

LOWER CRETACEOUS FAUNA FROM SLOVENSKI VRH NEAR KOČEVJE (SOUTH SLOVENIA)

**SPODNJEKREDNA FAVNA SLOVENSKEGA VRHA PRI
KOČEVJU**

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ABSTRACT

UDC 563.6(116.3)(497.12-13)
563.12(116.3)(497.12-13)**Lower Cretaceous Fauna from Slovenski vrh near Kočevje (South Slovenia)**

The biostratigraphy of the younger part of Lower Cretaceous limestones (Aptian and Albian) from Slovenski vrh near Kočevje is treated. In lower part the Lower Orbitolina limestone with foraminifers typical for Lower Aptian has been determined. In higher part the Upper Orbitolina limestone with foraminifers appears, and next to it the reef fauna of corals and rudists has been found, characteristic for Upper Aptian and Albian stages. 13 species of foraminifers have been determined, six coral species have been systematically described, among them two new species (*Procladocora kocevjsensis* and *Strotogyra augusti*), as well as rudists which belong to four genera.

From the paleoecological aspect the limestone with orbitolinas was deposited in a lagoon of the shallow Dinaric platform, and in the favorable circumstances the reef organisms (rudists and corals) built there smaller patch reef.

IZVLEČEK

UDC 563.6(116.3)(497.12-13)
563.12(116.3)(497.12-13)**Spodnjekredna favna Slovenskega vrha pri Kočevju**

Biostratigrafsko smo obdelali mlajši del spodnjekrednih apnencev (aptij in albij) s Slovenskega vrha pri Kočevju. V spodnjem delu teh apnencev smo ugotovili spodnji orbitolinski horizont s foraminiferami, ki so značilne za spodnji aptij. Nad njimi se pojavi zgornji orbitolinski horizont ter grebenski fosili (korale in rudisti), značilni za zgornji aptij in albij. Določili smo 13 vrst foraminifer, sistematično smo opisali 6 vrst koral, od teh sta dve novi vrsti (*Procladocora kocevjsensis* in *Strotogyra augusti*) in rudiste, ki pripadajo štirim rodovom.

V paleoekološkem smislu spada nahajališče na Slovenskem vrhu Dinarski karbonatni platformi. Orbitolinski apnenci so nastajali v lagunah, grebenski organizmi (rudisti in korale) pa so v ugodnih okoliščinah zgradili manjši greben (patch reef).

KEY WORDS: Lower Cretaceous, Foraminifera, Corals, Rudists, South Slovenia

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INTRODUCTION

The reason for starting the biostratigraphic study of the Lower Cretaceous limestones at Slovenski vrh northwest of Kočevje was the existence of an unusual and rich orbitolinid and coral - rudist fauna which was discovered by L. ŠRIBAR in the upper part of the Lower Cretaceous beds.

Similar limestones with orbitolinas, corals and rudists in the Kočevje area were found earlier by URŠIČ (1933) and mentioned in his treatise on the stratigraphic development of beds at Kočevje. Several horizons were referred to, and a number of fossils mentioned, among them species of foraminifers, corals and rudists.

Later, the limestones with orbitolinas in this area were recorded during mapping of the Delnice sheet of the Basic geological map at a scale 1:100.000, where in the region of Slovenski vrh the Lower Cretaceous beds were divided into more stages. In Aptian and Albian numerous foraminifers and algae were listed. Reef facies was mentioned in Lower Aptian without localities and without names of fossils (SAVIČ & DOZET 1985, 34-35).

The Lower Cretaceous coral-rudist reef development on Slovenski vrh most probably corresponds to the white corallogenous limestone and white yellow hamid limestone of II. horizon as mentioned by URŠIČ (1933). Nevertheless, he neither described fossils nor the collection exists. Therefore the present systematical investigation of coral-rudist reef fauna from this locality is the first one in the Dolenjsko region.

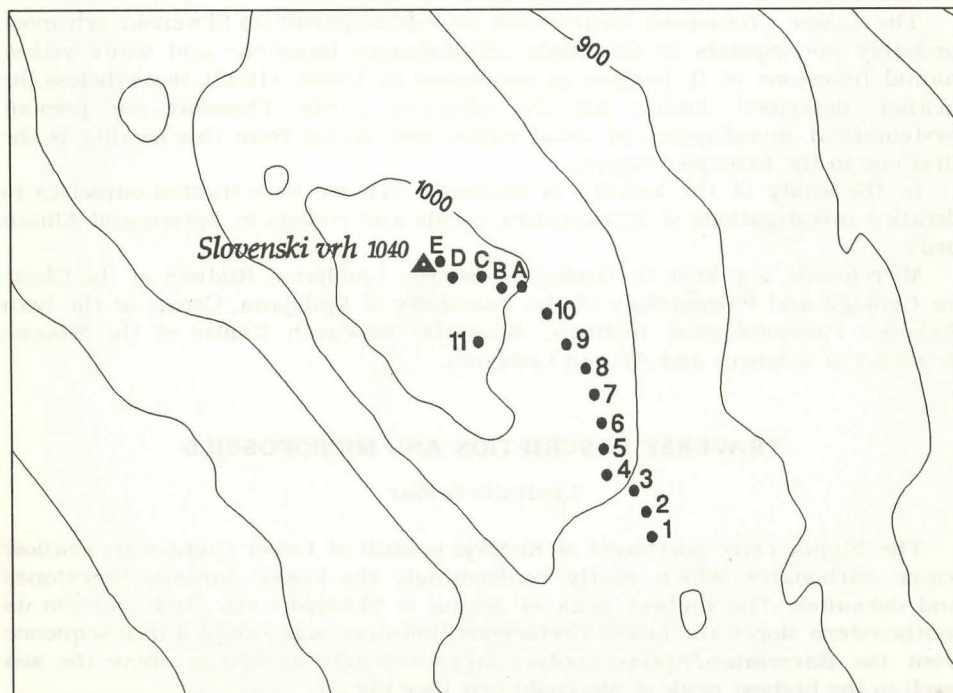
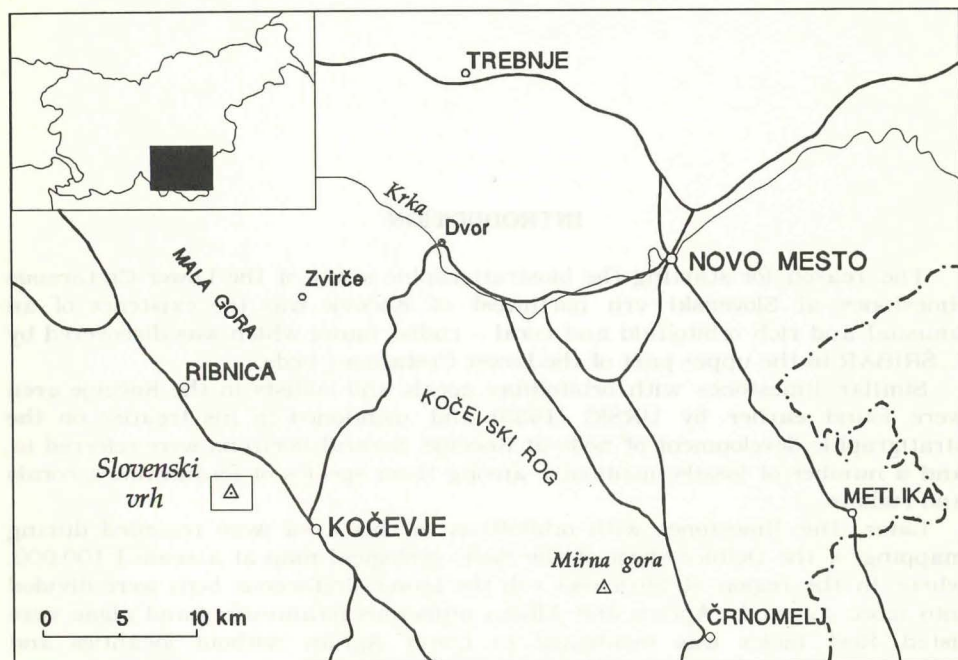
In the study of the locality of Slovenski vrh we have limited ourselves to detailed investigations of foraminifers, corals and rudists in Aptian and Albian beds.

Microfossils are kept in Geological Survey Ljubljana, Rudists at the Chair for Geology and Paleontology of the University of Ljubljana, Corals at the Ivan Rakovec Paleontological Institute, Scientific Research Centre of the Slovene Academy of Sciences and Arts in Ljubljana.

TRAVERSE DESCRIPTION AND MICROFOSSILS

Ljudmila Šribar

The Stojna ridge northwest of Kočevje is built of Lower Cretaceous shallow water carbonates which overly conformably the Upper Jurassic limestones and dolomites. The highest peak of Stojna is Slovenski vrh (1040 m). On its southeastern slopes the Lower Cretaceous limestone was sampled in a sequence from the Barremian/Aptian contact (approximately at 950 m above the sea level) to the highest peak of Slovenski vrh. (See Fig. 1).



The base of the Lower Aptian sediments (localities 1–3) is represented by pelmicritic and microsparitic limestone of Barremian age devoided on the basis of diagnostic microfossils. There are scarce ostracods, rare foraminifers and alga *Thaumatoporella parvovesiculifera* (Raineri). In spite of the absence of leading fossils the whole microbiofacies is typical for the Barremian shallow water carbonates of the Dinaric platform.

The Barremian limestone is conformingly overlain by the Lower Aptian bedded limestone (localities 4–10). The rock is medium to dark grey platy and bedded to biopelmicritic limestone. In thin sections of this beds numerous foraminifers were determined, among which orbitolinas predominate to the point of being rock forming in certain horizons (Pl. 1, Fig. 1). This is probably the dark grey limestone with orbitolinas mentioned by URŠIČ (1933). The most frequent species in this interval are:

<i>Palorbitolina lenticularis</i> (Blumenbach)	Pl. 1, Figs. 2,4
<i>Praeorbitolina wienandsi</i> Schroeder	Pl. 1, Fig. 5
<i>Praeorbitolina cormyi</i> Schroeder	Pl. 2, Figs. 1–2
<i>Orbitolina (Mesorbitolina) lotzei</i> Schroeder	Pl. 2, Fig. 3

All the above mentioned orbitolinas are leading fossils for the Lower Aptian deposits in Slovenia and for the whole area of Outer Dinarides. In the Lower Aptian beds we also determined some smaller foraminifers as follows:

<i>Neotrocholina friburgensis</i> Guillaume & Reichel	Pl. 2, Figs. 5–6
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Fig. 1. Location map of the Lower Cretaceous traverse at Slovenski vrh. Black points with numbers show the localities of fossils. Compare succession of fossils in Fig. 2.

Localities 1–3: Barremian limestone.

Localities 4–10: Dark grey bedded lower *Orbitolina* limestone (Lower Aptian)

Locality 11: Brown bedded upper *Orbitolina* limestone (Upper Aptian – Lower Albian).

Localities A–C: White organogenic reef limestone with lower coral–rudist Urganian association (Aptian).

Locality D: White reef limestone with middle coral–rudist association (Upper Aptian).

Locality E: White reef limestone with upper coral–rudist association (Albian).

Sl. 1. Položaj spodnjekrednega profila na Slovenskem vrhu. Črne pike kažejo nahajališča fosilov. Primerjaj zapovrstnost fosilov na sl. 2.

Nahajališča 1–3: Barremijski apnenec.

Nahajališča 4–10: Temno siv ploščast spodnjeorbitolinski apnenec (spodnji aptij).

Nahajališče 11: Rjav ploščast zgornjeorbitolinski apnenec (zgornji aptij – spodnji albij)

Nahajališča A–C: Bel organogeni grebenski apnenec s spodnjo koralno–rudistno urgonijsko združbo (aptij).

Nahajališče D: Bel grebenski apnenec s srednjo koralno–rudistno združbo (zgornji aptij).

Nahajališče E: Bel grebenski apnenec z zgornjo koralno–rudistno združbo (albij).

Debarina hahounerensis Fourcade et al.,
Spiroloculina cretacea Reuss
Paleodictyoconus sp.,
Nezzazata sp.,
Trocholina sp.,
Sabaudia sp.,
Praechrysalidina sp.

Miliolidae, Ophthalmidiidae, Textulariidae.

Foraminifers are accompanied by:

Bacinella irregularis Radoičić

Pl. 1, Fig. 3

Dasycladacean fragments

and some undetermined microfossils

Pl. 4, Figs. 3-4

The Lower Aptian beds are conformingly overlain by the Upper Orbitolinas horizon, the brownish bedded limestone (locality 11). Here Orbitolinas are not so frequent and well preserved as in the Lower Aptian limestone. Nevertheless, they can be attributed to the age of Upper Aptian - Lower Albian. Here species of the following group has been determined:

Orbitolina (Mesorbitolina) texana (Roemer)

Pl. 2, Fig. 4

and Pl. 3, Fig. 1-3

At the same time started deposition (localities A-E) of light grey to white organogenic, detritic limestone which belongs to a reef complex. Structure and colour are evidently different from the beds with Orbitolinas. Prevails bio-intrasparitic and biosparitic limestone. The fossils are very different, too. The most important fossils are corals and rudists treated in detail in next chapters. Microfossils in reef limestone are rare. There are some foraminifers as:

Orbitolinidae

Pl. 4, Fig. 1.

