

## LUTETIAN CORALS FROM ČRNI KAL IN YUGOSLAVIA

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### Preface

In the year 1963 I received the material with corals from the Lutetian layers near Črni Kal. It had been gathered and sent to me by colleague Mr. Rajko Pavlovec from the Paleontological Institute of the Slovene Academy of Sciences and Arts in Ljubljana.

All the corals have been found in the hard limestone in the quarry by the main road Kozina—Koper (North Istria). On the same place the Young-Pleistocene Paleolithic station (Brodar and Rakovec, 1958) has also been discovered.

In the limestone besides corals there occur Nummulites, Assilinas, Alveolinas, Hydrozoans and Bryozoans. It is petty that the corals are bad preserved — partly because of the crushed rocks and also because of the conglomerate character of the limestone. In the most part of the material I could determine neither species nor genera. But without any doubt the corals belong to the Middleeuropean fauna of the Middle-eocene (Lutetian) age.

### Taxonomy

23 calcareous pieces have been examined; some big pieces have been broken to small parts, nevertheless, they keep the same number.

1. *Calamophyllia pseudoflabellum* Catullo; *Stylophora* cf. *distans* Leymerie; *Manicina* cf. *flexuosa* (D'Achiardi)

2. *Dendracis* sp.; *Dendracis* cf. *seriata* Reuss; ? *Flabellum* sp.; *Actinacis cognata* Oppenheim

3. *Heliastrea* cf. *bosniaca* Oppenheim

4. *Calamophyllia pseudoflabellum* Catullo

5. *Euphyllia* sp.; *Heliastrea* cf. *bosniaca* Oppenheim; *Dendracis* sp.; *Stylophora distans* Leymerie

6. *Nummulites* sp.

7. Hydrozoans

8. *Heliastrea* cf. *bosniaca* Oppenheim

9. Hydrozoans

10. *Calamophyllia* sp.; *Stylophora distans* Leymerie; *Astrocoenia* cf. *subreticulata* D'Achiardi

11. *Euphyllia* cf. *forojuliensis* (D'Achiardi); *Heliastrea* *bosniaca* Oppenheim; *Cylicosmia* n. sp.
12. *Placosmia* cf. *multisinuosa* (Michelin); *Euphyllia* *contorta* Catullo; *Calamophyllia* sp.; *Stylophora* *conferta* Reuss
13. *Euphyllia* cf. *contorta* Catullo
14. *Euphyllia* cf. *contorta* Catullo
15. *Calamophyllia* sp.; *Euphyllia* *contorta* Catullo; *Stylophora* cf. *distans* Leymerie
16. Hydrozoans
17. *Calamophyllia* sp.; *Euphyllia* cf. *forojuliensis* (D'Achiardi)
18. *Calamophyllia* sp.; *Calamophyllia* *crenaticostata* (Reuss); *Placosmia* *multisinuosa* (Michelin); *Stylophora* *italica* D'Achiardi
19. *Placosmia* *multisinuosa* (Michelin); *Actinacis* cf. *cognata* Oppenheim; *Calamophyllia* *pseudoflabellum* Catullo; *Calamophyllia* *crenaticostata* (Reuss); *Placosmia* sp.
20. *Euphyllia* *contorta* Catullo; *Placosmia* cf. *bilobata* D'Achiardi; *Actinacis* *cognata* Oppenheim
21. *Euphyllia* *contorta* Catullo
22. *Stylophora* *distans* Leymerie; *Euphyllia* sp.
23. *Heliastrea* *bosniaca* Oppenheim

### Stratigraphy

Species	Countries after literary particulars (Kolosváry, 1949)	Eocene		
		Lower	Middle	Upper
<i>Stylophora italica</i>	Yugoslavia, Italy, Hungary	+	+	
<i>Placosmia multisinuosa</i>	Yugoslavia, Italy, Hungary, Egypt	+	+	+
● <i>Euphyllia contorta</i>	Italy, Hungary, East India	+	+	+
● <i>Dendracis seriata</i>	Italy, Hungary		+	
<i>Heliastrea bosniaca</i>	Yugoslavia, Hungary		+	
<i>Manicina flexuosa</i>	Yugoslavia, Italy, Hungary		+	
<i>Euphyllia forojuliensis</i>	Yugoslavia, Italy, Hungary		+	
● <i>Placosmia bilobata</i>	Italy, Hungary		+	
<i>Stylophora conferta</i>	Yugoslavia, Italy, Hungary		+	
<i>Calamophyllia pseudoflabellum</i>	Yugoslavia, Italy, Hungary, Greece		+	+
<i>Calamophyllia crenaticostata</i>	Yugoslavia, Italy, Hungary		+	+
<i>Stylophora distans</i>	Yugoslavia, Italy, Hungary, Greece, East Pyrenees			+
● <i>Astrocoenia subreticulata</i>	Italy, Hungary		+	+

