portions. Fissuration is not registered and the dimensions are smaller than those of Pia's original specimens:

D = 1.6 mm.
d = 0.7 mm.
H = ca. 0.7 mm.
p = 0.14–0.17 mm.

Locality: Dalmatia, Greda near Orlovica, N of Knin; the Anisian limestone.

Physoporella varicans Pia, 1935

Plate 12, figure 1–2; plate 13, figures 1, 2, 4

Physoporella varicans Pia, 1935, Geol. anali, vol. 12, no 2, pp. 229–232.

Physoporella varicans Pia. – Bystrický, 1957, Geol. sbor. Slov. akad., pp. 233–234, pl. 6, fig. 5.

Physoporella varicans Pia. – Herak, 1958, Journ. Pal. Soc. India, 3, p. 63, pl. 13, figs. 6–7.

The elongated cylindrical thallus bears whorls consisting of two sets of branches connected together at their base and diverging and bending to the surface of the calcareous wall. Especially characteristic is the approaching at the distal ends of branches of the neighboring whorls, forming outer convexities which cause a longitudinal undulation of the thallus. It depends on the orientation of sections as to which form we get. We have figured some instructive examples from different localities:

1. Lika, slope of Rastovača at Gračačko polje; the Anisian limestone. The specimen is cut obliquely through two whorls (plate 12, figure 1).

Dimensions: D (min.) = 2.3 mm.
d (min.) = 1.7 mm.
p (basal) = 0.28 mm.

2. Dalmatia, Plavno-Plešivica: the Anisian limestone. The first specimen (plate 12, figure 2) is also cut obliquely through two whorls.

Dimensions: D (min.) = 2.6 mm.
d (min.) = 1.8 mm.
p (basal) = 0.28 mm.

The second specimen (plate 13, figure 1a) is cut obliquely-tangentially. It shows a longitudinal undulation and the distribution of branches in two sets in each whorl.

Dimensions: D = 2.8 mm.
H = 1.3 mm.
p (basal) = 0.35 mm.

The specimen on plate 13, figure 1b, is important because it shows a more or less rounded shape in the cross-section of a whorl (segment) and enables to register real dimensions:

$$\begin{aligned} D &= 3 \text{ mm.} \\ d &= \text{ca. } 2.1 \text{ mm.} \\ p \text{ (basal)} &= 0.21 \text{ mm.} \end{aligned}$$

The specimen on plate 13, figure 2, is cut obliquely, showing all the typical features.

$$\begin{aligned} \text{Dimensions: } D &= 3 \text{ mm.} \\ d &= 1.5 \text{ mm.} \\ H &= \text{ca. } 1.4 \text{ mm.} \\ p \text{ (basal)} &= 0.25\text{--}0.28 \text{ mm.} \end{aligned}$$

The specimen on plate 13, figure 4, is cut obliquely-longitudinally. It is especially interesting that the undulation is not so clear as in the former specimens. The reason is in the fact that the section does not go through the middle of the branches which are cut longitudinally.

$$\begin{aligned} \text{Dimensions: } D &= 3.1 \text{ mm.} \\ d &= 2.6 \text{ mm.} \\ H &= \text{ca. } 1 \text{ mm.} \\ p \text{ (basal)} &= 0.25 \text{ mm.} \end{aligned}$$

Physoporella likana n. sp.

Plate 14, figures 1-3

Origin of the name: the name is due to the first finding place in Lika.

Description: the thallus is cylindrical but probably not very elongated, the main stem relatively large in comparison to the tiny branches and calcareous wall. The shape of the pores is pyriferous, generally closed at the distal end. There are traces which show that some of them penetrate through the calcareous wall. There are no visible traces of forming clear whorls.

Dimensions:	fig. 1	fig. 2
	D = 3.8 mm.	3 mm.
	d = 3 mm.	2.5 mm.
	p (basal) = up to 0.17 mm.	over 0.07 mm.
	fig. 3a	fig. 3b
	D = 1.9 mm.	2.3 mm.
	d = 1.3 mm.	1.5 mm.
	p (basal) = 0.04 mm.	0.10 mm.

Type locality: all specimens derive from Lika, NNW of Pečina ponor, near Sv. Rok.

Type stratum: the Middle Triassic limestone; accompanying algae: *Teutloporella aequalis* and *Macroporella* sp. indet.

Syntypes: the specimens on plate 14, figures 1-3. The slide is in the collection of the Institute for Geology and Palaeontology, University of Zagreb, Alg. 86.

Physoporella lotharingica (Benecke, 1898)

Plate 14, figures 4-6

Physoporella pauciforata var.? *lotharingica* Pia, 1920, Abh. zool.-botan. Ges. Wien, vol. 11, no 2, p. 52, pl. 3, figs. 11, 13.

Physoporella lotharingica (Benecke). - Pia, 1931, Ann. Naturh. Mus. Wien, 45, pp. 266-267, pl. 21, fig. 8.

This species has a long history. Benecke, according to Pia (1920), attributed it to the genus *Diplopora*. Pia (1920) considered it only a variety of *Physoporella pauciforata* and described new specimens under the name *Ph. pauciforata* var.? *lotharingica*. The question-mark indicates that the decision was not definite. And, indeed, in a new paper (Pia, 1931) he preferred to retain the species *Ph. lotharingica*. Afterwards (Pia, 1945) he gave a definite circumscription of the species by separating larger Bosnian specimens and establishing the new variety *Ph. pauciforata* var. *undulata*.

The thallus of *Physoporella lotharingica* is cylindrical. The calcareous wall is rather tiny, pores pyriferous in shape and distributed in whorls. The branches are individually calcified («thornlike») at their terminal end.

Especially variable are the dimensions:

	fig. 4	fig 5	fig. 6
D =	0.9 mm.	1.9 mm.	2.1 mm.
d =	over 0.6 mm.	ca. 1.5 mm.	ca. 1.6 mm.
p (basal) =	over 0.14 mm.	ca. 0.14 mm	ca. 0.14 mm.

The stratigraphical range has been unclear for a long time. Now we believe that the species is to be found from the Anisian to the Upper Ladinian.

Localities: 1. Lika: a) Gradina at Vrkljanski ponori, near Sv. Rok; the Ladinian limestone (specimen in figure 4); accompanying alga: *Diplopora annulata*.

b) Sekulin vrh, SW of Lička Kaldrma; the Middle Triassic limestone (specimen in figure 6).

2. Dalmatia, Debelo brdo, NW of Knin; the Upper Ladinian limestone (specimen in figure 5); accompanied by *Teutloporella* cf. *triasina*, *T. nodosa* and *Diplopora annulata*.

Subtribus DIPLOPORINAE Pia, 1927

Genus DIPLOPORA Schafhäütl, 1863

Diplopora annulata Schafhäütl, 1853, ex Pia, 1920

Plate 6, figures 1-4; plate 7, figures 3-4;
plate 12, figure 7

Diplopora annulata Schafhäütl. - Pia, 1920, Abh. zool.- botan. Ges. Wien, vol. 11, no 2, pp. 73-87, pl. 5, figs. 12, 14-27 (here the older synonyms).

Diplopora annulata Schafhäütl. - Herak, 1957, Micropaleontology, vol. 3, no 1, pp. 51-52.

Representatives of this species, within its normal features, are very often described in numerous papers. The thallus is cylindrical, annulated, branches trichophorous and vesiculiferous, arranged in tufts and whorls, from one to several whorls in each segment (but never only one).

The remains are very fragile. Therefore, larger specimens are rarely found. In our collection both subspecies are represented:

(a) *Diplopora annulata* Schafhäütl subsp. *annulata* is figured on plate 6, figures 2-4, and plate 7, figures 3-4. The main features are evident: annulation, distribution of branches, their trichophorous shape and various lengths of segments. In this respect especially interesting is the specimen on plate 6, figure 2, where besides »normal« segments also extremely thin ones can be noticed. The specimens on plate 6 clearly show the variability of dimensions:

	fig. 2	fig. 3	fig. 4
D =	2.3 mm.	2.5 mm.	5.2 mm.
d =	0.9 mm.	1.4 mm.	2.8 mm.
p =	0.03-0.07 mm.	0.07 mm.	0.105 mm.

Localities: 1. Dalmatia, Debeli Greda in the district of Orlovica, N of Knin; the Ladinian limestone (specimens on plate 6, figure 2, and plate 7, figure 4).

2. Lika, Vracc near Gračac; the Ladinian limestone (specimen on plate, 6, figure 3).

3. Velika Popina-Crni vrh; the Ladinian limestone (specimen on plate 6, figure 4)

4. Gradina at Vrkljanski ponori, near Sv. Rok; the Ladinian limestone (specimen on plate 7, figure 3).

(b) *Diplopora annulata* Schafhäütl subsp. *dolomitica* (Pia, 1920) Herak, 1957, is represented by only one but very characteristic specimen (plate 6, figure 1). Annulation, metaspondylity and vesiculiferous shape of branches are visible.

Dimensions: D = 4.3 mm.
d = 2.9 mm.
p (terminal) = 0.175 mm.

Locality: Lika, Gradina, at Vrkljanski ponori, near Sv. Rok; the Ladinian limestone; accompanying algae: *Diplopora annulatissima*, *Physoporella Iotharingica* and *Teutloporella triasina*.

Diplopora annulatissima Pia, 1920

Plate 5, figures 3-4; plate 7, figures 1-2; plate 12, figure 7

Diplopora annulatissima Pia, 1920, Abh. zool.-botan. Ges. Wien, vol. 11, no 2, pp. 67-68, pl. 4, figs. 11-16.

Diplopora annulatissima Pia. - Herak, 1957a, Micropalaeontology, vol. 3, no 1, pp. 49-51.