Cristelaria sp.,

Miliolidae, Lituolidae, Textulariidae, and Verneuilinidae.

More frequent is:

Neotrocholina friburgensis Guillaume & Reichel.

Except of foraminifers we have found remains of

Bacinella irregularis Radoičić

Lithocodium aggregatum Elliot

Pl. 4, Fig. 2

Coptocampilodon fontis Pratulius

Pl. 3, Fig. 4

Tubiphytes sp.,

Bryozoa, microgastropods, echinoderms, Dasycladacea.

CORAL FAUNA

Dragica Turnšek

Coral fauna has been collected at the top of Slovenski vrh in last 30 m of the hill. Precise finding places are signed from lower to upper horizons with letters A, B, C, D and E. Collection consists of 25 specimens and 60 thin sections. The seven species have been determined belonging to seven families and four suborders of Scleractinia. At description appointed abbreviations have been used: d = diameter of corallite, s = number or density of septa.

Subordo: Stylinina Alloiteau 1952

Familia: Cyathophoridae Vaughan & Wells 1943

Genus: *Cyathophora* Michelin 1843

Cyathophora pygmaea Volz 1903

Pl. 5, Fig. 1-2

1903 *Cyathophora pygmaea* nov. spec. VOLZ: 26-27, Taf. 4, Fig. 4-7.

1974 *Cyathophora pygmaea* Volz. TURNŠEK & BUSER: 92-93, Tab. 4, sl. 1. Synonymy.

1976 *Cyathophora pygmaea* Volz. TURNŠEK & BUSER: 47, Tab. 1, sl. 1-2.

1981 *Cyathophora pygmaea* Volz. TURNŠEK & MIHAJLOVIĆ: 18, Pl. 13, Fig. 1-2.

Description: This species has already been found in Slovenia (TURNŠEK & BUSER 1974, 1976). The specimens from Slovenski vrh are not well preserved, but their structure and dimensions approach to *C. pygmaea*.

Dimensions: d = 1 mm, density of tabulae 5-6/2 mm, colony ca 12 mm.

Distribution: Barremian - Lower Aptian of Romania, Poland, Eastern Serbia, Banjska planota in Slovenia, Barremian of Hungary.

Material: Slovenski vrh: A/3a, B/3ac. Aptian.

Subordo: Faviina Vaughan & Wells 1943

Familia: Axosmiliidae Geyer 1955

Genus: *Peplosmilia* Milne Edwards & Haime 1848

Peplosmilia fromenteli Angelis d'Ossat 1905

Tab. 6, Fig. 1-3

1905 *Peplosmilia fromenteli* n.sp. ANGELIS D'OSSAT: 242-243, Pl. 17, Fig. 6

1974 *Axosmilia fromenteli* (Angelis d'Ossat). TURNŠEK & BUSER: 99, Tab. 19, sl. 1. Synonymy.

1981 *Peplosmilia fromenteli* Angelis d'Ossat. TURNŠEK & MIHAJLOVIĆ: 23, Pl. 21, Fig. 1-6.

Description: The species has already been found in Slovenia and Serbia (TURNŠEK & BUSER 1974, TURNŠEK & MIHAJLOVIĆ 1981). It is a solitary coral with dentate septa and numerous dissepiments. Lamellar dissected columella.

Dimensions: d = ca. 20 mm, s = ca 96 (4-5 cycles).

Distribution: Aptian of Catalonia in Spain, Barremian of Mali Balkan, Barremian - Lower Aptian of Serbia and Banjska planota in Slovenia.

Material: Slovenski vrh: D/2abc. Upper Aptian.

Familia: Heliastreaeidae Alloiteau 1952

Genus: *Procladocora* Alloiteau 1952

Genus *Procladocora* was described and revised by ALLOITEAU 1957, 182. Later modern description was given by BEAUVAIS (1982: I, 102). Phaceloid dendroid colony has compact costosepta, distal fine dents, lateral granules, axial paliform lobes. Columella is papillous or spongy. Wall is septotheca. Microstructure consists of trabeculae with median line. BEAUVAIS (1982) distinguished *Procladocora* from *Cladocora* in paliform axial forms and in microstructure.

Procladocora kocevjeensis n.sp.

Pl. 7, Fig. 1-5; Pl. 8, Fig. 1-3; Pl. 9, Fig. 1-2

Name: After the Kočevje city not far from the finding place.

Holotypus: Specimen E/8

Locus typicus: Slovenski vrh near Kočevje

Stratum typicum: Albian

Material: 4 colonies with 9 thin sections (E/1a E/5ab, E/8abcd, 15ab).

Diagnosis: *Procladocora* with irregularly branched phaceloid corallites, compact costosepta, axial paliform lobes, papillous to spongy columella. d = 8-9 mm, s = ca 48.

Description: Phaceloid colony with irregularly branched corallites, in transverse section mainly round. Budding extracalicular, lateral. Septa thin, compact, radially arranged, in periphery partly costate, partly epithecate. Lateral part ornamented by granules. Typical is axial part where in some places structures like paliform lobes can be observed. In some places septa prolongate into axial part and interlace with long dissepiments forming spongy like columella. This axial structure looks sometimes like irregular amphistraeid fossula and approaches to *Donacosmilia*. Microstructure is poorly preserved, with ?median line. Endotheca consists of long and tabulate dissepiments all over the corallite.

Comparison: In dimensions our species stands close to *P. simonyi* (Reuss 1854), but differs in less costae and irregular structure of axial part. BEAUVAIS (1952, II, 233) ascribed *P. simonyi* to the genus *Calamophylliopsis* which I think has more porous septa and smaller corallites.

Distribution: *P. simonyi* from Turonian - Senonian beds of Gosau in Austria, *Procladocora* sp. from Barremian - Aptian of Tatra Mountains in Poland and in Eastern Serbia.

Familia: Dermosmiliidae Koby 1889

RONIEWICZ (1976: 70-77) excluded Dermosmiliidae from subordo Fungiina and ascribed it to Astracoina (=Faviina), because of lack of synapticulae and of microstructure having median line.

Genus: *Calamophylliopsis* Alloiteau 1952*Calamophylliopsis fotisalisensis* (Bendukidze 1961)

Pl. 5, Fig. 3-6

1961 *Procladocora fotisalisensis* n. sp. BENDUKIDZE: 19-20, Tab. 2, fig. 5.1966 *Calamophylliopsis fotisalisensis* (Bendukidze). MORYCOWA & LEFELD: 537-538, Pl. 34, Fig. 2, Textfig. 5.1976 *Calamophylliopsis fotisalisensis* (Bendukidze). TURNŠEK & BUSER: 63, 83, Tab. 20, sl. 1-4.

Description: The species has been described from Banjska planota (TURNŠEK & BUSER 1976). Specimens from Slovenski vrh are phaceloid forms and fit in completely with the descriptions of this species.

Dimensions: d = 3-5 mm, s = ca 40-45.

Distribution: Barremian of Crimea, Barremian - Aptian of Poland and Slovenia.

Material: Slovenski vrh: A/1ab, A/2ab, A/3ab, B/1a, B/3a, B/4a, C/1ab. Aptian.

Subordo: Meandriina Alloiteau 1952

Familia: Dendrogyridae Alloiteau 1952

Genus: *Strotogyra* Wells 1937

Among flabellate corals the genera *Rhipidogyra*, *Placosmilia* and *Strotogyra* are uniserial.

The genus *Rhipidogyra* Milne Edwards & Haime 1848 was revised by ELIAŠOVA 1973, 271. She put it into the family Rhipidogyridae Koby 1905. Later on RONIEWICZ (1976) ascribed it to her new subordo Rhipidogyrina on the basis of small trabecular microstructure, and of apophysal and lonsdaleoid septa.

The genus *Placosmilia* Milne Edwards & Haime 1848 was revised by BEAUVAIS M. (1982, I, 59) and on the basis of montlivaltioid microstructure ascribed to the subordo Astracoina.

The genus *Strotogyra* Wells 1937 was based by Wells upon the species *Rhipidogyra undulata* Reuss. He ascribed to this genus all Upper Cretaceous rhipidogyrids, which he characterized on the basis of contorted sometimes bifurcated series, thinner septa, obsolescent costae, nondentate septa, bifurcations and usually continuous columella.

Modern description and revision of *Strotogyra* was given by BEAUVAIS M. (1982, I, 191-199). He ascribed it to the family Dendrogyridae, subordo Meandriina. Emended diagnosis contains: "uniserial corallites winding, lamellar columella discontinuous, wall septotheca with parathecal peripheral stereozon, vesicular dissepiments, lateral granulae, distal teeth, microstructure of simple trabeculae with median line".

Specimens from Slovenski vrh are uniserial irregularly winding somewhere bifurcating corallites with discontinuous columella and so the closest to *Strotogyra*. Microstructure is not preserved.

Strotogyra augusti n.sp.

Pl. 10, Fig. 1-6; Pl. 11, Fig. 1-3; Pl. 12, Fig. 1-2

Name: Devoted to the memory of my brother August.

Holotypus: Slov. vrh E/6.

Locus typicus: Slovenski vrh near Kočevje

Stratum typicum: Albanian.

Diagnosis: Lamellar flabellate irregularly contorted uniserial corallites, septa in 2-3 orders, discontinuous columella, septoparatheca with peripheral dissepimentarium. Diameter of series = 10-12 mm, density of septa in peripheral part (S1+S2+S3) = 8-9/10 mm.

Material: Slovenski vrh E/3, E/4, E/6 (holotype), E/7, E/9, E/10, E/11 (seven colonies and 12 thin sections).

Description: Lamellar flabellate uniserial colony is laterally and frontally free. Irregularly contorted or even, rarely bifurcated at short distance. Septa compact in 2-3 orders, the first and second being almost equal in length and thickness. The third one very short, in wall region only. S1 and S2 axially thickened, free, laterally irregularly granulated. Columella lamellar, discontinuous, in upper part of colony thicker, in lower part thinner. Also septa seem to be thinner in lower part of corallites. Endotheca consists of numerous thin tabulate and long dissepiments: tabulate in peripheral part, long and bent in axial part. Wall is septoparatheca. In the whole peripheral part there is wide parathecal dissepimentarium which is often recrystallized into the massive structure where septa of last order are not observable, but look like massive septotheca. In better preserved specimens septa of last cycle are always evident and free. Septa are never apophysal nor lonsdaleoid. Centres of corallites are not recognizable. Microstructure is recrystallized. In systematics I follow M. BEAUVAIS (1982).

Comparison: "Similar" Upper Jurassic species of the genus *Rhipidogyra* are *R. elegans* Koby, *R. langi* Edwards & Haime, and *R. costata* Becker. They differ from our species in thicker septa (4-6/10 mm) and all have continuous columella (ELIAŠOVA 1973, RONIOWICZ 1966, 1976, ROSENDAHL 1985). "Similar" Upper Cretaceous species of *Strotogyra* are *S. poseidonis* (Felix), *S. sinuosa* (Felix), *S. subaequicosta* Beauvais, and *S. decorata* (Oppenheim), all of which have much more numerous and thinner septa (20/10 mm) (BEAUVAIS M. 1982). Similar in septal structure is *Lasmogyra tortuosa* Felix (FELIX 1903), later revised into *Placosmia turonensis* (BEAUVAIS M 1982, I, 63), which differs in more meandroid colony.

Distribution: So far all *Strotogyra* species have been known from Upper Cretaceous beds of Austria and France. The locality in Slovenski vrh is therefore supposed to be younger than "Urgonian", and I attribute it at least the Albanian age.

Subordo: Fungiina Verrill 1865

Familia: Microsolenidae Koby 1889

Genus: *Microsolena* Lamouroux 1821*Microsolena distefanoi* (Prever 1909)

Pl. 6, Fig. 4-6

1909 *Microsarea Distefanoi* n. f. PREVER: 71, Tav. 2, fig. 6-6a.1964 *Microsolena distefanoi* (Prever). MORYCOWA: 86-87, Pl. 25, Fig. 2, Pl. 26, Fig. 1-2.1974 *Microsolena distefanoi* (Prever). TURNŠEK & BUSER: 101-102, Tab. 11, sl. 2. Synonymy.1976 *Microsolena distefanoi* (Prever). TURNŠEK & BUSER: 59, Tab. 17, sl. 1-2.1984 *Microsolena distefanoi* (Prever). SCOTT: 342, Pl. 2, figs. 9-10.

