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CRETACEOUS SCLERACTINIAN CORALS FROM THE PARNASSOS AREA (CENTRAL GREECE) (Preliminary note)

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ABSTRACT

This preliminary note deals with the Scleractinian corals from the Cretaceous sediments of the allochthonous series of the Parnassos area (locality Agrostylia).

The sediments studied consist of: 1)marly limestone with Foraminiferes, *Nerinaea* and Rudistacea (mainly *Caprina* , *Radiolites* etc.) and 2)laminated material with marly matrix and microcongolomerate with a considerable number of corals, bryozoans, gastropods and bivalves especially *Ostreidae*.

From about 50 specimens it was possible to identify 15 species of Scleractinia, including 5 new species. Moreover 3 new genera were recognized. The most characteristic are species belonging to the suborders: **Amphiastraeina** and **Rhipidogyrina** . In the present premilinary note the species which belong to above mentioned suborders are chiefly considered.

The corals and foraminiferes indicate Albian - ?Cenomanian age of the coral assemblage of the sediments of Agrostylia locality. Previously the age of the same sediments from the area of Dremisa (HACKEMESSER,1936) was regarded as Cenomanian only. The coral assemblage in question is one of the few known shallow-water colonial hermatypic-like coral assosiation in Europe.

Key words : Scleractinian corals, Albian -?Cenomanian, Parnassos area Greece

INTRODUCTION

The present paper contains the first results of investigations of Scleractinian corals from the carbonate sediments of the locality Agrostylia situated 30 km NNW of the village Arachova (Fig.1).

The fauna presented in this paper has been collected during the spring and summer 1993.

A great number of thin sections (more than 100) had been chiefly made in the Department of Hist. Geology-Paleontology of the Athens University and studied in the Institute of Geological Siences of the Jagiellonian University of Krakow.

The collection will be housed at the Department of Historical Geology-Paleontology, University of Athens.

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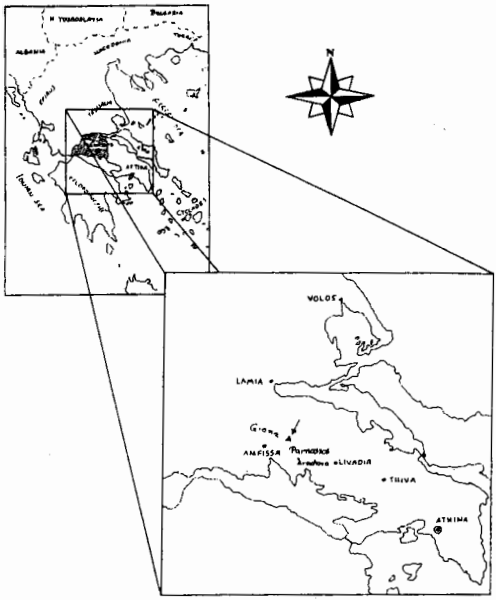

Fig. 1: General maps showing localization of studied area in Central Greece

coral collection available to the present writers.

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THE LOCALITY OF AGROSTYLIA

The locality of Agrostylia, where the source Krya Vryssi ,is situated in a valley flanked eastward by the massif of Parnassos mountain and westward by the massif of Jerolekkas(Fig.2) which culminate about 1400m.Because of the density of vegetation it is difficult to observe a continuous stratigraphical column(Fig. 3).

On the basis of literature (HACKEMESSER 1936, CELET 1962, p. 176-177;maps of IGME etc.) as well as from our observations of the large area of Parnassos we consider that the deposits of the studied area (Fig. 2) are coming from the allochthonous series of the Parnassos area and belong to the subpelagonian unit.

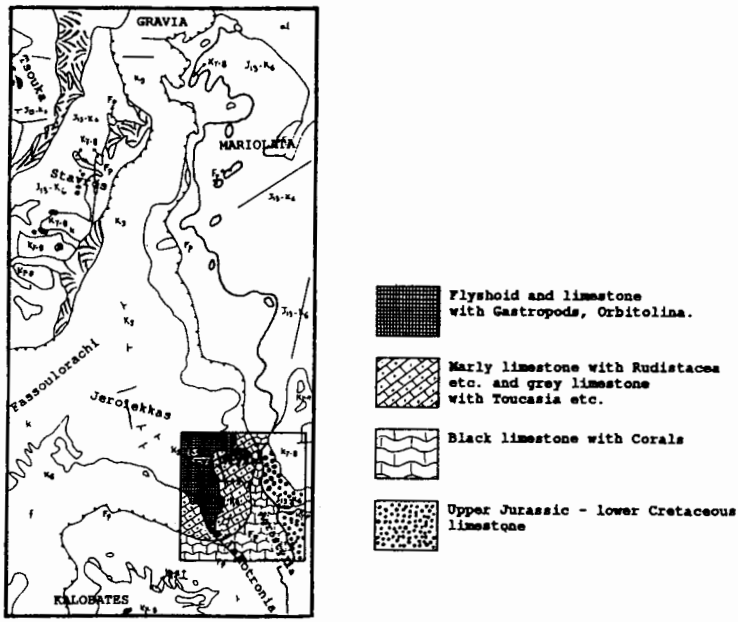

Fig. 2: Simplified geological map of Parnassos.Square inset shows localization of Agrostylia area (Sheet Amphissa,1:50000, IGME,1960)

GENERAL CHARACTERISTICS OF THE STUDIED CORAL FAUNA

The corals discussed in this report come from Cretaceous rocks of the locality of Agrostylia in Central Greece. The corals occur chiefly in pelitic sediments and less commonly in microclastic deposits. The associated fauna includes: foraminiferes (e.g. sections of unidentified Orbitolinas: pl.III,fig.5), sponges, annelids, hydrozoans, bivalves, brachiopods,

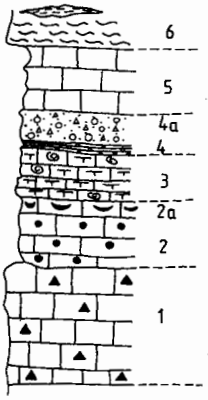

Fig.3: Lithostratigrafical section in Agrostylia
1. Black to grey bitumenious limestone with *Nerinaea* etc.
2. Black limestone with corals
2a. Intercalation of grey limestone with *Toucasia* etc.
3. Marly-a little reddish- limestone with Rudistacea etc.
4. Polymictic material
4a. Intercalation of conglomerate and breccia
5. White limestone
6. Material of the "flyschoid" type

echinodermes (fragments of echinides and crinoid plates).Dasycladaceae algae occur sporadically. In some thin sections small quartz grains were found. Reddish coloration (iron compounds) of host sediment is presumably due to postdepositional processes.

Basing on the examination of 50 coral specimens and about 100 thin sections, the following conclusions can be drawn:

1. Morphology of corals

The corals are exclusively colonial. The colonies are massive, lamellar, phaceloid and dendroid. The first two types are predomitant. Among the massive (and/or lamellar) colonies, the plocoids and meandroids are of common occurrence. Thamnasterioid and hydnophoroid colonies occur sporadically in the material examined.

2. Preservation of coral skeletons

Morphology and ornamentation are relatively well preserved. Apart from few specimens the microstructure is blurred, due to recrystali-zation.

3. Facies

The corals discussed represent shallow-water association characteristic of normal salinity and indicative of tropical or subtropical climatic conditions - as in the case of present day hermatypic corals.

4. Preliminary coral determinations

From the hirtheto examinated specimens (Table I) 15 species were identified (including 5 new species), 13 genera (including 3 new) ,8 families and 4 suborders. The most characteristic are species belonging to the suborders: **Amphiastraeina** ALLOITEAU,(genera: *Amphiaulastraea* GEYER),**Heterocoeniina** MORYCOWA(*Latusastraeopsis* gen.n.),**Rhipidogyrina** RONIEWICZ (*Paraacanthogyra* gen.n. and *Preverastraea* BEAUVAIS) and **Astraeoina** ALLOITEAU (among others :*Columnocoenia* ALLOITEAU, *Diplogyra* EGUCHI, *Eugyra* de FROMENTEL, *Eohydnophora* YABE & EGUCHI, *Tricassastraea* ALLOITEAU and *Calamophylliopsis* ALLOITEAU).There are also a few new genera and species presumably endemic.

