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# Contribution to the Knowledge of Upper Cretaceous Beds in Kočevje and Gorski Kotar Area (NW Dinarides)

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**Abstract**

On the basis of the characteristic fossil associations biostratigraphic subdivision has been carried out in continuously deposited Upper Cretaceous sedimentary succession of the Kočevje and Gorski Kotar area. Relying on macropaleontologic data it has been possible to define almost all assemblage zones being used for biozonation of the Upper Cretaceous deposits in Outer Dinarides.

## Introduction

This paper deals with stratigraphy and especially with biostratigraphy of the Upper Cretaceous beds in the Kočevje and Gorski Kotar area. From the paleogeographic point of view, the Kočevje and Gorski Kotar regions belong to Outer Dinarides. The main geologic characteristic of the area is the predominantly calcareous sedimentation on the vast Dinaric carbonate platform from the Upper Triassic to the end of the Upper Cretaceous. The examined sedimentary successions comprise the basal Albian-Cenomanian formation, and more or less continuous successions of Cenomanian, Turonian and Senonian beds. The transition from the Lower to the Upper Cretaceous occurred there with tectonic events, lithological variations, and sharp faunal changes. The uppermost part of the Upper Cretaceous successions is clastic. The boundary between Cretaceous and Tertiary is tectonic and erosional. The total thickness of the Upper Cretaceous beds in the studied area varies from about 1200 to more than 1400 metres. It is known that in the Upper Cretaceous beds of the Outer Dinarides biostratigraphically valuable macrofossil associations appear, but we can not affirm this for the Kočevje and Gorski Kotar area, where the Upper Cretaceous beds are relatively poor in view of fossil individuums and associations. During geological mapping for Fundamental Geologic Map of Yugoslavia 1 : 100 000 several fossils were collected in the Upper Cretaceous beds of this area. Rudists, having a certain stratigraphic value in Outer Dinarides due to mass of individuums and fast evolution, are predominant among fossils.

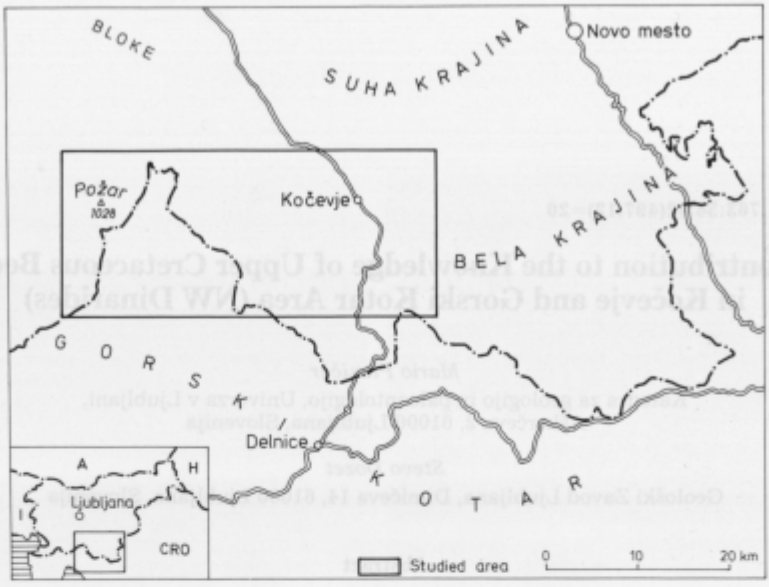


Fig. 1. Location map

**Short review of previous investigations**

Uršič described the limestone with *Chondrodonta joannae* Choffat near Kočevje and Jurassic limestone with *Diceras arietinum* Lamarck in the Kočevje surroundings (Uršič, 1931, 1932). A stratigraphic review of the Kočevje sedimentary successions with numerous determined rudists of the Upper Cretaceous was published later (Uršič, 1933).

