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SRLOVENSKA AKADEMIJA  
ZVANOSTI IN UMETNOSTI  
BIBLIOTEKA  
ODPISANO

THE LOWER CRETACEOUS HYDROZOA  
AND CHAETETIDAE FROM PROVENCE  
(SOUTH-EASTERN FRANCE)

(With 4 Figures and 1 Table in Text and 27 Plates in Annex)

SPODNJEKREDNI HIDROZOJI IN HETETIDE  
V PROVANSI JUŽNOVZHODNE FRANCIJE

(S 4 slikami in 1 tabelo v tekstu ter 27 tablami v prilogi)

DRAGICA TURNŠEK, JEAN PIERRE MASSE

SPREJETO NA SEJI ODDELKA ZA PRIRODOSLOVNE VEDE  
RAZREDA ZA PRIRODOSLOVNE IN MEDICINSKE VEDE  
SLOVENSKE AKADEMIJE ZNANOSTI IN UMETNOSTI  
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UREDIL AKADEMIK IVAN RAKOVEC

## INTRODUCTION

Numerous Hydrozoa and Chaetetidae have been found in the Lower Cretaceous beds of Provence, in south-eastern France, in various localities. They were collected by J. P. MASSE during his research work on the Lower Cretaceous and were sent on to D. TURNŠEK for further examination. Since only a few Hydrozoa have been described from the Lower Cretaceous so far, these finds from Provence represent a new contribution to our knowledge of this fauna. Nineteen species of Hydrozoa and three species of Chaetetidae have been determined and are here described; seven species of Hydrozoa are new. Some data on their stratigraphical and palaeoecological value are also given. Since research work on the Lower Cretaceous beds of Provence is still going on, not all the hydrozoan fauna having been collected yet, the results of our research must be treated as preliminary.

The specimens with numbers from 2000 to 3000 and specimen no. 663 are kept in the Laboratoire de Géologie Marine et Sédimentologie Appliquée in Marseille. The specimens numbered 1 to 22 and from 3000 on are kept in the collection of the Palaeontological Institute of the Slovene Academy of Sciences and Arts in Ljubljana. From these specimens thin sections were made by M. HUZJAN, a member of the technical staff of Institute, and the photographs were taken by C. NAROBÉ, the photographer of the Slovene Academy. Our grateful thanks are extended to both of them for their work.

## LOCALITIES, THEIR STRATIGRAPHY AND PALAEOECOLOGY

(J. P. MASSE)

### Geographic setting

The fossil specimens were collected from 21 stratigraphic sections, the geographic distribution of which is shown in Fig. 1—3. The "Haute-Provence" (Fig. 2) yields only Bedoulian sites of Hydrozoa, mostly in the Monts de Vaucluse area. Two locations have been recorded in the Nesque river canyon between Villes and Monieux: Les Tarlans et les Colombières. Four sites occur near Rustrel: coteau de Mery, Les Quintins and Les Esfourniaux, the fourth one is just near the village of Rustrel. In the south western part of Monts de Vaucluse, 2 localities have been studied: Col des 3 Termes near Gordes and Sénanque and la Tour de Sabran Quarries near the village of Lagnes.



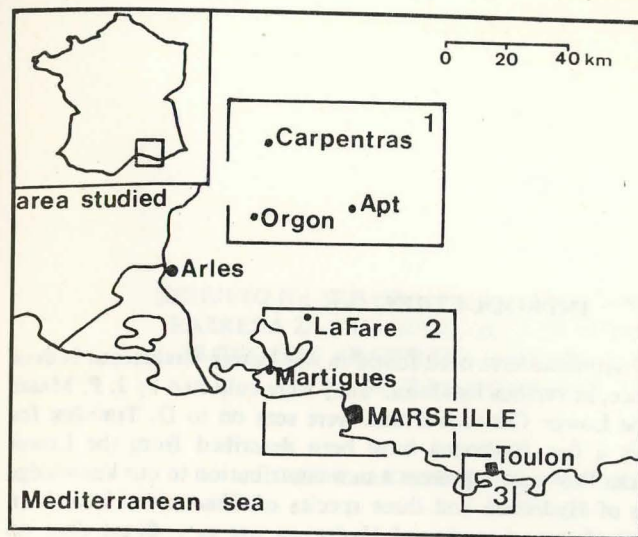


Fig. 1. Studied area with situation of hydrozoan localities

Sl. 1. Pregledna karta obdelanega ozemlja s situacijo hidrozojskih nahajališč

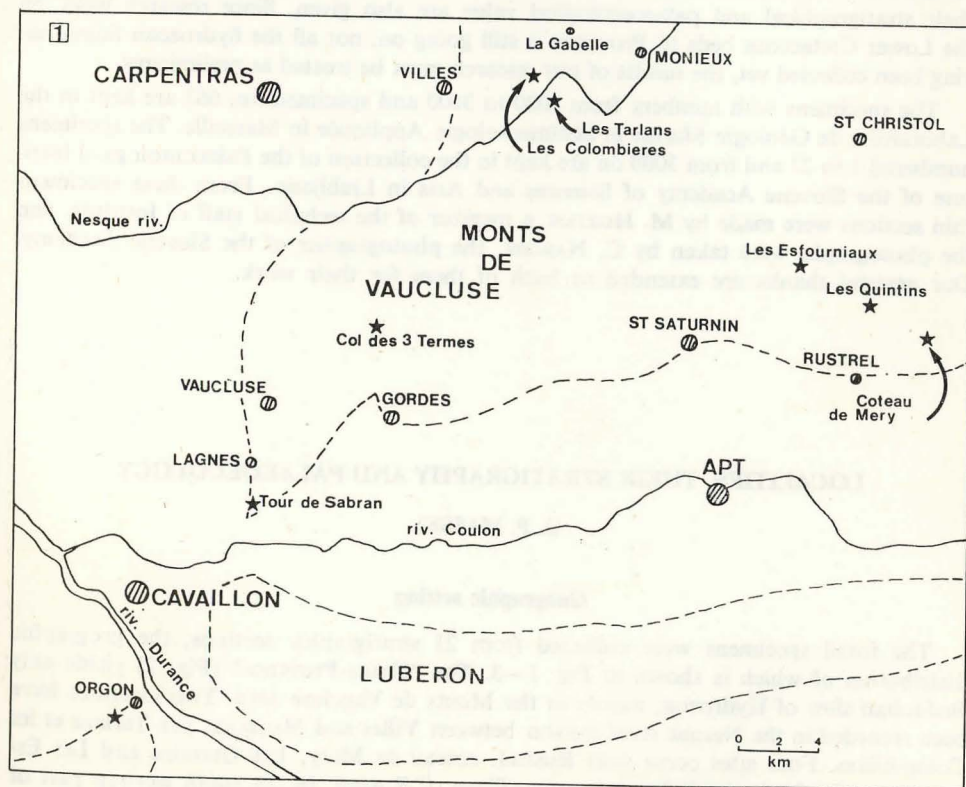


Fig. 2. Hydrozoan localities in the "Haute-Provence"  
Sl. 2. Hidrozojska nahajališča na ozemlju "Haute-Provence"

The southern and south-eastern "Basse-Provence occidentale" (Fig. 3) gives the unique prospected section from Valanginian (but there are several others): Mont Rose on north-western part of Marseille-Veyre Mountain. Hauterivian beds have been observed and sampled on the southern part of Marseille-Veyre just near "La Calanque de la Mounine" (Upper Hauterivian), the same levels have also been recorded near Le Logisson along the road from Marseille to Cassis.

In the Nerthe Mountains the Valtrède-Les Tourre section shows well developed Urgonian facies with the middle and upper part of the Hauterivian (after G. GUIEU, 1959), in which Hydrozoa have been collected. From the Lower and Middle Barremian Mont Puget and Pomègues island have given several specimens of isolated colonies. Upper Barremian specimens have been recorded from Souvarel, Les Camerlots and La Gare de Cassis sections near the village of La Bédoule. A good sampling location stays near Martigues (Nerthe Mountain). At the north of Etang de Berre in La Fare Mountains occur two localities: EDF canal section (Barremian) and Beauminière (Bedoulian). Another Bedoulian locality occurs near Toulon at the Mont Faron section. Some samples are coming from the Orgon quarries (type locality for "Urgonian") with numerous requienids and Monopleurid rudists.

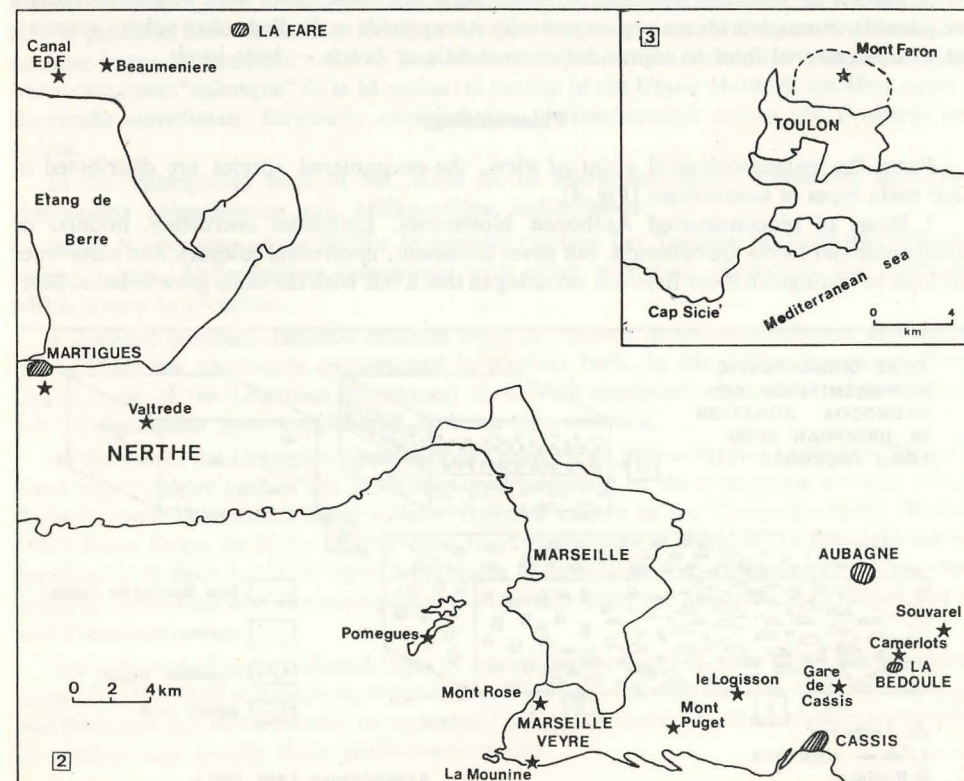


Fig. 3. Hydrozoan localities in the "Basse-Provence occidentale" (compare with fig. 1, situation of maps 2 and 3)

Sl. 3. Hidrozojska nahajališča na ozemlju "Basse-Provence occidentale" (situacija kart 2 in 3 glej na sl. 1)



### Stratigraphy

The examined stratigraphic interval is comprised between the Valanginian and the Bedoulian stages. During this period, occur in Provence two carbonate platform systems. The first one developed during the Valanginian, the second one (main) during the Barremian-Bedoulian times. The Hauterivian corresponds with a basinal phase. These carbonate series are commonly called "Urgonian Limestones".

The Valanginian limestones have not yet been studied with more details. In the Marseille area, they are composed of bioclastic grainstones — packstones (according to Dunham's classification of carbonate rocks) with sparse rudists, nerineids, few corals, abundant foraminifers (*Trocholina alpina*, *Trocholina elongata*, miliolids, etc.), dasyclads, etc.

The Urgonian limestones (Barremian-Bedoulian) show 3 main lithostratigraphic units (from bottom to the top).

1. Marly to pure limestones with occasional cherts, rare ammonites, infauna dominant (*Toxaster*, *Pholadomya*) passing through Bryozoa — Sponge Limestone.
2. Bioclastic-oolitic packstones-grainstones (orbitolinids, dasyclads rich) pure limestones associated with bioconstructed coral beds.
3. Muddy to bioclastic (foraminifers, miliolids rich) limestones with abundant rudists (requienids, monopleurids mainly, caprotinids — caprinids in the Bedoulian solely) associated with occasional inter to supratidal stromatolitic or beach — beds levels.

### Palaeoecology

From the palaeoecological point of view, the encountered species are distributed in four main types of assemblages (Fig. 4).

1. Heart of bioconstructed Anthozoa biostromes. Epibiotics encrusting, nodular or small columnar forms are common, but never dominant, upon coral colonies, and sometimes difficult to distinguish from Bryozoa occurring in this levels with the same growth-habit. Scar-

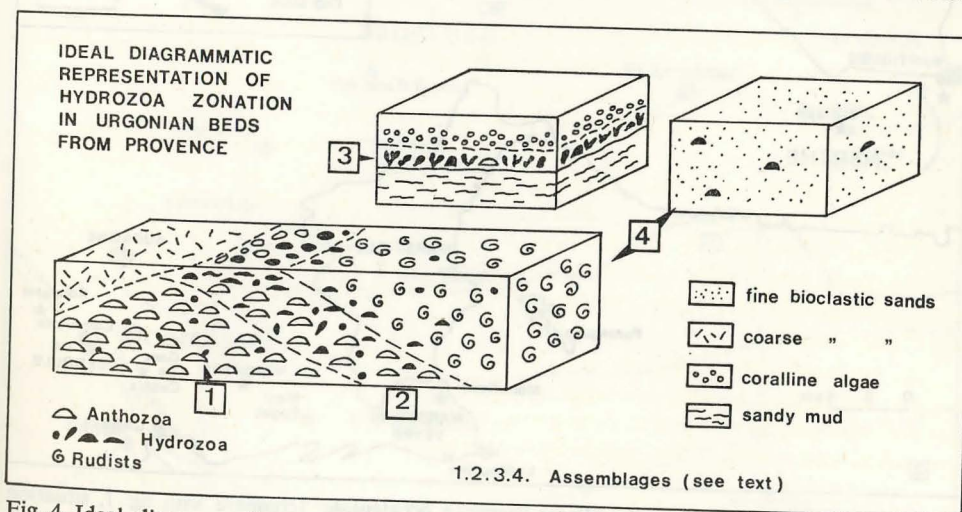


Fig. 4. Ideal diagrammatic representation of fossil zonation in Urgonian beds from Provence  
Sl. 4. Shematski prikaz fosilnih con v urgonskih skladih v Provansi. Podrobnejši opis litoloških členov je podan v povzetku

cely in some parts of these reefs Hydrozoa may constitute more than a half of the organic frame. This is the case of *Dehornella* aff. *harrarensis* and *Spongiomorpha* sp. from the Bedoulian reef of Rustrel - Coteau de Mery.

2. Margin or top of bioconstructed Anthozoa biostromes. In these zones, Hydrozoan fauna is well developed and makes a transition area between the Coral zone and the Rudist zone generally connected with the back reef environments. In these places of inferred decreasing energy occur massive encrusting, low columnar or small nodular colonies. For example:

In the Barremian of Martigues: *Actinostromaria orthogonalis*, *Burgundia wetzeli*, *Dehornella* aff. *harrarensis*, *Tosastroma magna*, *Promillepora provencensis*.

In the Bedoulian of Rustrel: *Actostroma hudsoni*, *Milleporidium kabardinense*, and *Disparistromaria urgonica*.

To this type of assemblage may be related from the top of the Upper Hauterivian — Lower Barremian beds from La Logisson to Cassis section (S. of Marseille): *Steineria tabulata* and *Steineria* cf. *romanica*.

3. Individual banks. The hydrozoan fauna is here broadly dominant and sometimes associated with sparse corals, and coralline algae. A close relationship with assemblage n. 2 is possible. Low branching forms in life position may occur with some encrusting or nodular forms. A beautiful outcrop has been recorded in the south of the Marseille-Veyre Mountain (near "calanque" de la Mounine) at the top of the Upper Hauterivian. Here occur: *Burgundia massiliensis*, *Burgundia semiclastrata*, *Actinostromaria coacta* and *Steineria tabulata*.

In the Valanginian beds of Mt. Rose (S. of Marseille) occur: *Steinerella mesocola*, *Astroporina valanginiensis* and *Milleporidium kabardinense*.

In the Hauterivian of the Nerthe Mountains (section Les Tourres, north of the Valtrede valley), occur: *Milleporidium cylindricum* with other numerous Hydrozoa, the study of which is now in progress.