5. The character of the coral association

Among the corals examined there are genera which are known from the Hauterivian to Albian - Cenomanian(*Eugyra* and *Eohydnophora* : Hauterivien-Cenomanien;*Diplogyra*:Aptian-Albian;*Preverastraea:*?Aptian, Albian-Cenomanian). Some of the identified species are known to occur in the Barremian-Albian and sporadically in lower Cenomanian rocks (Table II.),for instance:*Columnocoenia*

ksiazkiewiczi MORYCOWA (Pl.VI ,fig.5,6;MORYCOWA 1964, KRUGLOV & KUSMICHEVA 1968,KUSMICHEVA 1987, 1988, PRINZ 1991, SCOTT & GONZALES-LEON 1991, BARON-SZABO 1993, FERNANDEZ-MENDIOLA & BARON-SZABO 1994) *Calamophylliopsis fotisalensis* (BENDUKIDZE)(see Pl.VIII,fig.3).(After BENDUKIDZE 1961 also Haute-rivian; MORYCOWA & LEFELD 1966, TURNSEK & BUSER 1976, BARON-SZABO 1993, FERNANDEZ-MENDIOLA & BARON-SZABO 1994)and *Eohydnophora crassa* (de FROMENTEL)(only Hauterivian - Albian;de FROMENTEL 1862,1875, KOBY 1897; ANGELIS d'OSSAT 1905, ZLATARSKI 1968, MASSE & MORYCOWA 1994) Among the corals examined there is also the species described by HACKEMESSER(1936) from the Cenomanian strata in

Table I

Cretaceous **Scleractinian corals from Agrostylia** (Greece)
(Preliminary note)

Suborder	Amphiastraeina ALLOITEAU, 1952
Family	Amphiastraeidae OGILVIE, 1897
Genus	*Amphiaulastraea* GEYER, 1955
	Amphiaulastraea suprema sp.n.
Family	Heterocoeniidae OPPENHEIM, 1930
Genus	*Latusastraeopsis* gen.n.
	Latusastraeopsis mitzopoulosa sp.n.
Suborder	Riphidogyrina RONIEWICZ, 1976
Family	Riphidogyridae KOBY, 1905
Genus	*Paraacanthogyra* gen.n.
	Paraacanthogyra parnassensis sp.n.
Genus	*Preverastraea* BEAUVAIS, 1976
	Preverastraea diplothecata (HACKEMESSER, 1936)
	Preverastraea felixi (HACKEMESSER, 1936)
	Preverastraea issoli (PREVER,1909)
Suborder	Astraeoina ALLOITEAU, 1952
Family	Placocoeniidae ALLOITEAU, 1952
Genus	*Columnocoenia* ALLOITEAU,1951
	Columnocoenia ksiazkiewiczi MORYCOWA, 1964
Family	Faviidae GREGORY, 1900
Genus	*Eohydnophora* EGUCHI, 1936
	Eohydnophora crassa (de FROMENTEL,1862)
Genus	*Eugyra* de FROMENTEL, 1857
	Eugyra aff. *arasensis* ALLOITEAU, 1947
Genus	*Diplogyra* EGUCHI, 1936
	Diplogyra minima sp.n.
Family	Isastraeidae ALLOITEAU, 1952
Genus	*Tricassastraea* ALLOITEAU,1966
	Tricassastraea parnassensis ALLOITEAU,1966
Family	Dermosmiliidae KOBY, 1889
Genus	*Calamophylliopsis* ALLOITEAU,1952
	Calamophylliopsis fotisalensis (BENDUKIDZE,1961)
Suborder	Fungiina VERRILL, 1865
Family	Latomeandridae ALLOITEAU, 1952
Genus	*Latomeandra* EDWARDS & HAIME, 1848
	Latomeandra sp.
Genus	*Latiastraea* BEAUVAIS, 1964
	Latiastraea sp.
Group incer.sedis: Meandroid-phaceloid colony (genus and sp. nov.)	

Table II: Stratigraphic and geographic distribution of some more important Cretaceous Scleractinian corals recognized in Agrostylia area.

Species \ Distribution	GREECE	SLOVENIA	CRIMEA	BULGARIA	CARPATHIANS: UKRAINE	CARPATHIANS: RUMANIA	CARPATHIANS: POLAND	GERMANY	SWITZERLAND	ITALY	SPAIN	FRANCE: SOUTH	FRANCE: JURA	TURKMENIA	AZERBAIDJAN	TIBET	MEXICO	CHILE	HAUTERIVIAN	BARREMIAN	APTIAN	ALBIAN	CENOMANIAN
Preverastraea diplothecata (HACK.)	C ?																						
Preverastraea felixi (HACK.)	C ?																						
Preverastraea isseli (PREVER)								? C1		A2 - AL						? AL - C							
Eohydnophora crassa (de FROM.)				B - A1					U	B - A1		B - A1	U										
Eugyra aff. arasensis ALL.											A												
Columnocoenia ksiazkiewiczi MOR.		B - A		B - A		A 1	B - A1	C 1			AL			B 1	B		AL	H - B					
Calamophylliopsis fotisalensis (BEND.)		B - A	H				B - A1				AL												
Tricassastraea parnassensis ALL.	? A - AL																						

H - Hauterivian, B - Baremian, B1 - Lower Baremian, A - Aptian, A1 - Lower Aptian , A2 - Upper Aptian, Al - Albian
All - Lower Albian, C - Cenomanian, C1 - Lower Cenomanian
————: age certain
·····: age uncertain or approximate

Central Greece as e.g. *Phyllocoenia diplothecata* and *Ph.felixi* (the generic deter-mination is now changed to *Preverastraea*) and the specimen described by ALLOITEAU(1966) from the Neocomian of Greece (Argolide septentrional) as *Tricassastraea parnassensis* ALLOITEAU (see Pl.VII,fig.1,2).

The coral association under consideration in this note, shows the greatest similarity to the associations described from the Albian of Georgia(SIKHARULIDZE 1979), ?Upper Aptian-Albian of Italy(Abruzzes, Cenomanian after PREVER 1909 see MASSE & MORYCOWA, 1994) and from the Cenomanian of Central Greece (HACKEMESSER 1936).The assemblage is also similar to the recently discribed fauna from the Albian of North Spain (BARON-SZABO 1993,FERNANDEZ-MENDIOLA & BARON-SZABO 1994).As is the case with the here described assemblage all the above mentioned associations comprise many shallow-water colonial corals with taxons of the reduced and waning Jurassic line.The genera such as *Amphiaulastraea* and those from the *Acanthogyra*-group wich occur in Cretaceous sediments are relics of once abundant Jurassic fauna.

6. Suggestions concerning the age of the examined fauna

The coral assemlage as well as the associated microfossils indica-te Cretaceous age with time-interval Barremian-Albian-?Cenomanian.It appears however , that this interval may be restricted to Albian - ?Cenomanian.

Such conclusion is drawn from the coexistence of taxons of late early Cretaceous with the Upper Cretaceous (Cenomanian) taxons .If, however,the HACKEMESSER'S coral fauna (1936) is not Cenomanian but older (Albian?),the assemblage described by us would be Albian only. It is known from the literature that during Albian - Cenomanian time the old Jurassic development - lines were successively eliminated and/or reduced to some specific genera. Such reduction was accompanied by increasing differentiation of fauna manifested by the appearance of new genera within the existing lines of development and

the appearance of new Upper Cretaceous lines.There are many examples of Albian-Cenomanian coral associations containing surviving Upper Jurassic relics. In most of these mixed assemblages, the solitary corals of ahermatypic type dominated. The association described here is one of a few known shallow-water colonial hermatypic-like association in Europe.

CONCLUSIONS

The Scleractinian corals in the Cretaceous sediments of Agrostylia in Central Greece occur in the form of dispersed colonies.Most of them were penesynchronically redeposited. They represent reef type corals. With respect to their development, the corals in question are comparable to contemporaneous hermatypic corals. This means that they developed in shallow warm sea waters of normal salinity. Presumably these corals lived in relatively quiet waters as indicated by the presence of delicate branching form and predominatly micritic sediments. The relatively small amount of terrigeneous materials (quartz grains) point to a weak influence of land areas.The assemblage of corals bears certain similarity to the Tithonian corals. On the other hand, it shows a very close analogy to the Albian - ?Cenomanian corals from Tethys. Consequently, the age of corals described appears to be Albian - ?Cenomanian.

DESCRIPTION OF GEN. NOV. AND SP. NOV.

In the present paper we accept the ALLOITEAU'S (1952,1957) syste-matic proposals with emendations addeded by other authors.

The following characteristics of the skeleton were taken into ac-count:1-colony and corallite morphology,2- type of budding,3- microstructure of the skeleton. Microstructure and ornamentation of coral skeleton and particularly that of radial elements, are the most important criteria for the higher taxonomic groups.

In this article we accept the proposal of differentiation of trabecular structures after MORYCOWA & RONIEWICZ (report 1994). The trabeculae can be :simple , compound (with a few variations),and divergent.Depending on there diameters one can distinguish: minitrabeculae (diameters to 50 um), medium size trabeculae (from more than 50 to 100 um) and thick trabeculae (more than 100 um).

Abbreviations used in the descriptions :

d :corallite diameter ,dcal :calice diameter ,dl :diameter of co-rallite lumen ,c-c :distance between corallite centres ,col-col : distance between collinae ,dtr :diameter of trabeculae ,S :number of septa ,Sl...Sn :septa of succeeding size orders ,ds :septal density , Sl :lonsdaleoid septa ,ths :thickness of septa ,dgr : density of granules (radial elements) ,D :colony diameter ,H :colony height.

Order **Scleractinia** BOURNE, 1900

Suborder **Amphiastraeina** ALLOITEAU, 1952
Family **Amphiastraeidae** OGILVIE, 1897
Genus *Amphiaulastraea* GEYER, 1955
Species typica : *Aulastraea conferta* OGILVIE, 1897

Amphiaulastraea suprema sp. n.
Text-fig. 4a, 4b; Pl. I,fig. 1-4

Holotypus :No.:2/1; Pl. I, fig. 1-3

Locus typicus : Agrostylia in Central Greece (Parnassos area)
Stratum typicum : Albian - ?Cenomanian
Derivatio nominis : lat.: *supremus:* last(=the youngest amphiastreids)

Diagnosis: Polygonal corallites about 3-6 mm in diameter.Calices subcircular, 2,5-3,5 mm in diameter,surrounded by dissepiments (marginarium). Septal apparatus composed of 12-24 septa differentiated into 3 size orders. S4 septa sporadic developed. S1 septa thickest and reaching the axis. One of them is more pronounced.