Description: This species has already been found and described in Slovenia (TURNŠEK & BUSER 1974, 1976). Specimens from Slovenski vrh are massive thamnasterid colonies with large corallites, porous and confluent septa, lateral pennulae, axial small space with spongy columella.

Dimensions in mm:	Slovenski vrh	PREVER 1909	MORYCOWA 1961	TURNŠEK 1974
cc	(4)7-9	5-9	3.5-8	3-7
s	30-50	38-44	27-48	25-45
s/mm	7-9/2			

Distribution: Cenomanian of Italy, Barremian-Aptian of Poland and Banjska planota in Slovenia, Lower Cretaceous of Texas.

Material: Slovenski vrh: D/1abcdef, D/2b. Upper Aptian.

Familia: Actinacididae Vaughan & Wells 1943

Genus: *Actinaraea* d'Orbigny 1849*Actinaraea tenuis* Morycowa 1971

Pl. 5, Fig. 7-8

1971 *Actinaraea tenuis* n.sp. MORYCOWA: 128-130, Pl. 35, Fig. 1.1980 *Actinaraea tenuis* Morycowa. KUZMICHEVA in CHERNOV et al.: 106-107, tab. 39, fig. 4ab.1981 *Actinaraea tenuis* Morycowa. TURNŠEK & MIHAJLOVIĆ: 37-38, Pl. 45, fig. 1-4.1984 *Actinaraea* aff. *tenuis* Morycowa. SCOTT: 344, Pl. 2, Fig. 12-13.1985 *Actinaraea tenuis* Morycowa. SIHARULIDZE: 61-62, Tab. 28, fig. 1ab.1988 *Actinaraea tenuis* Morycowa. KUZMICHEVA in ALI-ZADE et al.: 175-176, Tab. 8, fig. 2ab.

Description: Bulbous or lamellar colony with identified corallites and spongy large peritheca.

Dimensions: cc = ca 2.5–4 mm, s = 12+s (7–8/2 mm).

Distribution: Aptian of Romania, Barremian of Azerbaijan, Berriassian of Georgia, Barremian – Lower Aptian of E Carpathians and Eastern Serbia, Lower Cretaceous of Texas.

Material: Slovenski vrh: C/4abc. Aptian.

RUDISTS

Mario Pleničar

The rudists from the white yellow limestone from the Slovenski vrh are only partly preserved and determinable. This limestone is underlain by the dark grey limestone with orbitolins. The limestone with the Rudists is of the same age as the limestone with corals.

The rudistid fauna is poorly preserved. Numerous valves are recrystallized or corroded by algae. The determination of specimens was possible only in cross sections of valves in the matrix rocks.

Superfamilia: Hippuritacea Gray 1848

Familia: Monopleuridae Munier-Chalmas 1873

Genus: *Monopleura* Matheron 1892

Monopleura sp.

Fossil material: One transversal and one longitudinal cross section of the small valve in the limestone, and also one transversal cross section of another (bigger) valve. Collection of the Chair for Geology and Paleontology of the University in Ljubljana.

Description: The transversal cross section of smaller valve is round in shape with diameter of 1 cm and length of 3 cm. The shell is about 3 mm thick. Besides this valve, a bigger transversal cross section of another lower valve is preserved. Both cross sections are in the direction cardinal apparatus – pallear side prolonged. By the bigger specimen with the diameter of 1 x 2 cm in the cross section of the valve, three tooth and anterior myophore are visible. The both valves are lamellar, and partly recrystallized. The exterior layer of valves is not preserved and of this reason the determination of species is impossible.

Stratigraphic distribution: Genus *Monopleura* extends from Valanginian to Turonian and is not a leading fossil of certain stratigraphic horizon. In Dinarides the species of Monopleuridae appear the most frequently in the Lower Cretaceous limestone. URŠIČ (1933) refers the species *Monopleura varians* and *M. trilobata* in the Kočevje area to be typical of Urganian limestone of the Lower Cretaceous.

Familia: Caprinidae Fischer 1887

Genus: *Praeacprina* Paquier 1903

Praeacprina sp.

Pl. 13, Fig. 1–2

Fossil material: Several transversal cross sections of valves of the Genus *Praeacprina* are kept in the collection of the Chair for Geology and Paleontology of the University in Ljubljana.

Description: The transversal cross sections are oval elongated in shape with diameter of 2–4 cm. Valves are recrystallized and partly corroded by algae. The best preserved specimen is the lower valve presented in Pl. 13, fig. 1. The shell is about 5 mm thick. In the right side the posterior myophore and the accessory cave are visible. Of the same genus is also specimen presented in the Pl. 13, fig. 2. Only the both cavities can be seen: the mantle-shell and the accessory cavity. The shell is very recrystallized and cross section disoriented. Probably it belongs to the upper valve.

Stratigraphic distribution: The genus *Praeacprina* is typical for the Aptian stage of France. MASSE (1985) mentioned genera *Praeacprina*, *Caprina* and *Offneria* to be typical for Lower Aptian of the Italo-Dinarides region or of the "Apulian subprovince"

Genus: *Offneria* Paquier 1903

Offneria sp.

Pl. 14, Fig. 1

Fossil material: The cross section of one fragment of the valve with typical channels. Collection of the Chair for Geology and Paleontology of the University in Ljubljana.

Description: In the cross section of the valve several wide channels of polygonal shape are visible. They pass onto oval shapes. The valve is pretty wide. The fragment presented in the Pl. 14, fig. 1 shows the characteristics of the species *O. rhodanica* Paquier. The similar channels has the specimen on the Pl. 12, fig. 7 in the work of PAQUIER (1903), showing anterior part of the valve.

Stratigraphic distribution: The genus *Offneria* is characteristic for the Urganian development. MASSE (1985) refers this genus as a typical fossil for the Lower Aptian of the Dinarides region, in the association of the species *O. rhodanica* and *O. interrupta*.

Familia: Radiolitidae Gray 1848
Genus: *Ichthyosarcollites* Desmarest 1812

Ichthyosarcollites monocarinatus Slišković
Pl. 14, Fig. 2

- 1964 *Ichthyosarcollites monocarinatus* n. sp.; Slišković, 59, Pl. 21, figs. 1-2; Pl. 22, figs. 1-3; Pl. 23, figs. 1-2.
1967 *I. monocarinatus* Slišković; Polšak, 80, Pl. 6, fig. 1; Pl. 8, figs. 1-5; Pl. 9, fig. 1.
1983 *I. monocarinatus major* n. subsp. Slišković, 19-26, Pl. 1, figs. 1-2; Pl. 2, figs. 1-2; fig. 1 in text.

Fossil material: The transversal cross section of the lower valve, kept in the collection of the Chair for Geology and Paleontology of the University in Ljubljana.

Description: The lower valve has strong and sharp rib. The cross section of the valve is oval in shape. The diameter of the valve is 2 x 1.7 cm. The length of the rib in the cross section is 2.1 cm. Because of the oblique cross section the elements of the valve are a little deformed. The round cross sections of channels of the valve are wider on the part of the valve where it passes into rib. They are reduces in the size towards the bottom of the rib which closes conically. Smaller round channels are also in the external side of the valve, whereas in the interior side the polygonal cross sections of channels can be seen.

Similarities and differences: The specimen from Slovenski vrh shows in the transversal cross section of the lower valve a very long and conical rib which has the same length as the diameter of the valve amounts. In the specimens of Slišković and Polšak this rib is shorter, however, Slišković refers that the length of the rib in various specimens is different. It can be supposed that the specimen from Slovenski vrh is a special variation in the frame of the species *I. monocarinatus*.

Stratigraphic distribution: The species *I. monocarinatus* was found in Bosnia and in Istria in the Cenomanian beds. Also in West Europe (Italy, France) many species are known in Cenomanian strata. Nevertheless, MASSE refers that the species of the genus *Ichthyosarcollites* are typical also for the Lower Aptian of the perimediterranean area (MASSE 1985). The genus *Ichthyosarcollites* is then stratigraphically more distributed as it was mentioned in older literature.

We have found the species on Slovenski vrh relatively high in the stratigraphic column, and therefore we can suppose that it reaches here at least in the highest part of the Lower Cretaceous, probably in the Albian.

STRATIGRAPHIC COMPARISON OF FOSSILS

Biostratigraphic investigations of foraminifers, corals, and rudists indicate the Aptian and Albian age of the beds at the top of Slovenski vrh.

In the lower part of the studied traverse foraminifers have been determined which belong to two different ages. The species *Palorbitolina lenticularis*, *Praeorbitolina cormyi*, *Praeorbitolina wienandsi*, *Orbitolina (Mesorbitolina) lotzei* are typical for Lower Aptian stage. Above them the species of the group *Orbitolina (Mesorbitolina) texana*, *Coptocampilodon fontis* and others have been identified. They can be attributed to the period of Upper Aptian - Lower Albian. The same succession can be observed in the whole Dinaric platform. (ŠRIBAR 1979, GUŠIĆ, JELASKA & VELIĆ 1988, VELIĆ 1988).

The coral assemblage can be subdivided into three associations. At the start of the reef complex (localities A-C) the lower coral association with the species *Cyathophora pygmaea*, *Calamophylloidsis fotisalisensis* and *Actinaraea tenuis* predominate. Higher (locality D) the middle coral association with the species *Peplosmilia fromenteli* and *Microsolena distefanoi* appears. Both associations are typical for the Urgonian facies of the Barremian-Aptian age. On the basis of position on Slovenski vrh they belong to the Upper Aptian.

At the very top (locality E) an entirely different, upper coral association with new species *Procladocora kocevjsensis* and *Strotogyra augusti* has been found. The both genera have so far generally been known from the Upper Cretaceous. This association is at any rate younger than the afore mentioned Urgonian species, and can be attributed to Albian.

The succession and stratigraphic comparison of coral species and associations from Slovenski vrh is shown on the table below:

Coral species/associations	Locality	Previous stratigr. distrib.	Stratigraph. position on Slovenski vrh
Lower association:			
<i>Cyathophora pygmaea</i>	A,B	Bar-Apt	Aptian
<i>Calamophylloidsis fotisalisensis</i>	A,B,C	Bar-Apt	Aptian
<i>Actinaraea tenuis</i>	C	Bar-Apt	Aptian
Middle association:			
<i>Peplosmilia fromenteli</i>	D	Bar-Apt	Upper Aptian
<i>Microsolena distefanoi</i>	D	Bar-Cen	Upper Aptian
Upper association:			
<i>Procladocora kocevjsensis</i> n.sp.	E	Genus UC	Albian
<i>Strotogyra augusti</i> n. sp.	E	Genus UC	Albian
Bar - Barremian, Apt - Aptian, Cen - Cenomanian, UC - Upper Cretaceous			

The rudist fauna is relatively rich, but poorly preserved. Valves are recrystallized and extensively corroded by parasites. Nevertheless, a rather characteristic association of chlamydic pelecypods of the youngest part of Lower Cretaceous beds could be established. The genera *Monopleura*, *Praecaprina*

and *Offneria* indicate Aptian age, and the genus *Ichthyosarcolites* found just below the Slovenski vrh peak Albian one. So they fit in with the corals. Very probably also other genera are present, but they could not be determined owing to the poor state of preservation of the material. URŠIČ (1933) mentioned additional genera and even species from this locality. He quoted for example species *Caprina schiosensis*, characteristic for Cenomanian and Turonian, *Monopleura varians* characteristic for Barremian, *Pachytraga lapparenti* for Aptian. Illustrations are not easy to evaluate, but from his work, too, the existence of rather the upper part of the Lower Cretaceous beds can be inferred.

It follows consequently from all biostratigraphical comparisons that in the area of Slovenski vrh near Kočevje the youngest Lower Cretaceous beds of Aptian and Albian age are presented. The complete succession of fossils is shown on the Fig. 2.

PALEOECOLOGICAL RESULTS

It is a general rule that on carbonate platforms rudists are more frequent in lagoon and back-reef environment, while corals settled the border areas of platforms. Slovenski vrh lies approximately in the middle of the extensive Dinaric carbonate platform. Its northeasterly outer border is at Trebnje–Novo mesto line. The coral–rudist reef at the Slovenski vrh is only a small patch reef in the central part of the platform. In this patch reef no lateral differentiation of fauna can be detected, since the corals and rudists occur intermixed. They differentiate in the vertical line. In the lower part of the reef rudists of *Monopleura*–*Praecaprina*–*Offneria* type, and corals of massive bulbous and lamellar *Cyathophora*–*Actinaraea*–*Microsolena* type predominate. Colonies are small and rare and show low rate water energy with circumstances not the best for the reef environment. In the upper part of the reef the rudists of the genus *Ichthyosarcolites* and ramose–flabellate corals of genera *Procladocora*–*Strotogyra* are very flourished. They indicate the better reef environments with higher water energy. Interesting in this uppermost part is the very frequent encrusting structure of *Lithocodium aggregatum* which is spread over almost all reef organisms, and seems to cause the end of coral growth by bioerosion. On Pl. 11, Fig. 1, we can see the coral skeleton as being swallowed by alga.