Diplopora annulatissima Pia. - Bystrický, 1957, Geol. sbor. Slov. akad., vol. 8, no 2, p. 235, pl. 7, fig. 3.

The main characteristics of this species are: annulation with small segments, metaspondylity with only one whorl in each segment, and an extremely trichophorous shape of branches. We are returning to this species because of some characteristic new specimens and new localities which definitely clear the stratigraphical range of this species. Besides numerous Ladinian specimens in the Dinaric Alps, we found the same species also at some Anisian localities. So it is clear that its stratigraphical range comprises the Upper Anisian and the whole Ladinian.

Localities: 1. Lika, Hrastova Kosa near Lotiči; surroundings of Sv. Rok; the Ladinian limestone. The specimen (plate 5, figure 3) is cut longitudinally, so we can see the termination of the thallus perfectly well.

Dimensions: D = 4.6 mm.
d = 2.8 mm.
p = 0.07-0.10 mm.

2. Lika, Rukavinska Gradina, Sv. Rok; the Anisian limestone (plate 5, figure 4). Dimensions of the figured specimen are as follows:

$$\begin{aligned} D &= 3.6 \text{ mm.} \\ d &= 2.2 \text{ mm.} \\ p &= 0.67 \text{ mm.} \end{aligned}$$

At the same locality another specimen has the following dimensions:

$$\begin{aligned} D &= 4.7 \text{ mm.} \\ d &= 3 \text{ mm.} \\ H &= 0.5 \text{ mm.} \\ p &= 0.105 \text{ mm.} \end{aligned}$$

Accompanying algae are: *Physoporella pauciforata*, *Teutloporella* sp. indet. and others undertermined remains.

3. Lika, N of Vrbani, near Sv. Rok; the Middle Triassic marly limestone (probably the Ladinian). The specimens are weathered so that their cylindrical shape and regular annulation are evident. The algal remains are accompanied by different Ammonites.

4. Lika, N of Velika Vršina, near Sv. Rok; the Ladinian sandstones. The specimens of *Diplopora annulatissima*, plate 12, figure 7 (upper part), are accompanied by the specimens of *Diplopora annulata* (lower part of the figure) and by the remains of *Daonella*.

Diplopora subtilis Pia, 1935

Plate 11, figures 2-3

Diplopora subtilis Pia, 1935, Geol. anali, vol. 12, no 2, pp. 236-244, pl. 4, fig. 4-6; pl. 5, fig. 2-13.

The thallus is cylindrical; branches, enlarged at their ends, are set upon small protuberances of the main stem, the same as in the species *D. hexaster* Pia. But they are not contracted in the middle. The whorls are very dense.

Our specimens correspond mostly with Pia's figures 9-13 on plate 5 (Pia, 1935) so we have to do with the variety *D. subtilis* «typica» which has to be named *D. subtilis* Pia var. *subtilis*.

$$\begin{aligned} \text{Dimensions: } D &= 1 \text{ mm. (and below)} \\ d &= 0.3-0.4 \text{ mm.} \end{aligned}$$

Localities: Slovenia, Skubrov vrh, near Jezersko; the Anisian limestone; accompanied by *Physoporella pauciforata*. Figure 2 on plate 11 is identical to the specimen 3a on the same plate (but taken in a later phase of thin-section).

Diplopora hexaster Pia, 1912

Plate 8, figures 1-4

Diplopora hexaster Pia, 1935, Geol. anali, vol. 12, no 2, pp. 234-236, pl. 4, figs. 1-3 (here also the older data).

Diplopora helvetica Pia, 1920, Abh. zool.-botan. Ges. Wien, pp. 66-67, pl. 3, fig. 16.

Diplopora hexaster Pia - Bystrický, 1957, Geol. sbor. Slov. akad., vol. 8, no 2, pp. 234-235, pl. 7, figs. 1-2.

The thallus is cylindrical, without true segmentation. But there are some fissures which can sporadically cause disintegration of the thallus.

The branches are most interesting because of their shape, which is characterized by a contraction through which a branch is divided into a proximal part and a distal one. Several branches are set upon a small protuberance of the main stem. Such protuberances are distributed into true whorls, which are very dense. The shape of the distal part of the branches was the basis for distinguishing *Diplopora hexaster* from *Diplopora helvetica*. In *D. hexaster*, according to Pia (1920, 1935), the terminal parts of branches are a little larger in the middle than the proximal ones. Their tapering terminations are outside of the calcareous wall. On the contrary, the branches of *D. helvetica* should be characterized by phloioforous terminations. This is the only morphological difference. But it is smaller than the differences among the infraspecific taxa in *Diplopora annulata*, *D. uniserialis*, etc. Therefore, the important reason for the establishing of two species was doubtlessly Pia's assumption that we have to do with two vicarious species.

Some specimens of our published material (plate 8, figures 1 and 2), as well as several unpublished remains, show that also in the Dinaric Alps are found forms which should be determined as *Diplopora helvetica*. So we cannot speak of the vicarious species. Therefore I believe that we have to do with only one species (*Diplopora hexaster*) and with two subspecies (*Diplopora hexaster* subsp. *hexaster* and *Diplopora hexaster* subsp. *helvetica*). New specimens have to verify this conclusion.

For the time being I wish to describe only the specimens we have figured (plate 12, figure 1-4).

In the specimen in figure 1 (tangential section) the enlarged distal parts of branches are visible. They are similar to those forms which were described as *Diplopora helvetica*.

Dimensions: D = over 1.7 mm.
p (terminal) = 0.21 mm.

The enlarged proximal parts of branches are also visible in the specimen in figure 2 (oblique-tangential section).

Dimensions: D = 2.1 mm.
p (terminal) = 0.21 mm.

The specimen on figure 3 is represented by a tangential-longitudinal section. The shape of branches should be characteristic for *Diplopora hexaster* subsp. *hexaster*.

Dimensions: D = 2.2 mm.
d = ca. 0.8 mm.
p (basal) = 0.10 mm.
p (terminal) = 0.15 mm.

The specimens in figure 4 are characteristic in many aspects: the shape of branches typical for *D. hexaster* subsp. *hexaster*, partially visible protuberances of the main stem; fissures which can cause the disintegration of the thallus, etc.

Dimensions: D = over 2.1 mm.
p (basal) = ca. 0.07 mm.
p (terminal) = 0.21 mm.

Locality: Serbia, Zlatibor, eastern part; the Anisian limestone.

BIOSTRATIGRAPHICAL REMARKS

First we shall present a short review of the localities mentioned in the preceding text (see text-fig. 1).

1. Spodnja Radovna-Krnica, S of Jesenice, Slovenia. In the Ladinian limestone only *Teutloporella aequalis* was determined.

2. Brdo, W of Tržič, Slovenia. In the Ladinian limestone (determination of age by A. Ramovš, after Pelecypods) *Teutloporella triasina* and *T. nodosa* were registered.

3. Skubrov vrh, near Jezersko, Slovenia. The Anisian limestone contains *Physoporella pauciforata* and *Diplopora subtilis*.

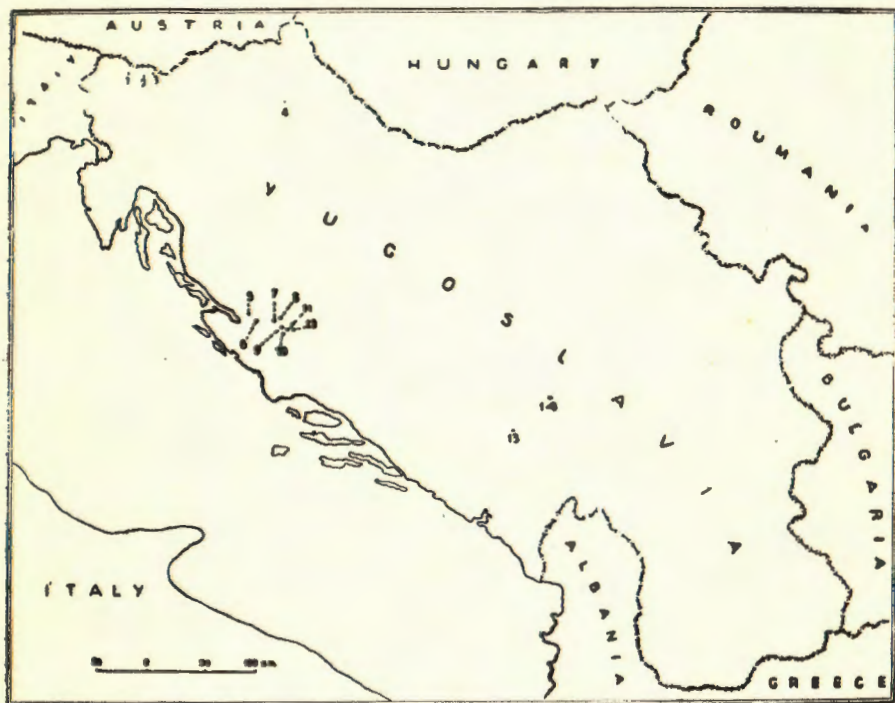
4. Očura, 800 m W of the railway station, near Golubovec, Northern Croatia. *Teutloporella herculea* was determined in the Ladinian limestone redeposited into the Younger Mesozoic flysch.