Pleničar surveyed the caprinids of Slovenia and some radiolitid representatives. He reported also the new rudist discoveries in the Kočevje Rog area (Pleničar, 1963, 1965). The author wrote several reports about radiolitids, respectively rudist fauna in Slovenia (Pleničar, 1973, 1974, 1977, 1982, 1983, 1985 and Pleničar & Šribar, 1983, 1986).

Pleničar and Premru described the Upper Cretaceous beds of the Novo mesto area in the explanatory text of the Novo mesto sheet 1 : 100000 (Pleničar & Premru, 1977).

Polšak wrote the geology of the southern Istria emphasizing the Upper Cretaceous biostratigraphy. In the same year he performed the biostratigraphic subdivision of the Upper Cretaceous for southern Hercegovina in five cenozones and subzones. In 1967 he researched the rudist fauna composition in southern Istria (Polšak, 1965, 1967). Later he discussed the problems of the interpretation of the Dinarides Upper Cretaceous on the basis of macrofossils (Polšak, 1970).

Polšak and Sliškovič gave a biostratigraphic description of the Istria and Hercegovina Upper Cretaceous beds. The subdivision in six cenozones was carried out on the basis of macrofossils (Polšak & Sliškovič, 1966).

Sliškovič completed Polšak's biostratigraphic subdivision of the Upper Cre-

taceous beds in Outer Dinarides. Later he carried out the biostratigraphic subdivision of the Upper Cretaceous beds in southern Hercegovina. The Upper Cretaceous was divided into six chronostratigraphic members. From the biostratigraphic point of view, he separated six cenozones. Five of them were identical with the biostratigraphic subdivision of southern Istria (Polšak, 1965), whereas the sixth one was newly established (Sliškovič, 1967, 1968, 1971).

Polšak and Mamužić investigated the Upper Cretaceous rudist association in numerous localities in Outer Dinarides in the area of Istria and Hercegovina (Polšak & Mamužić, 1969).

Buser described the Upper Cretaceous beds of the Ribnica area in the explanatory text of the Ribnica sheet 1 : 100 000 (Buser, 1974).

Dozet described the Upper Cretaceous beds of the Kočevje and Gorski Kotar area in the explanatory text of the Delnice sheet 1 : 100 000 (Savić & Dozet, 1985). Later he described the Kočevje and Gorski Kotar Cretaceous succession also in his dissertation (Dozet, 1989).

## Stratigraphy

### Albian and Cenomanian – Vraconian

Vraconian beds are exposed in the core of the Požar syncline, on the southeastern slope of the Konjsko hillock, where they build with other beds the Kočevje syncline, and in the northern part of Kočevje area. At the Lower Cretaceous-Upper Cretaceous transition in the area of the Požar and Kočevje synclines we observe a thick zone of yellowish gray, light brownish gray, plated and bedded (5–30 cm) calcareous breccia and limestone. In the limestone intercalations of the lower part occur numerous miliolids, whereas in the upper part of the succession there are rudist and other mollusk fragments. In the whole sedimentary succession breccias, even predominant at some places, have the greeatest significance. The limestones are micritic, fine-grained and rarely coarse-grained. They are mainly composed of micritic matrix, in which pelets, rare ostracods, mollusks, more or less numerous miliolids and poorly preserved undeterminable algae remains can be found. The limestones are chemically quite pure, containing 92 % to 98 % of carbonate. In the biomicritic limestone intercalations with miliolids and nezzazatids are found, whereas in dolomites and limestone breccias rudist fragments, especially of the genus *Requienia*, can be seen. In spite of rather unsignificant fauna, the stratigraphic position of the treated sedimentary succession is quite well known, because these sediments lie concordantly between the Upper Albian and Cenomanian beds which are well documented by fossils. According to their stratigraphic position, these beds belong to the uppermost part of Albian and to the lowermost part of Cenomanian. In other words, they are the shallow water equivalent of the Vraconian beds.