4. Isolated colonies. Isolated colonies occur in various levels with different associated fauna. They are commonly encountered in Rudists beds. In the chalky limestones from Orgon (type of the Urgonian limestones) occur with numerous requienids and monopleurids: *Promillepora provencensis* and *Steineria* cf. *romanica*.

At the top of the Urgonian limestones of Cassis (S. of Marseille) just under the "Heteroceras zone" (upper part of the Barremian and basement of the stratotypic sections of La Bedoule marly limestones) occur isolated colonies known as the "Zonatella beds" (ROCH, 1927). These forms must be referred here to *Actinostromaria shimizui*. Other Actinostromariidae have been found in levels of possible close relationship environment: *Actinostromaria* cf. *cantabrica* and *Actinostromaria orthogonalis* from the Marseille area (Mont Puget and Pomegues).

The meaning of these different types of assemblages is not yet quite clear. But the occurrence of well defined associations suggests that Hydrozoa are very sensitive to facies changes, and therefore may be very useful to reconstruct palaeoenvironments. More studies are needed to confirm and specify these preliminary results.



## PALAEONTOLOGICAL PART

(D. TURNŠEK)

Researches so far carried out on the  
Lower Cretaceous hydrozoans

So far relatively little research work has been carried out on the Lower Cretaceous hydrozoans. Several species from the Valanginian beds in Switzerland have been described (DEHORNE, 1920, STEINER, 1932, SCHNORF, 1960), just one species from the Hauterivian in Iraq (HUDSON, 1954), and one from the Aptian of Bulgaria (FLÜGEL, 1960). Three species have been described from the Albion in Spain (SCHNORF, 1957). Mention has been made of a few species from the Urgonian in Italy (PARONA, 1933) and of a few rare specimens from the Lower Cretaceous beds in Russia (YAWORSKY, 1947, 1965) and Japan (HAYASAKA, 1917). Chaetetidae from the Lower Cretaceous beds are not described very often either. They frequently occur in the Valanginian of Arzier in Switzerland (SCHNORF, 1963). A few species belong to Urgonian beds whose position has not yet been exactly stratigraphically determined in palaeontological literature.

In France the following Lower Cretaceous hydrozoans were mentioned by DEHORNE (1920): two species (*Stromatopora saccoi* OSIMO and *Zonatella urgoniana* DEHORNE) from the Urgonian of Saint Montant (Ardeche), and one species (*Stromatopora saccoi*) from the Urgonian of Martigues. The hydrozoon *Stromatopora saccoi* should be revised, because the genus *Stromatopora* is limited to the Paleozoic. This species probably belongs to one of the genera of the family Parastromatoporidae. The species *Zonatella urgoniana* is most likely a bryozoon. More specimens of hydrozoans are known from the Cenomanian beds. DEHORNE (1920) mentions them as occurring at Ile Aix, Ile Madame and La Bedoule.

The new finds of hydrozoans in Provence, Southern France, which I have been examining, are the new significant contribution to our knowledge of the Lower Cretaceous hydrozoans; all the more so, for the beds are, stratigraphically, fairly accurately defined. The species now described will therefore provide a good basis for further research on hydrozoan fauna in other places of the Lower Cretaceous Thetys.

## Classification of the Fauna Described

The fossil group of sessil colonial organisms with a characteristic reticular structure and astrorhizae named Stromatoporoidea, has been attributed to a great number of various animal groups, such as the Spongia, the Foraminifera, the Bryozoa and the Hydrozoa. In the last few years it has generally been accepted that this group is the ancestor of the present day hydrozoans. However, HARTMAN and GOREAU (1970) discovered a few recent sponges which bear a great resemblance to the stromatoporoids. They therefore suppose that these fossils should be attributed to the sponges. Doubts as to the justifiability of such a system were raised almost immediately. E. FLÜGEL maintains that there is not enough proof for the stromatoporoids to be attributed to the sponges. STEARN (1972), who has been examining this problem from various points of view, thinks that it would be best to deal with the stromatoporoids as an independent suborder of the group Porifera.

We can see, then, that in spite of some new discoveries concerning sponges, the question of the systematic position of stromatoporoids has not yet been finally solved. The reticular structure of their coenostea, their zooid or coenosteal tubes, their colonial growth, their carbonate skeletons and the microstructure of their skeletal elements undoub-

tedly show that they are related to the hydroid Cnidaria living today. Therefore, I, too, am going to attribute this fossil group to the Hydrozoa, until the systematic position of the stromatoporoids becomes completely clear.

Another question concerning this fossil group is that of its division into the Palaeozoic order Stromatoporoidea and the Mesozoic order Sphaeractinoidea. Judging by their macrostructure there can be no doubt that this is one and the same group of animals. However, opinions vary if the microstructure of the skeletal elements is considered. Some palaeontologists maintain in that the Mesozoic these elements consisted of fibrous calcite matter, whereas the microstructure of the Paleozoic specimens was compact, cellular and meshed. However, fibrous microstructures can be found in some Paleozoic specimens (for example in the genera *Amphipora*, *Stachyodes*) and a cellular-meshed microstructures in some Mesozoic genera. As an example of a cellular-like microstructure STEARN (1972, 373) mentions the genus *Epistromatopora* (= *Parastromatopora*), where the microstructure is known to be clinogonol "with elongate cavities in the skeletal fibres". The question is also raised as to what the primary microstructure of the Paleozoic stromatoporoids was like and whether or not the fibres later on changed or disappeared. When I was examining the Devonian stromatoporoids from Jezersko (TURNŠEK, 1970) and comparing them to the Mesozoic specimens, I, too, came to the conclusion that the difference between the microstructures is not such as to make possible the division into two independent orders especially since several microstructure types of the Paleozoic genera are secondary. It is true that all the Mesozoic hydrozoans have been attributed to genera and families other than those belonging to the Paleozoic. It would be possible, therefore, to combine these Mesozoic forms into one group on the basis of their age, but such a group would not represent a systematic category, i. e. an independent order.

For the classification of genera I have used the currently accepted system the Mesozoic Hydrozoa. I have attributed the genus *Actostroma*, in accordance with HUDSON's suggestion, to the family Stromatorhizidae. However, because of its heterogonol microstructure, this genus has a special place within the superfamily Actinostromariicae. The family Milleporidiidae has been attributed to the superfamily Milleporellidae because the microstructure and the reticulum of the former completely corresponds to those of the latter. The genus Spongiomorpha has been placed in the family Spongiomorphidae whose position among the Cnidaria is as yet not clear, and which represents a connection between the hydrozoans and the corals. The group Chaetetidae has been distinguished as an independent group of Cnidaria.

I have placed the above described Lower Cretaceous Hydrozoa and Chaetetidae from Provence into the following system:

- Classis: HYDROZOA  
 Ordo: STROMATOPOROIDEA  
 Superfamilia: ACTINOSTROMARIICAE HUDSON 1959  
 Familia: ACTINOSTROMARIIDAE HUDSON 1955  
 Genus: *Actinostromaria* DEHORNE 1920  
           *Actinostromaria coacta* SCHNORF  
           *Actinostromaria orthogonalis* n. sp.  
           *Actinostromaria shimizui* YABE et SUGIYAMA  
           *Actinostromaria* cf. *cantabrica* SCHNORF  
           *Actinostromaria* ? *lugeoni* DEHORNE



- Genus: *Disparistromaria* SCHNORF 1960  
*Disparistromaria urgonica* n. sp.
- Familia: STROMATORHIZIDAE HUDSON 1957
- Genus: *Actostroma* HUDSON 1958  
*Actostroma hudsoni* n. sp.
- Superfamilia: MILLEPORELLICAE HUDSON 1959
- Familia: PARASTROMATOPORIDAE HUDSON 1959
- Genus: *Dehornella* LECOMPTE 1952  
*Dehornella* aff. *harrarensis* WELLS
- Genus: *Tosastroma* YABE et SUGIYAMA 1935  
*Tosastroma magna* n. sp.
- Genus: *Steinerella* LECOMPTE 1952  
*Steinerella mesocola* STEINER
- Genus: *Astroporina* HUDSON 1960  
*Astroporina valangiensis* SCHNORF
- Familia: MILLEPORIDIIDAE YABE et SUGIYAMA 1935
- Genus: *Milleporidium* STEINMANN 1903  
*Milleporidium cylindricum* YAWORSKY  
*Milleporidium kabardinense* YAWORSKY
- Genus: *Steineria* HUDSON 1956  
*Steineria* cf. *romanica* (DEHORNE)  
*Steineria tabulata* n. sp.
- Genus: *Promillepora* DEHORNE 1920  
*Promillepora provencensis* n. sp.
- Superfamilia: BURGUNDIICAE TURNŠEK 1967
- Familia: BURGUNDIIDAE DEHORNE 1920
- Genus: *Burgundia* DEHORNE 1916  
*Burgundia wetzeli* (HUDSON)  
*Burgundia semicathrata* (HAYASAKA)  
*Burgundia massiliensis* n. sp.

## SPONGIOMORPHIDA

*Spongiomorpha* sp.

## CHAETETIDA

- Chaetetopsis favrei* (DENINGER)  
*Chaetetopsis krimholzi* YAWORSKY  
*Varioparietes* cf. *lamellosus* SCHNORF-STEINER

## Description of the species

Genus: *Actinostromaria* DEHORNE 1920

*Actinostromaria coacta* SCHNORF

Pl. 1—2

1960a, *Actinostromaria coacta* sp. nov., SCHNORF, 738—740, Pl. 3, Fig. 1—3, Textfig. 7—9  
 1965, *Actinostromaria coacta* SCHNORF, FENNINGER et HÖTZL, 8—9, Taf. 1, Fig. 1

**Description:** Bulbous coenosteum irregularly ramifies. The growth runs from numerous centres radially outwards. Vertical elements dominate, they are thick and uninterrupted, rectangular with horizontal elements, which are likewise numerous but much thinner and interrupted. Sometimes they are shorter than one interspace. In some places they are aligned at the same level forming longer lamellae. In cross section hexactinellid irregular reticulum of round and open spaces and rare points can be seen. Astrorhizae are not distinct, microstructure is orthogonal, interspaces irregular.

| Dimensions:                      | Provence     | SCHNORF      |
|----------------------------------|--------------|--------------|
| thickness of vertical elements   | 0,06—0,20 mm | 0,1—0,2 mm   |
| density of vertical elements     | 7—8/2 mm     | 7/2 mm       |
| thickness of horizontal elements | 0,05—0,1 mm  | 0,08—0,12 mm |
| density of lamellae              | 8—9/2 mm     | varies       |
| width of interspaces             | 0,1—0,15 mm  | —            |

**Comparison:** The specimen from Provence corresponds with the original specimens of this species from Switzerland, especially with the paratype no. 39541 (SCHNORF, 1960, 793, Fig. 9). Its astrorhizae only are not so well expressed. Also FENNINGER and HÖTZL found weakly developed astrorhizae, which are nearer to those of the species *A. regularis*. But the astrorhizal systems may change even in the same coenosteum. So I mean, I am justified to include the French specimen in the species *A. coacta*.

**Distribution:** Valanginian of Arzier in Switzerland, Upper Jurassic of Plassen in Austria.

In Provence this species has been found at La Mounine (specimen 3123C) in Hauterivian beds.

*Actinostromaria shimizui* YABE et SUGIYAMA

Pl. 6, Fig. 1

1935, *Actinostromaria shimizui* sp. nov., YABE et SUGIYAMA, 175—176, Pl. 56, Fig. 6, Pl. 58, Fig. 1—4

1965, *Actinostromaria shimizui* YABE et SUGIYAMA, FENNINGER et HÖTZL, 10—11

**Description:** Coenosteum is massive, roundish with rectangular reticulum of vertical and horizontal elements. Vertical elements are long, laminae are their horizontal protuberations. Microstructure is orthogonal. Here and there orthogonal fibres are not preserved, and skeletal elements look like tabulae, consisting only of medial dark line.

| Dimensions:                      | Provence    | YABE         | FENNINGER    |
|----------------------------------|-------------|--------------|--------------|
| thickness of vertical elements   | 0,1—0,15 mm | 0,11—0,17 mm | 0,08—0,18 mm |
| density of vertical elements     | 6—8/2 mm    | ?8—10/2 mm   | 7—9/2 mm     |
| thickness of horizontal elements | 0,1—0,12 mm | 0,09—0,15 mm | 0,07—0,12 mm |
| width of interspaces             | 0,1—0,2 mm  | —            | 0,18—0,26 mm |

**Comparison:** There is only one thin section at my disposal, however the structure compares well with the first descriptions of Japanese material. The dimensions are the same too, except the density of elements, which YABE mentioned to be more dense than there are in our specimens. But FENNINGER and HÖTZL (1965) enumerated less elements as well.

YABE found the species *A. shimizui* in Torinosu limestone in Upper Jurassic beds, yet he said, that this species is an intermediate form between the Valanginian species *A. lugeoni* and Cenomanian *A. stellata*. We may think, that *A. shimizui* can be considered as a Lower Cretaceous species.



**Distribution:** Torinosu Limestone (? Upper Jurassic) of Japan, Upper Jurassic of Plassen in Austria (if specimens with real tabulae can be ascribed to this species).

In Provence the specimen of the species *A. shimizui* (no. 1349/2) came from Barremian of Les Camerlats.

*Actinostromaria orthogonalis* n. sp.

Pl. 3—4, Pl. 27, Fig. 1

**Derivatio nominis:** it has regular orthogonal reticulum.

**Holotypus:** specimen 3131

**Locus typicus:** La Mounine

**Stratum typicum:** Hauterivian

**Material:** three coenostea with 8 thin sections

**Diagnosis:** *Actinostromaria* with regular rectangular (orthogonal) reticulum. Vertical and horizontal elements are equal in thickness, density and length. There come 8—10 elements on the distance of 2 mm.

**Description:** In longitudinal section the reticulum is a quite regular orthogonal net. Vertical elements and horizontal laminae are equally developed. In transverse section the reticulum is hexactinelid with open and shut slings and with points, which are the cross sections of pillars. Astrorhizae are small, well noticed, they are astrocorridors. Microstructure is orthogonal.

**Dimensions:**

|                                  |              |
|----------------------------------|--------------|
| thickness of vertical elements   | 0,06—0,10 mm |
| density of vertical elements     | 8—10/2 mm    |
| thickness of horizontal lamellae | 0,04—0,12 mm |
| density of lamellae              | 8—10/2 mm    |
| width of interspaces             | 0,15—0,17 mm |
| distance between astrorhizae     | 5—7 mm       |

**Comparison:** If we admit all the established species of the genus *Actinostromaria* in all their small differences in reticular structure, astrorhizae and dimensions, then our specimens cannot be compared with no so far known species in whole. In individual structural characteristics they approach so to the Cenomanian species as to some species of Valanginian or even Upper Jurassic. In the manner of growth, their laminar and latilaminar structures they resemble the species *A. stellata*, which differs in thicker elements and more rare lamellae and smaller astrorhizae. Also similar Valanginian species as *A. leptocana*, *A. jeanetti*, *A. laminaria* and *A. verticalis* have the same number of vertical elements, but denser and shorter laminae. The same density of vertical and horizontal elements has the species *A. maxima* (8—10/2 mm) but it has longer vertical pillars and shorter lamellae. In the dimensions of skeleton there is similar the Tithonian species *A. weberi* from Russia, however it has very large astrorhizae. So I mean that for our specimens the establishment of the new species is justified. It represents the connection between some Valanginian and Cenomanian forms.

**Distribution:** Holotype no. 3131 is from La Mounine, Hauterivian, specimen no. 6 from Martigues, Barremian, and specimen no. 13 from Pomegues, Barremian.