It is difficult to explain why in this time the reefs existed in rare localities only. Perhaps just in this part of the platform the currents were favorable and the depth appropriate. BUSER (1987) writes that the Dinaric platform was connected by smaller trenches with the Slovenian basin in the north. Along these channels the intensified water circulation could permit in places the growth of smaller patch reefs.

Species	Localities at Slovenski vrh				
	L.Aptian (4–10)	(11,	A–C,	D,	E)
Foraminifers:					
<i>Palorbitolina lenticularis</i>	+				
<i>Praeorbitolina cormyi</i>	+				
<i>Praeorbitolina wienandsi</i>	+				
<i>Orbitolina (Mesorbitolina) lotzei</i>	+				
<i>Neotrocholina friburgensis</i>	+	+	+	+	+
<i>Debarina hahounerensis</i>	+				
<i>Spiroloculina cretacea</i>	+				
<i>Paleodictyoconus</i> sp.	+				
<i>Nezzazata</i> sp.	+				
<i>Trocholina</i> sp.	+				
<i>Sabaudia</i> sp.	+				
<i>Praechrysalidina</i> sp.	+				
Ophthalmidiidae	+				
Miliolidae, Textulariidae	+	+	+	+	+
Lituolidae, Verneuilinidae	+	+	+	+	+
<i>Orbitolina (Mesorbitolina) texana</i>		+		+	
Algae, Microproblematica:					
<i>Bacinella irregularis</i>	+	+	+		
<i>Lithocodium aggregatum</i>		+	+	+	+
<i>Coptocampilodon fontis</i>		+	+	+	+
<i>Tubiphytes</i> sp.		+	+	+	+
Corals:					
<i>Cyathophora pygmaea</i>			+		
<i>Calamophylliopsis fotisalisensis</i>			+		
<i>Actinaraea tenuis</i>			+		
<i>Peplosmilia fromenteli</i>				+	
<i>Microsolena distefanoi</i>				+	
<i>Procladocora kocevjeensis</i>					+
<i>Strotogyra augusti</i>					+
Rudists:					
<i>Monopleura</i> sp.			+	+	
<i>Praecaprina</i> sp.			+	+	
<i>Offneria</i> sp.			+	+	
<i>Ichthyosarcolites monocarinatus</i>					+

Fig. 2. Succession of fossil species in the traverse of Slovenski vrh. Compare with localities in Fig. 1.

Sl. 2. Zaprstnost fosilnih vrst v profilu na Slovenskem vrhu. Primerjaj z nahajališči na sl. 1.

Povzetek

Za biostratigrafsko raziskavo spodnjekrednih apnencev na Slovenskem vrhu severozahodno od Kočevja smo se odločili zaradi nenavadne in bogate koralne in rudistne ter orbitolinske favne, ki jo je odkrila L. ŠRIBAR v zgornjem delu spodnjekrednih plasti.

Podobne apnence s koralami, rudisti in orbitolinami je na Kočevskem našel že F. URŠIČ (1933) in jih omenil v svoji razpravi o stratigrafskem pregledu plasti pri Kočevju. Navaja več horizontov in našteva vrsto fosilov, poimensko predvsem 3 vrste foraminifer, 2 vrsti rudistov in 7 vrst koral.

Pozneje so bili spodnjekredni apnenci tega področja registrirani pri izdelavi osnovne geološke karte lista Delnice v merilu 1:100.000, kjer so na Slovenskem vrhu lepo razčlenjeni na več horizontov. V aptijskih in albijskih skladih so navedene številne foraminifere in alge. Grebenski facies je omenjen v tolmaču v spodnjem aptiju, vendar brez nahajališč in brez navedbe fosilov. (SAVIČ & DOZET 1985, 34–35).

Tako je na vsem širšem območju Dolenjske spodnjekredni grebenški razvoj s koralami znan doslej le na Slovenskem vrhu in bližnji okolici. Te plasti verjetno ustrezajo URŠIČEVEMU belemu koralogenemu apnencu in belorumenemu hamidnemu apencu II. horizonta (URŠIČ 1933). Vendar URŠIČ fosilov ni opisal, tudi zbirka ne obstaja, zato je obdelava fosilov Slovenskega vrha toliko bolj zanimiva in pomembna. V pričujoči razpravi smo se omejili na podrobnejše raziskave foraminifer, koral in rudistov iz aptijskih in albijskih skladov.

Biostratigrafske raziskave foraminifer, alg, koral in rudistov kažejo, da zgornji del Slovenskega vrha grade najmlajši spodnjekredni skladi aptijske in albijske starosti.

V spodnjem delu obdelanega profila (4–10) prevladujejo foraminifere *Palorbitolina lenticularis* (Tab. 1, sl. 2, 4), *Praeorbitolina cormyi* (Tab. 2, sl. 1–2), *Praeorbitolina wienandsi* (Tab. 1, sl. 5) in *Orbitolina (Mesorbitolina) lotzei* (Tab. 2, sl. 3), ki so značilne za spodnji aptij. To je spodnji orbitolinski horizont.

Konkordantno nad njim leži zgornji orbitolinski horizont s foraminiferami iz skupine *Orbitolina (Mesorbitolina) texana* (Tab. 2, sl. 4 in Tab. 3, sl. 1–3) ter vrsto *Coptocampilodon fontis* (Tab. 3, sl. 4), ki stratigrafsko obsegajo zgornji aptij in segajo še v albij. Enaka biostratigrafska razdelitev skladov je ugotovljena na vsem območju Dinarske platforme. (ŠRIBAR 1979, GUŠIČ, JELASKA & VELIČ 1988, VELIČ 1988).

V isti višini se pojavi grebenški apnenec s koralami in rudisti. Korable se po združbi lahko dele na dve asociaciji. V začetku grebena se pojavljajo koralne vrste *Cyathophora pygmaea* (Tab. 5, sl. 1–2), *Calamophylliopsis fotisalenis* (Tab. 5, sl. 3–6) in *Actinaraea tenuis* (Tab. 5, sl. 7–8) ter nekoliko više *Peplosmilia fromenteli* (Tab. 6, sl. 1–3) in *Microsolena distefanoi* (Tab. 6, sl. 4–6), ki so vse značilne za urgonski facies barremijsko–aptijske starosti. Na Slovenskem vrhu po legi ustreza starost aptija.

Na samem vrhu pa smo dobili povsem drugo asociacijo dveh novih vrst *Procladocora kocevensis* (Tab. 7–9) in *Strotogyra augusti* (Tab. 10–12), katerih rodova sta znana iz zgornje krede. Ta asociacija je vsekakor mlajša od prej omenjenih vrst in jo lahko uvrstimo v najmlajši del spodnje krede. Na Slovenskem vrhu ustreza uvrstitve v albij. Zanimivo je, da je URŠIČ (1933) v koralo-

genem apnencu v okolici Kočevja (v vasi Spodnje Ložine in pod Koblerskim hribom) omenil 5 vrst koral (*Isastraea hörnesi*, *Litharaea vaughani*, *Phyllosmilia transiens*, *Montlivaltia lamx*, *Cyclolites nummulus* in *C. hemisphaerica*). Vse te vrste so bile iz literature znane iz zgornje krede, apnenec pa je uvrstil v spodnjo kredo verjetno zaradi orbitolin in hamidnih školjk. Natančna primerjava njegovih vrst z našimi najdbami ni mogoča, ker vrst ni opisal, priložene fotografije so zelo nejasne, zbirke pa ni.

Rudistna favna je relativno bogata, vendar slabo ohranjena. Lupine so prekrizalizirane in močno najedene od zajedalcev. Kljub temu lahko trdimo, da gre za dokaj značilno združbo hamidnih školjk najmlajšega dela spodnjekrednih plasti. Rodovi *Monopleura*, *Praecaprina* (Tab. 13, sl. 1–2) in *Offneria* (Tab. 14, sl. 1) kažejo na aptij. Vrsta najdena tik pod Slovenskim vrhom *Ichthyosarcollites monocarinatus* (Tab. 14, sl. 2) pa je mlajša in skupaj s koralami lahko ustreza albijski starosti. Starost rudistov se povsem ujema z zapovrstnostjo koral. Zelo verjetno gre tudi za druge rodove, ki jih sedaj nismo mogli ugotoviti zaradi slabe ohranjenosti materiala. URŠIČ (1933) omenja še druge rodove in celo vrste iz istega nahajališča. Tako je navedel vrsto *Caprina schiosensis*, značilno za cenomanij in turonij, *Monopleura varians* značilno za barremij, *Pachytraga lapparenti* značilno za aptij. Slike so nerazločne in težko je presoditi točnost determinacij, vendar tudi iz njegovega dela sledi, da gre bolj za zgornji del spodnjekrednih plasti.

Iz vseh biostratigrafskih primerjav lahko torej sklepamo, da imamo na območju Slovenskega vrha pri Kočevju ohranjene najmlajše spodnjekredne plasti, ki spadajo v aptij in v albij.

V splošnem velja pravilo, da so na karbonatnih ploščah orbitoline v glavnem uspevale v lagunah, tudi rudisti so pogostnejši v lagunah in zagrebenskem okolju, medtem ko so korable naseljevale obrobja plošč. Slovenski vrh leži nekako na sredi velike dinarske karbonatne plošče. Njen severni zunanji rob poteka približno med Trebnjem in Novim mestom. Koralno rudistni greben na Slovenskem vrhu je le manjši "patch" greben znotraj platforme. Na tem patch grebenu ne razločujemo lateralne diferenciacije favne, ampak so korable in rudisti pomešani med seboj. V spodnjem delu grebena prevladujejo rudisti tipa *Caprina*–*Praecaprina*–*Offneria* ter korable masivno skorjastih oblik, tipa *Cyathophora*–*Actinaraea*–*Microsolena*. Kolonije so majhne in redke in govore o neugodnih pogojih z malo cirkulacije vode. V vrhnjem delu grebena se pojavijo rudisti. grebenskega tipa rodu *Ichthyosarcollites* in korable vejnato flabelatnega tipa *Procladocora*–*Strotogyra*. Fosili so izredno pogostni, razvejani in nakazujejo močnejšo vodno cirkulacijo in ugodnejše pogoje za grebensko rast. V tem zgornjem delu je zanimiva pogostna kodiacejska alga vrste *Lithocodium aggregatum*, ki prekriva skoraj vse grebenske organizme. Lahko sklepamo, da je greben zadušila ali pa uničila.

Težko je razložiti, zakaj so v tem obdobju samo na redkih mestih uspevali grebeni. Morda so bili res ravno na tem delu platforme ugodni tokovi in prava globina. BUSER (1987) pravi, da je Dinarska platforma z manjšimi jarki povezana s Slovenskim bazenom proti severu. Ob teh jarkih se je pretok vode pospeševal in mestoma omogočal rast manjših grebenov.

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TABLE - PLATES
1 - 14

EXPLANATION TO PLATES

Coral and rudist photographs of thin sections (Pl. 5-14) are negatives, thin sections being enlarged directly onto the paper.

RAZLAGA K TABLAM

Vse fotografije zbruskov koral in rudistov (Tab. 5-14) so negativi, zbrusek je povečan direktno na papir.

PLATE 1

Association of Lower Aptian stage

Fig. 1. The Lower Aptian limnestone with Orbitolinas
Thin section 6, x 18.

Fig. 2. *Palorbitolina lenticularis* (Blumenbach)
Miliolidae. Thin section 6, x 55.

Fig. 3. *Bacinella irregularis* Radoičić
Thin section 9, x 18.

Fig. 4. *Palorbitolina lenticularis* (Blumenbach)
Thin section 6, x 45.

Fig. 5. *Praeorbitolina wienandsi* Schroeder
Thin section 9, x 45.

TABLA 1

Združba iz spodnjega aptija

Sl. 1. Spodnjeaptijski orbitolinski apnenec.
Zbrusek 6, x 18.

Sl. 2. *Palorbitolina lenticularis* (Blumenbach)
Miliolida. Zbrusek 6, x 55.

Sl. 3. *Bacinella irregularis* Radoičić
Zbrusek 9, x 18.

Sl. 4. *Palorbitolina lenticularis* (Blumenbach)
Zbrusek 6, x 45.

Sl. 5. *Praeorbitolina wienandsi* Schroeder
Zbrusek 9, x 45.