### Upper Cretaceous

At the Lower Cretaceous-Upper Cretaceous transition, the tectonic and sedimentation conditions changed so much, that they decisively influenced the life in the Cretaceous sea. The sedimentation continued on the vast carbonate platform behind

Table 1. The biostratigraphic subdivision of the Upper Cretaceous beds in the Kočevje and Gorski Kotar area (Outer Dinarides)

| | Age | OUTER DINARIDES (Polšak, 1965 and Slišković, 1967) | | | |
|---|---|---|---|---|---|
| | | Cenozone | | Subzone | |
| UPPER CRETACEOUS | Upper Maastrichtian | | 6 | b | |
| | Middle Maastrichtian | | | a | |
| | Lower Maastrichtian | *Sauvagesia tenuicostata* | 5 | b | *Hippurites (Vaccinites) boehmi* |
| | Santonian + Campanian | *Gorjanovicia costata* | | a | *Hippurites (V.) atheniensis* |
| | Coniacian | *Radiolites praegalloprovincialis* / *Radiolites sauvagesi* | 4 | | |
| | Upper Turonian | *Durania cornupastoris* / *Radiolites praesauvagesi* | 3 | c | *Hippurites (Orbignya) requieni* |
| | | | | b | *Durania adriatica* |
| | | | | a | *Praeradiolites saxeus* / *Vascoceras (P.) grossouvrei* |
| | Lower Turonian | *Durania arnaudi* | 2 | b | Cronozone of limestone with chert |
| | | | | a | *Agryopleura praeexcavata* |
| | Middle + Upper Cenomanian | *Praeradiolites fleuriausus* | 1 | b | *Ichthyosarcolites rotundus* |
| | | *Neocaprina gigantea* | | a | *Ichthyosarcolites poljaki* |
| | Albian + L. Cenomanian | | | | |

| KOČEVJE AREA | GORSKI KOTAR AREA | |
|---|---|---|
| Association | Association | Zone |
| *Bournonia triangulata*<br>*Radiolitella maestrichtiana*<br>*Rousselia* sp.<br>*Biradiolites* sp. | *Bournonia* cf. *dinarica* | 8 |
| *Bournonia wiontzeki*<br>*Bournonia bournoni* | Zone of limestone breccia with orbitoids and rudist fragments | 7 |
| *Exogyra costata*<br>*Exogyra overwegi* | | 6 |
| *Gorjanovicia costata*<br>*Bournonia dinarica*<br>*Katzeria hercegovinaensis* | *Gorjanovicia costata*<br>*Bournonia dinarica* | 5 |
| *Exogyra decusata*<br>*Exogyra pirenaica*<br>*Radiolites spinulatus*<br>*Eoradiolites franchii finerae*<br>*Durania* sp. | | 4 |
| *Durania carsica, Biradiolites* sp.<br>*Medeella angulosas*<br>*Radiolites socialis, Distefanella lombricalis* | | |
| *Durania adriatica*<br>*Durania* cf. *gaensis*<br>*Durania istriana* | *Durania istriana*<br>*Durania* cf. *spadai* | 3 |
| *Distefanella* cf. *salmojraghii*<br>*Eoradiolites* cf. *liratus*<br>*Medeella* sp., *Radiolites* sp. | *Distefanella salmojraghii*<br>*Radiolites* sp.<br>*Eoradiolites* cf. *franchii*<br>*Eoradiolites liratus*<br>*Bournonia* sp.<br>*Distefanella* sp. | |
| *Eoradiolites* cf. *franchii*<br>*Agriopleura salignacensis* | *Agriopleura* sp.<br>*Sauvagesia* sp. | 2 |
| *Chondrodonta joannae*<br>*Neithea* sp.<br>*Ichthyosarcolites quadratus*<br>*Eoradiolites liratus*<br>*Neocaprina nanosi*<br>*Ichthyosarcolites poljaki* | *Eoradiolites liratus*<br>*Eoradiolites* sp.<br>*Sauvagesia* sp. | 1 |
| *Requienia* sp. | Zone of dolomite, limestone and breccia with rudist and chert fragments | |

the low barrier, where different carbonate rocks were formed, and where quite different organisms lived. Among the Upper Cretaceous sediments limestones are predominant. The treated sedimentary beds contains also rare dolomite intercalations.