*Actinostromaria* cf. *cantabrica* SCHNORF-STEINER

Pl. 5, Fig. 1—2

1957, *Actinostromaria cantabrica* nov. sp., SCHNORF-STEINER, 558—563, Fig. 5—7  
1960, *Actinostromaria cantabrica* SCHNORF, FLÜGEL, 80—83, Abb. 1—2

**Description:** At my disposal there have been only two thin sections which show a little oblique section of reticulum. Thus it can be seen the roundish shape of coenosteam as well as a part of the vertical and horizontal reticulum. It mainly corresponds to the descriptions of the mentioned species. Skeletal elements are rectangular. Vertical ones are thick, more or less straight. Horizontal are thinner and a little subordinate. They are offsets of vertical elements, and superposed form various long concentric lamellae. Between elements there are wide interspaces and some astrotubes. In cross section the reticulum is very open. Microstructure orthogonal.

| Dimensions:                     | Provence     | SCHNORF       | FLÜGEL       |
|---------------------------------|--------------|---------------|--------------|
| thickness of vertical elements  | 0,08—0,15 mm | 0,065—0,10 mm | 0,06—0,10 mm |
| density of vertical elements    | 6—7/2 mm     | 6—8/2 mm      | 6—8/2 mm     |
| thickness of horizontal laminae | 0,07—0,12 mm | 0,06—0,08 mm  | 0,06—0,10 mm |
| density of horizontal laminae   | 5—6/2 mm     | —             | 4—6/2 mm     |

**Comparison:** The growth of coenosteam and rather sparse reticulum link our specimens well with the species *A. cantabrica*. But our specimens have more regular rectangular skeletal net than Swiss originals, what has been also mentioned by FLÜGEL in Bulgarian specimen of this species. Our specimens have here and there thick vertical elements which resemble to that of the species *A. tokadiensis*, but the latter differs in having larger and denser reticulum. The thickness of elements in our specimens is an intermediate between the species *A. tokadiensis* and *A. cantabrica*. Because it is in other properties closer to *A. cantabrica* I have allocated it to this species with "cf".

**Distribution:** Albian of Cantabria, Aptian of Bulgaria. In Provence two specimens of this species have been found: the specimen no. 1373 from Puget, and specimen marked "stroma" from Pomegues. Both localities are of Barremian age.

*Actinostromaria* ? *lugeoni* DENORNE

1920, *Actinostromaria lugeoni* n. sp., DEHORNE, 75—76, Pl. 3, Fig. 1, Pl. 15, Fig. 2, Pl. 16, Fig. 6—7

1932, *Actinostromaria lugeoni* DEHORNE, STEINER, 94—95, Pl. 2, Fig. 3

1965, *Actinostromaria lugeoni* DEHORNE (?), FENNINGER et HÖTZL, 10, Taf. 1, Fig. 3

From the specimen 1535 I have at my disposal only the transverse thin section of coenosteam. Owing to hexactinelid reticulum and orthogonal microstructure it doubtlessly belongs to the genus *Actinostromaria*. Its large astrorhizae resemble the species *A. lugeoni*, which is known from Lower Neocomian of Sainte Croix and from the Valanginian of Arzier in Switzerland. It was also mentioned by FENNINGER et HÖTZL in the Upper Jurassic of Austria. In Provence the specimen 1535 has been found at Garre de Cassis in the Upper Barremian beds.

Genus: *Disparistromaria* SCHNORF 1960

*Disparistromaria urgonica* n. sp.

Pl. 7—8, Pl. 26, Fig. 2—3

**Derivatio nominis:** it has been found in the Urganian beds

**Holotypus:** specimen 2753

**Locus typicus:** Le Faron

**Stratum typicum:** Lower Aptian (Bedoulian)

**Material:** 3 coenostea, 10 thin sections

**Diagnosis:** *Disparistromaria* with irregular reticulum of short vertical elements and still shorter lamellae, and numerous slightly developed astrotubes.



**Description:** Latilamination is strong, formed of concentric belts of dense and open reticula. In some places belts of dense reticulum are wholly destroyed. Vertical elements are uneven, short, with still shorter offsets rectangular or oblique to pillars. Both are forming irregular reticulum. Interspaces are of various forms, with short tubes among them. SCHNORF names these tubes axial astrotubes. Mostly they are without lateral channals, and therefore they could be considered as coenosteal tubes. In transverse section reticulum is vermiculate, at most with shut spaces. Microstructure is orthogonal, here and there unclear.

#### Dimensions:

|                                |              |
|--------------------------------|--------------|
| thickness of vertical elements | 0,03—0,06 mm |
| density of vertical elements   | 14—16/2 mm   |
| width of interspaces and tubes | 0,06—0,12 mm |
| width of latilaminar zones     | 2—4 mm       |

**Comparison:** Our specimens belong with their typical reticular structure and lack of tabulae, and with their orthogonal microstructure to the genus *Disparistromaria*. So far two species of this genus has been known. Our specimens resemble the species *D. tenuissima* SCHNORF from which they differ in more numerous and less marked tubes. Latilaminae are better seen in the new species, however it is owing to the different ecological conditions. Latilaminar structure with irregular reticulum can be seen at the family Milleporidiidae, but the representatives of this family has tabulae and clinogonal microstructure. Similar reticulum as *Disparistromaria* and lack of tabulae has the genus *Actostroma*, but *Actostroma* has heterogonal microstructure without medial dark line (compare Pl. 26, Fig. 2, 3 and 4). All these relations and differences show, that the new species is justified and its allocation to the genus *Disparistromaria* argued.

**Distribution:** To the new species *D. urgonica* I have ascribed the following specimens from Provence: holotype no. 2753 and specimen no. 2754 from Le Faron, Bedoulian, specimen no. 2404 from Rustrel, Bedoulian, and specimen no. 3252 from Souvarel, Barremian.

#### Genus: *Actostroma* HUDSON 1958

##### *Actostroma hudsoni* n. sp.

##### Pl. 9, Pl. 26, Fig. 4

**Derivatio nominis:** the name is dedicated to the palaeontologist Prof. R. G. S. HUDSON

**Holotypus:** specimen no. 1

**Locus typicus:** Les Tarlans

**Stratum typicum:** Lower Aptian (Bedoulian)

**Material:** 4 coenostea and 9 thin sections

**Diagnosis:** *Actostroma* with latilaminar belts of open and dense reticula, with short and common coenosteal tubes.

**Description:** Coenosteam is latilaminar, nodular. Latilaminae are formed of concentric belts with alternations of dense and sparse reticula. Vertical elements are proportionally long, uneven, with horizontal offsets, which are rectangular or not, in one interspace. When all aligned at the same levels they form longer laminae. Both elements form irregular reticulum. In some places two neighbouring vertical elements join, and thick wall arises. Between elements there are irregular interspaces and common short tubes. These tubes

are without lateral channals and have no tabulae. In transverse section reticulum is vermiculate. Microstructure is in our specimens without medial dark line, all the skeleton is equal.

#### Dimensions:

|                                |              |
|--------------------------------|--------------|
| thickness of vertical elements | 0,05—0,07 mm |
| density of vertical elements   | 15—17/2 mm   |
| width of tubes                 | 0,06—0,1 mm  |
| width of latilaminae           | 0,5—1,2 mm   |

**Comparison:** From all known species of this genus our specimens can be mostly compared with *A. damesini*. They differ in more numerous but less marked tubes, which, have no lateral channals. In reticular structure the new species and *A. damesini* much approach the genus *Disparistromaria*, from which they differ in microstructure. HUDSON (1958) named the microstructure of the genus *Actostroma* heterogonal. It has no real medial dark line therefore it is a question, if this genus belongs to Actinostromariidae.

**Distribution:** In Provence the specimens of this species has been collected from Les Tarlans (no. 1, holotype), from Col des 3 Termes (no. 20), and from Tour de Sabran (no. 2515, 2379). All the localities are of Bedoulian (Lower Aptian) age.

#### Genus: *Dehornella* Lecompte 1952

##### *Dehornella* aff. *harrarensis* (Wells)

##### Pl. 10

1943, *Stromatopora harrarensis*, n. sp., Wells, 50, Pl. 8, Fig. 1—5

1954, *Stromatopora harrarensis* Wells, HUDSON, 219, Pl. 7, Fig. 4

1960, *Dehornella harrarensis* (Wells), HUDSON, 194—195, Pl. 28, Fig. 3, 4, 9, 10, Textfig. 3A, 6

1965, *Dehornella* aff. *harrarensis* Wells sensu HUDSON, FENNINGER et HÖTZL, 35—36, Taf. 2, Fig. 6

**Description:** Encrusting coenosteam of irregular shape, 5 cm high and 8 cm wide. Reticulum latilaminar of concentric belts with sparse and dense elements. Vertical elements in some places very dense or even joined, forming thick walls. Horizontal lamellae are the offsets of vertical pillars, they are not longer than the width of one interspace. Between the elements there are elongated uneven tubes and interspaces with rare tabulae. Astrosystems of astrocorridor type are common, large, microstructure clinogonal.

| Dimensions:                    | Provence                | HUDSON      |
|--------------------------------|-------------------------|-------------|
| thickness of vertical elements | 0,15—0,27 mm            | 0,2—0,3 mm  |
| density of vertical elements   | 6—7/2 mm                | —           |
| width of interspaces and tubes | 0,07—0,24 (joined more) | 0,4 or less |
| distance between astrorrhizae  | 6—8 mm                  | 7—9 mm      |

**Comparison:** Our specimens compare well with HUDSON's ones, only with a difference that interspaces are somewhat narrower. However, when joined they are larger, and I mean the difference arises just because of joining.

**Distribution:** Upper Jurassic of Kurtch in Ethiopia, Oman in Arabia, Sinai, and Tressenstein in Austria.

In Provence this species has been found at the findingplace Martigues (no. 8, 9/1, 9/2, 11) in Barremian strata.



Genus: *Tosastroma* YABE et SUGIYAMA 1935*Tosastroma magna* n. sp.

Pl. 11, Fig. 1—4, Pl. 27, Fig. 1

Derivatio nominis: it has large vertical elements

Holotypus: specimen: 12

Locus typicus: Martigues

Stratum typicum: Barremian

Material: the only coenosteum with 2 thin sections

Diagnosis: *Tosastroma* with continuous thick uneven vertical elements, rare horizontal lamellae, and narrow coenosteal tubes with rare tabulae.

Description: Coenosteum semicircular, massive. Reticulum of continuous thick vertical elements, which in some places join with neighbouring pillars or they are connected with short transverse offsets. Between elements there are narrow coenosteal tubes and interspaces nearly without channels. In transverse section reticulum is vermiculate. Microstructure is clinogonal, sometimes the centres of elements seem to be destroyed and hollow.

## Dimensions:

|                                |              |
|--------------------------------|--------------|
| thickness of vertical elements | 0,1—0,3 mm   |
| width of interspaces or tubes  | 0,08—0,15 mm |
| density of vertical elements   | 7/2 mm       |

Comparison: The genus *Tosastroma* has been allocated in the family Parastromatoporidae by HUDSON, where it is especially close to the genera *Parastromatopora*, *Astroporina* and *Dehornella*. But it differs from all of them in the absence of tabulae and absence of astrorhizal systems. From *Dehornella* it differs in that it has no doubled concentric reticulum. From the species *Tosastroma tokunagai* it differs in much thicker vertical elements, what justifies to set up the new species. The third known species of the genus *Tosastroma* is *T. kiiensis*, which has very thin reticulum. FENNINGER et HÖTZL (1965) supposed it to belong to the genus *Actostroma*.

Genus: *Steinerella* LECOMPTE 1952*Steinerella mesocola* (STEINER)

Pl. 12 Fig. 1—2

1932, *Stromatopora mesocola* n. sp., STEINER, 105, Pl. 8, Fig. 1—3, Pl. 9, Fig. 1, Pl. 14, Fig. 11952, *Steinerella mesocola* STEINER, LECOMPTE, 26—27, Pl. 3, Fig. 1—21963 a, *Steinerella mesocola* STEINER, SCHNORF-STEINER, 1134—1135, Pl. 1, Fig. 1—4, Pl. 2, Fig. 1—2, Pl. 3, Fig. 1—3

Description: Massive and dendroid coenosteum has axial and peripheral reticula. Vertical elements run radial a little tortuous they are long. Horizontal elements are very short. Between the skeleton there are coenosteal and astrorhizal tubes which run through the whole coenosteum and have numerous tabulae, which can be aligned at the same levels. Astrorhizae are large. In axial reticulum the skeletal elements are much thinner as in peripheral one. There are less tubes and astrorhizae in axial part too. Microstructure is clinogonal.

## Dimensions:

|                                | Provence     | SCHNORF      |
|--------------------------------|--------------|--------------|
| thickness of vertical elements | 0,1—0,18 mm  | 0,08—0,18 mm |
| density of vertical elements   | 7—9/2 mm     | 8—14/2 mm    |
| width of tubes                 | 0,15—0,35 mm | 0,16—0,34 mm |
| density of tabulae             | 8—10/2 mm    |              |

Comparison: Vertical elements of our specimen are somewhat denser as of original specimens from Switzerland. But they fall in the variation of the species.

Distribution: Valanginian of St. Croix and Arzier in Switzerland. In Provence it has been found on Mt. Rose (no. 2476) in Valanginian beds.

Genus: *Astroporina* HUDSON 1960*Astroporina valangiensis* SCHNORF

Pl. 13, Fig. 1—3

1960c, *Astroporina valangiensis* sp. nov., SCHNORF, 729—730, Pl. 1, Fig. 1—4, Pl. 2, Fig. 1 Pl. 3, Fig. 1—2, Textfig. 1—2

Description: Coenosteum massive and encrusting. Reticulum of vertical parallel elements, in some places straight in others tortuous. When two neighbouring pillars join a solid wall is formed. Horizontal lamellae are rare, short, but there are very numerous tabulae in the tubes. SCHNORF (1960c, 730) and HUDSON (1960, 196) mean these tubes to be astrocorridors which spread in vertical and radial directions through the coenosteum. Microstructure clinogonal.

| Dimensions:                    | Provence     | SCHNORF      |
|--------------------------------|--------------|--------------|
| thickness of vertical elements | 0,15—0,23 mm | 0,15—0,34 mm |
| density of vertical elements   | 4—5/2 mm     | 4—5/2 mm     |
| density of tabulae             | 6—8/2 mm     | —            |
| distance of astrorhizae        | ca 6         | 5—10 mm      |

Comparison: Our specimen wholly corresponds with the original specimens from Switzerland.

Distribution: Lower Valanginian in Jura of Switzerland. In Provence this species has been found on Mt. Rose (no. 2477) in Valanginian beds.

Genus: *Milleporidium* STEINMANN 1903*Milleporidium cylindricum* YAWORSKY

Pl. 14, Fig. 3

1947, *Milleporidium cylindricum* nov. sp., YAWORSKY, 21—22, Tab. 10, Fig. 5—7

Description: Cylindrical and encrusting coenosteum of 10 mm high and diameter of about 20 mm. In the middle of the cylinder there is a sediment. Reticulum consists of parallel zooid, tubes crossed by tabulae at various levels. These tubes are enclosed with walls or vertical elements, which are parallel but uneven, bearing lateral offsets. In transverse section the reticulum is vermiculate with round or polygonal sections of tubes. Microstructure is clinogonal with short fibres, in some places some medial dark belt can be observed.

| Dimensions:              | Provence      | YAWORSKY     |
|--------------------------|---------------|--------------|
| width of tubes           | 0,10—0,15 mm  | 0,10—0,15 mm |
| thickness of elements    | 0,10—0,15 mm  | 0,13—0,17 mm |
| thickness of tabulae     | 0,012—0,02 mm | 0,015 mm     |
| distance between tabulae | 0,15—0,25 mm  | 0,10—0,30 mm |

Comparison: The specimen from Provence wholly corresponds with the holotype from Russia. The growth of coenosteum and the shape of tubes are special in this species and they can be distinguished from the other species of this genus.

Distribution: The only so far known specimen of the holotype is from Sequanian beds of Crimea. In Provence it has been found at Valtrede (specimen no. 663) in Hauterivian.



*Milleporidium kabardinense* YAWORSKY

Pl. 14, Fig. 1—2

1947, *Milleporidium kabardinense* n. sp., YAWORSKY, 19—20, Tab. 9, Fig. 6, 8

Description: Coenosteum massive, cylindrical, latilaminar, of 20 × 10 mm in diameter. Vertical elements dominant, horizontal short, both forming irregular reticulum and enclosing numerous zooid tubes in which tabulae occur at certain levels forming concentric belts or latilaminae. Between the two neighbouring belts the skeletal elements and tubes are continuous. Microstructure is clinogonal in some places not distinct.

| Dimensions:                    | Provence     | YAWORSKY             |
|--------------------------------|--------------|----------------------|
| thickness of vertical elements | 0,06—0,10 mm | —                    |
| thickness of tabulae           | 0,02 mm      | —                    |
| density of vertical elements   | 8—12/2 mm    | 5—6/1 (10—12/2) mm   |
| distance between latilaminae   | 1—1,5 mm     | 1—1,5 mm             |
| width of all tubes             | 0,08—0,25 mm | 0,2—0,27 (larger) mm |

Comparison: Our specimens compare well with the first described specimens from the Russia. *M. kabardinense* differs from other species of this genus in cylindrical shape of coenosteum, very abundant tubes and in aligned tabulae.