5. Surroundings of Sv. Rok, Lika (Central Croatia):

a) Rukavinska gradina at Sv. Rok. In a series of limestones belonging to the upper part of the Anisian stage the following algae were registered: *Physoporella pauciforata* var. *undulata*, *Physoporella* sp.

indet., *Diplopora annulatissima*, and *Teutloporella* sp. indet. It is interesting that *D. annulatissima* is found below the horizon with *Ph. pauciforata* var. *undulata* and above it.

b) N of the village of Vrbani. A zone of flyschlike sediments generally belongs to the Anisian stage. But at this locality they are in contact with Ladinian sediments. Therefore, we could not decide whether the figured specimens of *Diplopora annulatissima*, associated with some Ammonites, belonged to the Ladinian or the Anisian. Some small and ornated Ammonites make the Ladinian stage more probable. But we have to wait for the determination of Ammonites.



Localities of Dasycladaceae, mentioned in the paper: 1 Spodnja Radovna-Krnica, S of Jesenice, Slovenia; 2 Brdo, W of Tržič, Slovenia; 3 Skubrov vrh, near Jezerko, Slovenia; 4 Očura, near Golubovec, Northern Croatia; 5 Group of localities in the surroundings of Sv. Rok, Lika (Middle Croatia); 6 Group of the localities in the surroundings of Gračac, Lika; 7 Group of the localities in the surroundings of Velika Popina, Lika; 8 Sekulin vrh SW of Lička Kaldrma, Lika; 9 Plavno-Plešivica, NW of Knin, Dalmatia (Southern Croatia); 10 Debelo brdo, NW of Knin, Dalmatia; 11 Group of the localities in the district Orloviča, N of Knin, Dalmatia; 12 Deralo, on the road Strmica - Bosansko Grahovo, Bosnia; 13 Popov do, Ljubušnja, Montenegro; 14 Zlatibor, eastern part of the mountain, Serbia.

c) NNW of the ponor Pećina (swallow hole). The fossils derive from the limestone in which *Physoporella likana*, *Teutloporella aequalis* and *Macroporella* sp. indet. were found. The age is the Middle Triassic; the stage undetermined.

d) Velika Vršina. In a clastic (detritical) Ladinian complex – which overlies the limestone with *Diplopora annulata* – *Teutloporella triasina*, *T. nodosa*, *Gyroporella* cf. *ampleforata*, *G. maxima*, and *Diplopora annulata* were found. In the sandy shales, beside the remains of *Daonella*, *Diplopora annulata* and *D. annulatissima* were registered.

e) WSW of Klanac Pucalovića. In the detritical Anisian limestone, which belongs to the flyschlike zone, *Oligoporella pilosa*, *Physoporella varicans*, *Physoporella pauciforata* var. *undulata*, *Diplopora hexaster*, and *Diplopora annulatissima* (?) were determined.

In the Upper Anisian limestone above the clastic zone, *Macroporella alpina*, *Oligoporella pilosa*, *Physoporella minutula* (?), *Physoporella* sp. indet. were found.

f) Between Velika Vršina and Lotiči. In the Ladinian limestone *Diplopora annulata* and *D. annulatissima* were registered.

g) Gradina at Vrkljanski ponori. In the partially detritical Ladinian limestone were found: *Diplopora annulata* (predominance of *D. annulata* subsp. *dolomitica*), *D. annulatissima*, *Physoporella lotharingica*, *Teutloporella triasina* and *Griphoporella* sp. indet.

h) Jelovi vrh (without nearer designation) in the probably Ladinian limestone, *Teutloporella* cf. *triasina* was determined.

6. The surroundings of Gračac, Lika (Central Croatia):

a) Above the swallow holes of Ričica, on the slope of Rastovača, on the margin of the Polje of Štikada. The Upper Anisian limestone contains *Physoporella varicans* (predominant) and *Diplopora subtilis* (?).

b) Vrace, at the margin of the Polje of Štikada. In the Ladinian limestone *Diplopora annulata* and *D. annulatissima* were determined. The boulders of the Upper Triassic conglomerates above the bauxitic layers contain *Diplopora annulata* (both subspecies) and *Gyroporella* cf. *ampleforata* (?).

7. Surroundings of Velika Popina, Lika, (Central Croatia):

a) WNW of Šuplje brdo. The Upper Ladinian limestone (the age after I. Grimani) contains *Teutloporella nodosa* and perhaps *Macroporella beneckeii*.

b) NE of Crni vrh (point 1227). In the middle of the Ladinian stage *Diplopora annulata* was registered.

8. Sekulin vrh SW of Lička Kaldrma, Lika (Central Croatia). The most probably Upper Anisian limestone bears *Physoporella lotharingica*.

9. Plavno-Plešivica, NW of Knin, Dalmatia (Southern Croatia). In the Lower Anisian limestone (the horizon after I. Grimani) *Physoporella pauciforata*, *Ph. varicans*, probably *Macroporella alpina*, and some undetermined forms were registered.

In the upper part of the Anisian limestone *Physoporella varicans*, *Ph. pauciforata*, *Macroporella alpina*, and *Diplopora hexaster* were found.

10. Debelo brdo, NW of Knin, Dalmatia. In the Upper Ladinian limestone (the horizon after I. Grimani), besides *Diplopora annulata*, the remains of *Teutloporella* cf. *triasina* are very abundant, in addition an aberrant form of *T. nodosa* and *Physoporella lotharingica*, were registered.

11. Orlovica, N of Knin, Dalmatia (Southern Croatia):

a) Orlovica s. str. In the Lower Ladinian limestone (the horizon after I. Grimani) we registered *Teutloporella nodosa* and *Macroporella beneckeii*.

b) Debela Greda; the upper part of the Ladinian limestone (the horizon after I. Grimani) contains *Diplopora annulata*.

c) Greda near Golubić. The Anisian limestone contains *Physoporella* cf. *praealpina*.

12. Deralo (SW slope), on the road Strmica – Bosansko Grahovo, Bosnia. In the Anisian limestone *Oligoporella pilosa*, *Physoporella* cf. *minutula*, *Ph. pauciforata* cf. var. *gemerica*, *Macroporella alpina* and *Diplopora hexaster* subsp. *helvetica* were registered.

13. Popov do, Ljubišnja, Crna Gora (Montenegro). The Ladinian limestone bears *Teutloporella herculea*.

14. Zlatibor, eastern part of the mountain, Serbia. In the Anisian limestone, former considered Tithonian, only *Diplopora hexaster* (both subspecies) was determined.

As it is apparent, the stratigraphical range of several species has been extended: *Macroporella alpina* (up to the Upper Anisian), *M. beneckeii* (possibly up to the Upper Ladinian), *Teutloporella nodosa* and *T. triasina* (up to the Upper Ladinian), *Oligoporella pilosa* »typica« (= var. *pilosa*) (up to the Upper Anisian), *Physoporella varicans* (up to the Upper Anisiara) and *Diplopora hexaster* (up to the Upper Anisian). The age of *Gyroporella maxima* was determined as Ladinian; as to the age of *Diplopora annulatissima*, the range from the Upper Anisian up to the Ladinian was verified.

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ZAGREB

TAXONOMICAL REMARKS

Though conscious of great difficulties in the reconstruction of real phylogenetic relations within the taxa based only on fossil algal representatives, I intended at least to group organisms within taxonomical frames characterized by morphogenetic features which are not to be mistaken. Therefore I used only those criteria which are, in spite of possible variability, doubtlessly recognizable, without pretension to find out the final natural phylogenetic relations of the living organisms. This treatment differs somewhat from those where, often in the recent time, only small gradual differences in morphogenetic features, which sometimes could not even be properly compared, were considered a basis for new taxa. If such a treatment is necessary because of the lack of comparable specimens, then I prefer to create new infraspecific taxa which are easier to be handled in later emendation, inevitable in cases where new taxa have been created at isolated localities without the possibility to determine the natural distribution and geographic relations among the most related taxa. Any endeavour to determine the circumscription of species represented by numerous specimens from different localities shows a considerable variability of features which, isolated, most often cause the creation of new taxa.

As very instructive examples of such nearly real circumscriptions of species may be mentioned *Diplopora annulata*, *Oligoporella pilosa*, *Mizzia velebitana*, *Physoporella pauciforata*, etc. This was the very reason why in regards to *Teutloporella triasina* the circumscription has been left broad enough and the stratigraphical range has been enlarged. The same reason caused an enlargement of the variability ratio regarding the shape of the thallus in *Teutloporella nodosa*, as well as in *Macroporella beneckeii*, which undoubtedly shows great variability in the outer form of the thallus not only within the species but also within an individual.

As to the genus *Macroporella*, where generic characteristics have already been based on a limited number of features, the distinguishing of species has first of all to be based on gradual differences.

In *Physoporella likana*, the new characteristics are evident and constant in all specimens. Therefore, it was necessary to pay attention to it and create a new species.

As to the recurrence of some species already mentioned by Pia (1942), I have been able to affirm his assumption and, moreover, extend the phenomenon to the species *Teutloporella triasina* (Anisian-Upper Ladinian), *Diplopora annulatissima* (Anisian - Middle? and Upper Ladinian), *Teutloporella lotharingica* (Anisian - Upper Ladinian) etc. According to this fact, the establishing of new taxa on the basis of different stratigraphical horizons is not recommended at all if, additionally, a morphogenetic basis is not available.

The same may be said for vicarious taxa. The attempts with *Diplopora annulata*, in addition to *Macroporella alpina*, *M. dinarica*, *Physoporella lotharingica*, etc. show that the fact of finding similar specimens in remote localities alone is no real basis for the distinguishing of vicarious species. In all the mentioned cases new findings have connected the remote localities or showed the absolute predominance of one of the types proposed as species even in the district which was considered the area of the vicarious type. Therefore the specimens of the type »*D. helvetica*«, registered in the district of the Dinaric Alps, suggested the reexamination of the species *Diplopora hexaster* and *D. helvetica*. Their organization, especially their »segmented« branches, differ evidently from all other species of *Diplopora*. But the differences between them are limited only to the terminal parts of branches – the differences which are even greater within some other species (*Diplopora annulata* subsp. *annulata*, *Diplopora annulata* subsp. *dolomitica*, *Diplopora uniserialis*) or which, in a moderate degree, may be noticed within the same specimen itself (in *Palaeodasycladus mediterraneus*). In our case the vicarious species does not come in question. Therefore, I believe that only two subspecies (*D. hexaster* subsp. *hexaster* and *D. hexaster* subsp. *helvetica*) may be rightly distinguished.