● = for the first time found in Yugoslavia

**Classification** (Kolosváry, 1960)

Ordo: **Madreporaria**

**I. Conservativi** Kolosváry 1960

Subordo Amphistraeida Alloiteau 1952

**II. Elastici** Kolosváry 1960

Subordo Styliniida Alloiteau 1952

Subordo Archaeocaeniida Alloiteau 1952

Fam. Acroporidae Verrill 1902

*Dendracis*

Fam. Actinastraeidae Alloiteau 1952

*Astrocoenia*

Fam. Stylophoridae M. Edw. 1817

*Stylophora*

Subordo Meandriida Alloiteau 1949

Fam. Meandriidae Alloiteau 1952

*Euphyllia*

Fam. Placosmiliidae Alloiteau 1952

*Placosmilia*

Fam. Smilotrochiidae Alloiteau 1952

*Cylicosmilia*

**III. Gressivi** Kolosváry 1960

Subordo Astraeoidea Alloiteau 1952

Fam. Heliastreaeidae Alloiteau 1952

*Heliastrea*

Fam. Faviidae Gregory 1900

*Manicina*

Fam. Astrangiidae M. Edw. 1837

*Calamophyllia*

Subordo Caryophylliida Vaughan & Wells 1943

Fam. Flabellidae Alloiteau 1952

*Flabellum*

Subordo Fungiida Duncan 1889

Fam. Actinacididae Vaughan & Wells 1942

*Actinacis*

Subordo Eupsammida Alloiteau 1952

There have been found 11 genera and 16 species. Archaeotypes (a cardinal group: I. Conservativi) but regressive Eupsammiidae have not been found up to now.

### Notes on the species

1. *Dendracis* sp. (cf. *seriata* Reuss). (Fig. 1, 2) Two the best preserved branches have approximately 28 respectively 4 cups, with a diameter of 1 mm. The polyps stick rather firmly out over the surface of the coenosteum.

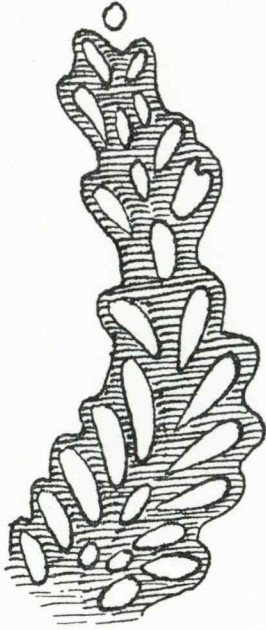


Fig. 1. *Dendracis* sp., a branch with the cup, coenosteum is dotted



Fig. 2. *Dendracis* sp., a branch with 4-5 cups (the contour sketch)

2. *Astrocoenia* cf. *subreticulata* D'Achiardi. (Fig. 3). The size of the cups of the colonial coral is 1 mm, but sometimes also bigger. Coenenchyme is granular, and in thin section lagunary developed. The number of septa

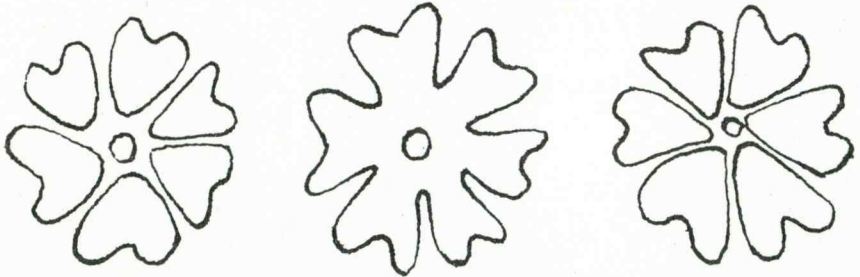


Fig. 3. Three cups of the species *Astrocoenia* cf. *subreticulata* (1 mm)



of the first and second cycle is 6, but the septa of the third cycle are rudimentary. Columella is present.

3. *Stylophora distans* Leymerie. (Fig. 4). The cups are far from each other. Their diameter 3 mm. The number of the whole septa is 22. Coenosteum in a thin section is lagunary developed. This species occurs pretty frequent among the described fauna.