Distribution: Valanginian of Caucasus, Barremian of Crimea, Upper Jurassic of Austria. In Provence it comes from the locality Mt. Rose, (2478) Valanginian, and from Tour de Sabran (2378), Bedoulian.

Genus: *Steineria* HUDSON 1956*Steineria* cf. *romanica* (DEHORNE)

Pl. 15, Fig. 1—3

1918, *Stromatopora romanica* n. sp., DEHORNE, 2211956, *Steineria romanica* (DEHORNE), HUDSON 723—727, Pl. 75, Fig. 1—4, 9—10, Textfig. 2—5 (with synonymy)1965, *Steineria romanica* (DEHORNE), FENNINGER et HÖTZL, 28—29

Description: Massive encrusting coenosteum, latilaminar, with more centres of growth. Vertical elements are discontinuous, sometimes two of them join, forming thick wall. They are lateral offsets which aligned form short lamellae. Reticulum is very irregular with irregular interspaces and tubes. More constant are tabulae which are aligned at the same levels. In transverse section the reticulum is vermiculate with lateral astrotubes. Microstructure is indistinctly clinogonal.

Dimensions: correspond to those described by HUDSON. Thickness of vertical elements 0,08—0,15 mm (when joined, more), density of vert. elements 13—14/2 mm, width of tubes 0,09—0,2 mm.

Comparison: Our specimens differ from those of HUDSON in having less horizontal laminae, therefore I mark them "cf".

Distribution: Upper Oxfordian of Romania, Kimmeridgian of Austria. In Provence it has been collected from Orgon, (no. 2091), from Martigues (22), Puget (1414) all of Barremian age, and from Le Logisson (2270) of Hauterivian age.

*Steineria tabulata* n. sp.

Pl. 16—17, Pl. 27, Fig. 2—3

Derivatio nominis: It has numerous tabulae

Holotypus: specimen 3125B

Locus typicus: La Mounine

Stratum typicum: Hauterivian

Material: 11 coenostea with 12 thin sections

Diagnosis: *Steineria* with numerous tabulae that are perpendicular to pillars, aligned at the same levels, and both form orthogonal reticulum.

Description: Coenosteum semicircular, or encrusting or roundish, 10 to 30 mm large. Slightly latilamination is due to alternation of concentric belts with dense and sparse reticula. Vertical elements dominate, they are long but uneven, laminae are very rare. There are abundant tabulae which appear in concentric belts. In one belt there are two to five tabulae. Between the elements irregular interspaces occur, and a little longer coenosteal tubes. In transverse section the reticulum is vermiculate, irregular, without astrophorae. Microstructure is clinogonal.

Dimensions:

|                                |              |
|--------------------------------|--------------|
| thickness of vertical elements | 0,03—0,05 mm |
| thickness of tabulae           | 0,01 mm      |
| width of interspaces and tubes | 0,06—0,15 mm |
| density of vertical elements   | 14—15/2 mm   |
| distance of tabulae (in belt)  | 0,05 mm      |
| distance of tabular belts      | 1,5 mm       |

Comparison: The new species differs from *S. romanica* in monocentric coenosteum, in thinner skeletal elements and in narrower tubes. It differs also from all other species of this genus in having more numerous tabulae. The new species has owing to the weakly expressed latilaminae more regular reticulum. In vertical reticulum it is much similar to the genus *Actinostromarianina* but the latter has orthogonal microstructure. From the genus *Milleporidium* the new species differs in that it has no zooidal tabular tubes. In reticular structure it most approaches the genus *Paramilleporella* (FENNINGER et HÖTZL, 1965) which has the same number of vertical and horizontal elements that are in FENNINGER's opinion formed of tabulae. Thus our new species is a nice intermediate form between the genera *Steineria* and *Paramilleporella*.

Distribution: The specimens of the new species has been collected from La Mounine (no. 3123B, 3123C, 3125A, 3125B) and from Le Logisson (no. 2750, 2752) in Hauterivian

Genus: *Promillepora* DEHORNE 1920*Promillepora provencensis* n. sp.

Pl. 18, 19

Derivatio nominis: it has been found in Provence (southern France)

Holotypus: specimen no. 16

Locus typicus: Orgon

Stratum typicum: Barremian

Material: 3 coenostea (no. 8, 16, 19), with 8 thin sections

Diagnosis: *Promillepora* with very irregular latilaminar reticulum and rare autotubes.

Description: The coenosteum has a shape of thick branch or cylinder with a diameter of 25 mm. The length is unknown. Reticulum is of very irregular tortuous short vertical and horizontal elements. Vertical ones grow radially from the centre outwards and dominate. They are uneven and variously long. Their density changes in concentric belts or "lati-



laminae". Horizontal elements are shorter offsets of pillars and do not represent real lamellae because they do never reach over the length of one interspace. Interspaces are of various forms. Tubes (named by HUDSON autotubes) are somewhat wider but uneven as well. Tabulae are rare. Microstructure is clinogonal somewhere destroyed. In some sparse latilaminae the whole reticulum is destroyed.

#### Dimensions:

|                                |                          |
|--------------------------------|--------------------------|
| thickness of vertical elements | 0,04—0,1 (joined 0,3) mm |
| width of interspaces           | 0,04—0,06 mm             |
| width of tubes                 | 0,1 (some 0,2) mm        |

Comparison: Our specimens distinguish from all known species of the genus *Pro-millepora* in having larger coenosteum and smaller tubes. The systematic position of this genus and its similarity has been already discussed by HUDSON (1956, 720—722). The described specimen resembles in reticular structure the species *Adaequoparietes schnorfae* BALTRES (1970), but the later has still shorter and more irregular elements and tubes.

Distribution: Specimens of this new species has been collected from Orgon (no. 16, 19), and from Martigues (no. 8). Both localities are of Barremian age.

Genus: *Burgundia* DEHORNE 1916

*Burgundia wetzeli* (HUDSON)

Pl. 20, Fig. 1—3

1954, *Bekhmeia wetzeli* n. sp., HUDSON, 49—51, Pl. 7—8  
1956, *Burgundia wetzeli* (HUDSON), SCHNORF-STEINER, 570

Description: Coenosteum initially nodular, than branched. Individual branches 10—25 mm in diameter. Reticulum of concentric lamellae and short vertical elements, that do not reach over one interlamellar space. Vertical elements here and there enclose small channels, somewhere they are only short rods. Astrorhizae are rare, compound of one or more axial astrotubes. In transverse section the reticulum is vermiculate. Microstructure is the same as described by HUDSON. Horizontal laminae have different microstructure as vertical pillars, and even at laminae it is not always the same. Pillars have granular or homogeneous microstructure, in lamellae it is zonated with a light axial part and somewhat darker periphery. Somewhere lamellae have one darker zone and one light zone.

| Dimensions:                    | Provence     | HUDSON         |
|--------------------------------|--------------|----------------|
| thickness of lamellae          | 0,06—0,1 mm  | —              |
| thickness of vertical elements | 0,05—0,07 mm | 50—60/ $\mu$   |
| density of lamellae            | 8/2 mm       | —              |
| density of pillars             | 8—9/2 mm     | —              |
| width of tubules               | 0,10—0,19 mm | 100—120/ $\mu$ |

Comparison: HUDSON (1954) has the species *B. wetzeli* ascribed to his new genus *Bekhmeia*, which he distinguished from *Burgundia* in "that the interlamellar structures are tubules and not branching pillars or laminae, and in that the reticulum of the coenosteal branch is differentiated into axial and peripheral zones". SCHNORF (1956) has revised *Bekhmeia* and she ascribed it to the genus *Burgundia* (see also TURNŠEK, 1967). Specimens from Provence correspond with HUDSON's descriptions of the species *B. wetzeli*. In interlamellar spaces there are tubules, but those were mentioned by HUDSON at the species *Burgundia steinerae* (1955), and by KELLAWAY and SMITH (1938) at *B. tutcheri* and other species of

*Burgundia*. FENNINGER (1965, 40) said, that these tubules are astrotubes which appear in almost all species of the genus *Burgundia*. Also axial and peripheral reticula can be seen in some species of this genus. So I agree with A. SCHNORF and allocate *Bekhmeia wetzeli* into the genus *Burgundia*.

Distribution: Hauterivian of Iraq. In Provence the only specimen of this species (no. 7) has been found at Martigues in Barremian beds.

*Burgundia semiclastrata* (HAYASAKA)

Pl. 21, Fig. 1—3

1917, *Circoporella semiclastrata* sp. nov., HAYASAKA, 58—59, Pl. 14, Fig. 1—8  
1920, *Burgundia semiclastrata* HAYASAKA, DEHORNE, 73, Textfig. 8  
1957, *Burgundia barremensis* sp. nov., YAWORSKY, 27—28, Tab. 12, fig. 2, 3

Description: Coenosteum is irregularly circular or branched. Reticulum of continuous horizontal lamellae and vertical pillars between them. In transverse section reticulum is vermiculate. Astrorhizae are common and run through the whole coenosteum. They are crossed by tabulae. Microstructure is like that of previous species.

| Dimensions:                    | Provence     | YAWORSKY<br><i>B. barremensis</i> | HAYASAKA      |
|--------------------------------|--------------|-----------------------------------|---------------|
| thickness of lamellae          | 0,08—0,12 mm | 0,06—0,10 mm                      | 0,09—0,12 mm  |
| thickness of vertical elements | 0,07—0,1 mm  | 0,06—0,1 mm                       | 0,06—and more |
| distance between laminae       | 0,2—0,7 mm   | 0,16—0,6 mm                       | 0,3—0,8 mm    |
| density of lamellae            | 5—6/2 mm     | —                                 | —             |
| density of pillars             | 5—7/2 mm     | —                                 | —             |
| width of astrotubes            | 0,25—0,4 mm  | 0,3—0,5 mm                        | 0,3—0,4 mm    |

Comparison: YAWORSKY (1957) distinguished species *B. barremensis* from *B. semiclastrata* in that it has different form of coenosteum and somewhat finer structure. We know, that different forms of coenosteum can appear at the same species. The dimensions of *B. barremensis* compare well with *B. semiclastrata*. Therefore I mean, that *B. barremensis* can be included in *B. semiclastrata*. FENNINGER and HÖTZL (1965) supposed *B. barremensis* to be identified with *B. steinerae*. However the latter has thinner (0,01 mm) and denser skeletal elements therefore I recognise it as an independent species.

Distribution: Lower Cretaceous Torinosu Limestone of Japan, Barremian beds in Caucasus in Armenia.

In Provence this species has been collected from La Mounine (specimens no. 3125 A, 3125 B, 3123 B) of Hauterivian age and from Canal EDF (no. 24) of Barremian age.

*Burgundia massiliensis* n. sp.

Pl. 22—23, Pl. 27, Fig. 4

Derivatio nominis: it is named after Massilia, an old name of Marseille

Holotypus: specimen 3125 C

Locus typicus: La Mounine, near Marseille

Stratum typicum: Hauterivian

Material: 10 branched coenosteal with 6 thin sections

Diagnosis: *Burgundia* with rare horizontal lamellae which occur in the peripheral part of coenosteum

Description: Coenosteum is irregularly branched. Individual coenosteal rods are 50 mm long with diameter of 5—10 mm. Coenosteum has axial and peripheral reticula,



like at the species *B. wetzeli*, but lamellae are limited to the extreme periphery of coenosteum, 2 or 3 or even 7 lamellae run concentrically parallel to the outer edge of coenosteum. Rarely any lamella extend more to the inner part of coenosteum. Between lamellae there are short vertical elements, which reach the distance of one interlaminal space. Axial reticulum is vermiculate with a little longer vertical elements. Astorhizal systems are well developed. They are single astrotubes with lateral channels, most of which extend in the transitional zone between the axial and peripheral reticula. Along the inner lamella such channels run at long distances.

#### Dimensions:

|                                |              |
|--------------------------------|--------------|
| thickness of lamellae          | 0,05—0,07 mm |
| thickness of vertical elements | 0,04—0,07 mm |
| width of astrotubes            | 0,2—0,35 mm  |

Comparison: In having typical horizontal lamellae our specimens belong doubtlessly to the genus *Burgundia*. Owing to the form of astrosystems and presence of double reticulum they most approach the species *B. wetzeli* from which they differ in smaller number of lamellae limited to the periphery of the coenosteum. Astrotubes at new species are thicker. In the growth of coenosteum the new species resembles the species *B. semiclathrata* which has more lamellae.

Distribution: All the coenostea of the new species has been found at La Mounine (no. 3125C) in the Hauterivian beds.

### SPONGIOMORPHIDA

#### *Spongiomorpha* sp.

The specimen no. 2338 belongs to the fossil group Spongiomorphida that is very similar to some fungiid corals. This is a colony or coenosteum with irregular structure of vertical and horizontal elements. Vertical elements predominate. They have strong geniculated thicknesses at some levels, from which different horizontal offsets arise, forming lamellae (or dissepiments). In transverse section the pattern of reticulum is vermiculate. Some star-like structures could be astorhizae. The representatives of *Spongiomorpha* are known from the whole Mesozoic, and generically have no stratigraphic value.

The mentioned specimen has been found on Cot. de Mery in Lower Aptian (Bedoulian) beds.

### CHAETETIDA

#### *Chaetetopsis favrei* (DENINGER)

Pl. 24, Fig. 1—2

1906, *Monotrypa favrei* n. sp., DENINGER, 64—65, Taf. 6, Fig. 5  
1930, *Chaetetopsis favrei* DENINGER, PETERHANS, 35—36, Pl. 1—3

Description: Roundish massive coenosteum with parallel tubes that are somewhere tortuous, and in longitudinal section they look like to end pointly. At some levels they bear tabulae. The wall is thinner than the diameter of tubes, it is not always smooth but has lateral offsets. In cross section the tubes are polygonal or roundish or of irregular form. Microstructure is clinogonal.

| Dimensions:           | Provence     | PETERHANS    |
|-----------------------|--------------|--------------|
| width of tubes        | 0,18—0,30 mm | 0,2—0,3 mm   |
| thickness of the wall | 0,04—0,06 mm | 0,04—0,07 mm |
| density of tubes      | 3/2 mm       | —            |

Comparison: Our specimen corresponds in all the characteristics with the previous descriptions of this species.

Distribution: First this species was described from the Urgonian beds of Avoudruz (Mt. Salève), latter on it was found in Urgonian of Wildhorn in Switzerland.

The specimen from Provence (no. 21) comes from Orgon and is of Barremian age.

#### *Chaetetopsis krimholzi* YAWORSKY

Pl. 24, Fig. 3—4

1947, *Chaetetopsis krimholzi* sp. nov., YAWORSKY, 23, Tab. 10, Fig. 13, Tab. 11, Fig. 1—5  
1961, *Chaetetopsis krimholzi* JAVORSKI, BACHMAYER et FLÜGEL, 155—156, Taf. 20, Fig. 1, Taf. 22, Fig. 3  
1965, *Chaetetopsis krimholzi* YAWORSKY, FENNINGER et HÖTZL, 48, Taf. 8, Fig. 5

Description: Exact descriptions of this species have been given by authors mentioned in synonymy. Long parallel tubes are enclosed by thick walls. Tabulae are at the same levels and make coenosteum zonate or latilaminar. In one belt there are 1 to 5 tabulae. Towards the bottom of the coenosteum these belts are denser. Microstructure is clinogonal.

| Dimensions:                 | Provence     | YAWORSKY       | FLÜGEL       |
|-----------------------------|--------------|----------------|--------------|
| diameter of tubes           | 0,1—0,25 mm  | 0,14—0,24 mm   | 0,13—0,20 mm |
| thickness of wall           | 0,05—0,07 mm | 0,06—0,07 mm   | 0,08 mm      |
| thickness of tabulae        | 0,02—0,03 mm | 0,017—0,025 mm | —            |
| distance of latilaminae     | 0,7—2,5 mm   | 0,3—2,3 mm     | 0,6—1,1 mm   |
| distance of tabulae in belt | 0,1—0,2 mm   | 0,1—0,3 mm     | —            |

Comparison: The specimens from Provence distinguish from the other described specimens of this species in having some smaller tubes. But the most of tubes are with diameter of 0,15 mm, and I mean, that some smaller tubes can be regarded as a variation of this species. *C. krimholzi* shows a great similarity with *Varioparietes separatus* SCHNORF, which might be its younger synonymus.