## Cenomanian

The Cenomanian beds occur in the Požar syncline south of Babno polje, in the Kočevje syncline, in the Kočevski Rog area and in its surroundings. In the Kočevje and Gorski Kotar areas, we distinguish two developments of the Cenomanian beds.

In the Kočevje area the Cenomanian beds are composed of dolomitic and limestone breccia, dolomite and limestone. Further up we find brownish gray, very fine-grained, and predominantly fine-grained bedded limestones with more or less numerous thin organic fragments, rare rudist cross sections and foraminiferal microfauna. The described beds pass upwards into very light gray and white bedded radiolitid and caprinid limestones.

From the textural point of view we are dealing with biointrasparites, biointrapelsparites, and rarely micrites, respectively biomicrites. In this development fine-grained foraminiferal and calcilutitic limestones prevail. Radiolitid and caprinid bioherms are rare. They occur only in the upper part of Cenomanian beds. Very significant is the horizon with chondrodonts in the uppermost part of the succession.

The development of the Cenomanian beds in the Požar syncline is quite different. Lithologically, the succession consists of rudist biostromes and smaller bioherms. In the treated beds, very light gray and white radiolitid, biosparitic and biointrasparitic, often poorly bedded limestone strongly prevails. In both developments we find also intercalations of bedded, light gray, grained dolomite.

The Lower Cretaceous as well as the Upper Cenomanian beds contain high percentage of carbonate. These are pure limestones containing 91 % to 99 % of carbonate. In the majority of specimens there is more than 95 % of carbonate. The chemical analysis of the Cenomanian pelsparitic limestone gave the following results: $SiO_2$ – 0.38 %, $Al_2O_3$ – 0.18 %, $Fe_2O_3$ – 0.11 %, CaO – 52.98 %, Mgo – 2.25 % and ignition loss – 43.92 %.

In the rudist limestones of the Kočevje area the following macrofossils occur: *Neithea* sp., *Chondrodonta joannae* (Choffat), *Neocaprina nanosi* Pleničar, *N. carniolica* Pleničar, *Ichthyosarcolites poljaki* Polšak, *I. quadratus* Pleničar and *Eoradiolites liratus* (Conrad) Douvillé. The whole association and the stratigraphic position of the treated beds in the Kočevje area, as well as in the Požar syncline indicate in both cases the beds of the oldest Upper Cretaceous stage.

Among fossils are the most significant pelecypods *Chondrodonta joannae, Eoradiolites liratus* and species from the genera *Neocaprina* and *Ichthyosarcolites*. The former occurs in Outer Dinarides mostly in Cenomanian, although in other areas (Italy, Spain) it is more significant for Turonian beds. *Eoradiolites liratus* is significant for Cenomanian as well as for Turonian, but the superpositon and the association with the species *Chondrodonta joannae,* indicate in our case the Cenomanian. The genera *Neocaprina* and *Ichthyosarcolites* are likewise significant for the Cenomanian.

## Turonian

Turonian beds build the Kočevje and Požar synclines, but they are the most widespread in the Kočevski Rog area and its surroundings. The Cenomanian beds pass continually upwards into the Turonian ones. We divide the Turonian sedimentary succession into two parts:

In the lower part of the Turonian column light limestones strongly prevail. Dolomites are very rare, and they occur only in the form of thin intercalations. In this part of the Cretaceous succession appear among limestones rudist biostromes. In the well-washed carbonate groundmass with intraclasts, foraminifers and sometimes pelets occur also numerous well preserved, mostly equally oriented rudist shells, among which radiolitids prevail. There are less intrasparitic limestones in Turonian. Bioclastic limestones, composed mostly of rudist fragments and to a lesser extent other mollusks, also occur.