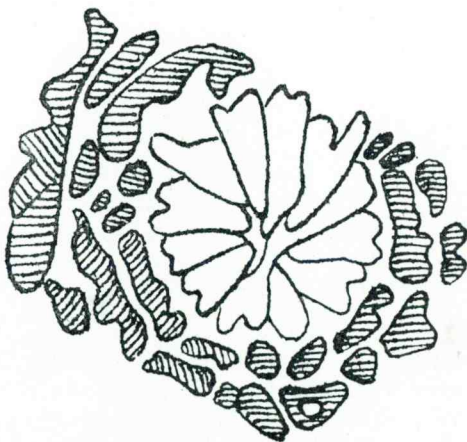


Fig. 4. *Stylophora distans*, the cup with coenosteum (hatched),  $3 \times 3$  mm in diameter

4. *Stylophora* cf. *italica* D'Achiardi. (Fig. 5). Some rare strong septa are joined together. The diameter of the oval cups is  $1 \times 1,5$  mm, the number of septa 12—14. The septa of the third cycle are firmly rudimentary. Coenosteum is fine granular, it means lagunar in the thin section. The cups are sometimes very close to each other and more or less round.

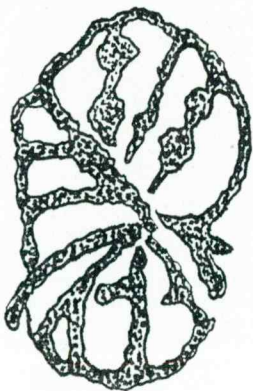


Fig. 5. *Stylophora* cf. *italica*, the cup ( $1 \times 1,5$  mm), coenosteum is not drawn

5. *Stylophora* cf. *conferta* Reuss. (Fig. 6). The oval cups are very close to each other. Their diameter is 1 mm. Septa disappear in the

middle. The number of the septa is 18, the third cycle is rudimentary. Six septa reach the centre of the cup.

6. *Heliastrea bosniaca* Oppenheim. (Fig. 7, 8). There have been found more colonial fragments. The diameters of the cups are 1—2 mm. Co-

Fig. 6. *Stylophora* cf. *conferta*, three cups with coenosteum



lumella is present. The septa number in the second cycle is 12, in all three cycles 24. The outer edges of the polyp cups are 24 too. Specimens are very calcified, so that all the polyps can not be clearly seen.

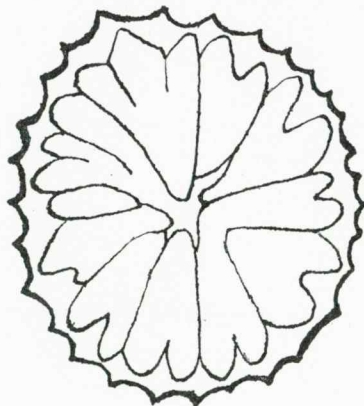


Fig. 7. *Heliastrea bosniaca*, the cup  
1,5 × 2 mm

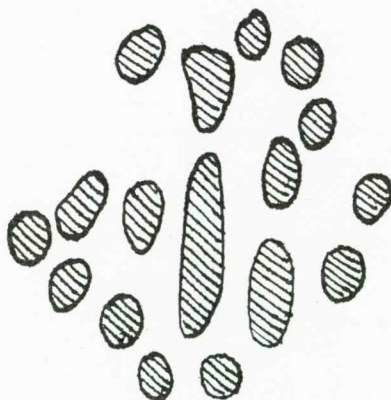


Fig. 8. The part of colony of the species *Heliastrea bosniaca* is showed schematically (the upper parts of the cups are hatched)

7. *Calamophyllia pseudoflabellum* Catullo. (Fig. 9, 10). The diameter of the cup is 10 × 10 mm. More fragments of the colony have been found. Endotheca is very strong. The septa of the first cycle are firmly pointed out in the middle of the cups. The septa number of all cycles is more

Fig. 9. *Calamophyllia pseudoflabel-  
lum*, the cup  $10 \times 10$  mm, the wall  
dotted