Distribution: Tithonian of Crimea, Hauterivian of Turkmenia, Tithonian of ČSR and Austria.

In Provence this species has been collected from Coteau de Mery (no. 15), Les Quintins (no. 2097), and Les Tarlans (no. 2), all of Bedoulian (Lower Aptian) age.

#### *Varioparietes* cf. *lamellosus* SCHNORF-STEINER

Pl. 26

1963b, *Varioparietes lamellosus* gen. nov. spec. nov., SCHNORF-STEINER, 1119—1122, Pl. 1—2

Description: Massive, latilaminar (zonate) coenosteum consists of parallel tubes which are roundish, polygonal or open in transverse section. Their growth is interrupted in some zones in which recrystallisation took place. Such destroyed zones make reticulum latilaminar. The walls of tubes look in longitudinal section like vertical element of Milleporidiidae. Here and there these vertical elements join and form thick walls. Somewhere they have lateral offsets. Microstructure is clinogonal.



| Dimensions:       | Provence     | SCHNORF       |
|-------------------|--------------|---------------|
| thickness of wall | 0,06—0,07 mm | 0,04—0,08 mm  |
| diameter of tubes | 0,1—0,15 mm  | 0,10—0,163 mm |
| density of tubes  | 9—10/2 mm    | 8—10/2 mm     |

Comparison: In tubular structure of reticulum our specimen corresponds with *Varioparietes lamellosus*. It differs in wider recrystallised zones or latilaminae, which are in my opinion the consequence of intensiver recrystallisation and can be seen also at the paratypus from Arzier (SCHNORF-STEINER, 1963, Pl. 1, Fig. 1). Tabulae in our specimen are aligned along the outer parts of destroyed latilaminae, where they are not seen well as at holotypus. Therefore I mean, it is correct to allocate our specimen to this species. In longitudinal section some species of *Varioparietes* resemble very much the genus *Milleporidium*. Perhaps it would be better to ascribe *Varioparietes* to the family Milleporidiidae?

Distribution: Valanginian of Switzerland. In Provence the specimen 23 has been found at Canal EDF in Barremian beds.

#### Comparison of Hydrozoan localities

The described Hydrozoa and Chaetetidae from Southern France show similarity to some of those found in Lower Cretaceous and the Upper Jurassic strata (Table). *Astroporina valangiensis* and *Steinerella mesocola*, which are known from the Valanginian of Switzerland, have also been found in the same strata in Provence. Therefore, they are, for the time being, stratigraphically limited to a narrow horizon. *Burgundia wetzeli* also shows reasonable stratigraphical agreement, previously known from the Hauterivian strata in Iraq, it occurs in the Barremian in Provence. *Burgundia semicathrata*, which has been found in the Lower Cretaceous Torinosu limestone in Japan and in the Barremian strata in the Caucasus, appears in Provence in the Hauterivian and Barremian beds. The species *Actinostromaria cantabrica*, described from the Albian of Spain, and the Aptian of Bulgaria, can be found in Provence in the Barremian. *Chaetetopsis favrei*, established in the Urganian of France and Switzerland, has been discovered in Provence in the Barremian. *Chaetetopsis krimholzi*, known from the Hauterivian of Turkmenia, occurs, in Provence, in the Lower Aptian. *Milleporidium kabardinense*, which has been established in the Barremian strata of the Crimea and in the Valanginian strata of the Caucasus, has been found in Provence in the Valanginian as well as in the Barremian beds.

There is a considerable stratigraphical agreement between the species so far known from the Valanginian strata of Arzier in Switzerland and those found recently in Provence in the Hauterivian and Barremian beds. These are the species *Actinostromaria coacta*, *A. lugeoni* and *Varioparietes lamellosus*.

Thus we can see that eleven species originate from the same or very similar horizons. A stratigraphical value can therefore be attributed to these species, which prove the Lower Cretaceous age of the strata in Provence.

The seven new species, too, are, as yet, limited to particular horizons of the Lower Cretaceous. However, their stratigraphical importance will be shown only after further finds are made.

In the Lower Cretaceous of Provence I have determined another four species which have so far been known only from the Upper Malmian or from the Tithonian. In Provence these species occur in the Hauterivian, Barremian and Lower Aptian strata. These four species are: *Actinostromaria shimizui*, from Japan, *Dehornella*

| DISTRIBUTION OF SPECIES                   |                       | FINDING PLACES IN PROVENCE |              |              |              |              |              |              |              |              |              |              |              |              |              | STRATIGRAPHIC CORRELATION OF SPECIES |              |              |              |              |              |
|-------------------------------------------|-----------------------|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------------------------------|--------------|--------------|--------------|--------------|--------------|
| ● IN PROVENCE                             | ● IN OTHER LOCALITIES | NAHAJALIŠKA V PROVANSI     |              |              |              |              |              |              |              |              |              |              |              |              |              | STRATIGRAFSKA PRIMERJAVA VRST        |              |              |              |              |              |
|                                           |                       | HAUTE-RIVIAN               | BARREMIAN    | BEDOULIAN    | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    | BEDOULIAN    | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    | BEDOULIAN    | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    | VALANGINIAN                          | HAUTE-RIVIAN | BARREMIAN    | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    |
| ● RAZŠIRJENOST VRST                       | ● V PROVANSI          | ● V PROVANSI               | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI                         | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI | ● V PROVANSI |
| SPECIES - VRSTE                           |                       | MT. ROSE                   | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    | BEDOULIAN    | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    | BEDOULIAN    | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    | BEDOULIAN    | VALANGINIAN  | HAUTE-RIVIAN                         | BARREMIAN    | VALANGINIAN  | HAUTE-RIVIAN | BARREMIAN    | VALANGINIAN  |
| Actinostromaria coacta SCHNORF            |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Actinostromaria orthogonalls n. sp.       |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Actinostromaria shimizui YABE et SUGIYAMA |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Actinostromaria cf. cantabrica SCHNORF    |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Actinostromaria lugeoni DEHORNE           |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Disparistromaria urgonica n. sp.          |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Actostroma hudsoni n. sp.                 |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Dehornella aff. harrarensis WELLS         |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Tosastroma magna n. sp.                   |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Steinerella mesocola (STEINER)            |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Astroporina valangiensis SCHNORF          |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Milleporidium cylindricum YAWORSKY        |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Milleporidium kabardinense YAWORSKY       |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Steineria cf. romanica (DEHORNE)          |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Steineria tabulata n. sp.                 |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Promillepora provencensis n. sp.          |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Burgundia wetzeli (HUDSON)                |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Burgundia semicathrata (HAYASAKA)         |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Burgundia massiliensis n. sp.             |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Spongiomorpha sp.                         |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Chaetetopsis krimholzi YAWORSKY           |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Chaetetopsis favrei (DENINGER)            |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |
| Varioparietes cf. lamellosus SCHNORF      |                       |                            |              |              |              |              |              |              |              |              |              |              |              |              |              |                                      |              |              |              |              |              |

Table. Distribution of hydrozoan species in Provence and their stratigraphic correlation with other known localities (empty, circles)  
Tabela. Razširjenost hidrozojskih vrst v Provansi in njihova stratigrafska primerjava z drugimi znanimi nahajališči (prazni krogi)



*harrarensis*, from Ethiopia and Arabia, *Milleporidium cylindricum*, from Crimea, and *Steineria romanica* from Romania and Austria. It could be assumed that all these species were transferred to the Cretaceous beds from the older Jurassic reefs. However, the sedimentological and palaeoecological data in Provence show (after MASSE), that re-sedimentation could not have taken place. These species, therefore, must have been flourishing from the Upper Jurassic till the end of the Lower Aptian.

All the hydrozoan species found in Provence belong to the so called Parastromatoporida type of hydrozoans, which, in the Upper Jurassic of Slovenia, were flourishing in the Southern and Central hydrozoan areas (TURNŠEK, 1966, 1969). This type did not belong to the reef barrier but rather to the back reef or to the shelf meadows. Among the French material examined there is no specimen belonging to the Actinostromariid or Sphaeractiniid type of hydrozoans which, in Slovenia, occupied the Upper Jurassic Northern reef barrier.

The Lower Cretaceous hydrozoans from Provence show an organic Link with the Upper Jurassic hydrozoans but there are no Upper Cretaceous species among the fauna examined. Only the species *Actinostromaria shimizui* and *A. orthogonalis* show certain resemblance or sings of a transition between the Valanginian forms and the Cenomanian-Turonian species *Actinostromaria stellata*.

## POVZETEK

### SPODNJEKREDNI HIDROZOJI IN HETETIDE V PROVANSI JUŽNOVZHODNE FRANCIJE

V spodnjekrednih skladih v Provansi so bili v raznih krajih odkriti številni grebenški organizmi. Našel in zbral jih je J. P. Masse, geološki ataše pri Laboratoriju za morsko geologijo univerze v Marseilleju, ko je raziskoval facialne značilnosti teh skladov. Hidrozoje in hetetide mi je poslal v obdelavo. Doslej so bili spodnjekredni hidrozoji (razen v valanginiju Arzeria v Švici) zelo malo znani, zato so najdbe v Provansi pomemben prispevek k poznavanju te favne.

Zbranih je okrog 60 vzorcev iz 21 profilov. Nahajališča so razvidna na slikah 1—3, fosilna združba in litološke značilnosti na sliki 4. Vzorci so iz valanginija, hauterivija, barremija in spodnjega aptija (bedoulija). Barremijsko-aptijski apnenci se imenujejo tudi urgonski apnenci.

V valanginiju in hauteriviju se pojavljajo hidrozoji v bioklastičnem zrnatem apnencu z nerinejami, koralami, pogostnimi foraminiferami in dzikladacejami.

V urgonskih apnencih dobimo hidrozoje v treh horizontih. Spodaj v lapornih do čistih apnencih z redkimi roženci, redkimi amoniti, nekaj briozoji in spongijami. Više v bioklastičnih oolitnih zrnatih apnencih z orbitolinidami in koralami, v najvišjem horizontu pa v glinastih bioklastitih s foraminiferami, pogostnimi rudisti in stromatoliti.

V paleoekološkem oziru se hidrozojska in hetetidna favna pojavlja v štirih različnih okoljih:

1. V osrčju koralnih biostrom, kjer srečujemo hidrozoje s skorjastimi, nodularnimi in vejnatimi kolonijami, ki včasih zavzemajo polovico grebenske tvorbe.
2. Na robovih in na vrhovih koralnih biostrom, kjer so hidrozoji razviti v masivnih kolonijah in predstavljajo prehodno področje med koralnimi in rudistnimi conami.
3. V individualnih blokih, kjer hidrozoji prevladujejo, pomešani so le z redkimi koralami in koralinskimi algami. Cenosteji so skorjasti in nodularni.
4. Izolirane kolonije hidrozojev se pojavljajo v različnih horizontih v raznih fosilnih združbah, predvsem med rudisti.

Od zbranih vzorcev je bilo določenih 19 vrst hidrozojev in tri vrste hetetid. Sedem hidrozojskih vrst je novih. Hidrozoji pripadajo rodovom: *Actinostromaria*, *Disparistromaria*, *Actostroma*, *Dehornella*, *Tosastroma*, *Steinerella*, *Astroporina*, *Milleporidium*, *Steineria*, *Promillepora*, *Burgundia* in

*Spongiomorpha*. Hetetide pripadajo rodovoma *Chaetetopsis* in *Varioparietes*. Nove vrste so *Actinostromaria orthogonalis*, *Disparistromaria urgonica*, *Actostroma hudsoni*, *Tosastroma magna*, *Steineria tabulata*, *Promillepora provencensis* in *Burgundia massiliensis*. Podroben sistem z opisom vseh vrst je podan v angleškem tekstu.

Opisani hidrozoji in hetetide kažejo podobnost z nekaterimi nahajališči iz spodnje krede in zgornje jure. Osem teh vrst je bilo tudi doslej znanih le iz istih ali bližnjih spodnjekrednih horizontov. Tem vrstam že lahko pripišemo določeno stratigrafsko vrednost, ki potrjuje spodnjekredno starost skladov v Provansi. Tudi sedem novih vrst je zaenkrat vezanih na določene horizonte spodnje krede, vendar bodo te svoj stratigrafski pomen pokazale šele pri nadaljnjih najdbah. Tri opisane vrste so bile doslej znane iz zgornjejurskih in spodnjekrednih skladov, medtem ko smo štiri vrste poznali do zdaj samo iz zgornje jure. Ena vrsta je le generično določena in nima stratigrafske veljave.

Tako vidimo, da kar 15 opisanih vrst kaže zaenkrat samo na spodnjekredno starost, medtem ko sedem vrst govori za povezavo z zgornjejurskimi oblikami. Niti ena najdena vrsta ni zgornjekredna. Iz tega moremo sklepati, da so spodnjekredni hidrozoji iz Provanse organsko povezani z zgornjejurskimi hidrozoji in ne z zgornjekrednimi. Natančno stratigrafsko razširjenost v posameznih spodnjekrednih horizontih vidimo na razpredelnici, kjer je podana tudi primerjava z že doslej znanimi nahajališči.

Vse hidrozojske vrste, ki so jih dobili v Provansi, pripadajo parastromatopordnemu tipu hidrozojev, kakršen je uspeval v Sloveniji v zgornji juri v srednjem in južnem favnističnem področju (TURNŠEK, 1966, 1969). Iz tipa aktinostromaridnih in sferaktinidnih hidrozojev, ki so v Sloveniji naseljevali severno grebenko bariero, ni v Provansi nobenega primerka.

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## PLATES — TABLE

## Naslov — Address:

Dr. Dragica Turnšek  
Inštitut za paleontologijo  
Slovenska akademija znanosti in umetnosti  
Novi trg 3, pp 323  
61001 Ljubljana, Jugoslavija

Jean Pierre Masse  
Centre Universitaire — Luminy  
Laboratoire de Géologie marine  
70, Route Léon Lachamp  
13 — Marseille (9e), France



## EXPLANATION OF PLATES

All the photographs enlarged 4 times and 8 times are negatives of thin sections. Specimens of fossils are marked with field numbers and capital letters, their thin sections with additional small letters.

Photographed by Carmen Narobe.

## RAZLAGA K TABLAM

Vse fotografije povečane 4-krat in 8-krat so negativi mikroskopskih zbruskov. Vzorci fosilov so označeni s terenskimi številkami in velikimi črkami, njihovi zbruski pa z dodatnimi majhnimi črkami.

Fotografije je izdelala Carmen Narobe.