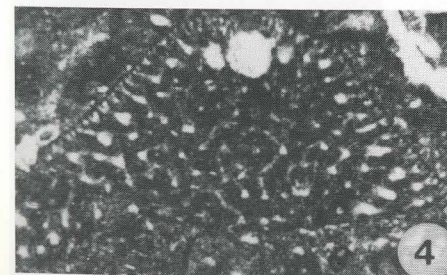
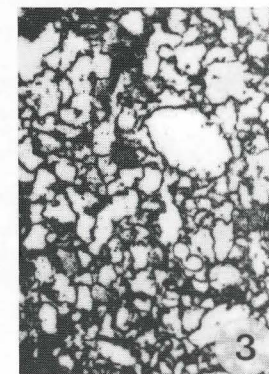
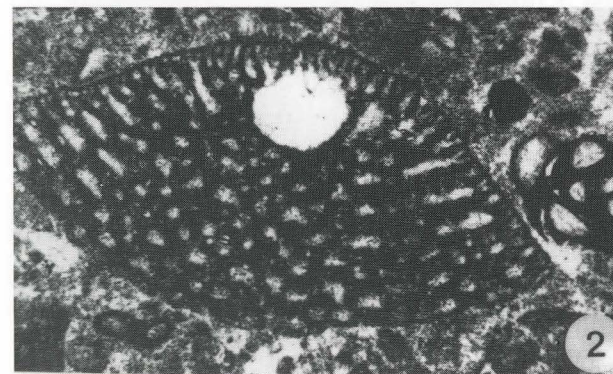
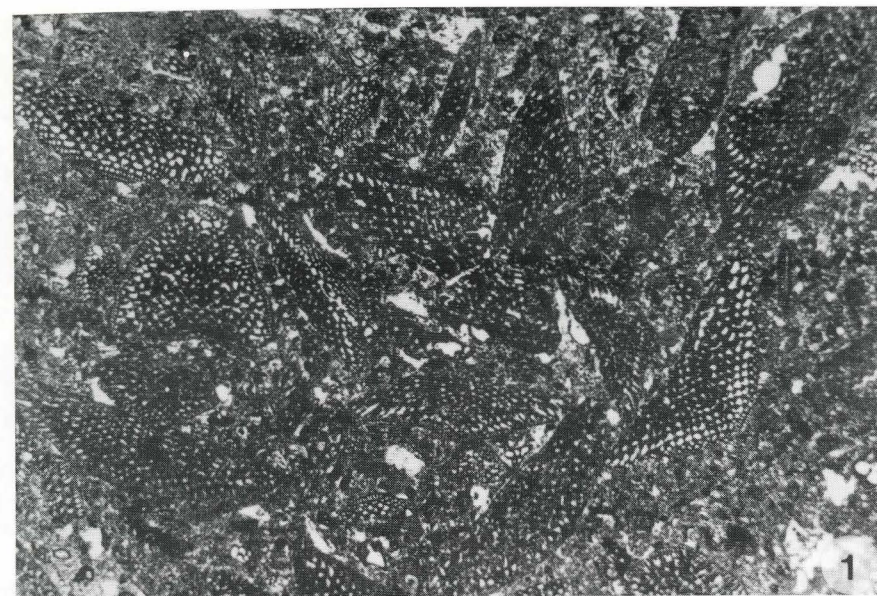


PLATE 2

- Figs. 1-2. *Praeorbitolina cormyi* Schroeder
Thin section 9 (Lower Aptian), x 55.
- Fig. 3. *Orbitolina (Mesorbitolina) lotzei* Schroeder
Thin section 9 (Lower Aptian), x 55.
- Fig. 4. *Orbitolina (Mesorbitolina) texana* (Roemer)
Thin section 11 (Upper Aptian - Lower Albian). x 60.
- Figs. 5-6. *Neotrocholina friburgensis* Guillaume & Reichel
Thin section 10, (Lower Aptian), 5. x 18, 6. x 60.

TABLA 2

- Sl. 1-2. *Praeorbitolina cormyi* Schroeder
Zbrusek 9 (spodnji aptij), x 55.
- Sl. 3. *Orbitolina (Mesorbitolina) lotzei* Schroeder
Zbrusek 9 (spodnji aptij), x 55.
- Sl. 4. *Orbitolina (Mesorbitolina) texana* (Roemer)
Zbrusek 11 (zgornji aptij - spodnji albij). x 60.
- Sl. 5-6. *Neotrocholina friburgensis* Guillaume & Reichel
Zbrusek 10, (spodnji aptij), 5. x 18, 6. x 60.

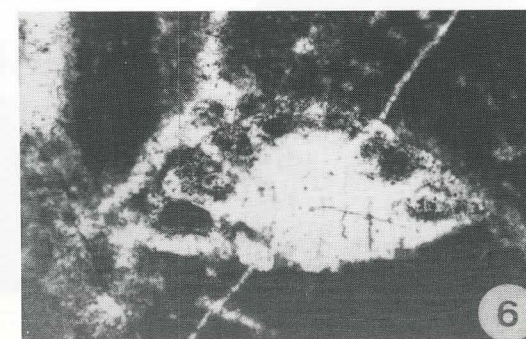
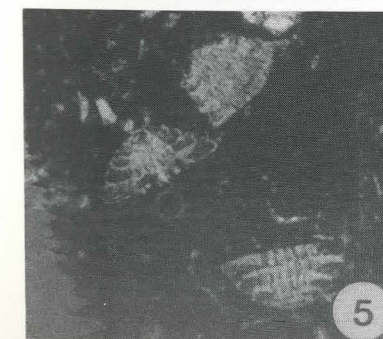
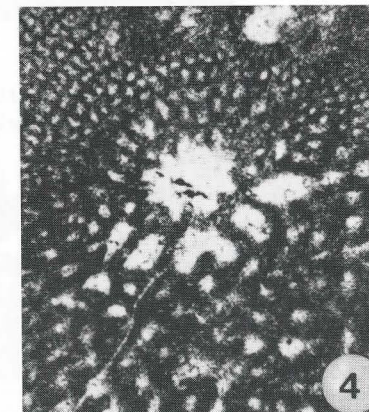
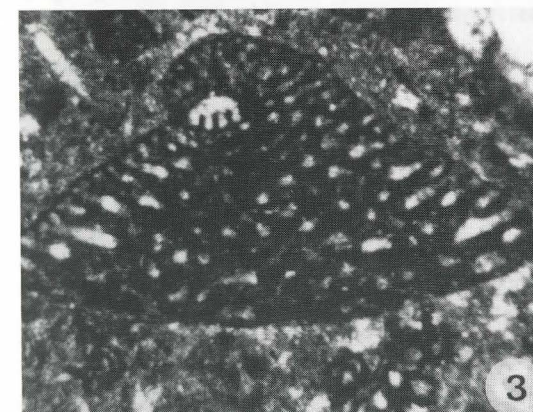
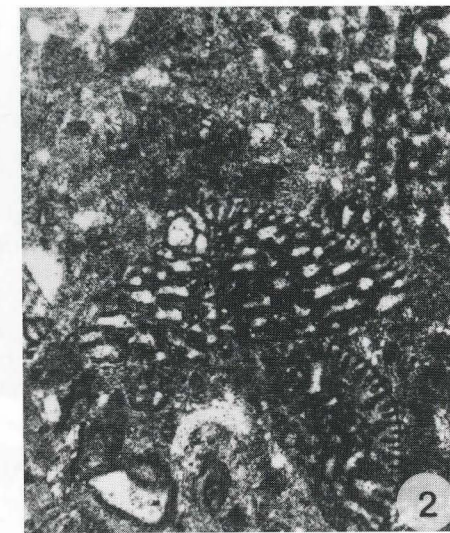
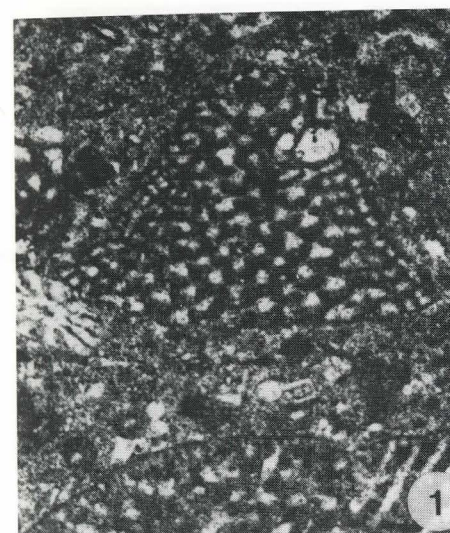


PLATE 3

Figs. 1-3. The Orbitolinas association
(ex gr. *Orbitolina* (*Mesorbitolina*) *texana* characteristic for the Upper
Aptian - Lower Albian.
Thin section 11, x 45.

Fig. 4. *Coptocampilodon fontis* Pratrulius
Thin section 11 (Upper Aptian - Lower Albian), x 45.

TABLA 3

Sl. 1-3. Orbitolinska asociacija
(iz grupe *Orbitolina* (*Mesorbitolina*) *texana* značilna za zgornji aptij -
spodnji albij.
Zbrusek 11, x 45.

Sl. 4. *Coptocampilodon fontis* Pratrulius
Zbrusek 11 (zgornji aptij - spodnji albij), x 45.

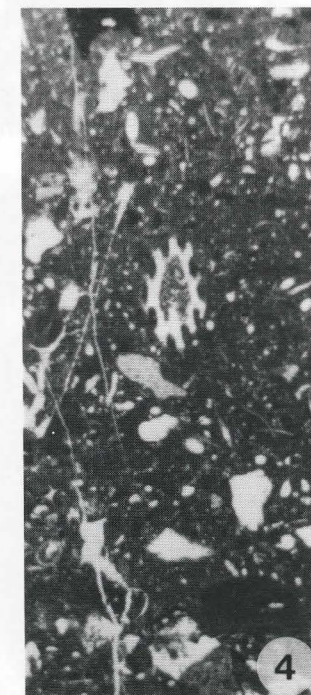
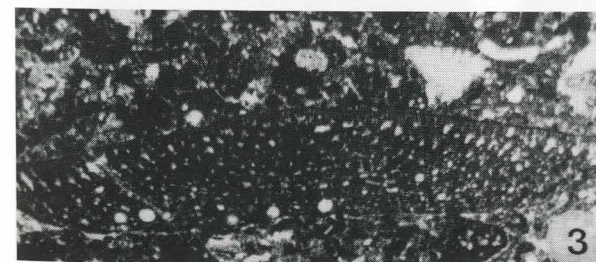
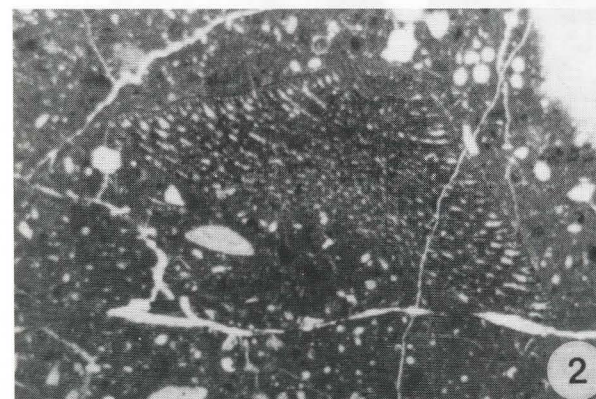
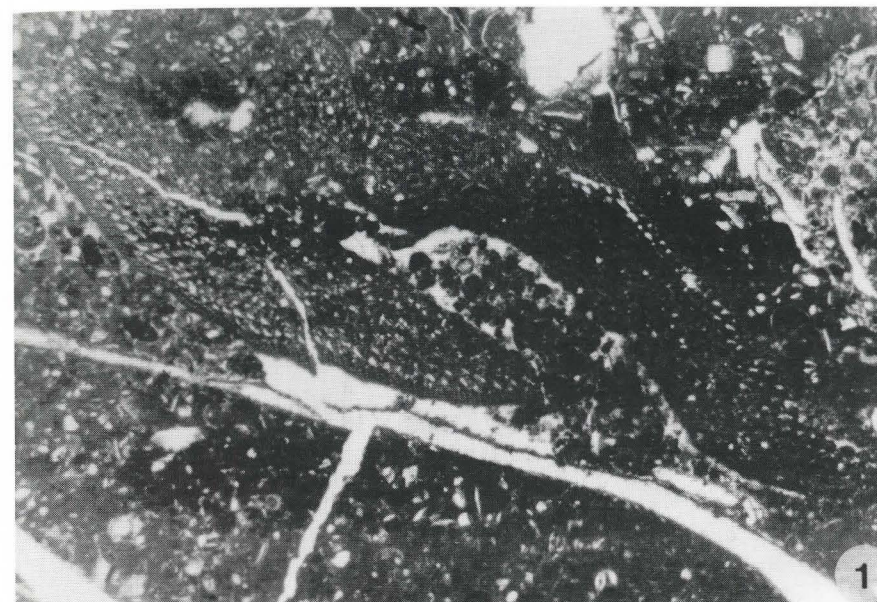


PLATE 4

- Fig. 1. The Albian organogenic detritic limestone.
Thin section E, x 18.
- Fig. 2. *Lithocodium aggregatum* Elliot
Thin section E, Albian, x 18.
- Figs. 3-4. Undetermined microfossils.
Thin section 9 (Lower Aptian), 3. x 18, 4. x 45.