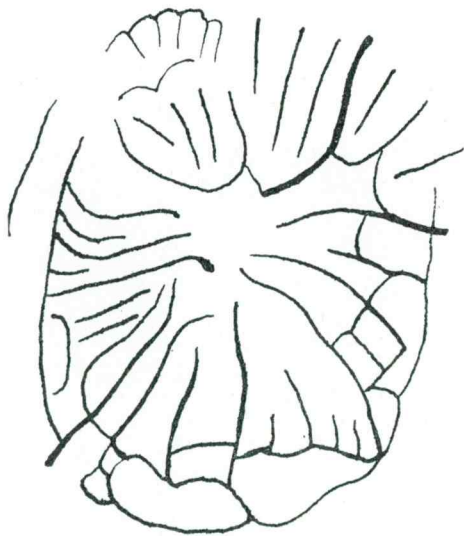
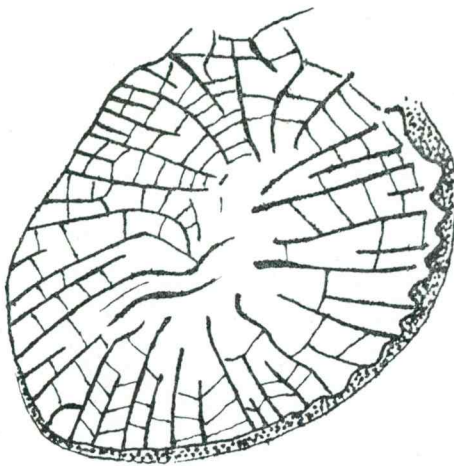


Fig. 10. *Calamophyllia pseudoflabel-  
lum*, the cup with the trace of the  
lateral thorny offsets

than 52, but it is impossible to count them exactly. Pseudocolumella very thin and very variable. The number of the cardinal septa is 14—16.

8. *Calamophyllia crenaticostata* (Reuss). (Fig. 11, 12). There have been found two fragments in a transverse section with the diameter  $6 \times 7$  and  $6 \times 6$  mm. The number of the septa is 32—52, endotheca can be sometimes easily seen, but now and then it seems to be lacking. I have not found any colony, but only individual polyps. This species, which

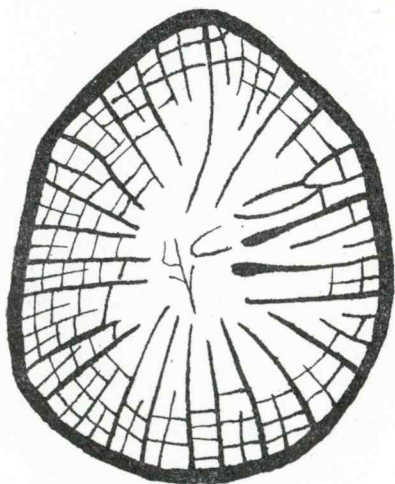


Fig. 11. *Calamophyllia crenaticostata*, the cups (6 × 7 mm) with the wholly developed endothecal system

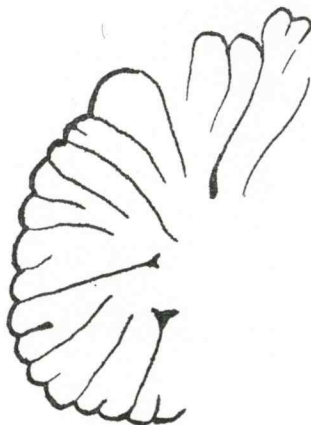


Fig. 12. *Calamophyllia crenaticostata*, the cup (6 mm)

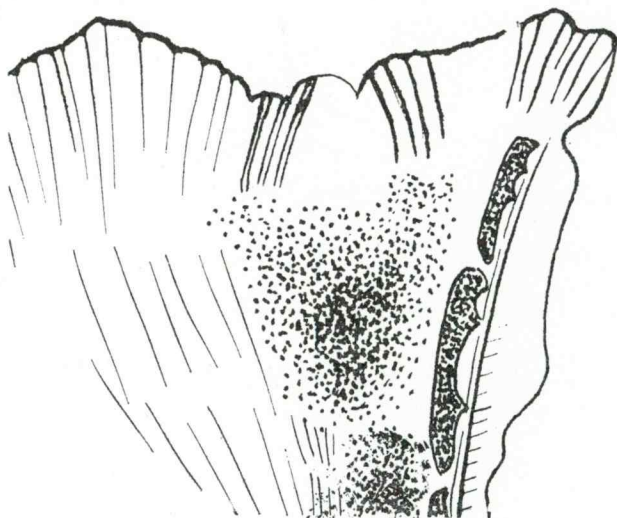


Fig. 13. *Euphyllia* cf. *contorta*, a longitudinal section of the colony with secondary calcifications (dotted)

appears in the Upper Eocene in acmic phylogenetic stadium, still occurs in the Middle Eocene in the epacmic stadium. Septa are very often joined one with another. Columella is lacking. The number of the cardinal septa is 16.