The circumscriptions of several genera are heterogenous in conception. Some of them are based only on the mode of the distribution of the branches (*Diplopora*) while in others discrepancies in this feature are tolerated (*Teutloporella*). At the same time some gradation in one or more features has been the basis for new genera (several new Palaeozoic examples). Greater precaution is needed here, and a detailed analysis of the original specimens, which problem exceeds the frame of this paper.

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M. HERAK

KOMPARATIVNI STUDIJ NEKIH TRIJASKIH DASIKLADACEJA U JUGOSLAVIJI

Intenzivna istraživanja trijasa omogućila su sakupljanje bogate zbirke fosilnih dasikladaceja od kojih su neke potpuno nove, druge po prvi puta ustanovljene na području Jugoslavije, a treće, iako poznate, sakupljene su na lokalitetima važnim za određivanje stratigrafskog raspona.

U prikupljanju fosilnoga materijala pomogli su mi i kolege Ž. Babić, Z. Bešić, I. Grimani, M. Malez, B. Marković, A. Ramovš, D. Šikić i M. Šušnjarić. Fotografije je izradio Ž. Majcen. Svima njima zahvaljujem na suradnji.

Vrste su opisane po tribusima i subtribusima. Ovdje ćemo dati samo glavne nazimene uz pojedine vrste:

Teutloporella herculea (Stoppani). Uz već poznata svojstva istaknuta je i pojava da ogranci ne moraju biti paralelni.

Teutloporella aequalis (Guembel). Još uvijek nema dovoljno primjeraka koji bi mogli ukloniti sumnju u opravdanost samostalne vrste.

Teutloporella triasina (Schauroth). Osobito je naglašena varijabilnost vanjske forme talusa. Serije ogranaka nisu potpuno evidentne. Vrsta je registrirana u ladiniku. Neki oblici označeni su kao *Teutloporella cf. triasina*.

Teutloporella nodosa (Schafhäutl). Ova se vrsta odlikuje još većom varijabilnošću vanjskog oblika talusa. Problem stvaranja pršljenova još ostaje otvoren, iako se čini vjerojatnijim da pršljenovi nisu osnovna karakteristika ove vrste.

Teutloporella sp. indet. je anizička. Za specifičku determinaciju potreban je novi materijal.

Macroporella albina Pia. I ovom prilikom se pokazalo da se fosilni predstavnici u dinarskom području lakše mogu pribrojiti ovoj vrsti nego vrsti *M. dinarica*, koja će najvjerojatnije morati biti napuštena.

Macroporella beneckeii (Salomon). Bogat fosilni materijal omogućio je određivanje vanjskog oblika talusa koji djelomično može biti nodozan i savijen.

Macroporella sp. indet. Relativno nepravilan primjerak. Zanimljiv je u toliko što bi mogao biti ladiničke starosti.

Gyroporella cf. amplexorata Guembel. Pod originalnom vrstom vjerojatno je opisan heterogeni materijal. To se može pretpostaviti i za primjerke koji se ovdje navode u svrhu usporedbe. Starost: ladinik.

Gyroporella maxima Pia. Morfološke karakteristike su u skladu s originalnim materijalom. Starost opisanog primjerka je ladinička.

Oligoporella pilosa Pia. Odlikuje se varijabilnošću koja je našla odraza u formiranju varijeteta. Svi su oblici anizički.

Physoporella pauciforata (G u e m b e l). Uz pojačanu varijabilnost već poznatih varijeteta, utvrđen je i oblik *Ph. cf. var. gemerica*.

Physoporella minutula (G u e m b e l). Uz tipičan primjerak, opisan je i oblik s jednim nizom ogranaka u pršljenu koji su većinom otvoreni pa je zbog toga oblik označen kao *Ph. cf. minutula*, uz napomenu da eventualno novi materijal može ukazati na potrebu formiranja samostalne vrste.

Physoporella cf. praealpina Pia. Oblik pora odlučio je specifičku determinaciju. Potreban je novi materijal da se utvrdi varijabilnost vrste. Tada će se vjerojatno »cf.« moći izostaviti.

Physoporella varicans Pia. Novi dokumentacioni materijal pokazuje sve osnovne karakteristike vrste u različitim presjecima. Ističe se i varijabilnost.

Physoporella likana, nova vrsta. Glavne specifičke karakteristike jesu: izrazito sitne pore, relativno širok lumen i nejasan raspored ogranaka, za razliku od ostalih vrsta kod kojih je raspored prilično jasno pršljenast. Starost je u okviru srednjega trijasa. Postoji mogućnost da se radi o ladiniku.

Physoporella lotharingica (B e n e c k e). Ističe se velika varijabilnost u promjeru lumena uz zadržavanje približno istih dimenzija vapnenačke stijenke. Uz ladiničke primjerke, utvrđen je i jedan za kojega se pretpostavlja anizička starost.

Diploporella annulata S c h a f h ä u t l. Navode se osobito karakteristični primjerci koji potvrđuju dosadašnje koncepcije u pogledu varijabilnosti i postojanja infraspecifičkih kategorija.

Diploporella annulatissima Pia. Prikazan je jedan ladinički primjerak s potpuno jasnim završetkom i jedan anizički zbog utvrđivanja stratigrafskog raspona. Iako su ladinički primjerci češći u dinarskom području, ni anizički nisu više tako rijetki.

Diploporella hexaster Pia. Na osnovu većeg broja različitih primjeraka predlaže se da se u okvir vrste uključe i oblici opisani kao *Diploporella helvetica*, te da se razlikuju dvije podvrste *Diploporella hexaster* subsp. *hexaster* i *D. hexaster* subsp. *helvetica*. Povod za taj prijedlog jest činjenica da ti oblici nisu vikariirajući, a morfološke razlike među njima su manje nego kod nekih postojećih infraspecifičkih jedinica.

Diploporella subtilis Pia zastupana je primjercima koji odgovaraju varijetetu *D. subtilis* »typica«, kojeg po nomenklaturnim pravilima treba zvati *D. subtilis* Pia var. *subtilis*.

U aniziku dolaze slijedeće forme: *Teutloporella* sp. indet., *Macroporella alpina*, *Oligoporella pilosa*, *Physoporella pauciforata*, *Physoporella minutula*, *Ph. cf. minutula*, *Ph. cf. praealpina*, *Physoporella varicans*, *Diploporella hexaster*, i *D. subtilis*.

U aniziku i ladiniku: *Diploporella annulatissima*, *Physoporella lotharingica*.

U ladiniku: *Teutloporella herculea*, *T. triasina*, *T. nodosa*, *Macroporella beneckeii*, *Gyroporella cf. ampleforata*, *G. maxima* i *Diploporella annulata*.

U srednjem trijasu (eventualno ladiniku): *Teutloporella aequalis*, *Macroporella* sp. indet. i *Physoporella likana*.

Od navedenih formi utvrđene su po prvi puta u Dinaridima *Teutloporella aequalis*, *T. triasina*, *T. nodosa*, *Macroporella beneckeii*, *Gyroporella cf. ampleforata*, *G. maxima*, *Physoporella cf. var. gemerica*, *Ph. minutula*, *Ph. cf. minutula*, *Ph. lotharingica*, *Diploporella hexaster* subsp. *helvetica* i nova vrsta *Physoporella likana*.

Utvrđen je prošireni stratigrafski raspon za slijedeće oblike: *Macroporella alpina* (do gornjeg anizika), *M. beneckeii* (vjerojatno do gornjeg ladinika), *Teutloporella triasina* i *T. nodosa* (do gornjeg ladinika), *Oligoporella pilosa* »typica« (= var. *pilosa*) (do gornjeg anizika) i *Diploporella hexaster* (do gornjeg anizika). Starost vrste *Gyroporella maxima* utvrđena je kao ladinička, a za vrstu *Diploporella annulatissima* verificiran je raspon od gornjeg anizika do gornjeg ladinika.

U taksonomskom pogledu vodilo se dosta računa o varijacionom rasponu te se izbjegavalo uspostavljanje novih taksona na jednosmjernoj gradaciji morfoloških svojstava.

Kod jednosmjernog stupnjevanja svojstava davana je prednost infraspetsičkim kategorijama, pa su na toj osnovi vrste *Diplopora hexaster* i *D. helvetica* skupljene u jednu vrstu s dvije podvrste (*Diplopora hexaster* subsp. *hexaster* i *D. hexaster* subsp. *helvetica*). Infraspetsičke kategorije su bez sumnje pogodnije u eventualnoj kasnijoj reviziji taksona.

Predlaže se također da se vikariirajući oblici, bez jasne morfološke osnove, ne opisuju kao samostalne vrste, jer su mnogi slučajevi pokazali da se »vikariirajući« komplementi kasnije nađu zajedno (na pr. *Diplopora hexaster* i »*D. helvetica*«, zatim infraspetsički taksoni vrste *D. annulata* i dr.), ili čak prevlada jedan oblik u arealu gdje se očekuje drugi (u Dinaridima *Macroporella alpina* umjesto *M. dinarica*). Ima i slučajeva da se utvrdi veća rasprostranjenost neke vrste nego se očekivalo (*Physoporella lotharingica*).