TABLA 4

- Sl. 1. Albijski organogeni detritični apnenec.
Zbrusek E, x 18.
- Sl. 2. *Lithocodium aggregatum* Elliot
Zbrusek E, albij, x 18.
- Sl. 3-4. Nedoločeni mikrofosili.
Zbrusek 9 (spodnji aptij), 3. x 18, 4. x 45.

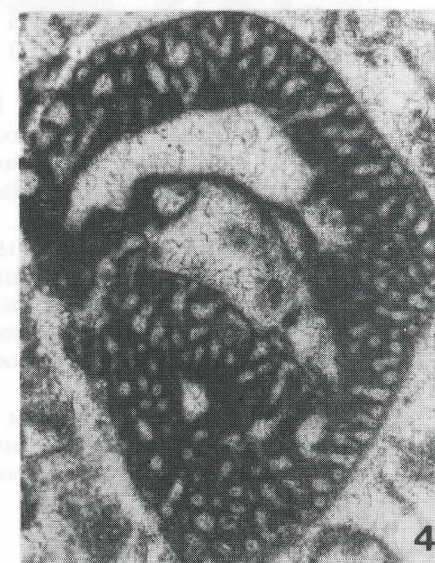


PLATE 5

Lower coral reef *Cyathophora*-*Calamophylliopsis*-*Actinaraea* association.
Localities: Slovenski vrh A-B-C, Aptian.

Figs. 1-2. *Cyathophora pygmaea* Volz 1903

1. Transverse section of massive colony. Thin section B/3a, x 4.
 2. Longitudinal section of colony. Thin section B/3b, x 4.
- Left above fragment of *Calamophylliopsis*.

Figs. 3-6. *Calamophylliopsis fotisalisensis* (Bendukidze 1961)

3. Surface of phaceloid colony. Specimen A/1, x 1.1.
4. Transverse section of one corallite. Thin section A/1a, x 4.
5. Transverse section of another corallite. Thin section A/2a, x 4.
6. Longitudinal section of one corallite. Thin section A/3b, x 4.

Figs. 7-8. *Actinaraea tenuis* Morycowa 1971

7. Transverse section of massive colony. Thin section C/4a, x 4.
8. Longitudinal section of the same colony. Thin section C/4b, x 4.

TABLA 5

Spodnja koralna grebenska združba *Cyathophora*-*Actinaraea*-*Calamophylliopsis*. Nahajališča: Slovenski vrh A-B-C, aptij.

Sl. 1-2. *Cyathophora pygmaea* Volz 1903

1. Prečni presek masivne kolonije. Zbrusek B/3a, x 4.
 2. Podolžni presek iste kolonije. Zbrusek B/3b, x 4.
- Levo zgoraj *Calamophylliopsis*.

Sl. 3-6. *Calamophylliopsis fotisalisensis* (Bendukidze 1961)

3. Površina faceloidne kolonije. Zbrusek A/1, x 1.1.
4. Prečni presek enega koralita. Zbrusek A/1a, x 4.
5. Prečni presek drugega koralita. Zbrusek A/2a, x 4.
6. Podolžni presek enega koralita. Zbrusek A/3b, x 4.

Sl. 7-8. *Actinaraea tenuis* Morycowa 1971

7. Prečni presek masivne kolonije. Zbrusek C/4a, x 4.
8. Podolžni presek iste kolonije. Zbrusek C/4b, x 4.

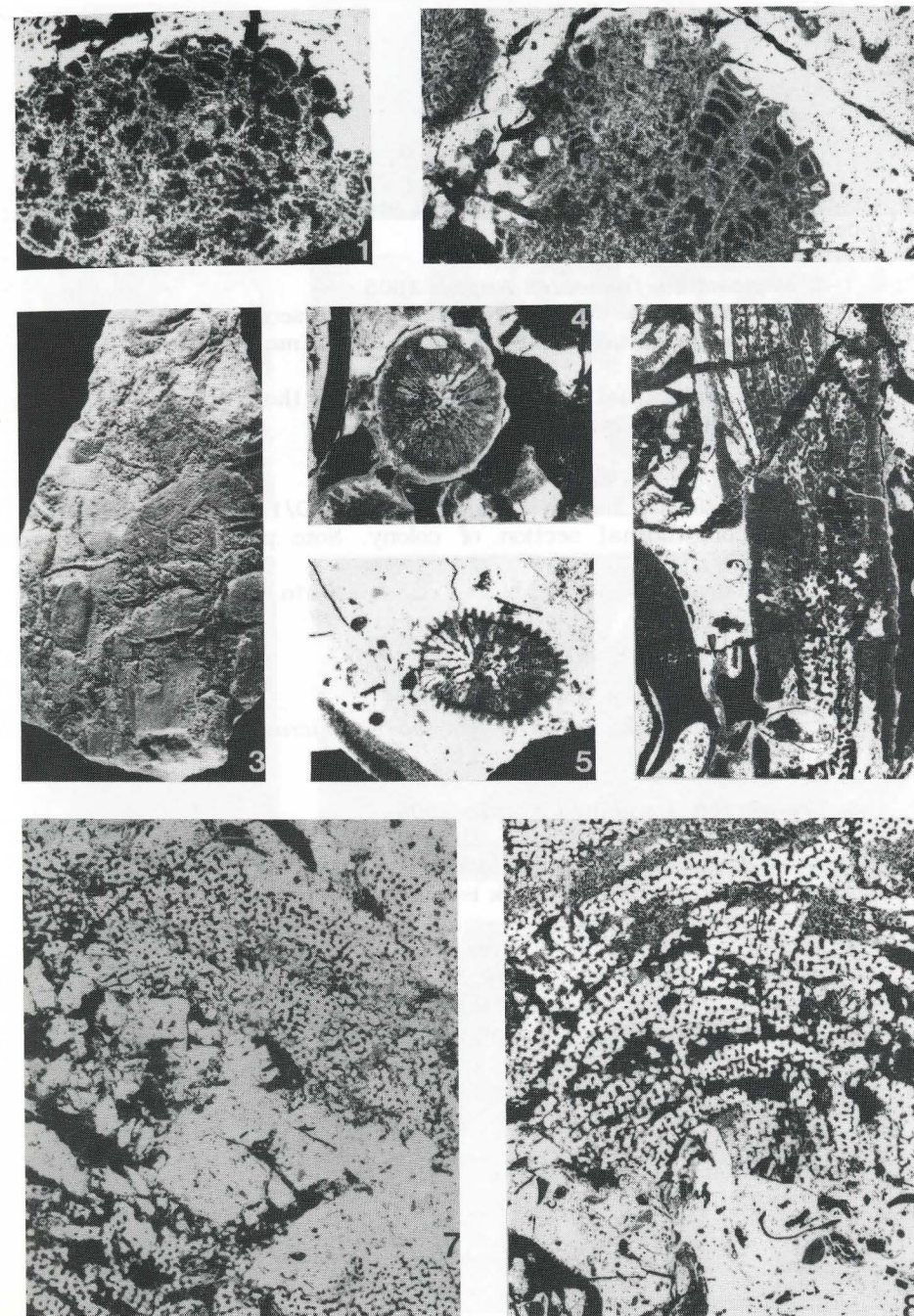


PLATE 6

Middle coral reef *Peplosmilia-Microsolena* association. Locality: Slovenski vrh D, Upper Aptian.

Figs. 1-3. *Peplosmilia fromenteli* Angelis 1905

1. Transverse section of corallum. Thin section D/2b, x 4.
2. Longitudinal axial section of the same corallum. Thin section D/2c, x 4.
3. Longitudinal peripheral section of the same corallum. Thin section D/2a, x 4.

Figs. 4-6. *Microsolena distefanoi* (Prever 1909)

4. Surface of massive colony. Specimen D/1, x 1.
5. Longitudinal section of colony. Note pennulae. Thin section D/1b, x 4.
6. Transverse section of two colonies. Thin section D/1c, x 4.

TABLA 6

Srednja koralna grebenska združba *Peplosmilia-Microsolena*. Nahajališče: Slovenski vrh D, zgornji aptij.

Sl. 1-3. *Peplosmilia fromenteli* Angelis 1905

1. Prečni presek koraluma. Zbrusek D/2b, x 4.
2. Podolžni aksialni presek istega koraluma. Zbrusek D/2c, x 4.
3. Podolžni periferni presek istega koraluma. Zbrusek D/2a, x 4.

Sl. 4-6. *Microsolena distefanoi* (Prever 1909)

4. Površina masivne kolonije. Vzorec D/1, x 1.
5. Podolžni presek kolonije. Penule. Zbrusek D/1b, x 4.
6. Prečni presek dveh kolonij. Zbrusek D/1c, x 4.

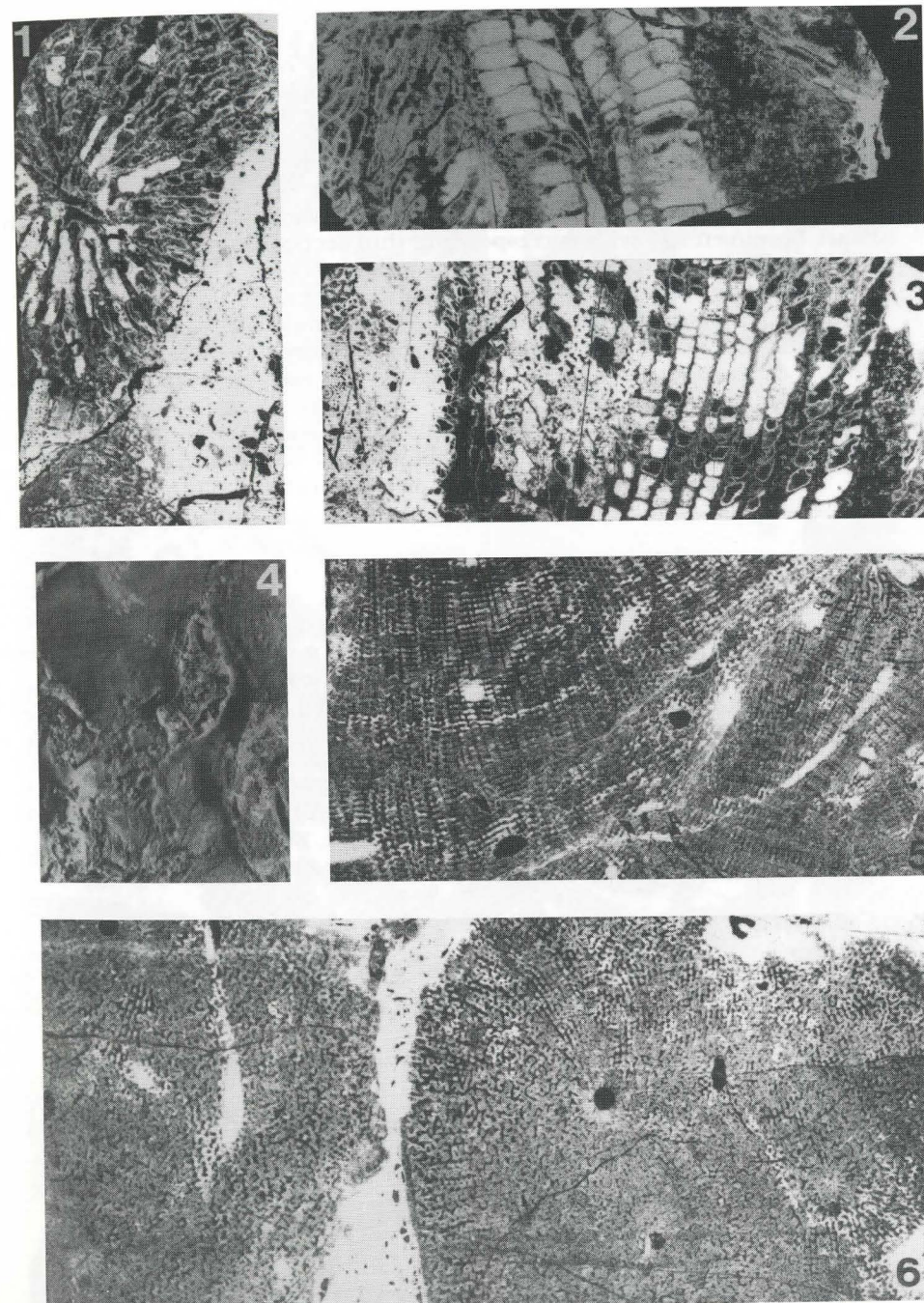


PLATE 7

Upper coral reef *Procladocora-Strotogyra* association. Locality: Slovenski vrh E, Albian. Specimen E/8 with corresponding thin sections is holotype.

Figs. 1-5. *Procladocora kocevjeensis* n. sp.

1. Surface of the phaceloid colony. Specimen E/8. x 1.
2. Transverse section of the colony. Thin section E/8c. x 4.
3. Transverse and partly longitudinal section of more corallites. Thin section E/8a. x 4.
4. Longitudinal peripheral section of one corallite. Thin section E/8d. x 4.
5. Longitudinal axial section of two corallites. Thin section E/8b. x 4.