9. *Euphyllia* cf. *contorta* Catullo. (Fig. 13). The small colony is approximately consisted of 3—4 individuums. This species is very variable. The



specimen is very poorly preserved. It has been examined only in the moulded condition. The size of the colony is  $20 \times 20$  mm. The shape is very variable, the growth stage various. The diameter of cup is  $5 \times 2,7$  mm,  $4,5 \times 3$  mm, and  $4 \times 4$  mm. The meandrous joins are very frequent. The number of the septa is over 160.

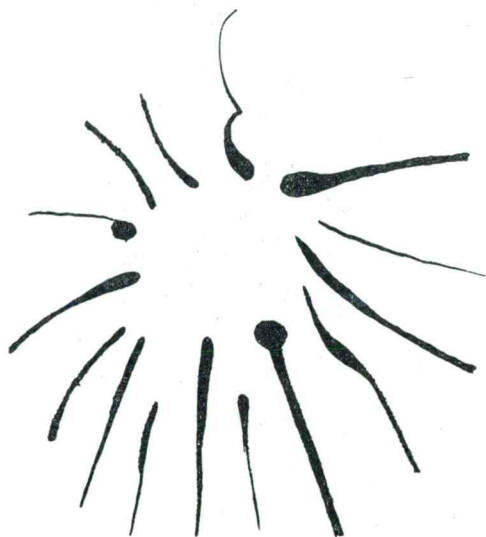


Fig. 14. The central endings of septa at *Euphyllia* cf. *forojuliensis* (very enlarged)

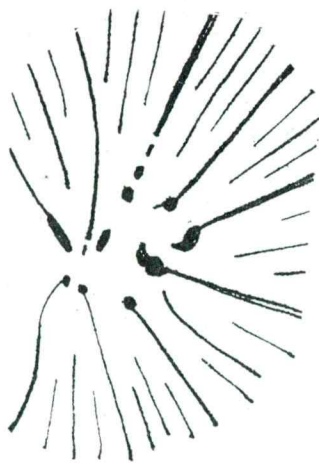


Fig. 15. *Euphyllia* cf. *forojuliensis*, the parts of the cups with the endings of septa in the middle of the cups

10. *Euphyllia* cf. *forojuliensis* (D'Achiardi). (Fig. 14, 15). Polyps have been found by the breaking of the pieces. It is characteristic, that the central endings of the septa are thorny fattened in a transverse section. The number of the cardinal septa is 14. The centre of cup is mostly not in the middle.

11. *Manicina* cf. *flexuosa* (D'Achiardi). (Fig. 16, 17). The specimen is very poorly preserved and broken. The cups are meandrous gyrate. The septa are strong, well developed and in the middle joined together. On the many places they are bent. The wall is wholly developed.

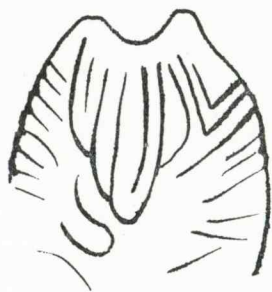


Fig. 16. The endings of cups at *Manicina* cf. *flexuosa* with the visible welding of septa



Fig. 17. The wall at *Manicina* cf. *flexuosa* is very enlarged

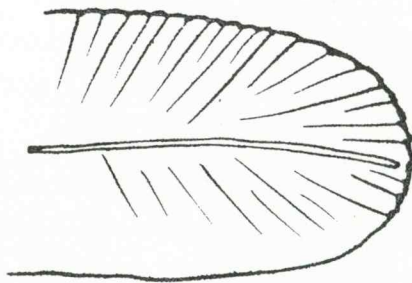
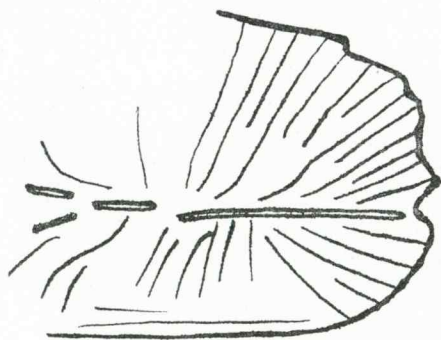


Fig. 18. Two endings of the cups at the species *Placosmilia multisinuosa* in the size  $7 \times 10$  mm

12. *Placosmilia multisinuosa* (Michelin). (Fig. 18). I have had at my disposal more fragments of this species with a characteristic long lamellar columella and fine, thin septa, which are over 100 in number. The centres of cups are disappearing, and there arises polycentrismus. Well preserved specimen has been found in the piece of limestone (number 18). It measures  $9 \times 3$  cm. This form often appears in the several onthogenetical stages and is very variable.