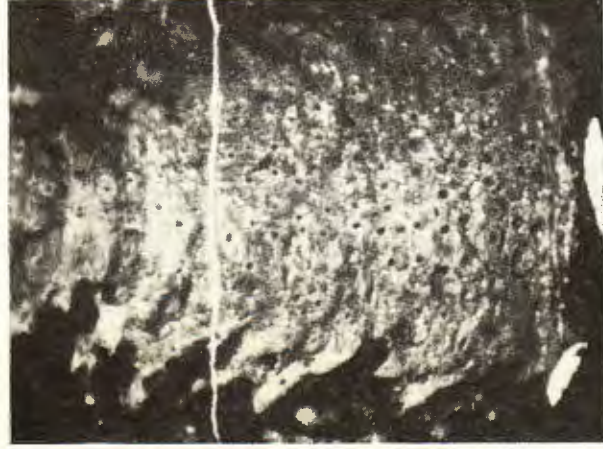
Na kraju se upozorava na nejednoličnost u dosadašnjem tretiranju pojedinih taksona. Ponekad je za dijagnozu mjerodavan samo raspored ogranaka (*Diplopora*), dok se kod drugih tome ne pridaje presudno značenje (*Teutloporella*). Kod nekih se varijabilnost nastojala shvatiti dovoljno široko, dok se kod drugih čak i jednosmjerne stupnjevite promjene služile kao osnova za uspostavljanje novih vrsta, itd. No to su problemi koji traže širi komparativni studij te prelaze okvir ovoga rada, a iznose se sa sugestijom da se kod opisivanja novih taksona izbjegava takav postupak.

Primljeno 5. 2. 1964.

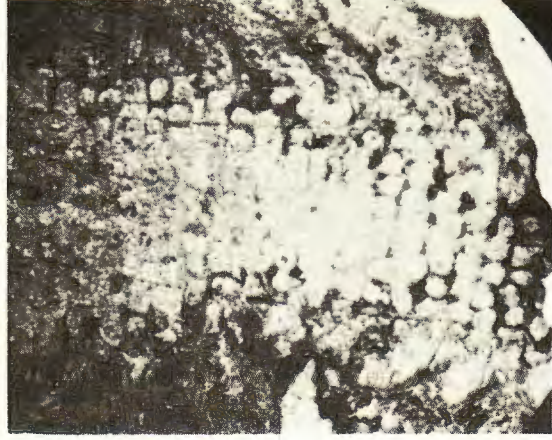
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PLATE – TABLA I

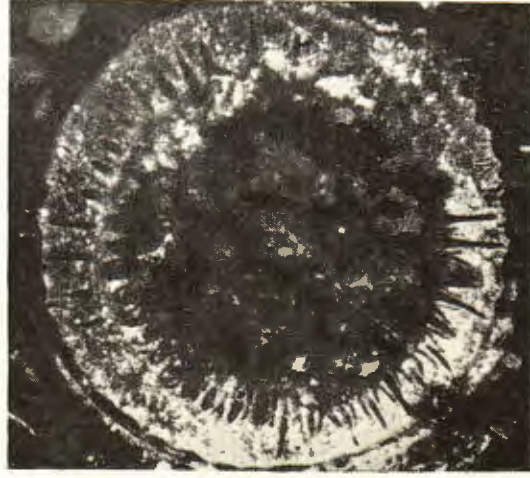
- 1 *Teutloporella triasina* (Schauroth), oblique-tangential section (koso-tangencijalni presjek), \times ca. 9; W of Tržič, Slovenia; the Ladinian (ladinik).
- 2 *Teutloporella triasina* (Schauroth), tangential section (tangencijalni presjek), \times ca. 10; W of Tržič, Slovenia; the Ladinian (ladinik).
- 3 *Teutloporella triasina* (Schauroth), cross-section, (poprečni presjek), \times ca. 9; W of Tržič, Slovenia; the Ladinian (ladinik).
- 4 *Teutloporella triasina* (Schauroth), oblique-longitudinal section (koso-uzdužni presjek), \times ca. 11; Velika Vršina, Lika; the Ladinian (ladinik).



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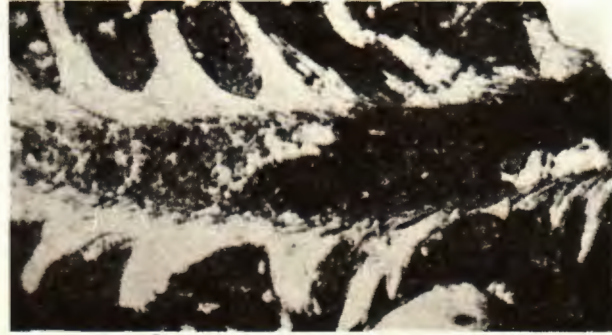


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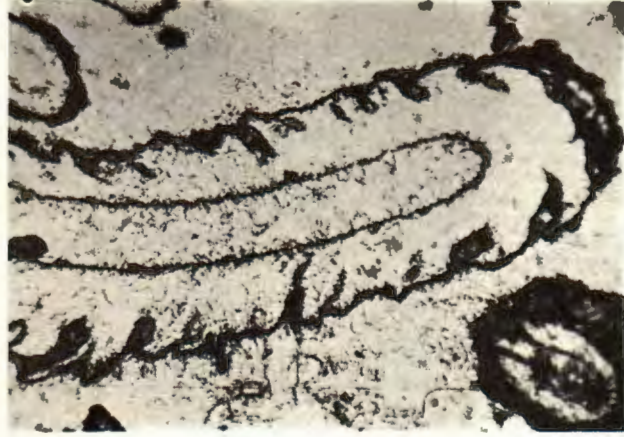
Explanation on page 34. Turnaj na str. 34.

PLATE - TABLA II

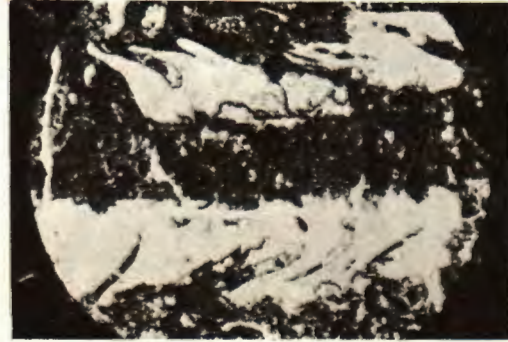
- 1 *Teutloporella nodosa* (Schafhäütl), longitudinal section (uzdužni presjek), \times ca. 10; W of Tržič, Slovenia; the Ladinian (ladinik).
- 2 *Teutloporella* cf. *triasina* (Schauroth), oblique-longitudinal section (koso-longitudinalni presjek), \times ca. 13; Debelo brdo, Dalmatia; the Ladinian (ladinik).
- 3 *Teutloporella triasina?* (Schauroth), longitudinal section (uzdužni presjek), \times ca. 11; Jelovi vrh, Sv. Rok, Lika; the Middle Triassic (srednji trijas).
- 4 *Gyroporella maxima* Pia, cross-section (poprečni presjek), \times ca. 12; Velika Vršina, Lika; the Ladinian (ladinik).



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PLATE — TABLA III

1 *Teutloporella nodosa* (Schafhäütl), tangential sections of separated segments (tangencijalni presjeci odvojenih segmenata), \times ca. 13; Orlovica, Dalmatia; the Ladinian (ladinik).

2 *Teutloporella nodosa* (Schafhäütl), oblique section (kosi presjek), \times ca. 12; Orlovica, Dalmatia; the Ladinian (ladinik).

3 *Teutloporella nodosa* (Schafhäütl), oblique-longitudinal section (koso uzdužni presjek) \times ca. 12; Orlovica, Dalmatia, the Ladinian (ladinik).

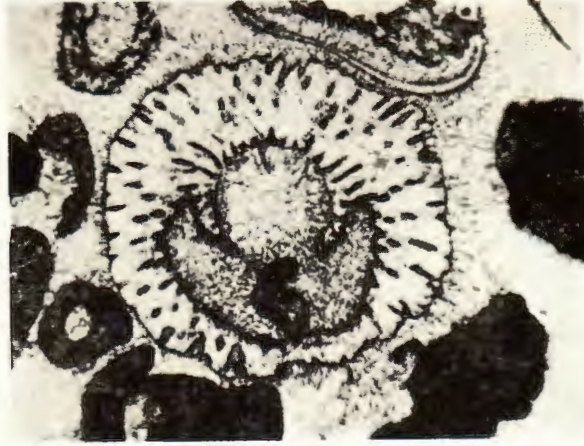
4 *Teutloporella nodosa* (Schafhäütl), oblique-longitudinal section of an aberrant form (koso-uzdužni presjek jedne aberantne forme), \times ca. 13; Debelo brdo, Dalmatia; the Ladinian (ladinik).

Herak: Triassic Dasycladaceae

PLATE - TABLA III



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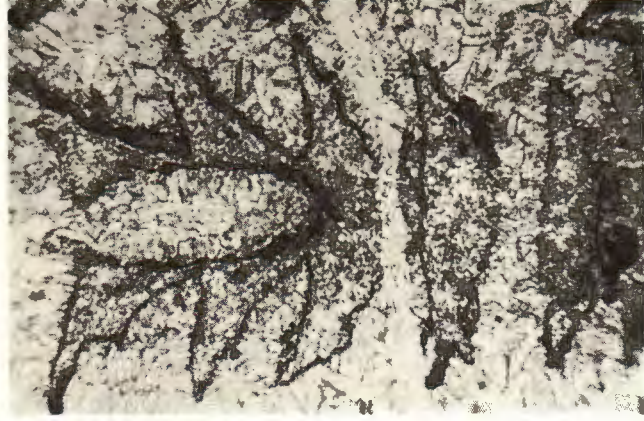
PLATE - TABLA IV

1-3 *Teutloporella nodosa* (Schafhäütl), oblique-longitudinal sections (koso-uzdužni presjeci), \times ca. 12; Šuplje brdo, Velika Popina, Lika; the Ladinian (ladinik).