Material:3 specimens No.:2/1,2/2,1); 5 thin sections (No.:2/1a-c, 2/2/1a-b,1a).

Dimensions (in mm):

Specimens No	1	2/2	Holotypus No.2/1
dp	3,0-5,0(6,0)	(3,5)4,5-7,0	3,0-6,5
d	(1,5)2,0-2,5	2,5-3,5 (5)	2,5-3,5
s	12-24(6S1+6S2+nS3)	24 + nS4	24 + nS4
D fragm.	20 x 20	90 x 60	30 x 40
H fragm.	30	20	40

Description: Colonies cerioid. Calices subcircular, surrounded frequently by large dissepiments (marginarium). The corallite wall is thin. Frequent lonsdaleoid septa. Septa differentiated into 3-4 size orders, six of them thicker and longer, reach the axial fossa. One of these S1 is, in some corallites, a little stronger. Endotheca consists of vessicular peripherical and central tabuloid elements. Budding intracalinical, marginal (Taschenknospung).

Microstructure: The septal blade is built of densely packed small, simple trabeculae, arranged in a single middle row. The wall of corallites is poorly preserved.

Remarks: Our species differs from all other species of *Amphiaulastraea* with hexameral symmetry in that the diameter of corallites and calices is smaller. Also the septa show less marked bilateral symmetry. It seems that *A.conferta* OGILVIE from the Senonian breccia of Slovenia (TURNSEK & BUSER 1976)is very similar to the species described here.

Distribution : Agrostylia in Central Greece(Parnassos area
Albian - ? Cenomanian.

Suborder **Heterocoeniina** RONIEWICZ, 1976

ALLOITEAU (1957, p.368)suggested that the family **Heterocoeniidae** should be raised to a suborder rank.M. BEAUVAIS(1977) accepted his opinion and introduced into the literature the suborder mentioned above. Current research questions the necessity of maintaining this suborder (KOLODZIEJ, in preparation).

Family **Heterocoeniidae** OPPENHEIM, 1930, emend.
Genus *Latusastraeopsis* nov.
Species typica:*Latusastraeopsis mitzopoulosa* sp. n.,
No. 8/1,Pl.I,fig.5-7;Pl. II,fig.1, 2
Locus typicus : Agrostylia in Central Greece (Parnassos area)
Stratum typicum : Albian - ?Cenomanian
Derivatio nominis:*Latusastraeopsis*-from the similarity to the *Latusastraea* d'ORBIGNY

Diagnosis: Colony plocoid. Septothecal wall. Bilaterial symmetry of septal apparatus.Granular ornamentation. Internal edge of septa with trabecular projections. Costal part often dissociated into trabeculae. Endotheca composed of tabuloid and exotheca of large vessicular dissepiments. Columella lacking. Budding intracalicinal, marginal.

Microstructure : Septa composed frequently of simple, nonbranching mini- to medium- size trabeculae, with the exception of their peripheric part in peritheca zone where the trabeculae are frequently medium to thick sizes and in places fusing into compound units.

Species included: The genus is monotypic.

Stratigraphic and geographic ranges: as for the type species

Remarks: On the basis of the corallite morphology, septal micro-structure and ornamentation the genus is assigned to the family of **Heterocoeniidae**

Our new genus is very closely related to *Latusastraea* d'ORBIGNY. The similarity between *Latusastraeopsis* and *Latusastraea* is observed in the type of colony , symmetry of radial elements and in the development of peritheca. However, *Latusastraeopsis* differs from *Latusastraea* in the well- developed septa, in the type of budding and in the shape of calices. In *Latusastraea* genus, apart from the major septum and a few first order size septa, all other are developed in the form of septal spines (at places more or less joined perpendicularly). The budding is here mainly intercalicinal and shape of calices semicircular. On the other hand *Latusastraeopsis* gen.n. shows similarity in the development and arrangement of the radial elements to the *Pseudopisthophyllum* GEYER (GEYER 1955). However, the latter genus has phaceloid growth form.

Latusastraeopsis mitzopoulosa sp.n.
Text-fig. 5a,5b; Pl.I, fig. 5-7; Pl.II,fig. 1,2

Holotypus :No.:8; Pl.I, fig. 5-7; Pl.II, fig. 1,2
Locus typicus : Agrostylia in Central Greece (Parnassos area)
Stratum typicum : Albian - ?Cenomanian
Derivatio nominis :*mitzopoulosa* - to the memory of Prof.M. MITZOPOULOS, University of Athens (1897-1968)

Diagnosis: Longer diameter of corallite lumen from 2,5 to 3,5 mm The 28-36 septa (S1-S3 +nS4) are differentiated into three size orders, of wich 12-16 S1 reach to the center. Five of S1 septa are longer and thicker, and the middle of these five is still larger.

Material:2 specimens (No.: 8/1, 8/2), 2 thin sections (No.:8/1a, 8/1b).

Dimensions (in mm) :

d long	2,5 - 3,5
d short	(1,8) 2 (2,2)
c-c long	3,5 - 4,5 (5)
c-c short	2,5 - 3,5 (4)
S about	(28-32) - 36 (S1-S3+nS4)
S1	12 - 16
n S long	5 (7)
D about	30 x 70
H about	20

Description : Colony plocoid, corallites dense, subcircular or elliptic in

transverse section. 28-36 septa are thin, straight or undulating. Of these 12-16 are longest and thickest and reach the excentric, arched central depression. 5, rarely 7 of them(one sector) are even longer and the middle one is still longer and thicker. The S2 septa are roughly half the length of S1; the S3 are much shorter than S2 and not always developed. Septal faces with sharply pointed, large granules. Internal edges provided with thin trabecular projections. Septothecal wall. Endotheca composed of subhorizontal elements crossing the lumen. The peritheca is built by thick, irregular in size, trabecular lamellae and vessicular dissepiments. Budding intracalicinal marginal.

Microstructure : Septa are composed mainly of simple trabeculae of the diameters about 50 to 80 um, with the exception of their periphe-ric part where they are larger and often branching.

Distribution : As for the holotype .

Suborder **Rhipidogyrina** RONIEWICZ, 1976
Family **Rhipidogyridae** KOBY, 1905
Genus *Paraacanthogyra* nov.
Species typica: *Paraacanthogyra parnassensis* gen. et sp.n., No. 28,Pl. III, fig 1-4
Derivatio nominis : *Paraacanthogyra* - gr. para= near;this new genus is placed in systematic scheme near the *Acanthogyra*

Diagnosis: Colony phaceloid-cerioid, during the initial stage of septal division it is subcerioid-meandroid. The septa S1 thick, whe-reas those of the lower size orders much thinner and differentiated in length. Septa lonsdaleoid numerous.Wall: septothecal-trabecular. Columella lacking. Endotheca composed of the subhorizontal tabuloid elements in the central part and the vessicular ones at the periphe-ry. Budding intracalicinal, marginal and/or by septal division. *Acan-thogyra*- type microstructure.

Species included: the genus is monotypic.

Stratigraphic and geographic ranges: as the type species

Remarks: Our new genus seems to be similar if not identical with the one described by TURNSEK(1981) as *Acanthogyra aptiana*. The pre-sence of the lonsdaleoid septa in *A. aptiana* and in our species excludes both these species from the genus *Acanthogyra*(see *Acanthogy-ra* diagnosis;BEAUVAIS,1976).*A. aptiana* belongs either to our new ge-nus or represents yet another new genus. Comparative studies are ne-cessary in this respect.

Paraacanthogyra parnassensis sp.n.
Text-fig. 6a, 6b; Pl. III, fig. 1-4

Holotypus :No.:28, Pl. III, fig. 1-4
Locus typicus : Agrostylia in Central Greece (Parnassos area)
Stratum typicum : Albian - ?Cenomanian
Derivatio nominis :*parnassensis* - from the Parnassos area

Diagnosis: Colony phaceloid-cerioid, in places submeandroid.Corallites subpolygonal, general, closely connected so that they look like a cerioid colony. Corallite diameters from 8 to 13,rarely 14 mm.About 24 septa differentiated into three size orders. Septa S1 are considerably thicker than the others. Short S4 septa appear at places. Nu-merous lonsdaleoid septa. Other features as in the genus diagnosis.

Material: 1 colony (No.: 28), 3 thin sections (No.: 28a-c).

Dimensions (in mm):

d long	8-13 (14)
S about	24 (12 S1= S2 + nS3 + nS4)
No. 28:	D about 50 x 60 ; H 35

Description and remarks: Fragments of phaceloid-cerioid colonies. Corallites mainly closely connected with one another. Epitheca with finely granulated costae occasionally visible. In some places colony looks like cerioid, in others cerioid-meandroid. This latter type of colony is the result of septal budding. During the initial stage 2 or 3 corallites were not completely separated. Septa of first order size (S1) are thick and nearly reach the center of the corallite. In places they have trabecular expansions, subperpendicular or oblique to the septal blade. S2 septa are much thinner and generally shorter than S1. They are in some cases lonsdaleoid.S3 and S4 septa are still shorter, generally thinner and most frequently lonsdaleoid. The wall is septotrabecular, mono- or bilaminar, formed mainly by curving peripherical edges of the septa. Other features as in the genus diagnosis.