TABLA 7

Zgornja koralna grebenska združba *Procladocora-Strotogyra*. Nahajališče: Slovenski vrh E, albij. Vzorec E/8 s pripadajočimi zbruski je holotip.

Sl. 1-5. *Procladocora kocevjeensis* n. sp.

1. Površina faceloidne kolonije. Vzorec E/8. x 1.
2. Prečni presek dveh koralitov. Zbrusek E/8c. x 4.
3. Prečni in deloma podolžni presek več koralitov. Zbrusek E/8a. x 4.
4. Podolžni periferni presek enega koralita. Zbrusek E/8d. x 4.
5. Podolžni aksialni presek dveh koralitov. Zbrusek E/8b. x 4.

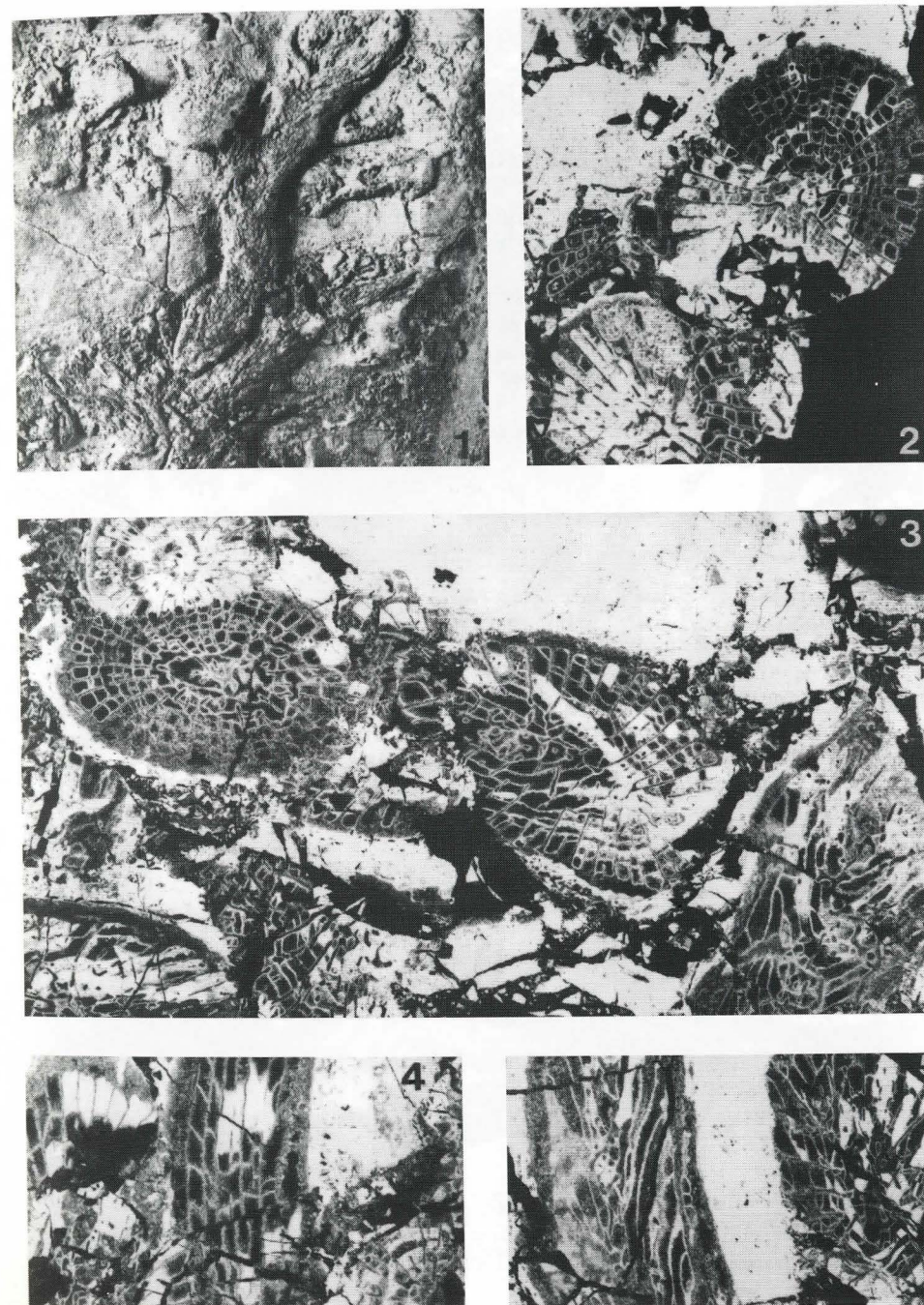


PLATE 8

Upper coral reef association. Locality: Slovenski vrh E, Albian. Specimen E/8 with corresponding thin sections is holotype.

Figs. 1-3. *Procladocora kocevjsensis* n. sp.

1. Transverse section of two corallites. Note typical axial structure with papilous or spongy columella. Thin section E/8a. x 8.
2. Transverse section of axial part of corallite. Thin section E/8c. x8.
3. Longitudinal axial section of one corallite. Thin section E/8b. x8.

TABLA 8

Zgornja koralna grebenska združba. Nahajališče Slovenski vrh E, albij. Vzorec E/8 s pripadajočimi zbruski je holotip.

Sl. 1-3. *Procladocora kocevjsensis* n. sp.

1. Prečni presek dveh koralitov s tipično aksialno strukturo, ki kaže papilozno in spongiozno kolumelo. Zbrusek E/8a. x 8.
2. Prečni presek osrednjega dela koralita. Zbrusek E/8c. x 8.
3. Podolžni aksialni presek enega koralita. Zbrusek E/8b. x 8.

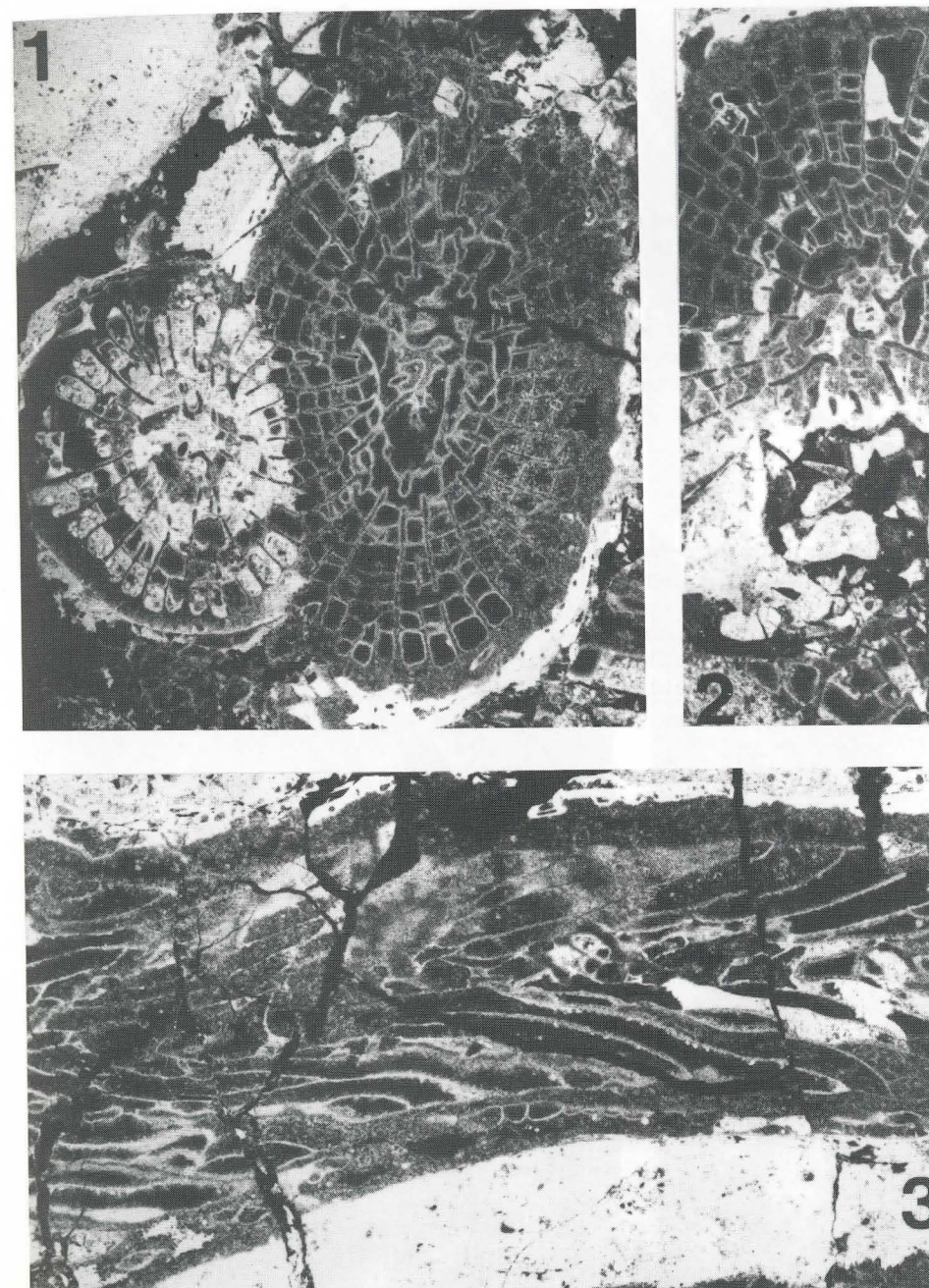


PLATE 9

Upper coral reef association. Locality: Slovenski vrh E, Albian. Specimen E/8 with corresponding thin sections is holotype.

Figs. 1-2. *Procladocora kocevensis* n. sp.

1. Microstructure of skeleton in transverse section. Thin section E/8a. x 20.
2. Microstructure of skeleton in longitudinal section. Thin section E/8d. x 20.

TABLA 9

Zgornja koralna grebenska asociacija. Nahajališče: Slovenski vrh E, albij. Vzorec E/8 s pripadajočimi zbruski je holotip.

Sl. 1-2. *Procladocora kocevensis* n. sp.

1. Mikrostruktura skeleta v prečnem preseku. Zbrusek E/8a. x 20.
2. Mikrostruktura skeleta v podolžnem preseku. Zbrusek E/8d. x 20.



PLATE 10

Upper coral reef *Strotogyra-Procladocora* association. Locality: Slovenski vrh E, Albian. Specimen E/6 with corresponding thin sections is holotype.

Figs. 1-6. *Strotogyra augusti* n. sp.

1. Schematic drawing of flabelate colony. Numbers show the position of thin sections in next figures.
2. Surface of the colony from above. Specimen E/6. x 1.
3. Transverse section of the contorted colony, showing septal structure and discontinuous lamellar columella. Thin section E/6a. x 4.
4. Longitudinal peripheral section parallel to long axes, marked on Fig. 1. Thin section E/7b. x 4.
5. Longitudinal axial section parallel to long axes, marked on Fig. 1. Thin section E/9c. x 4.
6. Longitudinal frontal section parallel to short axes, marked on Fig. 1. Thin section E/6c. x 4.

TABLA 10

Zgornja koralna grebenska asociacija *Strotogyra-Procladocora*. Nahajališče: Slovenski vrh E, albij. Vzorec E/6 s pripadajočimi zbruski je holotip.

Sl. 1-6. *Strotogyra augusti* n. sp.

1. Shematska risba flabelatne kolonije. Številke kažejo položaj zbruskov na naslednjih slikah.
2. Površina kolonije od zgoraj. Vzorec E/6. x 1.
3. Prečni presek vijugaste kolonije s septi in prekinjano lamelarno kolumelo. Zbrusek E/6a. x 4.
4. Podolžni periferni presek vzporeden daljši osi, označen na sl. 1. Zbrusek E/7b. x 4.
5. Podolžni aksialni presek vzporeden daljši osi, označen na sl. 1. Zbrusek E/9c. x 4.
6. Podolžni frontalni presek vzporeden krajši osi, označen na sl. 1. Zbrusek E/6c. x 4.