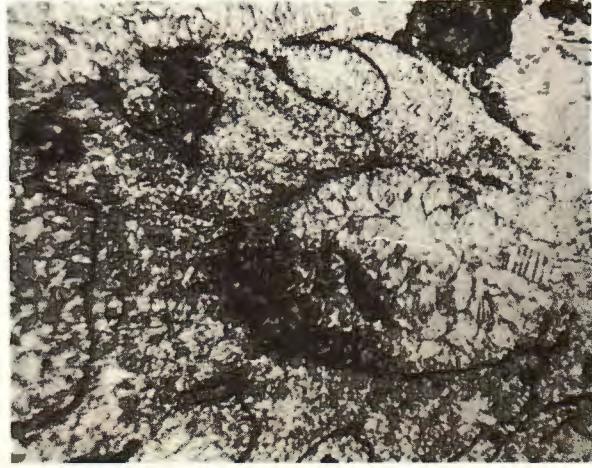
4 *Teutloporella nodosa* (Schafhäütl), oblique section (kosi presjek), \times ca. 12; Šuplje brdo, Velika Popina, Lika; the Ladinian (ladinik).



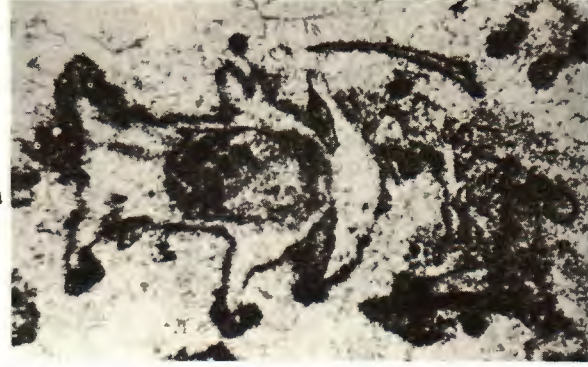
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PLATE - TABLA V

1 *Teutloporella herculea* (Stoppani), oblique-longitudinal section (koso-uzdužni presjek), \times ca. 13; Popov do, Crna Gora (Montenegro); the Ladinian (ladinik).

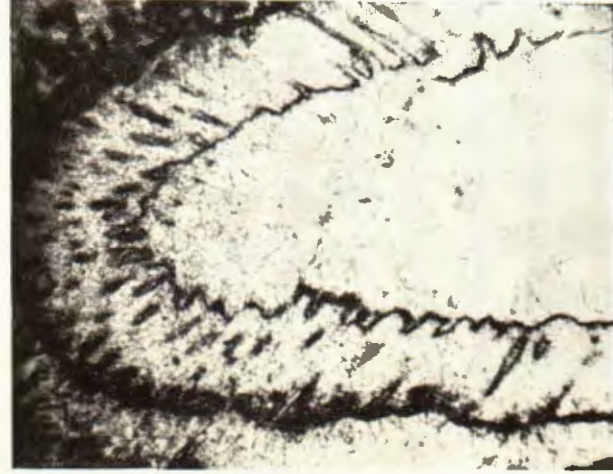
2 *Teutloporella herculea* (Stoppani), longitudinal section and a part of an oblique section (uzdužni i dio kosog presjeka), \times ca. 8; Očura near Golubovec; the Ladinian (ladinik).

3 *Diplopora annulatissima* Pia, longitudinal section (uzdužni presjek), \times ca. 8; Hra-stova Kosa near Sv. Rok, Lika; the Ladinian (ladinik).

4 *Diplopora annulatissima* Pia, oblique-longitudinal section (koso-uzdužni presjek), \times ca. 7; Rukavinska Gradina, Sv. Rok, Lika; the Anisian (anizik).

Herak: Triassic Dasycladaceae

PLATE - TABLA V



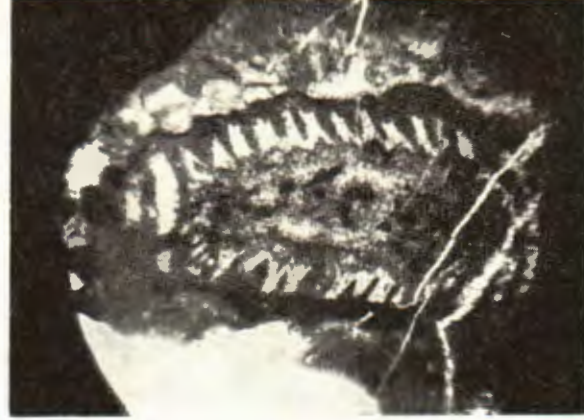
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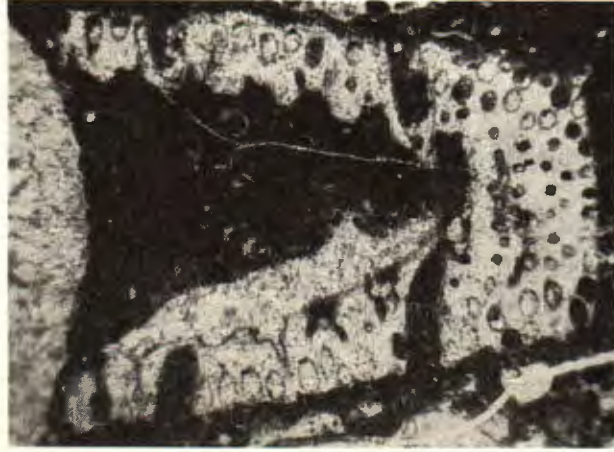
PLATE - TABLA VI

1 *Diplopora annulata* Schafhäutl subsp. *dolomitica* (Pia) Herak, oblique-longitudinal section (koso-uzdužni presjek), × ca. 12; Gradina near Vrkljanski ponori, Lika; the Ladinian (ladinik).

2 *Diplopora annulata* Schafhäutl subsp. *annulata*, oblique section (kosi presjek), × ca. 8; Debela Greda, Orlovica, Dalmatia; the Ladinian (ladinik).

3 *Diplopora annulata* Schafhäutl subsp. *annulata*, oblique section (kosi presjek), × ca. 12; Vrace near Gračac, Lika; the Ladinian (ladinik).

4 *Diplopora annulata* Schafhäutl subsp. *annulata*, oblique section (kosi presjek), × ca. 8; Crni vrh, Velika Popina, Lika; the Ladinian (ladinik).



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PLATE - TABLE VII

1-2 *Diplopora annulatissima* Pia, weathered specimens with Ammonites, somewhat below natural size (trošenjem oslobođeni primjerci s amonitima, nešto ispod prirodne veličine); N of Vrbani, Sv. Rok, Lika; the Middle Triassic (srednji trijas).

3 *Diplopora annulata* Schaffhäutl, oblique section (kosi presjek), \times ca. 12; Gradina near Vrkljanski ponori, Lika; the Ladinian (ladinik).

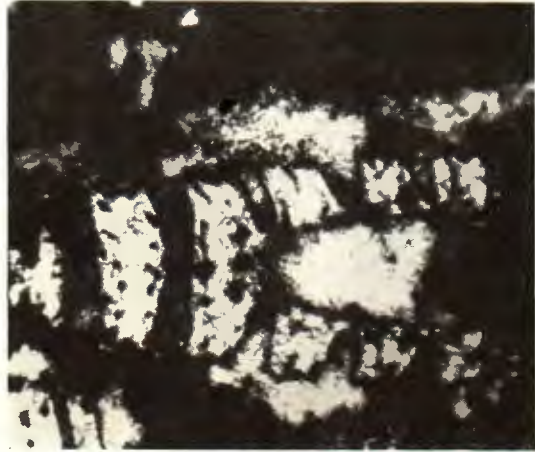
4 *Diplopora annulata* Schaffhäutl, oblique section (kosi presjek), \times ca. 9; Debela Greda, Orlovica, Dalmatia; the Ladinian (ladinik).



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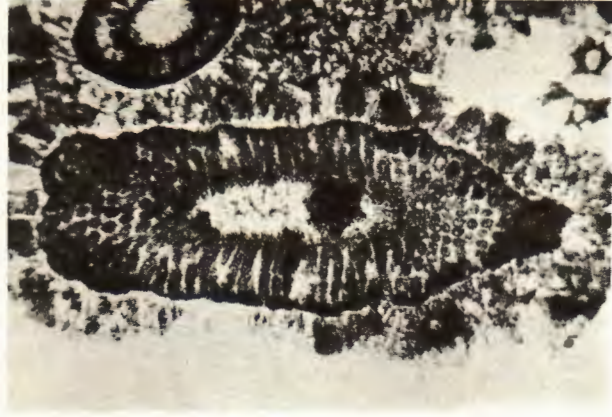
PLATE - TABLA VIII

1-2 *Diplopora hexaster* Pia subsp. *helvetica* n. subsp., tangential, partially oblique section (tangencijalni, djelomice kosi presjek), \times ca. 11; Zlatibor, Serbia; the Anisian (anizik)

3-4 *Diplopora hexaster* Pia subsp. *hexaster* n. subsp.; 3 tangential-longitudinal section (tangencijalno-uzdužni presjek), 4 oblique-tangential section (koso-tangencijalni presjek), \times ca. 11; Zlatibor, Serbia; the Anisian (anizik).