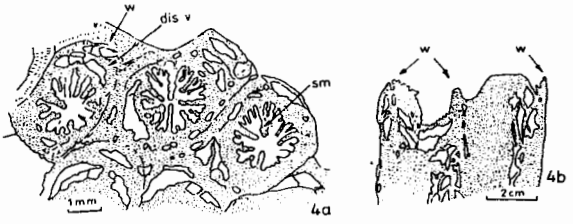

Fig. 4: *Amphiaulastraea suprema* sp.n.:
a-Corallites in transverse section b-Corallite in longitudinal section
w:wall; dis v: vessicular dissepiments; sm: major septum.

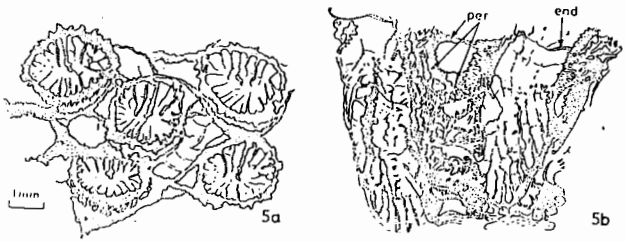

Fig. 5: *Latusastraeopsis mitzopoulosa* gen. et sp.n.:
a-Transverse section of corallites , b-Longitudinal-oblique section of two corallites.
end: endothecal tabuloid dissepiment
per: peripherical dissepiments and trabecular lamellae visible.

Remarks: The species closest to ours seems to be *Acanthogyra aptiana* TURNSEK (TURNSEK and MIHAJLOVIC 1981) from the Barremian-Lower Aptian of Serbia. It has similar corallite diameters, cerioid corallites, short calicinal series and also lonsdaleoid septa. After TURNSEK (1981, p. 25, pl. 24, fig. 1-4), *A.aptiana* is in the form of the massive colony with cerioid polygonal corallites, which irregularly divide into two, three or even four individuals.So the difference between *A. aptiana* and our new genus is in the growth form of colony; massive, cerioid in the former and phaceloid - cerioid in the latter.

Distribution: as in the diagnosis of holotype

Preverastraea BEAUVAIS, 1976
Species typica: *Aulastraeopora Chelusi* PREVER, 1909, Italy (Abruzzes)-?Upper Aptian-Albian (after PREVER: Cenomanian)

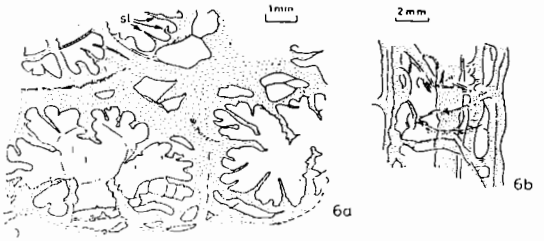

Fig. 6: *Paraacanthogyra parnassensis* gen. et sp.n.
a-Corallites in transverse section.Lonsdaleoid septa marked (Sl)
b-Corallites in longitudinal section.Vessicular and tabuloid dissepiments visible.

We have in our collection two specimens corresponding to the HACKEMESSER'S species *Phyllocoenia diplothecata* (see pl.IV;pl.VI,fig.1, 2) and *Phyllocoenia felixi*(pl.V;pl.VI, fig. 3,4). On account of the type of colony (cerioid, non-plocoid), the development of radial elements (septa, non-costo-septa), the character of the microstructure and ornamentation of radial elements and wall, these species cannot be placed in *Phyllocoenia* genus. Presumably these species belong to the genus *Preverastraea*. This genus, we placed into suborder ***Rhipidogyrina***, contrary to the opinion of other authers(e.g.L.BEAUVAIS 1976, M.BEAUVAIS 1977,LIAO & XIA 1985, LOESER 1994).

The question arises, however,whether the species described by Hakkemesser as *Phyllocoenia* represent *Preverastraea*? The difference between specimens of these genera lies mainly in the number of deve-loped lonsdaleoid septa. In the species *Preverastraea* they are abu-dant,in *Phyllocoenia diplothecata* HACKEMESSER and *Phyllocoenia felixi* HACKEMESSER they are rare and developed chiefly on dissepiments forming pseudo-wall("internal wall"). Further investigations in this respect are necessary.

Only the species *Ph. diplothecata* (pl.IV,fig. 1-3;text-fig.7a,7b) and *Ph.felixi* are considered here because the other, described by HACKEMESSER (1936) under the generic name *Phyllocoenia*, seem to represent yet another genus.

Remarks concerning the systematic position of Preverastraea

In 1976 L.BEAUVAIS introduced genus *Preverastraea* for 5 colonial species described by PREVER (1909) under the genus name *Aulastraeopora. Aulastraeopora chelusi* PREVER was accepted by her as a type species of the genus *Preverastraea.* PREVER (1909) described the species of the genus *Aulastraeopora* (colonial and solitary forms) close to the *Amphiastraea* genus. ALLOITEAU placed this genus in the new family **Aulastraeoporidae** created by him (ALLOITEAU 1957), in suborder **Amphiastraeida** ALLOITEAU, 1952 (correctly **Amphiastraeina**). L. BEAUVAIS,however, placed her new genus *Preverastraea* (=*Aulastraeopora*part) in the family **Heterocoeniidae** OPPENHEIM, suborder **Stylinida** (=**Stylinina**) ALLOITEAU. It seems that the genus *Preverastraea* (=*Aulastraeopora* colonial) and most probably *Aulastraeopora* (solitary forms) should be placed in suborder **Rhipidogyrina**, on account of the microstructure of radial elements, similar to rhipidogyrids (see L. BEAUVAIS 1976, Pl.5, fig.2b, and M.BEAUVAIS 1977, p.280,pl. 3, fig. 1,3).

Preverastraea diplothecata (HACKEMESSER, 1936)
Text-fig. 8; Pl. IV, fig. 4-6;Pl.VI, fig. 1,2.
v. 1936. *Phyllocoenia diplothecata* HACKEMESSER;HACKEMESSER, p. 17-18, Pl. 2, figs 6,7.

Material: 1 specimen (No 11), 3 thin sections(No. 11a-c).

Specimens studied now		No D 6121, Basle museum HACKMESSER,1936,pl. 2, fig. 6,7 new data
d	(5,5)6,0-9,5(10)	6,5-8,5-10;
d interne	(2)2,5-3,0	2,5-3,0-3,5
c-c	5,0-8,5(9,5)	5,0-10
S	12 (6S1 + 6S2) + nS3	12 (6+6) 12 S1+S2 + nS3
D	50 x 30	
H	about 40	

Description: Two fragments of colony. Colony cerioid. Polygonal corallites with middle deeper circular part of calice. This shape of the circular fossa is also marked in transverse sections of corallites.This"wall"is formed by large vessicular peripheric dissepiments ("internal wall"after HACKEMESSER). Radial elements represent septa arranged in radial (6 systemes), and weak bilateral symmetry. This bilateral symmetry is marked by one septum S1 slightly longer than other S1. The septa S1 and S2 have similar thickness but differ in length.There occasionally occur septa S3.Lonsdaleoid septa rare. They occur chiefly in internal parts of vessicular dissepiments of the "internal wall". Lateral surfaces of septa are ornamented with fine, densely arranged granules, with rare well developed lateral trabecular extensions. The edge of septa thickened, in places we can observe auricular sections. No columella. The wall is septothecal, formed by curving peripheral parts of the septa.Endotheca composed of tabuloid dissepiments in the central part of corallites and vessicular ones in its peripheric zone. Budding intracalicinal, marginal or intrathecal?.

Microstructure: Radial elements built of rich branching mini - to medium size trabeculae of diameters from about 40 to 80 um (Pl.IV,fig 1,6). The septa are in microstructural continuity with the wall.

Remarks: On the basis of the skeletal microstructure this species is placed in the family **Rhipidogyridae**.

Distribution: Central Greece: Agrostylia (Parnassos area):Albian-?Cenomanian and Dremisa:Cenomanian.

Preverastraea felixi (HACKEMESSER, 1936)
Text-fig. 9; Pl. V, fig. 1-6; Pl.VI, fig. 3,4

v. 1936. *Phyllocoenia felixi* HACKEMESSER;HACKEMESSER, p.16-17, Pl. 2, fig. 1-4.

Material: 4 specimens (No. 7, 10, 15, 27), 8 thin sections (No. 7a-b; 10a-b, 15a-b, 27a-b).

Diameters (in mm):

Our specimens		No.6119, Basle, Museum HACKEMESSER,1936,Pl. 2, fig. 1-3
d	8-17	10-15
d between _internal wall_	4-8	4,5-7
S	about 18-24 + nS4	24
ths1 (near-wall)	about 1	
dgr	5-6/1	
No 27: D about 80x40; H 45		

Description: Cerioid colony. Polygonal corallites with central slightly deeper circular part of calice. The thick, subequal septa are differentiated into three size orders and arranged in radial,and in some corallites in feeble bilateral symmetry. Lonsdaleoid septa rare, occurring chiefly in the internal part of large vessicular dissepiments ("internal wall"). Fine granular ornamentation of septal surfaces. In places, however, we can observe well developed lateral trabecular extensions (see pl. VI, fig.4). The columella, if present, is feeble, papillar, composed by joining several internal trabecular septal edges. The wall is septothecal, formed by curving of peripheral edges of septa. Endotheca composed of large, subhorizontal dissepiments transversing the lumen and the vessicular ones at the periphery. Budding intracalicinal, marginal and rare by septal division.