## PLATE 1

*Actinostromaria coacta* SCHNORF

Locality: La Mounine, 3123 C, Hauterivian

Fig. 1. Transverse section of coenosteum showing branches or centres of reticular growth. Left down longitudinal section of reticulum, 3123 C a,  $\times 4$

## TABLA 1

*Actinostromaria coacta* SCHNORF

Nahajališče: La Mounine, 3123 C, hauterivij

Sl. 1. Prečni presek cenosteja z več centri retikularne rasti. Levo spodaj je podolžni presek retikula, 3123 C a,  $\times 4$

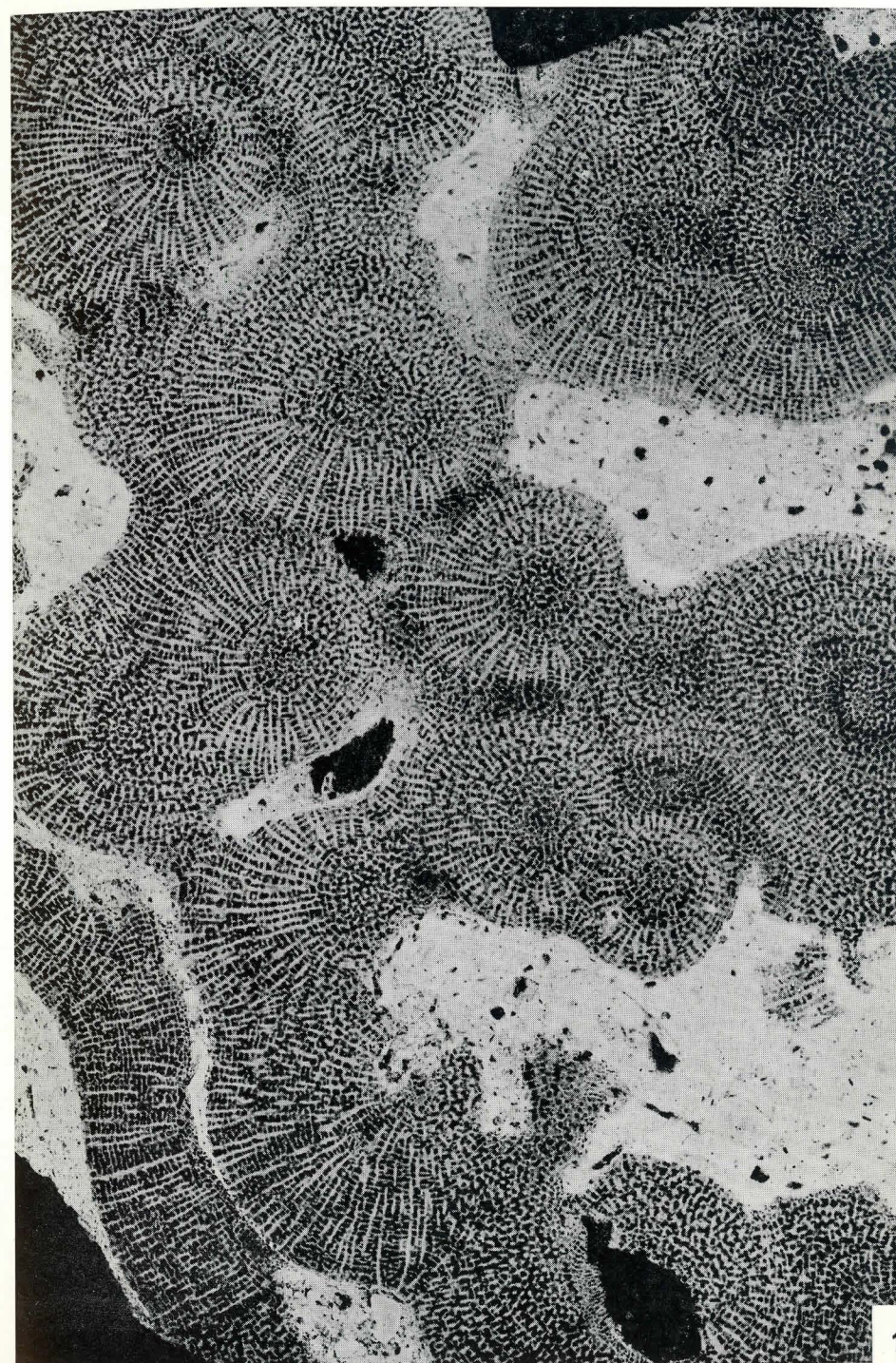




PLATE 2

*Actinostromaria coacta* SCHNORF

Locality: La Mounine: 3123 C, Hauterivian

Fig. 1. Longitudinal reticulum, note thick vertical elements, 3123 C b,  $\times 8$

Fig. 2. Transverse section of coenosteal branch, with hexactinelid and pointed reticulum, 3123 C a,  $\times 8$

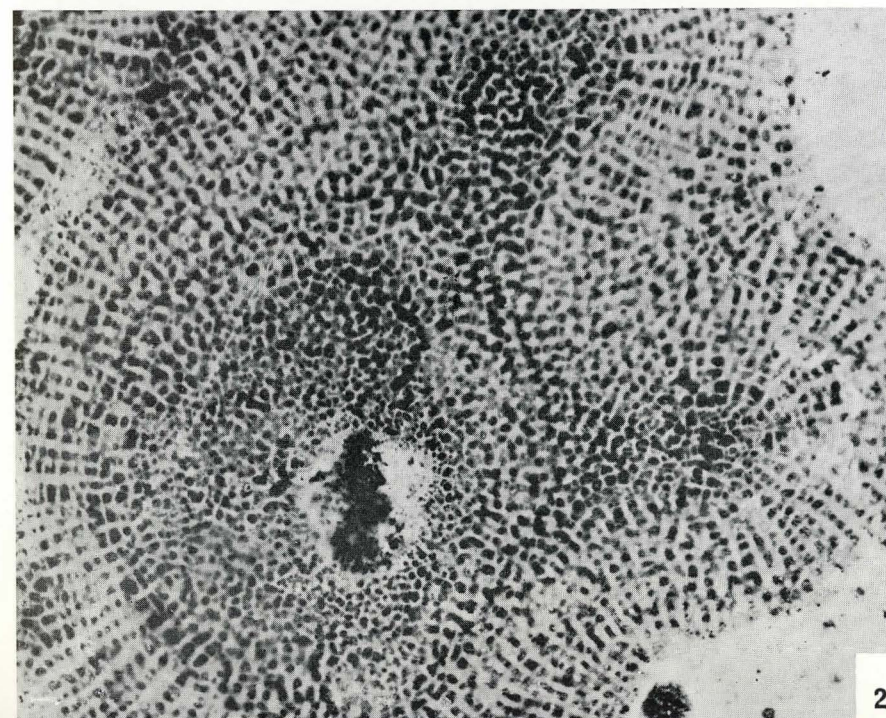
TABLA 2

*Actinostromaria coacta* SCHNORF

Nahajališče: La Mounine, 3123 C, hauterivij

Sl. 1. Podolžni presek retikula z debelimi vertikalnimi skeletnimi elementi, 3123 C b,  $\times 8$

Sl. 2. Prečni presek cenostilne veje s heksaktinelidnim in točkastim retikulom, 3123 C a,  $\times 8$





## PLATE 3

*Actinostromaria orthogonalis* n. sp.

Localities: La Mounine, 3131, holotype, Hauterivian; Martigues, 6, Barremian

Fig. 1. Longitudinal section, showing regular orthogonal reticulum 3131 b,  $\times 4$ Fig. 2. Transverse section of reticulum, 3131 a,  $\times 4$ Fig. 3. Radial section of reticulum, 6 a,  $\times 4$ 

## TABLA 3

*Actinostromaria orthogonalis* n. sp.

Nahajališča: La Mounine, 3131, holotip, hauterivij; Martigues, 6, barremij

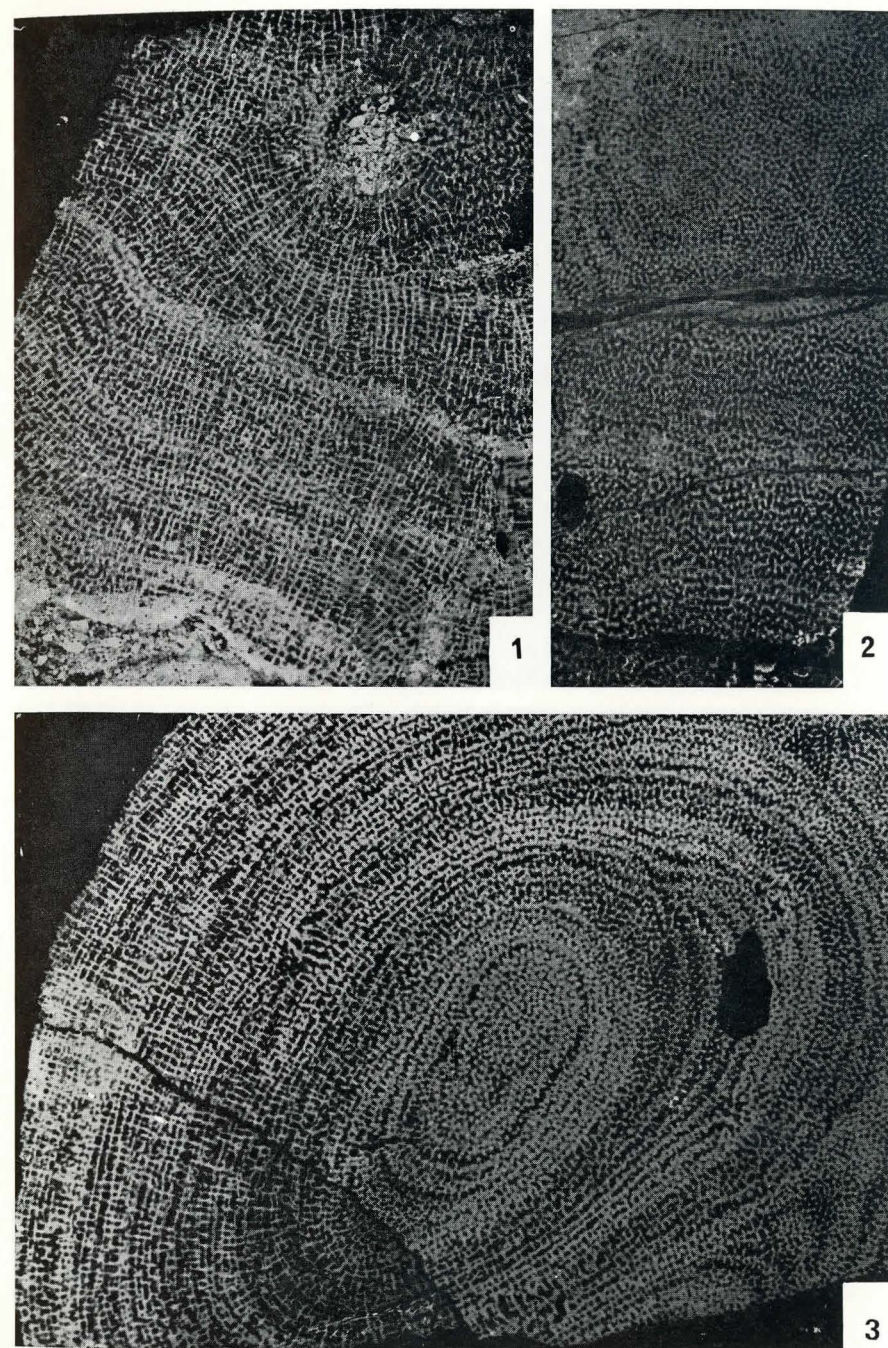
Sl. 1. Podolžni presek pravilnega ortogonalnega retikula, 3131 b,  $\times 4$ Sl. 2. Prečni presek retikula, 3131 a,  $\times 4$ Sl. 3. Radialni presek retikula, 6 a,  $\times 4$ 



PLATE 4

*Actinostromaria orthogonalis* n. sp.

Locality: La Mounine, 3131, holotype, Hauterivian

Fig. 1. Vertical section of regular orthogonal reticulum 3131 b,  $\times 8$

Fig. 2. Transverse section of reticulum, 3131 a,  $\times 8$

TABLA 4

*Actinostromaria orthogonalis* n. sp.

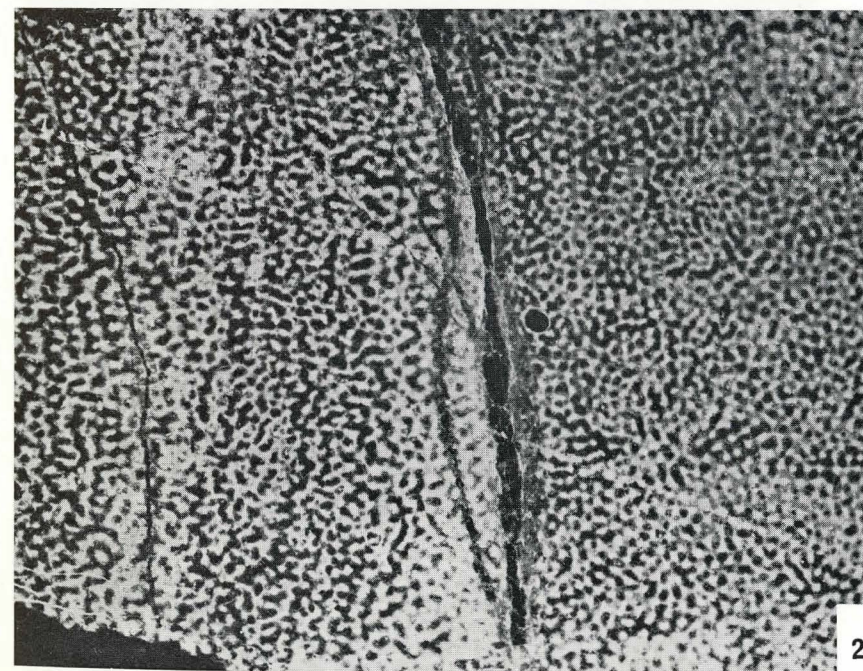
Nahajališče: La Mounine, 3131, holotip, hauterivij

Sl. 1. Vertikalni presek pravilnega ortogonalnega retikula, 3131 b,  $\times 8$

Sl. 2. Prečni presek retikula, 3131 a,  $\times 8$



1



2



## PLATE 5

*Actinostromaria cf. cantabrica* SCHNORF

Localities: Puget, 1373; Pomegues, "Stroma", Barremian

Fig. 1. Longitudinal section of coenosteum with very large reticulum, 1373 a,  $\times 8$ Fig. 2. Transverse section of reticulum, well marked horizontal lamellae. "Stroma",  $\times 8$ 

## TABLA 5

*Actinostromaria cf. cantabrica* SCHNORF

Nahajališča: Puget, 1373; Pomegues, "Stroma", barremij

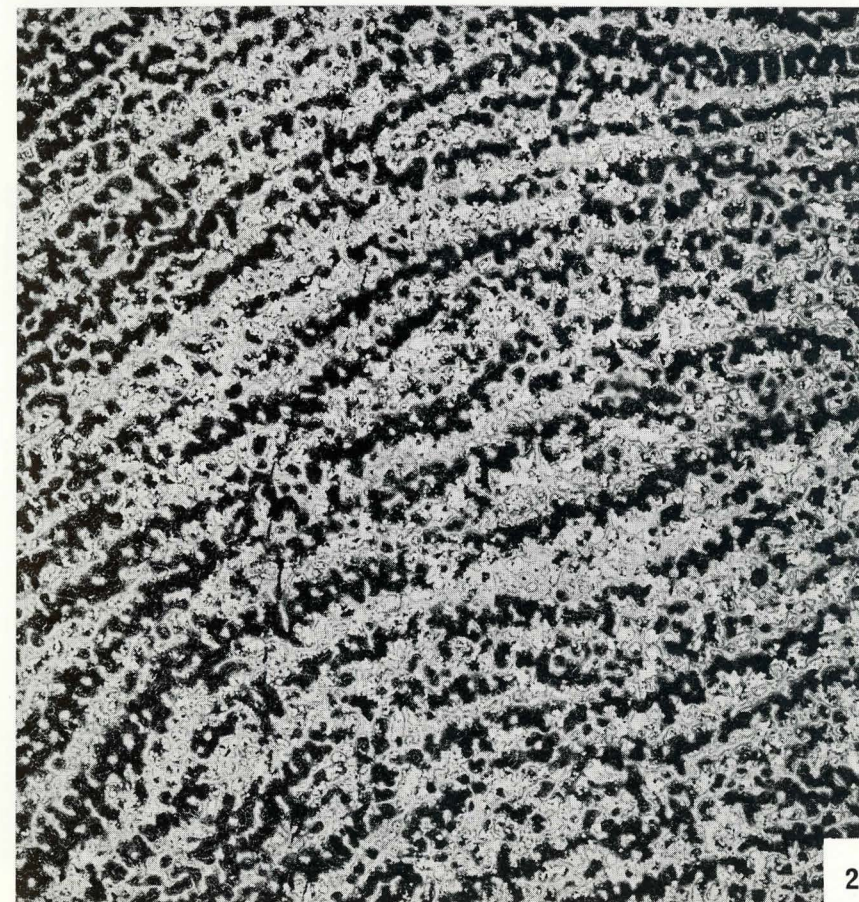
Sl. 1. Podolžni presek cenosteja z zelo širokim retikulom, 1373 a,  $\times 8$ Sl. 2. Prečni presek retikula z dobro razvitimi horizontalnimi lamelami. "Stroma",  $\times 8$ 



PLATE 6

*Actinostromaria shimizui* YABE et SUGIYAMA

Locality: Les Camerlots, 1349, Barremian

Fig. 1. Vertical section of reticulum, showing here and there thin skeletal elements (medial dark lines without fibres), 1349 a,  $\times 8$

*Actinostromaria ? lugeoni* DEHORNE

Locality: Gare de Cassis, 1535,  $\times 8$

Fig. 2. Transverse section of reticulum showing large astrorhizae

TABLA 6

*Actinostromaria shimizui* YABE et SUGIYAMA

Nahajališče: Les Camerlots, 1349, barremij

Sl. 1. Vertikalni presek retikula, tu in tam vidni tudi drobni skeletni elementi (temna osrednja črta brez vlaken), 1349 a,  $\times 8$

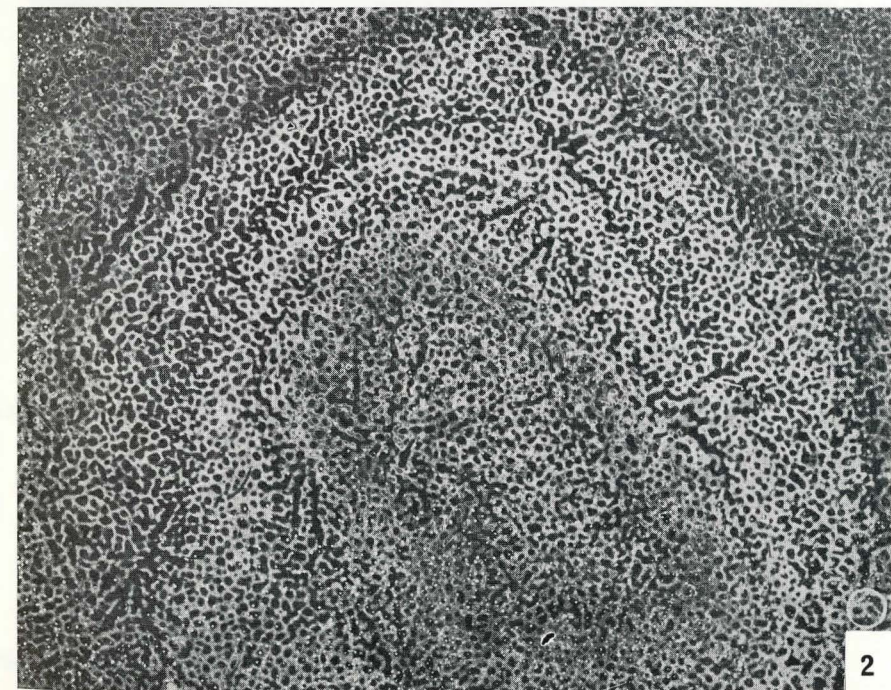
*Actinostromaria ? lugeoni* DEHORNE

Nahajališče: Gare de Cassis, 1535,  $\times 8$

Sl. 2. Prečni presek retikula z velikimi astrorizami



1



2



# PLATE 7

*Disparistromaria urgonica* n. sp.