It is significant for the Turonian succession that in these beds different textural types of limestones occur, almost all containing fragments of rudists and small foraminifers. According to texture they belong to biosparites, biointrasparites, biointramicrites and rarely to micrites. On the other hand, as to grain-size the rocks could be attributed to calcirudites, calcarenites and calcilutites. Fragments of organic source are poorly sorted, angular and poorly rounded. The groundmass of the described limestones is to a greater extent sparitic. Micritic calcite is rare: in the high energy environment micritic mud was more or less washed out. It is retained only in fine-grained sediments. The limestones are bedded, poorly bedded and massive. Contacts between layers are mostly not clear, and bedding planes are irregular. In the composition of the Turonian limestones among alochems the bioclasts, i.e. rudist shell fragments prevail. At some places more or less rounded intraclasts, foraminifers and pelets occur, as well as echinoderm plates, bryozoans, echinoid spines and algae. In the Turonian limestones of Požar appear nodules and small lenses of chert.

Just as Cenomanian also the Turonian limestones do not contain much terrigenous admixture. Limestones are pure with the carbonate content between 91 % and 99 %. The majority of speciments contain more than 95 % of carbonate. The samples of the light gray radiolitid limestone have the following chemical composition: $SiO_2$ – 0.45 %, $Al_2O_3$ – 0.75 %, $Fe_2O_3$ – 0.25 %, CaO – 63.83 %, MgO – 0.80 %, and ignition loss – 33.92 %.

The Turonian beds contain radiolitid fauna, in which duranias are the most numerous. In the localities of the Požar and Kočevje synclines the following macrofauna was determined: *Agriopleura salignacensis* (Bayle), *Biradiolites angulosus* d'Orbigny, *Distefanella lombricalis* (d'Orbigny) Douvillé, *D.* cf. *salmojraghii* Parona, *Durania adriatica* Polšak, *D.* cf. *gaensis* (Dacqué), *D. istriana* Polšak, *Eoradiolites liratus* (Conrad), *Radiolites socialis* (d'Orbigny) Toucas, and *Actaeonella* sp..

It is obvious that the fauna of the treated part of the Upper Cretaceous beds is relatively rich with genera and species. Turonian age is proved by species *Agriopleura salignacensis, Durania adriatica, Durania istriana* and *Radiolites socialis.*

## Senonian

The Senonian beds are preserved in the cores of the Požar and Kočevje synclines, in the Kočevski Rog area and in its surroundings. They are lithologically similar to the Upper Cenomanian and Upper Turonian beds. Namely, also in the treated part of

the Upper Cretaceous successions rudist biostromes can be observed but they are not so frequent as in Turonian. Biostromes alternate with bioclastic, intraclastic and calcilutitic limestones. With respect to texture the limestones belong to biomicrites, biosparites, biointrasparites, intramicrites and intrasparites. In the Kočevje syncline a several metres thick limestone horizon with exogyras appears. The latter are so numerous that they are rock-forming and appear in lumachelles. Besides exogyras the limestone also contains more or less numerous foraminifers. The Senonian strata are thick-bedded (40 to 100 cm). Thiner beds are very rare. The bedding is in places not clear. It sometimes even disappears, and massive limestone appears. The bedding planes are irregular, wavy and flat. The colour is predominantly light gray and white. Sometimes the beds are light brownish gray. The Senonian sedimentary rock are frequently well-washed and have sparitic groundmass. Here and there both matrix and micritic calcite are preserved. Among the clasts bioclasts, intraclasts and foraminifers are the most frequent, whereas the algal clasts and pelets are more rare. The Senonian limestones are pure and they almost do not contain terrigenous admixture. They contain from 95 % to 99 % of carbonate. A specimen of the Senonian light gray radiolitid limestone has the following chemical composition: $SiO_2$ – 0.15 %, $Al_2O_3$ – 0.10 % $Fe_2O_3$ – 0.11 %, CaO – 52.31 %, MgO – 2.70 %, and the ignition loss – 44.63 %.