Microstructure:The skeletal microstructure is closest to the rhipidogyrid microstructure but is more complicated, because the secondary trabeculae are more numerous (see Pl. V, fig. 2).The septal and wall trabeculae are of medium- to thick- size diameters(about 60-160 um). Septa are in microstructural continuity with the wall.

Further considerations concerning the skeletal microstructure dis-cussed in this paper will be presented in a forthcoming publication.

Remarks: The species *Ph. felixi* resembles Upper Cenomanian-Lower Turonian species *Saxuligyra major* ELIASOVA(ELIASOVA,1991) from which it differs in having "internal wall", a slightly larger corallite diameters and the presence(although rare) of S4 septa.

Distribution: Central Greece: Agrostylia (Parnassos area), Albian - ? Cenomanian.

Preverastraea isseli (PREVER, 1909)
Pl. II, fig. 3-5

1909. *Aulastraeopora isseli* PREVER; PREVER,p.142-143,text-fig.44-47 Pl.10, fig. 31,31a,34.
1976. *Preverastraea isseli* (PREVER); BEAUVAIS,pl.5, fig. 4.
1977. *Preverastraea isseli* (PREVER); BEAUVAIS,p. 280,pl.3,fig. 1,3.
?1985. *Preverastraea isseli* (PREVER); LIAO&XIA,p. 154,pl.12,fig.3-6.
?1994. *Preverastraea* cf.*isseli*(PREVER); LOESER,p. 15-16,pl.5,fig.3,4

Material:2 specimens (No. 12/1,12/2),3 thin sections (No. 12/1a-c)
Dimensions (in mm):

d corallites	8-10
d corallite (between pseudowall)	3,5-4,5
S to 24	(6S1 + 6S2 + nS3)
No. 12/1: D about 60 x 40 ;	H about 40

Description: Cerioid colonies. Septa are differentiated into three size orders and arranged in radial,and in some corallites in feeble bilateral symmetry. This bilateral symmetry is marked by one or two opposite septa slightly longer and/or thicker. The lonsdaleoid septa (S3 septa, rarely S2) frequently occur in the internal part of large vessicular dissepiments("internal wall"). The lateral surfaces of septa are finely granulated and, in places, have lateral trabecular expansions. These expansions occur chiefly in the central part of corallites. Auriculae present. Septothecal-trabecular thick wall and parathecal interior pseudowall. Endotheca composed of large vessicular elements in periphery and subhorizontal or/and concave in central part of corallites. Budding intracalicinal, marginal and probably by septal division

(see also PREVER 1909,fig.45).

Microstructure: The wall is generally thick. It has the same trabecular construction as the septa (see pl.II,fig.5). They are built by branching medium- to thick- size trabeculae (diameters about 80-200 um). The septa and wall consist of monolinear series of trabeculae, wich are vertical at the wall and slightly inclined adaxially. The secondary trabeculae extending from axes of the main trabeculae are arranged regularly and perpendicularly to the septal and wall surfaces.

Remarks: Our specimens seem to correspond to the forms described and figured by PREVER(1909). The specimens of this species from the Albian-Cenomanian of Tibet (LIAO & XIA 1985) have less septa (6S1:pl. 12, fig.5 or 6S1 and a few lonsdaleoid septa:pl.12, fig.3a) and those presented by LOESER from the Lower Cenomanian of Westphalie have smaller corallite diameters, in comparison with the species presented by PREVER.

Distribution: Central Greece: Agrostylia (Parnassos area):Albian-?Cenomanian; Italy, Monti d'Ocre in Abruzzes: ?Upper Aptian - Albian; Bangoin in Tibet: Cenomanian; ?Westphalie(Germany):Cenomanian.

Suborder **Astraeoina** ALLOITEAU, 1952
Family **Faviidae** GREGORY, 1900,emend. ALLOITEAU, 1952
Genus *Diplogyra* EGUCHI,1936

Diplogyra minima sp.n.
Text-fig. 10a-c; Pl.VII, fig. 4-7

Holotypus: No.:30, Pl. VII, fig. 4-7
Locus typicus: Agrostylia in Central Greece (Parnassos area)
Stratum typicum: Albian - ?Cenomanian
Derivatio nominis: *minima* - from the narrow calicinal series

Diagnosis: Meandroid colony. Generally long series. Collinae with narrow ambulacrae. Distance between central part of collinae is from 1,5 to 2,0, rarely to 2,5 mm. Costo-septal density:3-4 in 2mm;density of tabuloid endothecal elements:3-4 in 2 mm.

Material: 2 specimens (No. 30 and 18), 5 thin sections (No. 30a-c, 18a-b).

Dimensions (in mm):

Diplogyra minima sp.n. *Diplogyra lamellosa* *D. lamellosa eguchi*

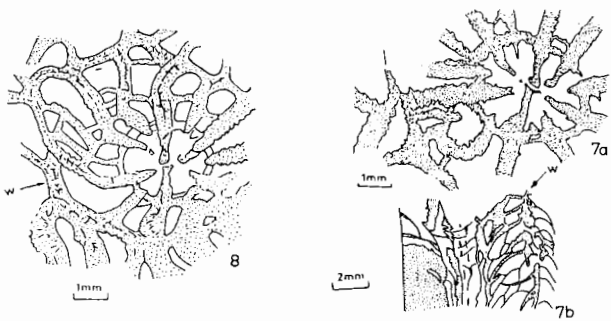

Fig. 7 and 8: Prev*erastraea diplothecata* (HACKEMESSER):
a and b- specimen from the HACKEMESSER coll.,No D 6121, Basle Museum a - transverse section of corallites b- same specimen,longitudinal section showing disposition of endothecal dissepiments;
8- transverse section of Argostylia specimen.Corallite wall(w) and internal pseudowall is marked w: wall

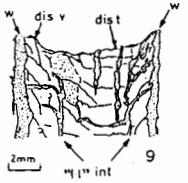

Fig. 9: *Preverasttaea felixi* (HACKEMESSER): a-Corallite in longitudinal section ; dis v: vessicular dissepiments; w: wall;"w"int:"internal wall"; dis t: tabuloid dissepiments.

	EGUCHI,1936	MORYCOWA,1971
col-col	1,5-2,0 (2,5)	4-5	(2) 2,5-3,5 (4,5)
ds	3-4/2	4/2	3-4 (5)/2
ths1	ca.0,3-0.4 (external zone)		0.18-0,25
dt	6-8 (9)/3	?	3-4/3

No.30:D 50x60 ; H 53

Description: Meandroid colonies. Series long.Centres of corallites indistinct.Collinae with ambulacrae. Radial elements thick, differentiated into two size orders. S1 septa thick, S2 thinner and shorter than S1, occurring irregularly. Septal face ornamented with sharply pointed granules. Paraseptothecal wall. Endotheca composed of a narrow zone of external vessicular dissepiments(wall region) and tabuloid ,subhorizontal in the central part of series. Columella lacking or rudimentary, composed by the joining of several internal septal edges.

Microstructure: Trabeculae of radial elements are thick, simple and branching. The distance between trabecular calcification centres along the median zone of septum is generally from 100 to 200 μm. The microstructure is shown in Text-fig. 10c and in the pl.VII, fig. 7. It is the same as presented by MORYCOWA (1971, text-fig. 25, p. 82) for the *L.lamellosa eguchi*.

Remarks: *Diplogyra minima* differs from *D. lamellosa lamellosa* and *D.lamelosa eguchi* in much narrower calicinal series and denser endothecal elements.

At first sight *Diplogyra minima* sp.n. appears to be similar to *Eu-gyra bernardi* (PREVER) (HACKEMESSER,1936, p.10,pl.1,fig.1,2; the HACKEMESSER'S coll.: specimen No. D 6115, Museum, Basle) wich probably lso belong to the genus *Diplogyra*. The former, however, have interrupted collinae and ambulacrae. The ambulacrum of *Eugyra bernardi* has the appearance of a chain. The distance between the centres of oval depressions rather regular and about 1,5 mm. In our species the collinae and ambulacrae are continuous.

The genus *Diplogyra* EGUCHI(1936), appears to be closely related to *Anisoria* VIDAL,1917 (see REIG, 1987). The revision of the two genera mentioned is necessary.

Distribution: as in the diagnosis of holotype.

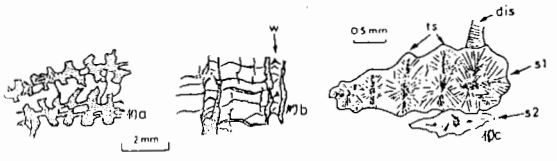

Fig. 10 a-c: *Diplogyra minima* sp.n. a-transverse section of corallite series;b-longitudinal section of corallite series showing disposition of endothecal dissepiments; c-trabeculae of radial element with lateral axes; dis:dissepiment; S1,S2:radial elements of 1 and 2 size orders; w:wall;ts:trabeculae of radial elements with lateral axes.

Περίληψη

• Τα Σκληρακτίνια Κοράλλια, που μελετήθηκαν από τα ανθρακικά ιζήματα της περιοχής Αγροστύλια Παρνασσού,

προέρχονται από τις αλλόχθονες σειρές (υποπελαγονικήα ενότητα) και απαντούν με τη μορφή των βιοστρωμάτων ή των διασκορπισμένων αποικιών. Δεν μπορούν να χαρακτηριστούν σαν ύφαλοι ή βιοέρματα s.s. Αντιπροσωπεύουν όμως Κοράλλια του λεγόμενου υφαλογόνου τύπου.