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PLATE - TABLA IX

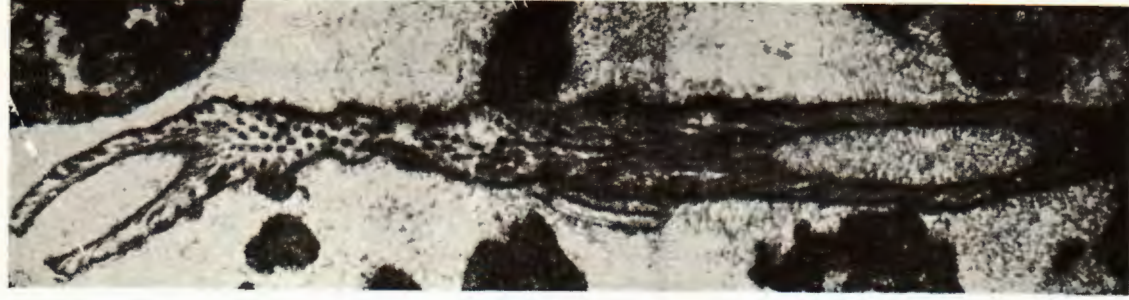
1 a. *Macroporella alpina* Pia, oblique section (kosi presjek); b. *Physoporella pauciforata* (Guembel), cross-section (poprečni presjek), \times ca. 12; Plavno-Plešivica, Dalmatia; the Anisian (anizik).

2 *Macroporella alpina* Pia, oblique-longitudinal section (koso-uzdužni presjek), \times ca. 12; Deralo, Bosnia; the Anisian (anizik).

3 *Macroporella beneckeii* (Salomon), longitudinal-tangential section (uzdužno-tangencijalni presjek), \times ca. 13; Orlovica, Dalmatia; the Ladinian (ladinik).



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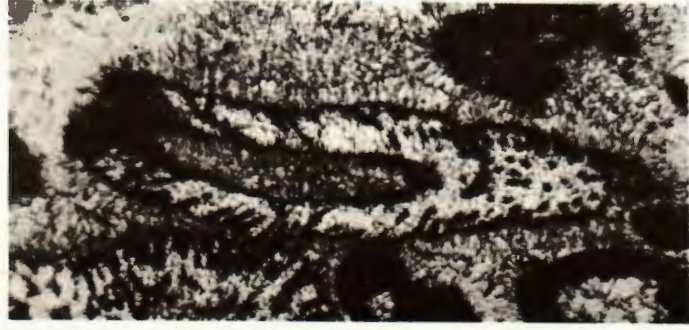


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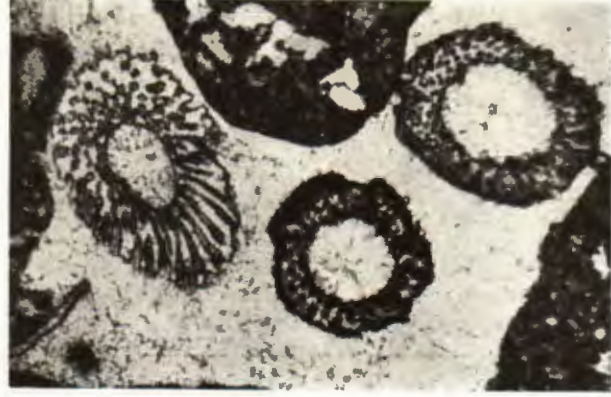
PLATE - TABLA X

1 *Macroporella beneckeii* (Salomon), oblique-longitudinal section (koso-uzdužni presjek), \times ca 12; Orlovica, Dalmatia; the Ladinian (ladinik).

2-4 *Macroporella beneckeii* (Salomon), different sections of typical specimens (različiti presjeci tipičnih primjeraka), \times ca. 12; Orlovica, Dalmatia; the Ladinian (ladinik).



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PLATE - TABLA XI

1 *Macroporella* sp. indet., oblique section (kosi presjek), \times ca. 12; NNW of Pečina ponor, near Sv. Rok, Lika; the Middle Triassic (srednji trijas).

2 *Diplopora subtilis* Pia., oblique section (kosi presjek), \times ca. 12; Skubrov vrh, Slovenia, identical with 3 a (identičan s 3 a); the Anisian (anizik).

3 *Diplopora subtilis* Pia.; a, b, c different sections (accompanied by *Physoporella pauciforata*) (razni presjeci, praćeni vrstom *Physoporella pauciforata*), \times ca. 6; Skubrov vrh, Slovenia; the Anisian (anizik).

4 *Oligoporella pilosa* Pia var. *varicans* Pia; a. oblique section (kosi presjek), b. nearly cross-section (približno poprečni presjek), \times ca. 11; WSW of Klanac Pucalovića, near Sv. Rok; the Anisian (anizik).

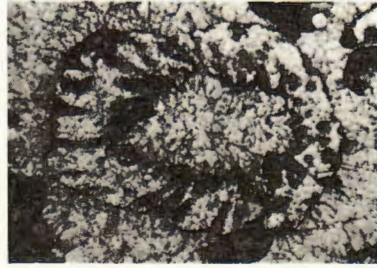
5 *Oligoporella pilosa* Pia var. *intusannulata* Pia. oblique section (kosi presjek), \times ca. 11; WSW of Klanac Pucalovića, near Sv. Rok, Lika; the Anisian (anizik).

6 *Oligoporella pilosa* Pia var. *semivaricans* Pia, oblique section, (kosi presjek), \times ca. 12; WSW of Klanac Pucalovića, near Sv. Rok, Lika; the Anisian (anizik).

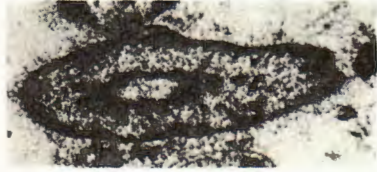
7 *Oligoporella pilosa* Pia var. *intusannulata* Pia, oblique section (kosi presjek); \times ca. 11; WSW of Klanac Pucalovića, near Sv. Rok, Lika; the Anisian (anizik).

8 *Oligoporella pilosa* Pia var. *varicans* Pia, oblique section (kosi presjek), \times ca. 11; WSW of Klanac Pucalovića, near Sv. Rok, Lika; the Anisian (anizik).

9 *Oligoporella pilosa* Pia var. *varicans* Pia, oblique section (kosi presjek), \times ca. 11; WSW of Klanac Pucalovića, near Sv. Rok, Lika; the Anisian (anizik).



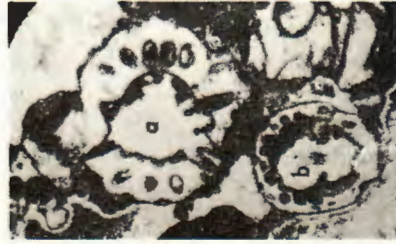
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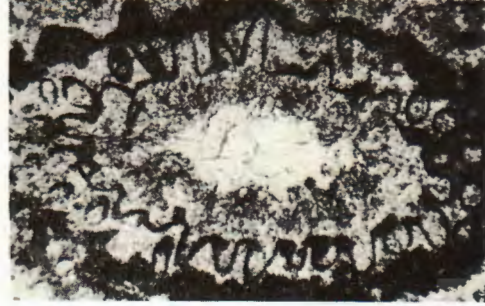
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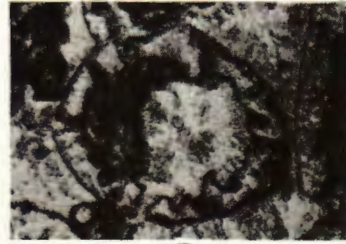
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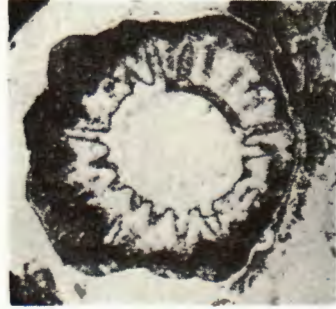
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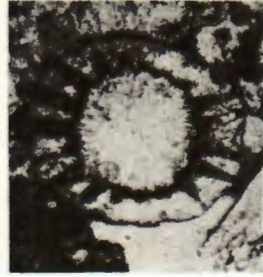
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PLATE - TABLA XII

1 *Physoporella varicans* Pia, oblique section (kosi presjek), \times ca. 11; Slope (padina) of Rastovača, near Gračac, Lika; the Anisian (anizik).

2 *Physoporella varicans* Pia, oblique section (kosi presjek), \times ca. 12; Plavno-Plešivica, Dalmatia; the Anisian (anizik).

3 *Physoporella* cf. *minutula* (Guembel), longitudinal section (uzdužni presjek), \times ca. 12; Deralo, Bosnia; the Anisian (anizik).

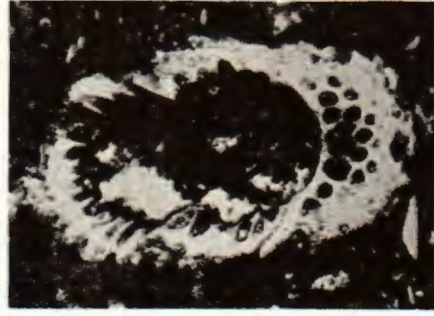
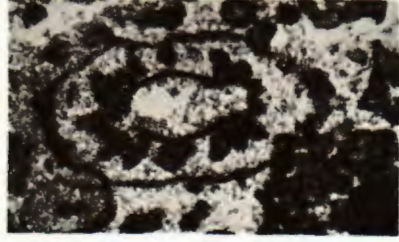
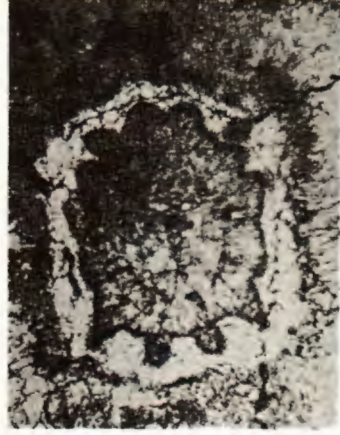
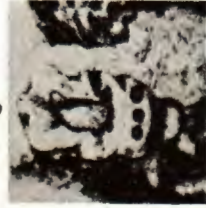
4 *Physoporella pauciforata* (Guembel) var. *undulata* Pia, oblique section (kosi presjek), \times ca. 12; Plavno-Plešivica, Dalmatia; the Anisian (anizik).