13. *Placosmilia* cf. *bilobata* D'Achiardi. (Fig. 19). There has been found not a particularly typical transverse section of the polyp. The diameter of the cup is  $9 \times 6$  mm. The cup is lobular and has slight traces of the elongated furrows. The number of septa is 48, reconstructed

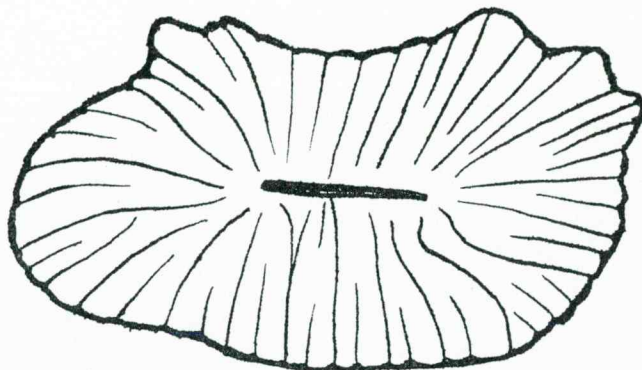


Fig. 19. *Placosmilia* cf. *bilobata* (is not typical); the diameter of cup  $9 \times 6$  mm

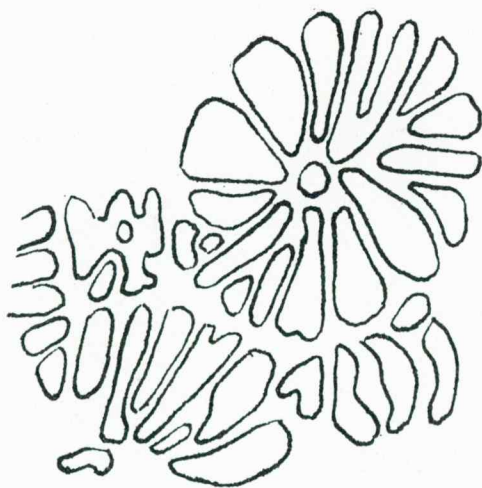


Fig. 20. *Actinacis cognata*, the neighbouring cups (4 mm) with the parts of coenosteum

in all the cycles they are 100. (Typical specimens with the size about  $4 \times 2$  mm have 120 septa.).

14. ? *Flabellum* sp. So far only one very poorly preserved specimen has been found.

15. *Actinacis cognata* Oppenheim. (Fig. 20—23). Coenenchyme is roughly granular, in the transverse section lagunar developed. The diameter of the cup is 2 mm, some of them also reach 3 mm. The edges of the cup are very distinctly developed. 6—8 septa are thoroughly developed,

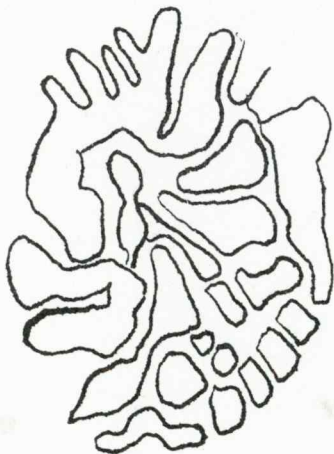


Fig. 21. *Actinacis cognata*, the cups with papillose columella and axial papillae

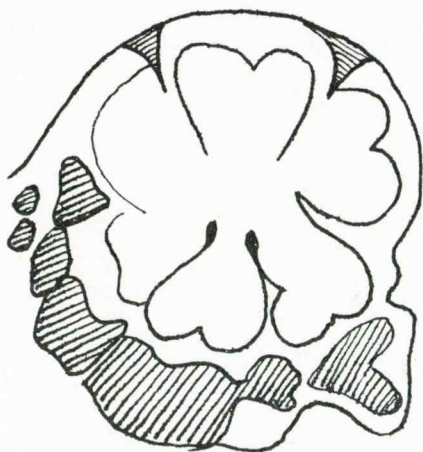


Fig. 22. *Actinacis cognata*, the cup with the strong edges (2 mm)