• Λαμβάνοντας υπόψη τον τρόπο ανάπτυξης των μελετηθέντων Κοραλλίων μπορούμε να τα θεωρήσουμε συγκρίσιμα με τα σύγχρονα ερματυπικά Κοράλλια. Αυτό σημαίνει ότι τα Κοράλλια της περιοχής Αγροστύλια Παρνασσού, αναπτύχθηκαν σε ζεστά και ρηχά θαλάσσια νερά, κανονικής αλατότητας.

• Η παρουσία των λεπτών κλαδωτών μορφών και ο μικριτικός τύπος του ιζήματος επιτρέπουν να δεχθούμε ότι τα Κοράλλια αυτά ζούσαν προφανώς σε σχετικά ήρεμα νερά.

• Η σχετικά μικρή ποσότητα χερσογενούς υλικού (κόκκοι χαλαζία), που παρατηρήθηκε σε ορισμένα δείγματα, δείχνει ασθενή επίδραση ξηράς (γειτνίαση με τη χέρσο).

• Η συγκέντρωση των Κοραλλίων δείχνει αφ'ενός μεν ομοιότητα με Κοράλλια του Τιθωνίου και αφ' ετέρου με Κοράλλια Αλβίου και Κενομανίου της Τηθύος.

• Η ηλικία των μελετηθέντων Κοραλλίων φαίνεται να είναι αυτή του Αλβίου - ?Κενομανίου.

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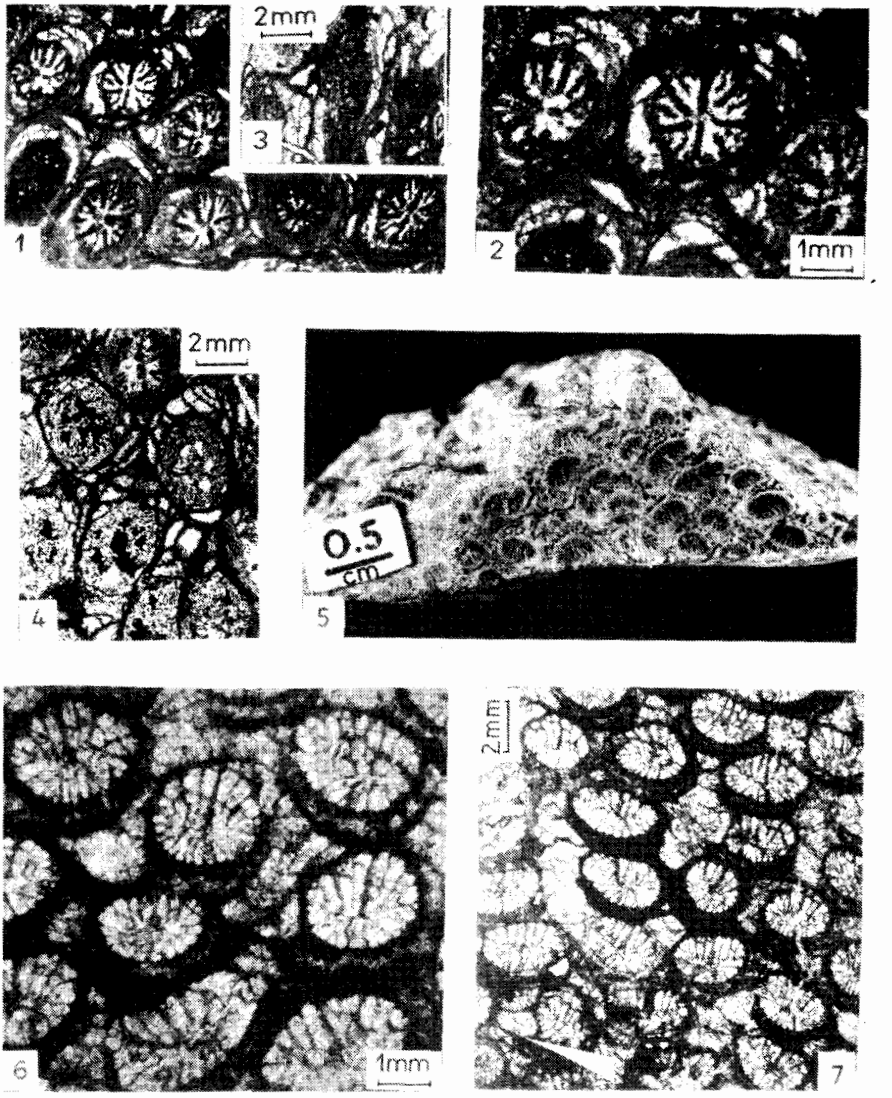

Plate I

Fig. 1-4. *Amphiaulastraea suprema* sp.n.,Holotypus No. 2/1, Agrostylia Parnassos area, Central Greece.

1- Corallites in transverse section (thin section No. 2/1a)

2- Detail from fig. 1

3- Longitudinal section (thin section No 2/1b) showing oblique vessicular dissepiments in peripheric part of co- rallite.

4- Transverse section of corallites (thin section No. 2/2a) Polygonal forms of corallites and external dissepimental zone are marked.

Fig. 5-7. *Latusastraeopsis mitzopoulosa* gen. et sp.n., Holotypus No. 8/1, Agrostylia.

5- Calicinal, slightly polished surface of colony;

6- Transverse section of corallites (thin section No. 8/1a) bilateral symmetry well marked;

7- Same thin section. Mode of budding and two young coral- lites (arrow) are visible.

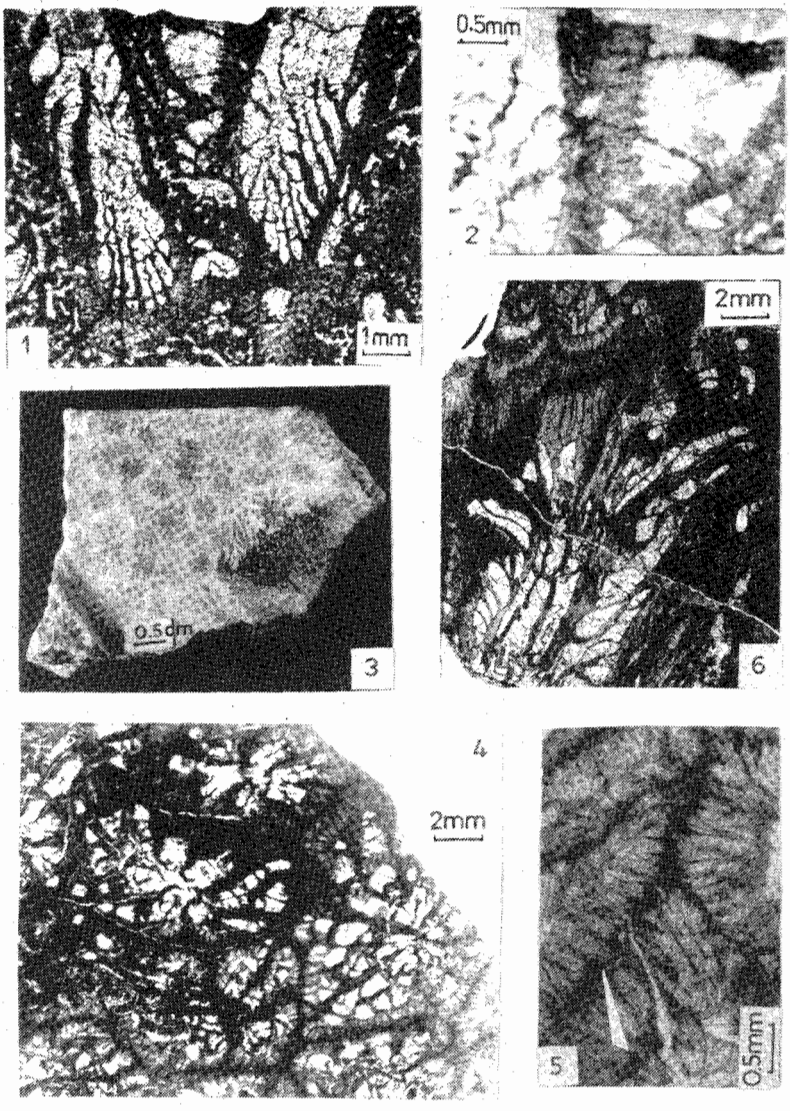

Plate II

Fig. 1,2. *Latusastraeopsis mitzopoulosa* gen. et sp.n., Holotypus No. 8/1, Agrostylia.

1- Longitudinal-oblique section of two corallites (thin section No.8/1b). Endothecal tabuloid element and peri- pherical zone are visible;

2- Detail of pl. II, fig. 1. Perithecal dissepiments and trabecular lamellae visible.

Fig. 3-6. *Preverastraea issoli* (PREVER), No. 12, Agrostylia.

3- Polished calicinal surface of incomplete colony.Polygo- nal corallites and circular central part within "internal wall" can be observed;

4-Transverse section of same specimen(thin section No. 12a)

5- Detail from fig. 4, showing the wall and septa micro- structure.The main trabeculae ranged in the median zone (arrow) and the secondary trabeculae subperpendicular to the main ones. The wall(arrow) and the septa have the sa- me microstructural construction;

6- Corallite in longitudinal section (thin section No.12b).