5 *Physoporella* cf. *praealpina* Pia, oblique section (kosi presjek), \times ca. 13; Greda near Golubić, Dalmatia; the Anisian (anizik).

6 *Physoporella minutula* (Guembel), oblique section (kosi presjek), \times ca. 10; WSW of Klanac Pucalovića, near Sv. Rok, Lika; the Anisian (anizik).

7 *Diplopora annulata* Schaffhäutl, below (dolje), and *Diplopora annulatissima* Pia, above (gore), specimens within the sandstone (primjerci u pješčenjaku), somewhat over natural size (nešto iznad prirodne veličine); Velika Vršina, Lika; the Ladinian (ladinik).

8 *Teutloporella* sp. indet., oblique section (kosi presjek), \times ca. 12; Rukavinska gradina, Sv. Rok, Lika; the Anisian (anizik).



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PLATE - TABLA XIII

1 *Physoporella varicans* Pia, a. oblique-tangential section (koso-tangencijalni presjek), b. nearly cross-section (približno poprečni presjek), \times ca. 13; Plavno-Plešivica, Dalmatia; the Anisian (anizik).

2 *Physoporella varicans* Pia, oblique section (kosi presjek), \times ca. 12; Plavno-Plešivica, Dalmatia; the Anisian (anizik).

3 *Physoporella pauciforata* (Guembel) cf. var. *gemeric*a Bystrický, oblique section (kosi presjek), \times ca. 13; Deralo, Bosnia; the Anisian (anizik).

4 *Physoporella varicans* Pia, oblique-longitudinal section (koso-uzdužni presjek), \times ca. 13; Plavno-Plešivica, Dalmatia; the Anisian (anizik).

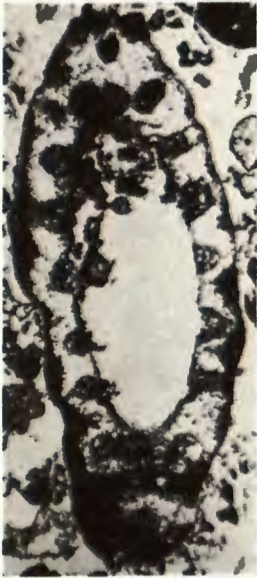
5 *Physoporella pauciforata* (Guembel) var. *simplex* Pia, oblique-longitudinal section (koso-uzdužni presjek), \times ca. 13; Plavno Plešivica, Dalmatia; the Anisian (anizik).



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PLATE - TABLA XIV

1 *Physoporella likana* n. spec., cross-section (poprečni presjek), \times ca. 10; NNW of Pećina ponor, near Sv. Rok, Lika; the Middle Triassic (srednji trijas).

2 *Physoporella likana* n. spec., oblique section (kosi presjek), \times ca. 11; NNW of Pećina ponor, near Sv. Rok, Lika; the Middle Triassic (srednji trijas).

3 *Physoporella likana* n. spec., a. and b. cross-sections (poprečni presjeci), \times ca. 11; NNW of Pećina ponor, near Sv. Rok, Lika; the Middle Triassic (srednji trijas).

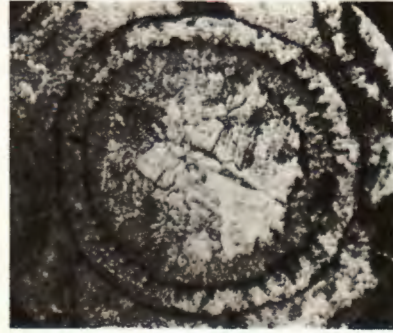
4 *Physoporella lotharingica* (Benecke), oblique section (kosi presjek), \times ca. 12; Debelo brdo, Dalmatia; the Ladinian (ladinik).

5 *Physoporella lotharingica* (Benecke), nearly cross-section (približno poprečni presjek), \times ca. 12; Gradina near Vrkljanski ponori, Lika; the Ladinian (ladinik).

6 *Physoporella lotharingica* (Benecke), cross-section (poprečni presjek), \times ca. 12; Sekulin vrh, Lika; the Middle Triassic (srednji trijas).

7 *Teutloporella aequalis* (Guembel), cross-section (poprečni presjek), \times ca. 12; Spodnja Radovna-Krnica, Slovenia; the Middle Triassic (srednji trijas).

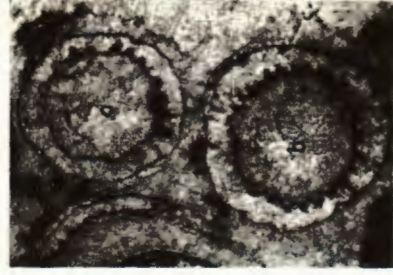
8 *Teutloporella aequalis* (Guembel), oblique section (kosi presjek), \times ca. 12; NNW of Pećina ponor, near Sv. Rok, Lika; the Middle Triassic (srednji trijas).



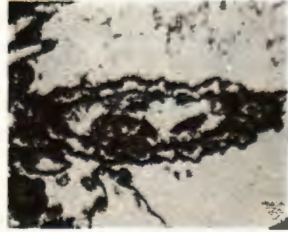
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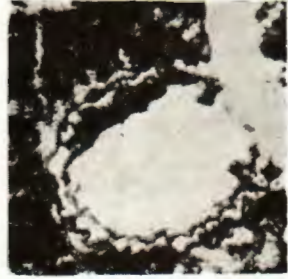
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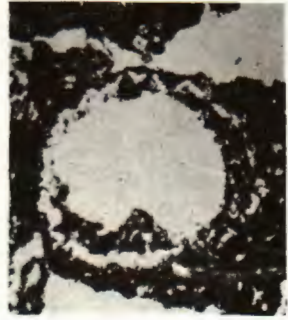
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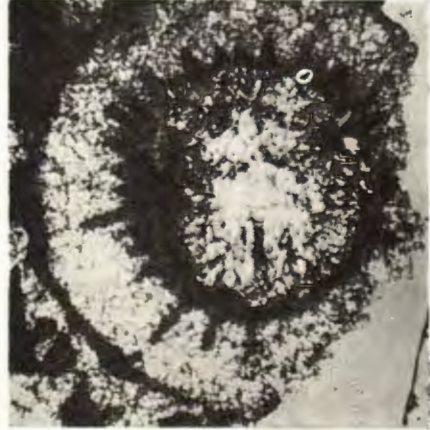
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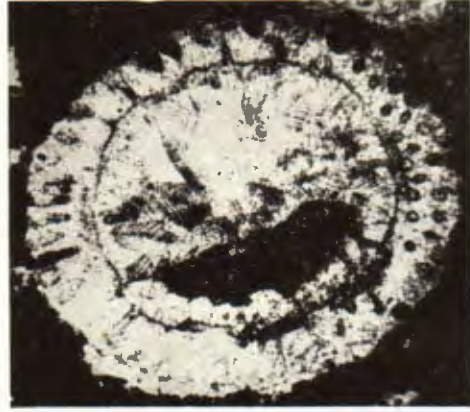
8

PLATE - TABLA XV

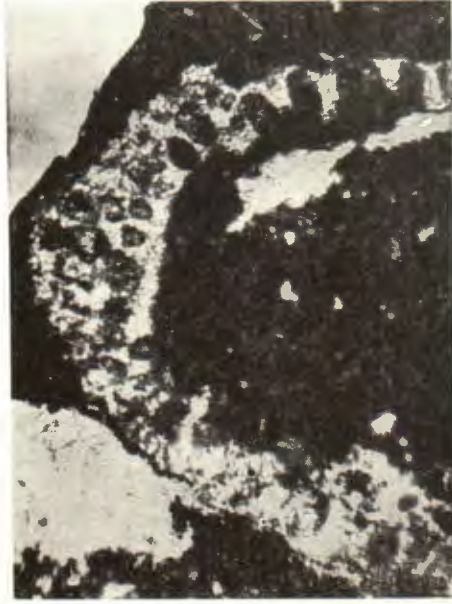
1-4 *Gyroporella* cf. *ampleforata* Guembel; the Ladinian (ladinik): 1. cross-section (poprečni presjek), \times ca. 13; Gradina near Vrkljanski ponori, Lika; 2. nearly cross-section (približno poprečni presjek), \times ca 12; Gradina near Vrkljanski ponori, Lika; 3. oblique section (kosi presjek), \times ca. 12; Vracc near Gračac, Lika; 4. oblique-longitudinal section (koso uzdužni presjek), \times ca. 11; Velika Vršina, Lika.



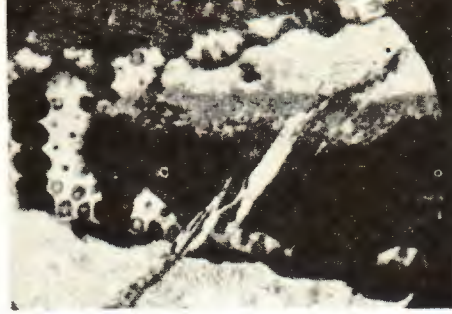
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