Locality: Le Faron, 2753, holotype, Bedoulian

Fig. 1. Vertical section of coenosteum with very thin reticulum, note concentric belts or "latilaminae", 2753 a,  $\times 8$

Fig. 2. Transverse section of vermiculate reticulum and closed slings, 2753 b,  $\times 8$

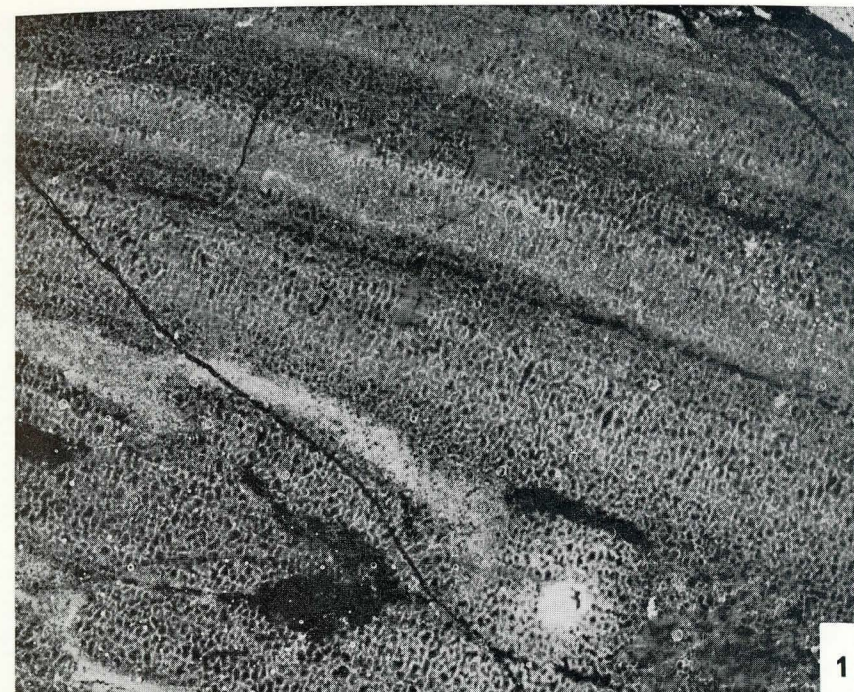
# TABLA 7

*Disparistromaria urgonica* n. sp.

Nahajališče: Le Faron, 2753, holotip, bedoulij

Sl. 1. Podolžni presek cenosteja z zelo drobnim retikulom. Dobro so vidni koncentrični pasovi ali "latilamine", 2753 a,  $\times 8$

Sl. 2. Prečni presek črvastega retikula, ki ima tudi zaprte zanke, 2753 b,  $\times 8$



1



2



## PLATE 8

*Disparistromaria urgonica* n. sp.

Localities: Rustrel, 2404, Bedoulian; Souvarel, 3252, Barremian

Fig. 1. Longitudinal section of coenosteum with latilaminar reticulum, 2404 a,  $\times 8$ Fig. 2. Transverse section of vermiculate and closed reticulum, 2404 b,  $\times 8$ Fig. 3. Partly longitudinal partly transverse section of reticulum, 3252 a,  $\times 8$ 

Note a great reticular similarity with the next Plate, showing the species *Actostroma hudsoni* n. sp. These two species differ in microstructure, which can be compared on Pl. 26, fig. 2, 3, and 4

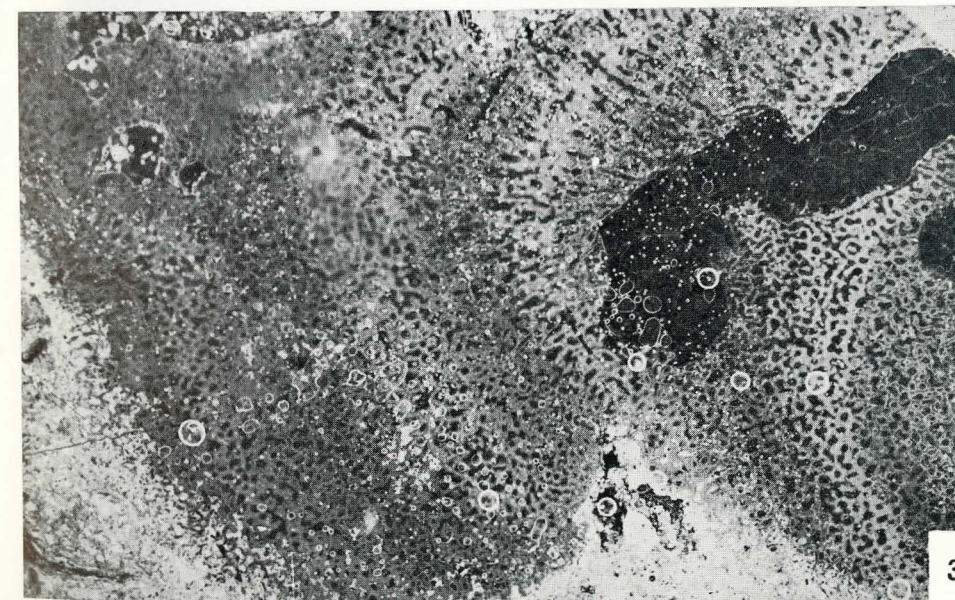
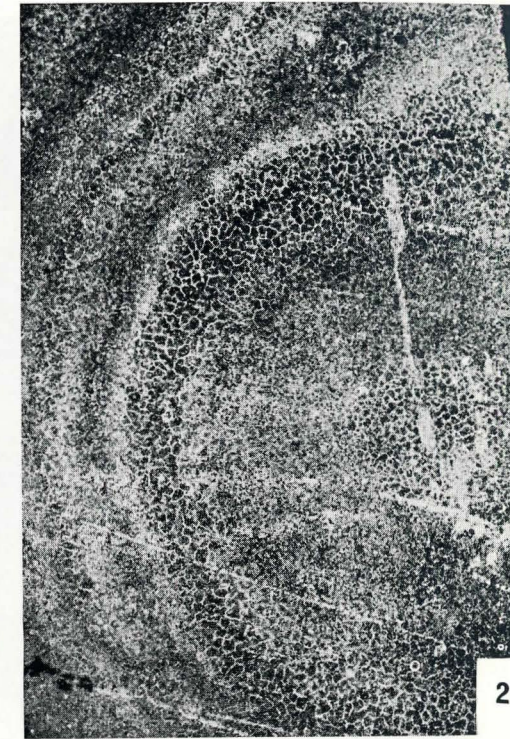
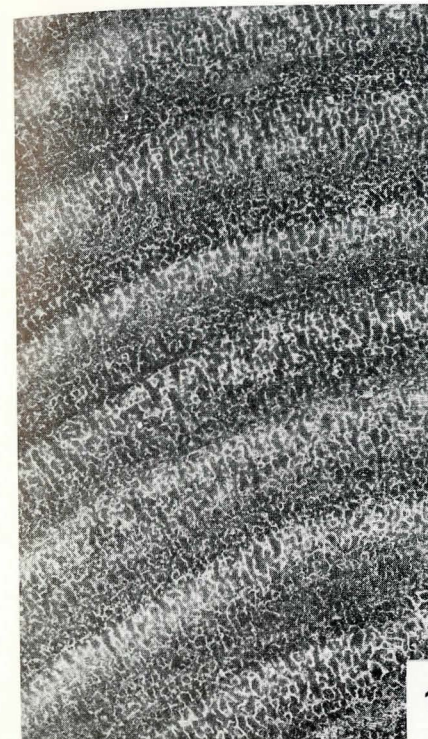
## TABLA 8

*Disparistromaria urgonica* n. sp.

Nahajališča: Rustrel, 2404, bedoulij; Souvarel, 3252, barremij

Sl. 1. Podolžni presek cenosteja z latilaminarnim retikulom, 2404 a,  $\times 8$ Sl. 2. Prečni presek črvastega in zaprtega retikula, 2404 b,  $\times 8$ 

Sl. 3. Deloma podolžni deloma prečni presek retikula, 3252 a,  $\times 8$ . Vsi primerki vrste *D. urgonica* so v retikularni zgradbi podobni vrsti *Actostroma hudsoni* n. sp. (na tabli 9). Razlikujejo se pa v mikrostrukturi, ki jo lahko primerjamo na tabli 26, sl. 2, 3 in 4





## PLATE 9

*Actostroma hudsoni* n. sp.

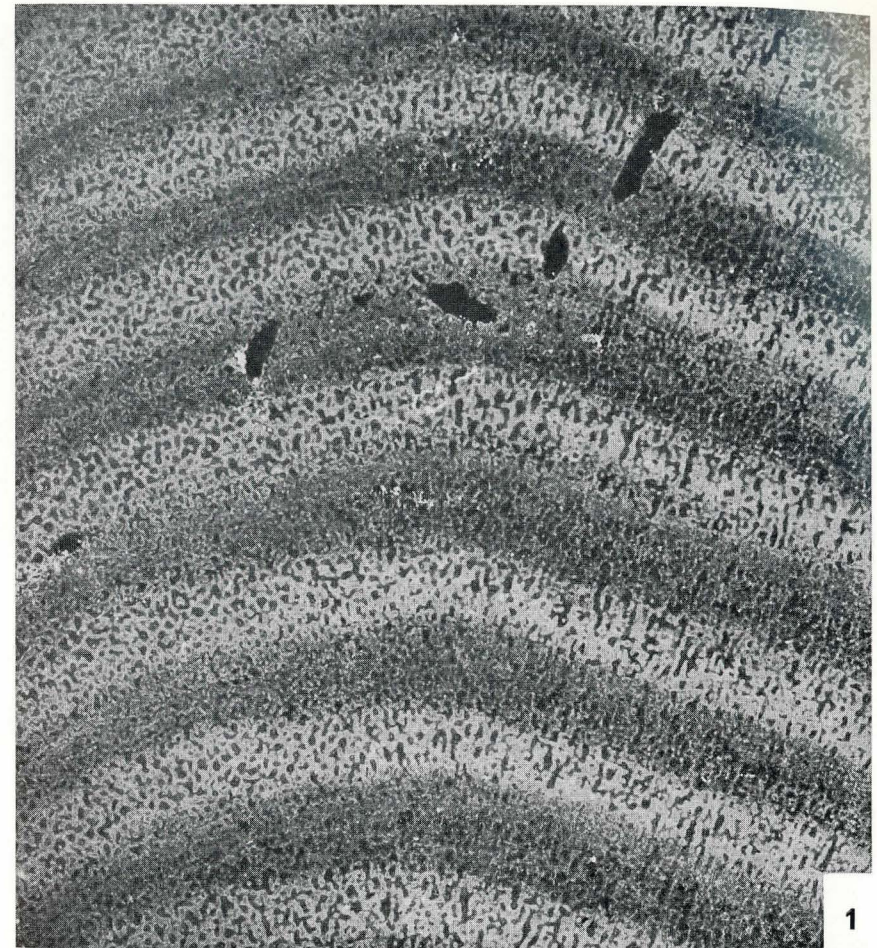
Localities: Tour de Sabran, 2379, Bedoulian; Les Tarlans, 1, holotype, Bedoulian

Fig. 1. Partly longitudinal, partly transverse section of reticulum 2379 a,  $\times 8$ Fig. 2. Longitudinal section of irregular reticulum with small tubes, 1 a,  $\times 8$ Fig. 3. Transverse section of vermiculate reticulum, 1 b,  $\times 8$ 

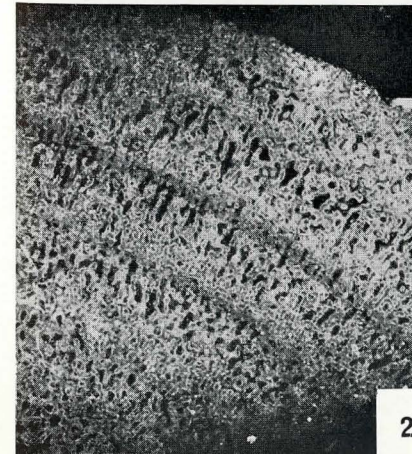
## TABLA 9

*Actostroma hudsoni* n. sp.