In the lower part of the Senonian beds at Željne in the Kočevje syncline area occurs a bedded biointrasparitic limestone with numerous exogyras. The following exogyra species were determined (Pleničar, 1960): *Exogyra overwegi* Buch, *E.* cf. *decusata* Goldfuss, *E.* cf. *pirenaica* Lapeirouse and *E.* cf. *costata* Say. Except exogyras numerous foraminifers are present in the limestone. Besides, a relatively numerous radiolitid fauna with the following species appears in the described beds: *Biradiolites stoppanianus* var. *vittata* Parona, *Bournonia bournoni* (Des Moulins) Fischer, *B.* cf. *dinarica* Slišković, *B.* cf. *fourtaui* (Douvillé), *B. wiontzeki* Pejović, *Durania carsica* Pleničar, *D. iapygiae* Campobasso, *Eoradiolites franchii finerae* Polšak, *Gorjanovicia* cf. *bosniaca* Slišković, *G. costata* Polšak, *G. cf. vinjolae* Polšak, *Joufia* sp., *Katzeria hercegovinaensis* Slišković, *Radiolitella maestrichtiana* Pejović, *Radiolites* sp. and *Rousselia* sp.. The gathered and determined macrofauna proves the Senonian age of the beds.

## Biostratigraphic Subdivision of the Upper Cretaceous Beds

The beginning of the Upper Cretaceous in Outer Dinarides is characterized by the explosive development of rudists. Particular species had relatively short life spans and large extensions, which is well favourable for the biostratigraphic subdivision in cenozones and subzones.

It is characteristic for the Kočevje and Gorski Kotar Upper Cretaceous fauna that it is rather poor in comparision to other parts of Outer Dinarides, in terms of numbers of organisms and the variability of species. In spite of the fact that we did not find in the collected material the most typical fossils, on the basis of which Polšak (1965) and Slišković (1967) named six Upper Cretaceous cenozones with subzones, the determined fauna could be arranged into associations corresponding to their cenozones and subzones.

At the Lower Cretaceous-Upper Cretaceous transition occurs in the treated are a zone of dolomite, limestone and breccia with rudist and chert fragments. Upwards

follow the associations: (1) *Eoradiolites liratus-Ichthyosarcolites*-Caprinidae (Cenomanian), (2) *Agriopleura salignacensis* (Lower Turonian), (3) *Durania adriatica – D. istriana-Distefanella salmojraghii* (Upper Turonian), (4) *Radiolites spinulatus-Eoradiolites franchii finerae* (Coniacian), (5) *Gorjanovicia costata-Katzeria hercegovinaensis-Bournonia dinarica* (Santonian, Campanian), (6) *Exogyra costata-Exogyra overwegi* (Lower Maastrichtian), (7) *Bournonia bournoni-Bournonia wiontzeki* (Middle Maastrichtian) and (8) *Bournonia triangulata-Radiolitella maestrichtiana, Rousselia* sp., *Biradiolites* sp. (Upper Maastrichtian).

(1) The *Eoradiolites liratus-Ichthyosarcolites*-Caprinidae association (Cenomanian)

The above association is developed especially in Gorski Kotar and corresponds to cenozone *Praeradiolites fleuriausus-Neocaprina gigantea*. It is composed of radiolitids of the species *Eoradiolites liratus*, forming in the Cenomanian vast biostromes. Besides eoradiolitids in this association also occur sauvagesias and especially chondrodonts, for which it is characteristic that they occur there individually and not in form of colonies, building the whole layers. Very characteristic for this part of Gorski Kotar area is also the absence of ichthyosarcolitids and caprinids. The radiolitids forced all other organisms out of that place. On the other hand, caprinids and ichthyosarcolitids occur in the Kočevski Rog area where they built bioherms (Pleničar, 1965). At the end of Cenomanian the sea deepened which proved fatal for chondrodonts and rudists.