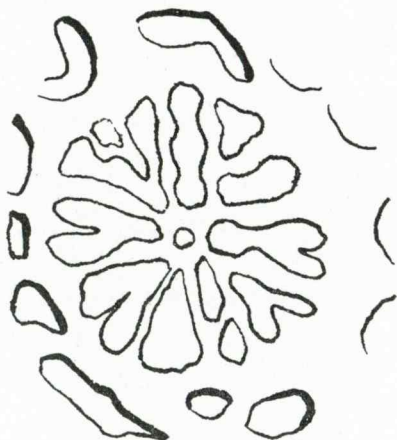


Fig. 23. *Actinacis cognata*, the cup with the parts of coenosteum at the edges

the septa of third cycle are rudimented. All the septa are 12—18 approximately. There can be also found the axial papillae, however, they join with the endings of septa.



### Description of the new species

16. *Cylicosmilia crnikalensis* n. sp. (Fig. 24, 25). The holotype is the only preserved specimen in limestone and examined in a transverse section. The diameter  $5 \times 4$  mm. It is smaller than the nearest species *Cylicosmilia altavillensis* (Defrance), which occurs in the Lutetian and also in the Upper Eocene in Hungary. The size of the species *C. altavillensis* is 10—12 mm. It has 78—84 septa, among them there are 12—14 cardinal septa. The new described polyp is bent, with the columella of papillose consistence. The septa number is 72 by the new species. There are 24 thick septa of the first cycle. The second cycle has the same number of septa. In the third cycle there are 24 rudimentary septa.

#### COMPARISON OF THE SPECIES CYLICOSMILIA CRNIKALENSIS AND CYLICOSMILIA ALTAVILLENSIS

Species	Diameter of the cup	Septa number	Cardinal septa	Outer ridges	Columella
<i>C. altavillensis</i>	10—12 mm	78—84	12—14	thin	spongy or papillose
<i>C. crnikalensis</i>	$5 \times 4$ mm	72	24	thin	papillose

Species	Corpus	Periferal endothecal ring	Endotheca of the cups centre	Bilateral tendence at septa system
<i>C. altavillensis</i>	bent	slight	slight	lack
<i>C. crnikalensis</i>	bent	strong	slight	exist

Species	Formation of the septa
<i>C. altavillensis</i>	not the same
<i>C. crnikalensis</i>	more the same

## Summary

1. In the 23 calcareous pieces from Lutetian layers near Črni Kal in north Istria, ten genera with 16 species of corals have been found.

2. Facies: coral layers with Nummulites, Assilinas, Alveolinas, Hydrozoans and Bryozoans.

3. The coral fauna is very poorly preserved, therefore it has been impossible to determine all the specimens.

4. The Middle Eocene corals *Manicina flexuosa*, *Heliastrea bosniaca*, *Euphyllia forojuliensis*, *Cylicosmilia crnikalensis*, *Dendracis seriata* and *Stylophora conferta* are of the stratigraphical significance.

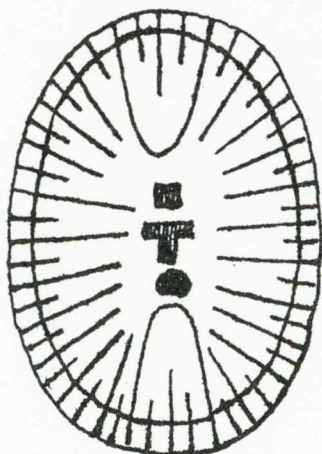


Fig. 24. *Cylicosmilia crnikalensis*, the cup is reconstructed and represented schematically. The system of septa and the peripheral endothecal edge are visible. Septa tend to be bilateral

5. The most frequent are *Stylophora* sp., *Heliastrea bosniaca*, *Calamophyllia pseudoflabellum*. A little less frequent are *Placosmilia multisinuosa* and *Actinacis cognata*.

6. The new species *Cylicosmilia crnikalensis* has been described.

7. *Stylophora italica* still lived in the Middle Eocene. *Calamophyllia crenaticostata* has been found in the layers of the Middle Eocene as epamic-species. All the species mentioned under 4 belong to acme and *Stylophora italica* to paracme.

8. 4 species have been established for the first time in the Yugoslav Eocene. There are: *Euphyllia contorta*, *Dendracis seriata*, *Placosmilia bilobata* and *Astrocoenia subreticulata*.