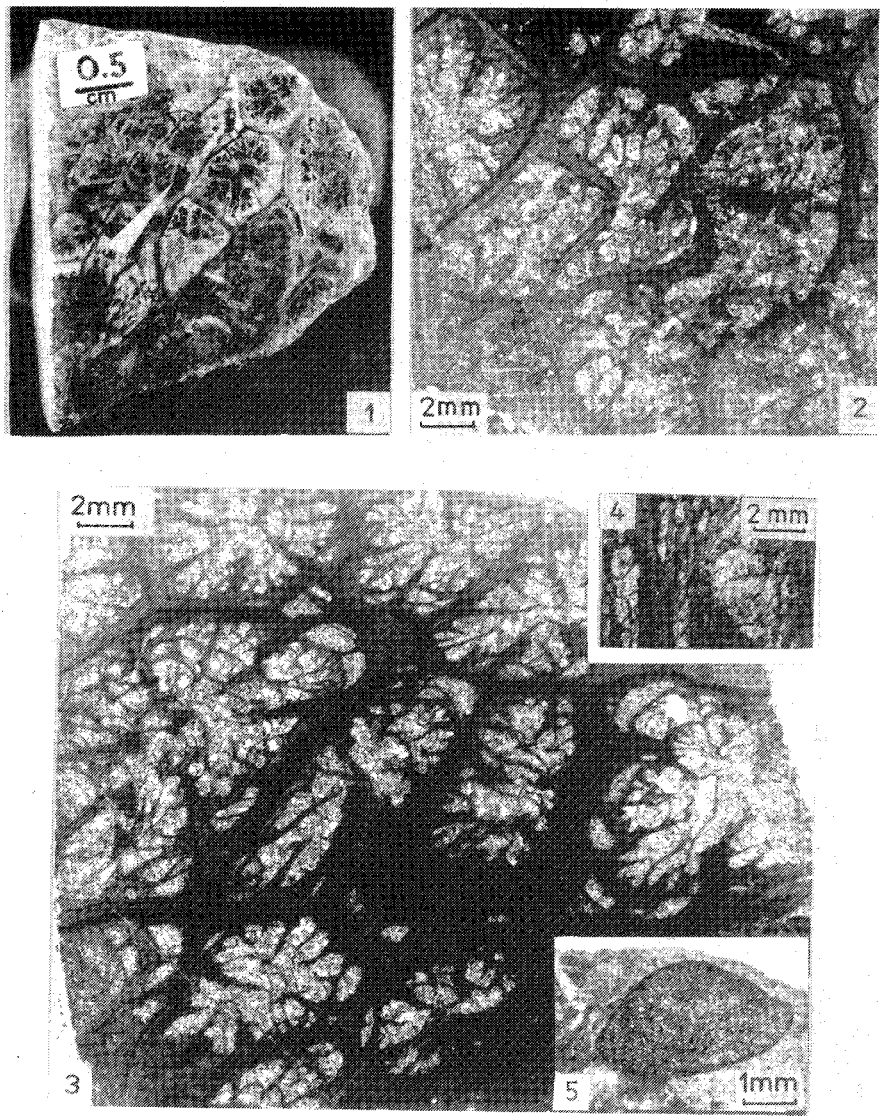

Plate III

Fig. 1-4. *Paraacanthogyra parnassensis* gen. et sp.n., Holotypus No. 28, Agrostylia.

1- Slightly polished calicinal surface of specimen showing phaceloid-cerioid growth form and one corallite in the process of budding (arrow);

2- Transverse section (thin section No. 28c) showing bud- ding by septal division;

3- Transverse section of corallites (thin section No.28a) presented in fig. 1. Arrangement of radial elements and lonsdaleoid septa of higher order sizes are visible;

4- Fragment of longitudinal section of corallites (thin section No. 28 c). Vessicular dissepiments in peripheric zone and subhorizontal elements in center of corallite observed.

Fig. 5. Section of Foraminifera (*Orbitolina*; thin section No. 28c)

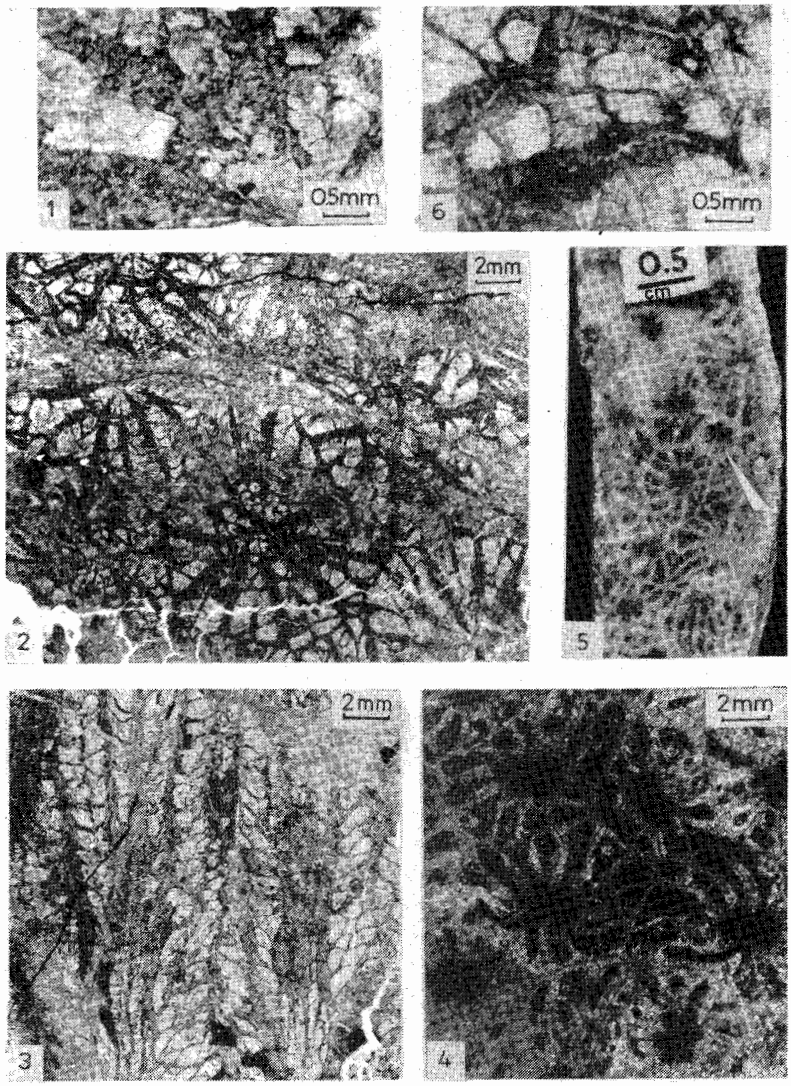

Plate IV

Fig. 1-3. *Preverastraea diplothecata* (HACKEMESSER).Specimen from the HACKEMESSER collection No. D 6121, Basle Museum, (HACKEMES- SER 1936, pl. 2, fig. 6, 7),Central Greece(Dremisa):Cenoma- nian.
1- Detail of pl.IV, fig. 2.Trace of microstructure of septa lonsdaleoid septa and _"internal wall"_ visible;
2- Transverse section of corallites showing polygonal co- rallites joined by septothecal wall and well marked circular "internal wall";
3- Longitudinal section of same specimen showing arrange- ment of endothecal elements:vessicular in peripherical part and subhorizontal and/or concave in central part of coral- lites.

Fig. 4-6. *Preverastraea diplothecata* (HACKEMESSER).Specimen No. 11, Agrostylia.
4- Corallites in transverse section(thin section No. 11a)
5- Polished upper surface of colony. Polygonal corallites with the circular "internal wall"(arrow)_ can be seen;
6- Detail of pl. IV, fig. 4 showing traces of the septa microstructure and "internal wall".

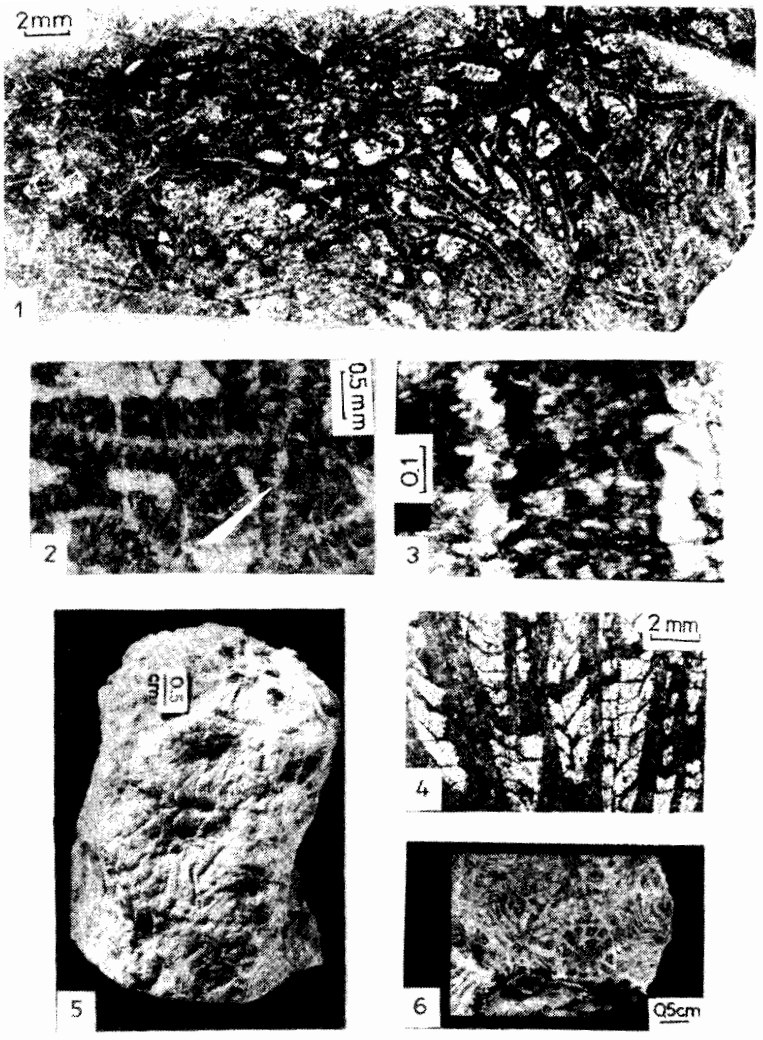

Plate V

ig. 1-6. *Preverastraea felixi* (HACKEMESSER), specimen No. 27, Agrostylia.