PLATE - TABLA 10

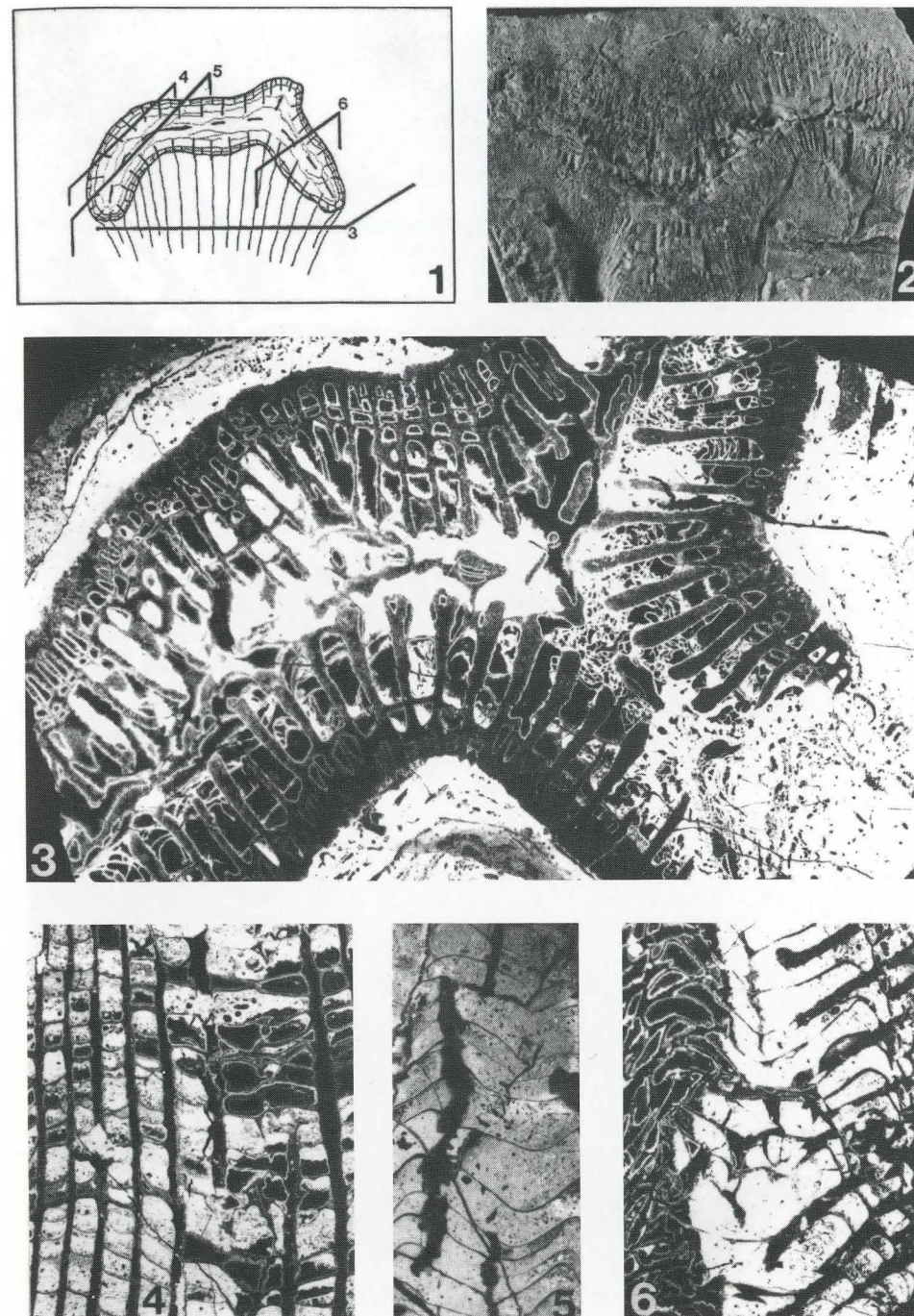


PLATE 11

Upper coral reef association. Locality: Slovenski vrh E, Albian. Specimen E/6 with corresponding thin sections is holotype.

Figs. 1-3. *Strotogyra augusti* n. sp.

1. Transverse section of flabelate colony. Thin section E/6a. x 8.
2. Longitudinal peripheral section parallel to longer axes. Thin section E/7b. x 8.
3. Longitudinal axial section parallel to longer axes. Thin section E/9c. x 8.

TABLA 11

Zgornja koralna grebenska združba. Nahajališče: Slovenski vrh E, albij. Vzorec E/6 s pripadajočimi zbruski je holotip.

Sl. 1-3. *Strotogyra augusti* n. sp.

1. Prečni presek flabelatne kolonije. Zbrusek E/6a. x 8.
2. Podolžni periferni presek, vzporeden daljši osi. Zbrusek E/7b. x 8.
3. Podolžni aksialni presek, vzporeden daljši osi. Zbrusek E/9c. x 8.

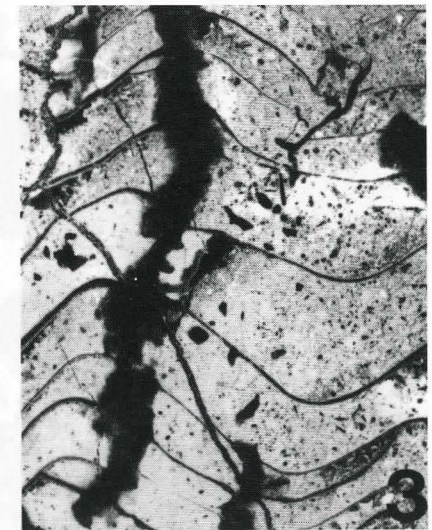
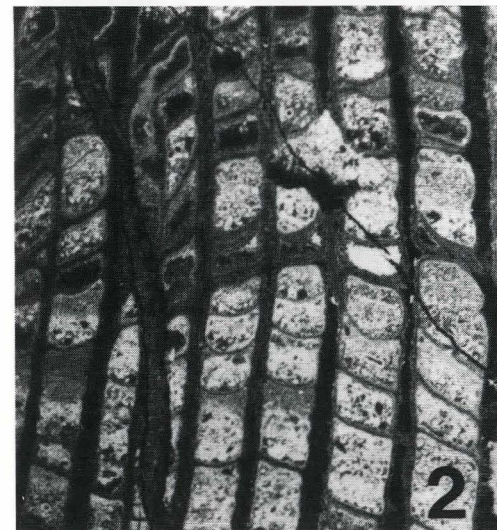
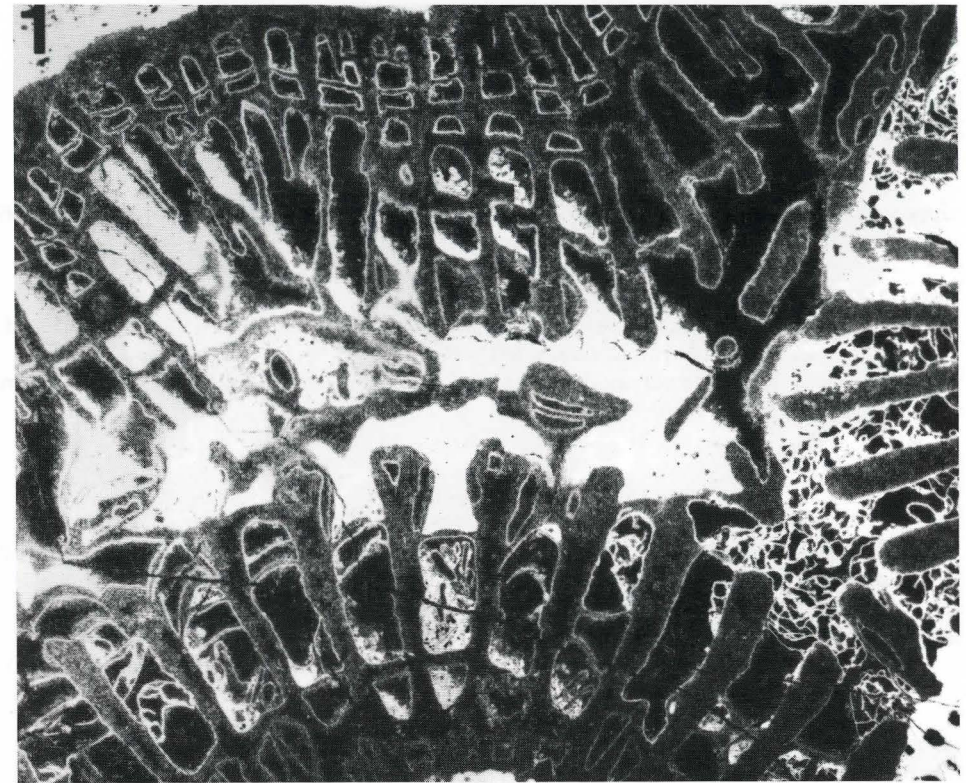


PLATE 12

Upper coral reef association. Locality: Slovenski vrh E, Albian. Specimen E/6 with corresponding thin sections is holotype.

Figs. 1-2. *Strotogyra augusti* n. sp.

1. Microstructure of skeleton in transverse section. Recrystallized. Thin section E/6a. x 20.
2. Microstructure of skeleton in longitudinal section. Thin section E/7b. x 20.

TABLA 12

Zgornja koralna grebenska združba. Nahajališče: Slovenski vrh E, albij. Vzorec E/6 s pripadajočimi zbruski je holotip.

Sl. 1-2. *Strotogyra augusti* n. sp.

1. Mikrostruktura skeleta v prečnem preseku. Prekristalizirano. Zbrusek E/6a. x 20.
2. Mikrostruktura skeleta v podolžnem preseku. Zbrusek E/7b. x 20.

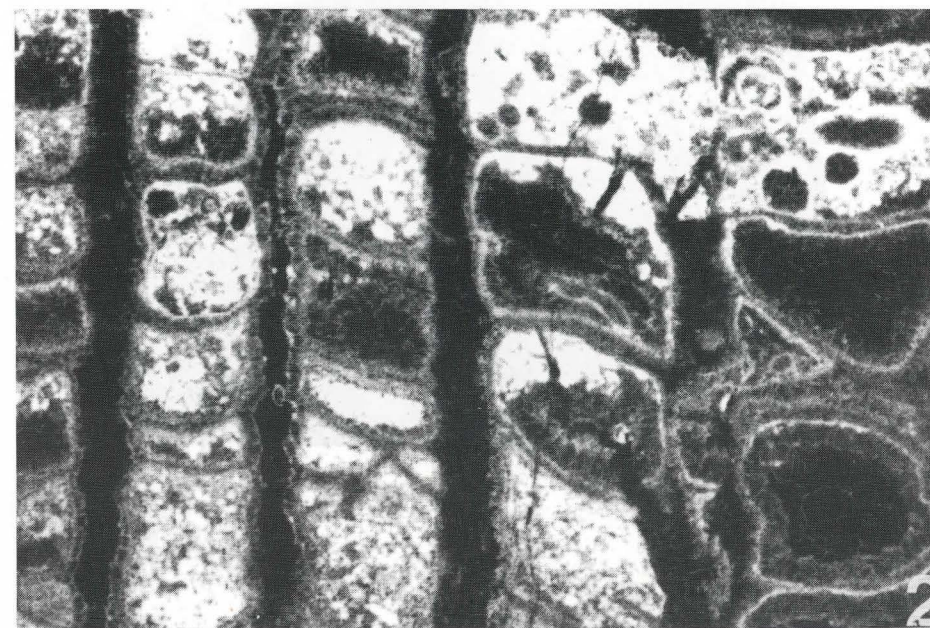
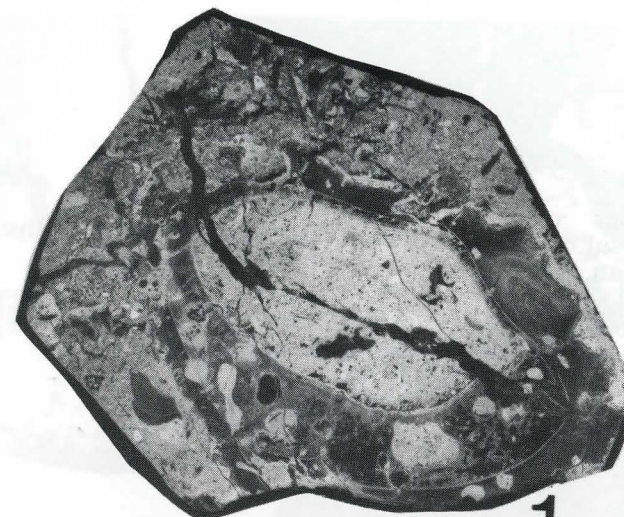


PLATE 13

Figs. 1-2. *Praecaprina* sp.
Transversal sections of the valves.
Specimens A/0, B/0, Aptian. x 3.5.

TABLA 13

Sl. 1-2. *Praecaprina* sp.
Prečna preseka lupin.
Vzorca A/0, B/0, aptij. x 3.5.



1



2

PLATE 14

- Fig. 1. *Offneria* sp.
Transversal cross section of the fragment of the lower valve. Specimen C/0, Aptian. x 4.
- Fig. 2. *Ichthyosarcollites monocarinatus* Slišković
Transversal cross section of the lower valve.
Specimen E/0, Albian. x 3.5.

TABLA 14

- Sl. 1. *Offneria* sp.
Prečni presek dela spodnje lupine. Vzorec C/0, aptij. x 4.
- Sl. 2. *Ichthyosarcollites monocarinatus* Slišković
Prečni presek spodnje lupine. Vzorec E/0, albij. x 3.5.