(2) The *Agriopleura salignacensis* association (Lower Turonian)

Eoradiolitids prevailed also in the Lower Turonian sea. Among radiolitids the new species *Eoradiolites* cf. *franchii* appeared: on the other hand, the species *Eoradiolites liratus* is still frequent. In spots, the above-mentioned association also contains individual distefanellas, bournonias and sauvagesias. In the association species *Agriopleura salignacensis* prevail mostly accompanied by sauvagesias. There were few genera at that time, which indicates unfavourable life conditions for rudists. The association of agriopleuras and eoradiolitids corresponds to Polšak's cenozone *Durania arnaudi* (Polšak, 1965).

(3) The *Durania adriatica* and *Distefanella salmojraghii* association (Upper Turonian)

In the Upper Turonian the life conditions for rudists were improved. That was true especially for the genus *Durania* which settled in great number on the bottom of the Turonian sea and developed numerous species. The most significant species of the *Durania* association in the Kočevje and Gorski Kotar area are *Durania adriatica* and *Durania istriana*. At the Lower Turonian-Upper Turonian transition *Distefanella* cf. *salmojraghii* and genera *Eoradiolites, Radiolites* and *Medeella* prevailed. Towards

the end of the Turonian the sea deepened again, and limestones with cherts were formed in it. The described fossil association corresponds to Polšak's cenozone *Durania cornupastoris-Radiolites praesauvagesi.*

(4) The *Radiolites spinulatus-Eoradiolites franchii finerae* association (Coniacian)

This fossil association of the Kočevje and Gorski Kotar area represents the equivalent of Polšak's cenozone *Radiolites praegalloprovincialis-Radiolites sauvagesi* (Coniacian). It is obvious that the sedimentary conditions were rather alike to those in the Lower and Upper Turonian. Life conditions for rudists were only periodically satisfactory. At some places the first rudist colonies were formed in which radiolitids and eoradiolitids prevailed. Duranias were still always present. On the other hand, exogyras appeared in the area treated.

(5) The *Gorjanovicia costata-Katzeria hercegovinaensis-Bournonia dinarica* association (Santonian, Campanian)

After short deepening of the basin, rudists began to settle on the Senonian shoals, at first individually, later in great numbers, building there some meters thick pseudoreefs where rudists prevailed, while other reef-bulding organisms were rare. The most extended among rudists was genus *Gorjanovicia costata* form which the fifth Upper Cretaceous cenozone got the name (Polšak, 1965). Besides rudists, corals and echinoderms occur in these beds. For the fauna of this part of the Kočevje and Gorski Kotar area the absence of hippuritids is characteristic. Among rudists occur besides gorjanovicias also katzerias and bournonias.

*Katzeria hercegovinaensis* occurs always together with foraminifer *Keramosphaerina tergestina.*

(6) The *Exogyra costata-Exogyra overwegi* association (Lower Maastrichtian)

The beds with exogyras occur in the Senonian succession of the Kočevje syncline area. The beds are several metres thick and composed of numerous valves of the genus *Exogyra.* Here and there we observe individual echinoderm cross sections. There are also numerous foraminifers especially miliolids.

(7) The *Bournonia bournoni-Bournonia wiontzeki* association (Middle Maastrichtian)

The beds with above mentioned bournonias occur particularly in the Kočevski Rog area. Besides the genus *Bournonia* numerous representatives of the genus *Biradiolites* occur.

(8) The *Bournonia triangulata-Radiolitella-Rousselia* association (Upper Maastrichtian)

The fauna of the Upper Maastrichtian is characteristic for the Kočevje and Kočevski Rog area. The development is well seen in the Stara Cerkev–Dvor roadside.

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