1- Transverse section of corallites (thin section No.7a)

2- Detail of pl. V, fig. 1, showing traces of septal and wall (arrow) microstructure. The trabeculae arranged in the mid-line and secondary trabeculae extend more or less per- pendicularly to the main ones;

3- Detail of fig. 1 showing microstructure of wall. The secondary trabeculae and fibre bundles are visible.

4- Longitudinal section (thin section No. 27c) showing thin -walled vesicular dissepiments in the periphery and sub- horizontal in the central part of corallites;

5- Calicinal surface of incomplete colony showing polygonal shape of corallites;

6- Young corallite from lower, slightly polished surface of colony presented in fig. 5.

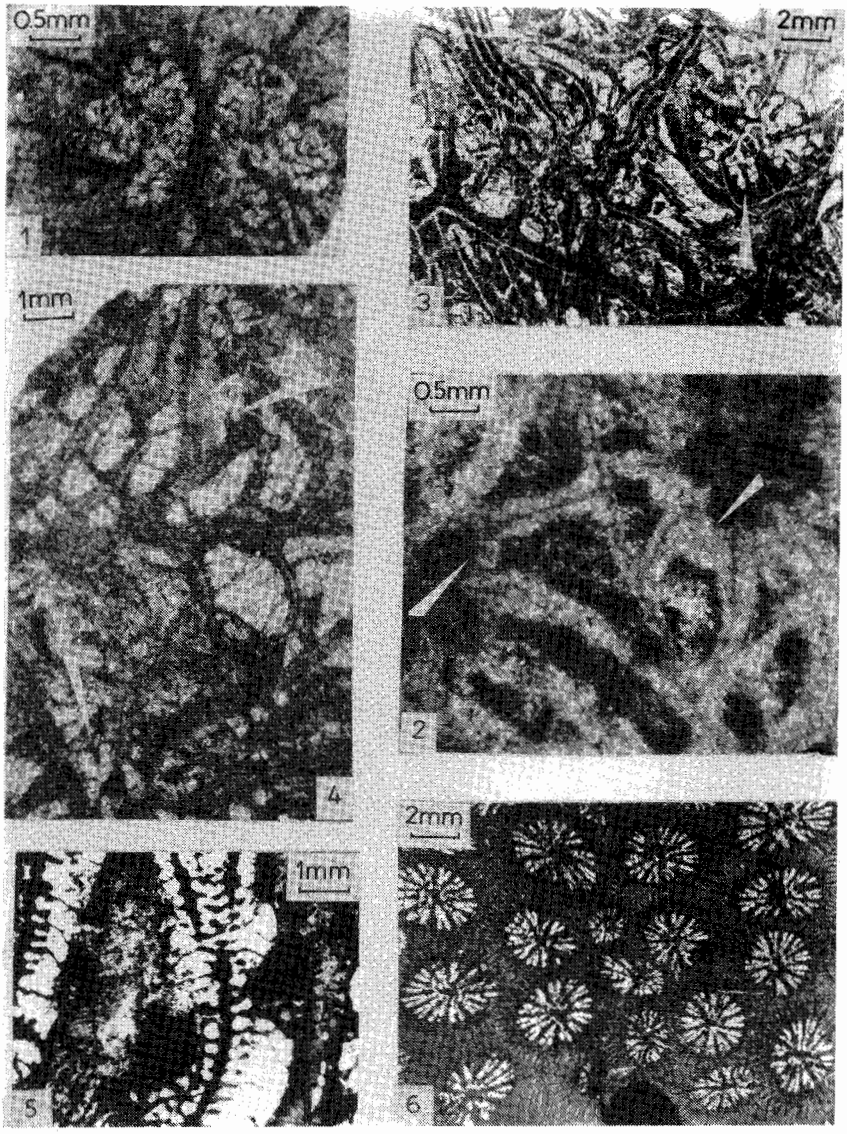

Plate VI

Fig 1,2. *Preverastraea diplothecata* (HACKEMESSER).Agrostylia.
1- Corallite in transverse section (thin section No. 11a) Bilateral symmetry is marked by one septum S1 slightly longer then other S1;
2- Same thin section. Wall between two corallites, "internal wall",septal arrangement and lonsdaleoid (arrows) septa visible.

Fig. 3,4. *Preverastraea felixi* (HACKEMESSER), Agrostylia.
3- Transverse section of corallites showing intercalicinal marginal budding.One young individual is marked by arrow;
4- Transverse section (thin section No. 27a) of two corallites. In lower part of photography we can see lonsdaleoid septum (arrow), in upper part-septal trabecular extention visible (arrow)

Fig. 5,6. *Columnocoenia ksiazkiewiczi* MORYCOWA.
5- Longitudinal section(thin section No. 13b) of corallites
6- Transverse section (thin section No. 13a) of corallite.

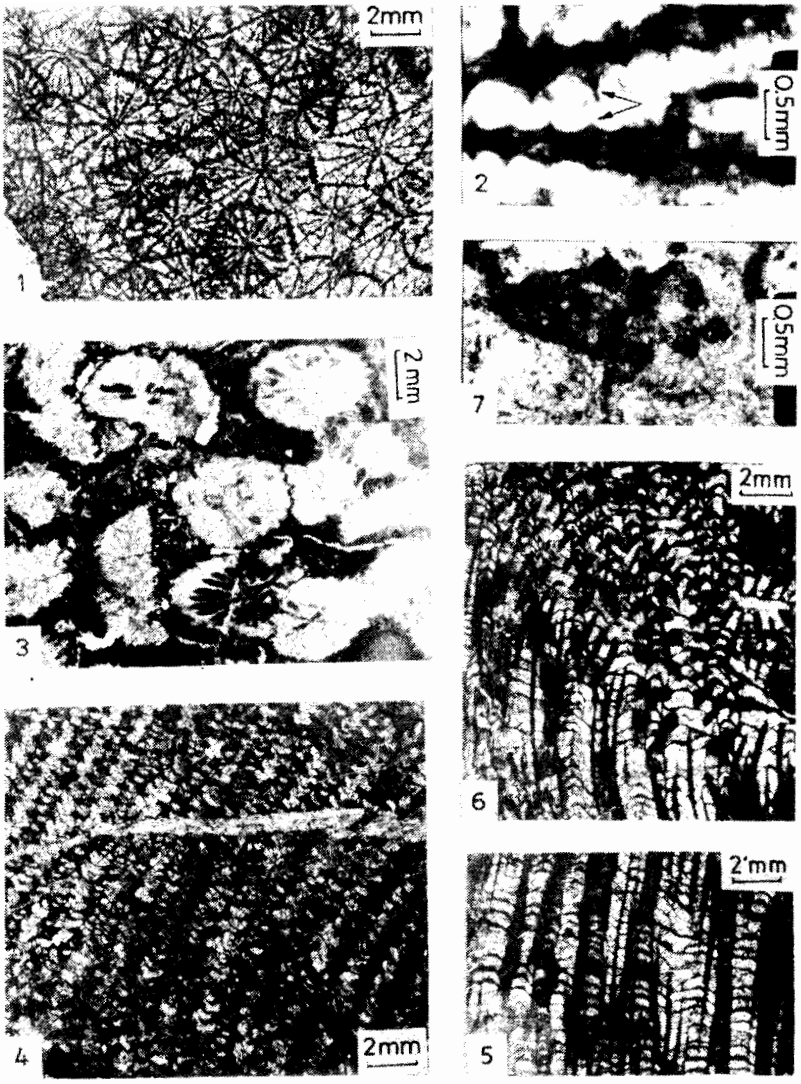

Plate VII

Fig. 1,2. *Tricassastraea parnassensis* ALLOITEAU, Agrostylia.
1- Transverse section of corallites (thin section No. 17a)
2- Detail of fig. 1. Trabeculae of radial elements with lateral axes (arrow).

Fig. 3. *Callamophylliopsis fotisalensis* (BENDUKIDZE), Agrostylia. Transverse section of corallites(thin section No. 29a).

Fig. 4,5,7. *Diplogyra minima* sp. n., Agrostylia, Holotypus No.30
4- Transverse section of corallite series (thin section No. 30a).
5- Longitudinal section of corallite series(thin section No. 30b) showing subhorizontal, tabuloid, endothecal elements in central part of series and slightly convex in the wall region;
7- Detail from fig. 4 showing the black points represent calcification centre.

Fig. 6. Same species, No. 18, Agrostylia. Transverse , oblique and longitudinal sections of specimen (thin section No. 18a).