## LUTECIJSKE KORALE IZ ČRNEGA KALA V JUGOSLAVIJI

Avtor je obdelal korale iz kamnoloma pri Črnem Kalu v severni Istri. Najdene so bile v apnencu in precej slabo ohranjene. Določil je 10 rodov s 16 vrstami. Predstavljajo značilno srednjeevropsko lutecijsko favno. Štiri vrste so bile v Jugoslaviji prvič najdene. Opisal je novo vrsto *Cylicosmilia crnikalensis*.

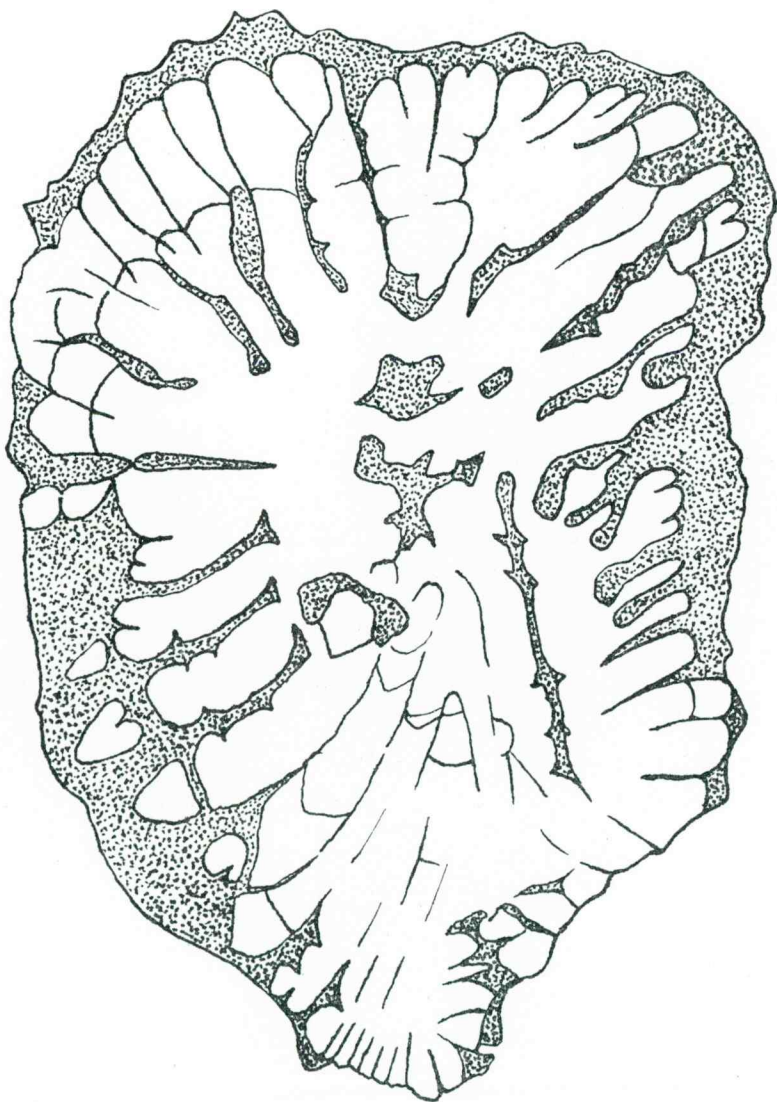


Fig. 25. *Cylicosmilia crnikalensis* n. sp. from Črni Kal in North Istria

#### REFERENCES CITED

- Alloiteau, J., 1957, Contribution Syst. Madreporaires fossiles. Centre Nat. Rech. Sci. Paris.
- Alloiteau, J., 1949, Les coraux de l'éocène dans les Karpates Slovaques. Práce Stát. Geol. Ustav. Sos. 24, p. 1—30.
- Brodar, S., and Rakovec, I., 1958, Pleistocene in the quarry near Črni Kal. Raspr. Slov. Acad. 4.
- Hantken, M., 1871, Az esztergomi burányrétegek. Ért. Term. Tud. Közl. M. Tud. Akad. II. 13, p. 1—18.
- Kolosváry, G., 1949, Dunántúli eocén korallok. Földt. Közl. 79, p. 1—100.
- Kolosváry, G., 1960, The phylogenetic classification of the Madreporarian. Journ. Paleont. 34. 5., p. 1051—1054.
- Vogl, V., 1912, A Vindol eocén márgáinak faunája. M. Kir. Földt. Int. Évk. XX, 2, p. 69—100.