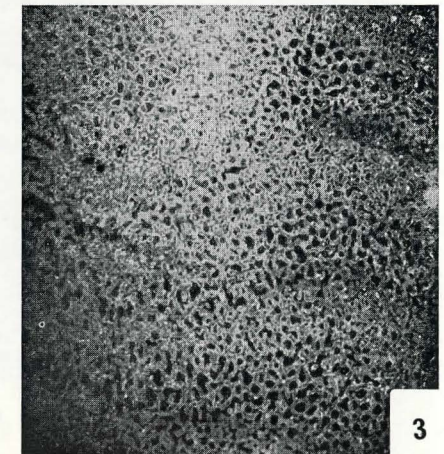
Nahajališča: Tour de Sabran, 2379, bedoulij; Les Tarlans, 1, holotip, bedoulij

Sl. 1. Deloma podložni, deloma prečni presek retikula, 2379 a,  $\times 8$ Sl. 2. Podolžni presek nepravilnega retikula z majhnimi cevmi, 1 a,  $\times 8$ Sl. 3. Prečni presek črvastega retikula, 1 b,  $\times 8$ 

1



2



3



## PLATE 10

*Dehornella* aff. *harrarensis* WELLS

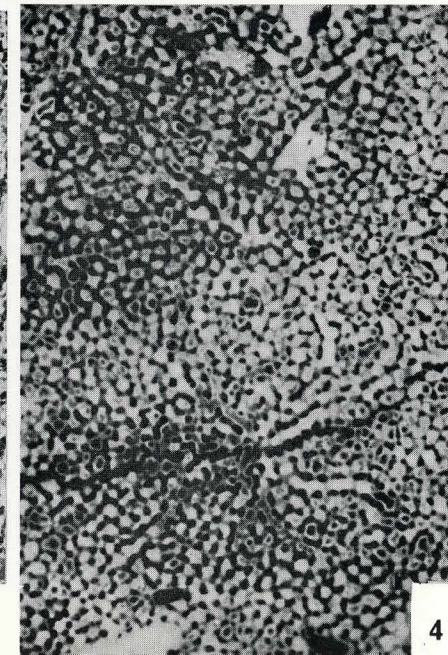
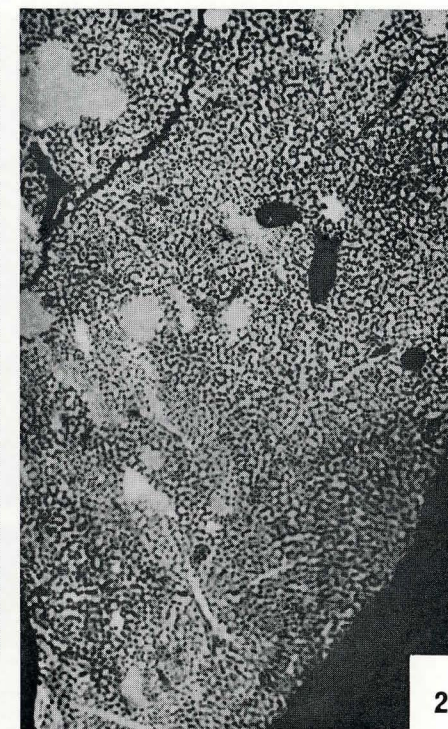
Locality: Martigues, 11, Barremian

Fig. 1. Longitudinal section of coenosteum with dense and sparse zones of reticulum, 11 c,  $\times 4$ Fig. 2. Transverse section of coenosteum showing vermiculate reticulum with nice astrorhizae, 11 b,  $\times 4$ Fig. 3. Longitudinal section of the same reticulum as on fig. 1, 11 c,  $\times 8$ Fig. 4. Transverse section of the reticulum from fig. 2, 11 b,  $\times 8$ 

## TABLA 10

*Dehornella* aff. *harrarensis* WELLS

Nahajališče: Martigues, 11, barremij

Sl. 1. Podolžni presek cenosteja s conami redkega in gostega retikula, 11 c,  $\times 4$ Sl. 2. Prečni presek cenosteja s črvastim retikulom in lepimi astrorizami, 11 b,  $\times 4$ Sl. 3. Podolžni presek istega retikula kot na sl. 1, 11 c,  $\times 8$ Sl. 4. Prečni presek retikula s slike 2, 11 b,  $\times 8$ 



## PLATE 11

*Tosastroma magna* n. sp.

Locality: Martigues, 12, holotype, Barremian

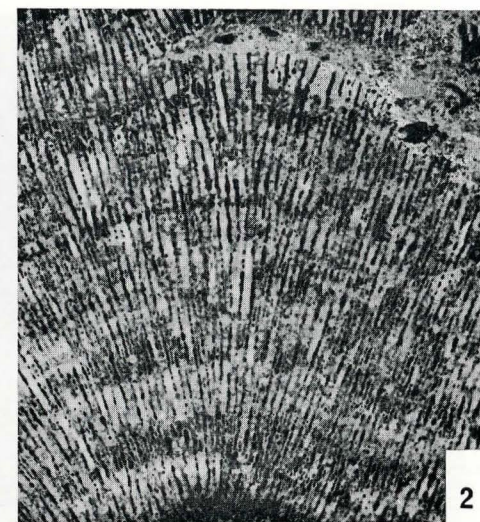
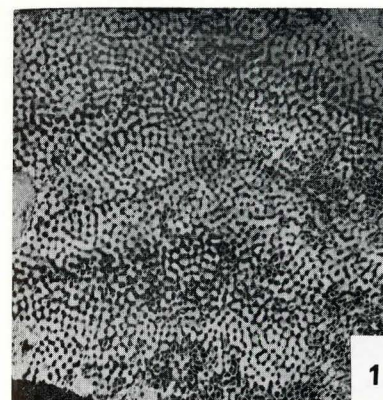
- Fig. 1. Transverse section of coenosteum showing vermiculate reticulum, 12 a,  $\times 4$   
 Fig. 2. Longitudinal section of nonlatilaminar reticulum. Note the lack of tabulae, 12 b,  $\times 4$   
 Fig. 3. Part of reticulum from fig. 2, enlarged  $8 \times$   
 Fig. 4. Part of transverse reticulum from fig. 1,  $\times 8$

## TABLA 11

*Tosastroma magna* n. sp.

Nahajališče: Martigues, 12, holotip, barremij

- Sl. 1. Prečni presek črvastega retikula, 12 a,  $\times 4$   
 Sl. 2. Podolžni presek retikula, brez latilamin in brez tabul, 12 b,  $\times 4$   
 Sl. 3. Del retikula s sl. 2,  $\times 8$   
 Sl. 4. Del prečnega retikula s slike 1,  $\times 8$





## PLATE 12

*Steinerella mesocola* (STEINER)

Locality: Mt. Rose, 2476, Valanginian

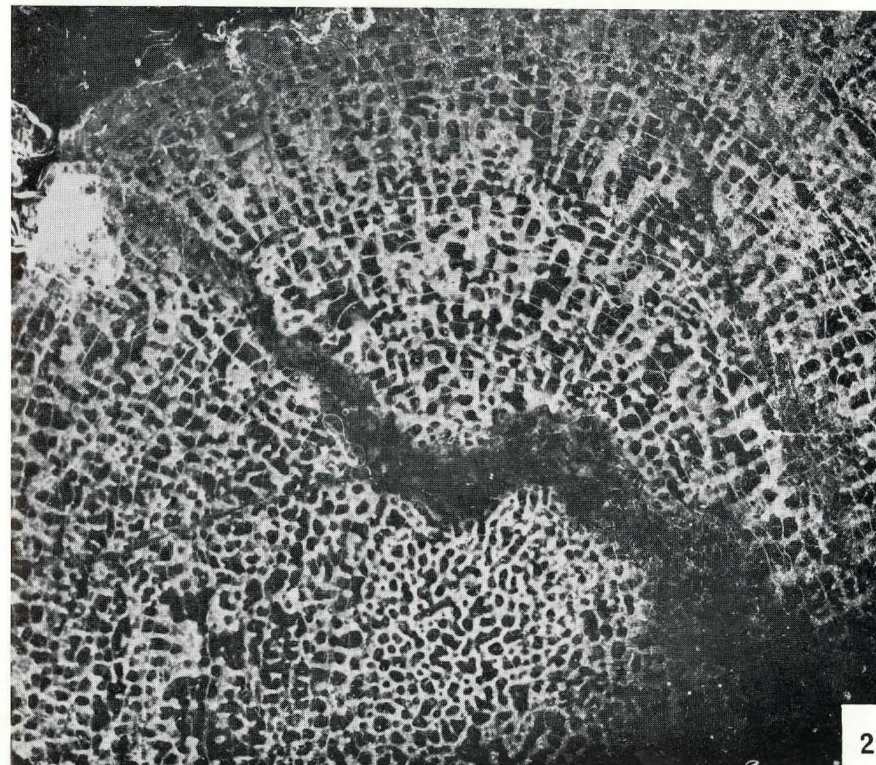
- Fig. 1. Longitudinal-tangential section of coenosteum. On the left vertical reticulum, in the middle the transverse reticulum with astrorhizal structures, 2476 a,  $\times 4$
- Fig. 2. Radial section of coenosteum, showing transverse reticulum in the middle, and longitudinal reticulum in periphery, 2476 b,  $\times 8$

## TABLA 12

*Steinerella mesocola* (STEINER)

Nahajališče: Mt. Rose, 2476, valanginij

- Sl. 1. Podolžni tangencialni presek cenosteja. Na levi strani je vertikalni retikul, v sredini pa prečni retikul z astrorizami, 2476 a,  $\times 4$
- Sl. 2. Radialni presek cenosteja, ki kaže prečni retikul v sredini in podložnega na periferiji, 2476 b,  $\times 8$





## PLATE 13

*Astroporina valangiensis* SCHNORF

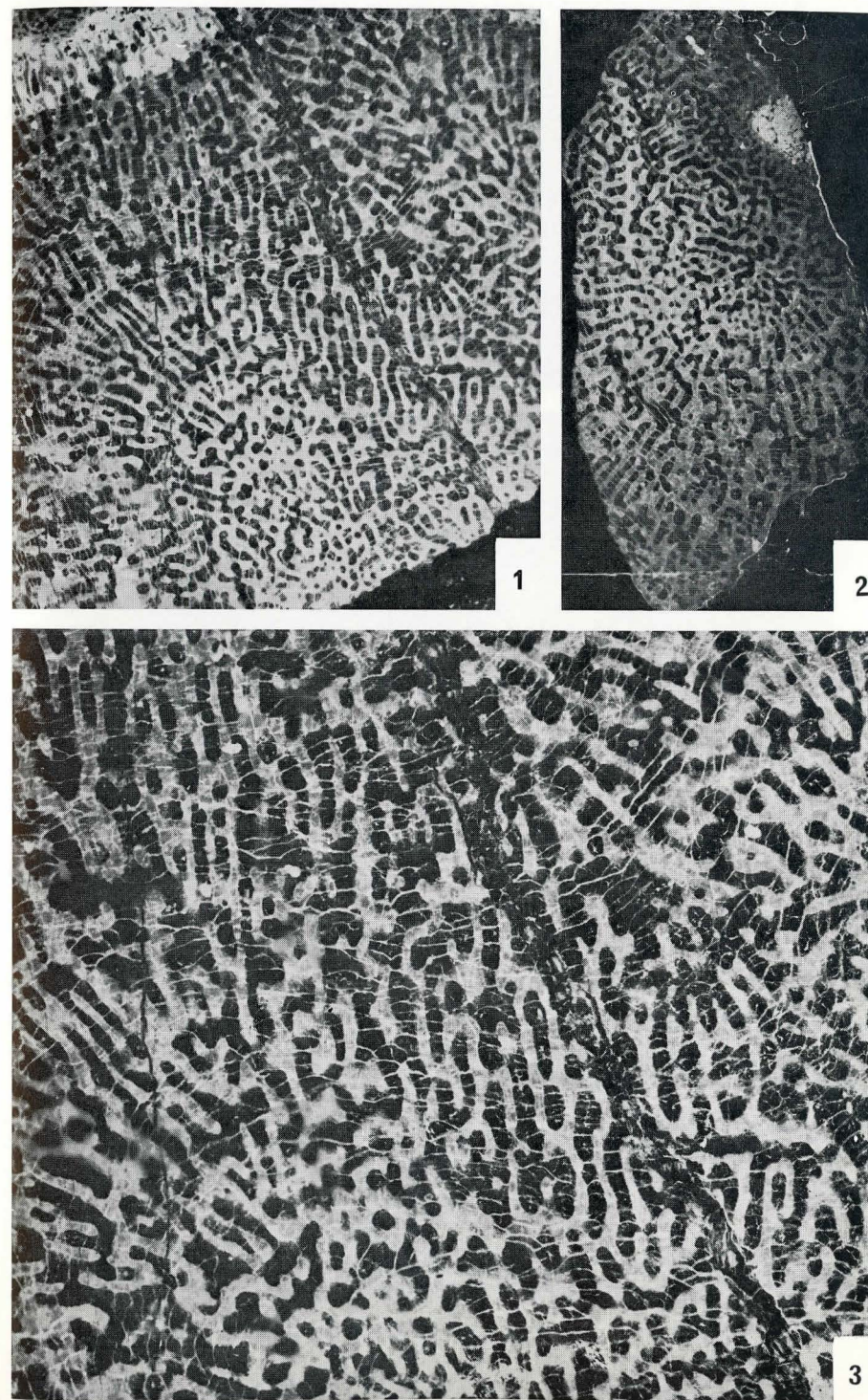
Locality: Mt. Rose, 2477, Valanginian

Fig. 1. Vertical section of reticulum with abundant tabulae, 2477 a,  $\times 4$ Fig. 2. Radial section of coenosteum, showing transverse and partly vertical reticulum, 2477 b,  $\times 4$ Fig. 3. The same section as on fig. 1. enlarged  $8 \times$ 

## TABLA 13

*Astroporina valangiensis* SCHNORF

Nahajališče: Mt. Rose, 2477, valanginij

Sl. 1. Podolžni presek retikula s številnimi tabulami, 2477 a,  $\times 4$ Sl. 2. Radialni presek cenosteja s prečnim in deloma vertikalnim retikulom, 2477 b,  $\times 4$ Sl. 3. Isti presek retikula kot na sl. 1, povečano  $8 \times$ 



## PLATE 14

*Milleporidium kabardinense* YAWORSKY

Locality: Mt. Rose, 2478, Valanginian

Fig. 1. Longitudinal section of coenosteum. Note aligned tabulae, 2478 a,  $\times 8$ Fig. 2. Transverse section of reticulum, showing round zooidal tubes, 2478 b,  $\times 8$ *Milleporidium cylindricum* YAWORSKY

Locality: Valtrede, 663 a, Hauterivian

Fig. 3. Partly longitudinal, partly transverse section of reticulum, showing abundant zooidal tubes,  $\times 8$ 

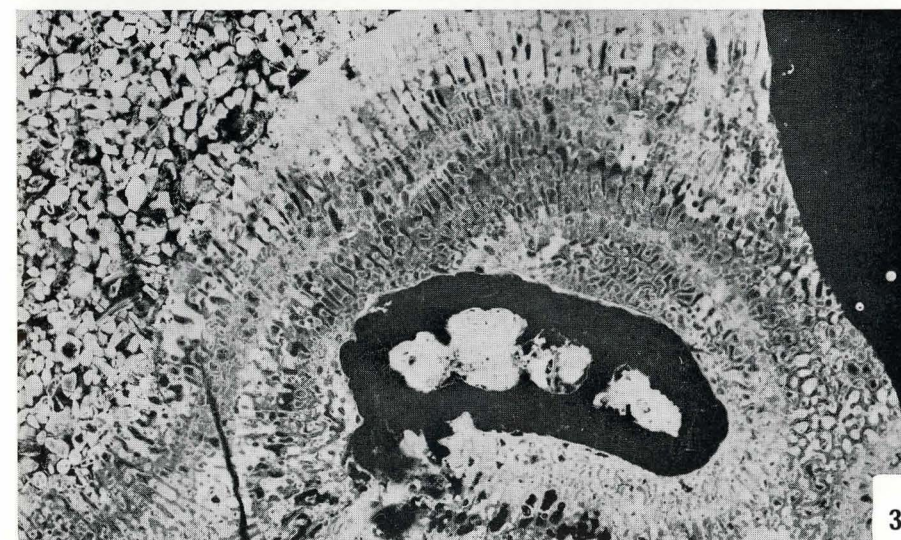
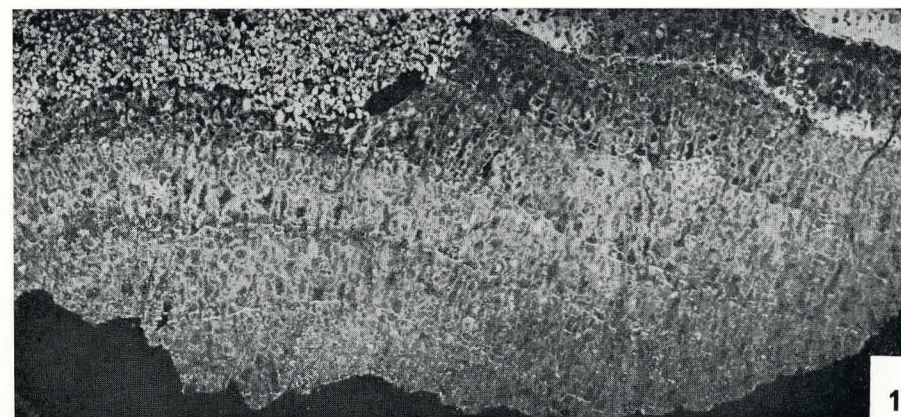
## TABLA 14

*Milleporidium kabardinense* YAWORSKY

Nahajališče: Mt. Rose, 2478, valanginij

Sl. 1. Podolžni presek retikula, tabule so v istih nivojih, 2478 a,  $\times 8$ Sl. 2. Prečni presek retikula z okroglastimi preseki zooidnih cevi, 2478 b,  $\times 8$ *Milleporidium cylindricum* YAWORSKY

Nahajališče: Valtrede, 663 a, hauterivij

Sl. 3. Deloma podolžni deloma prečni presek retikula s številnimi zooidnimi cevmi,  $\times 8$ 



## PLATE 15

*Steineria cf. romanica* (DEHORNE)

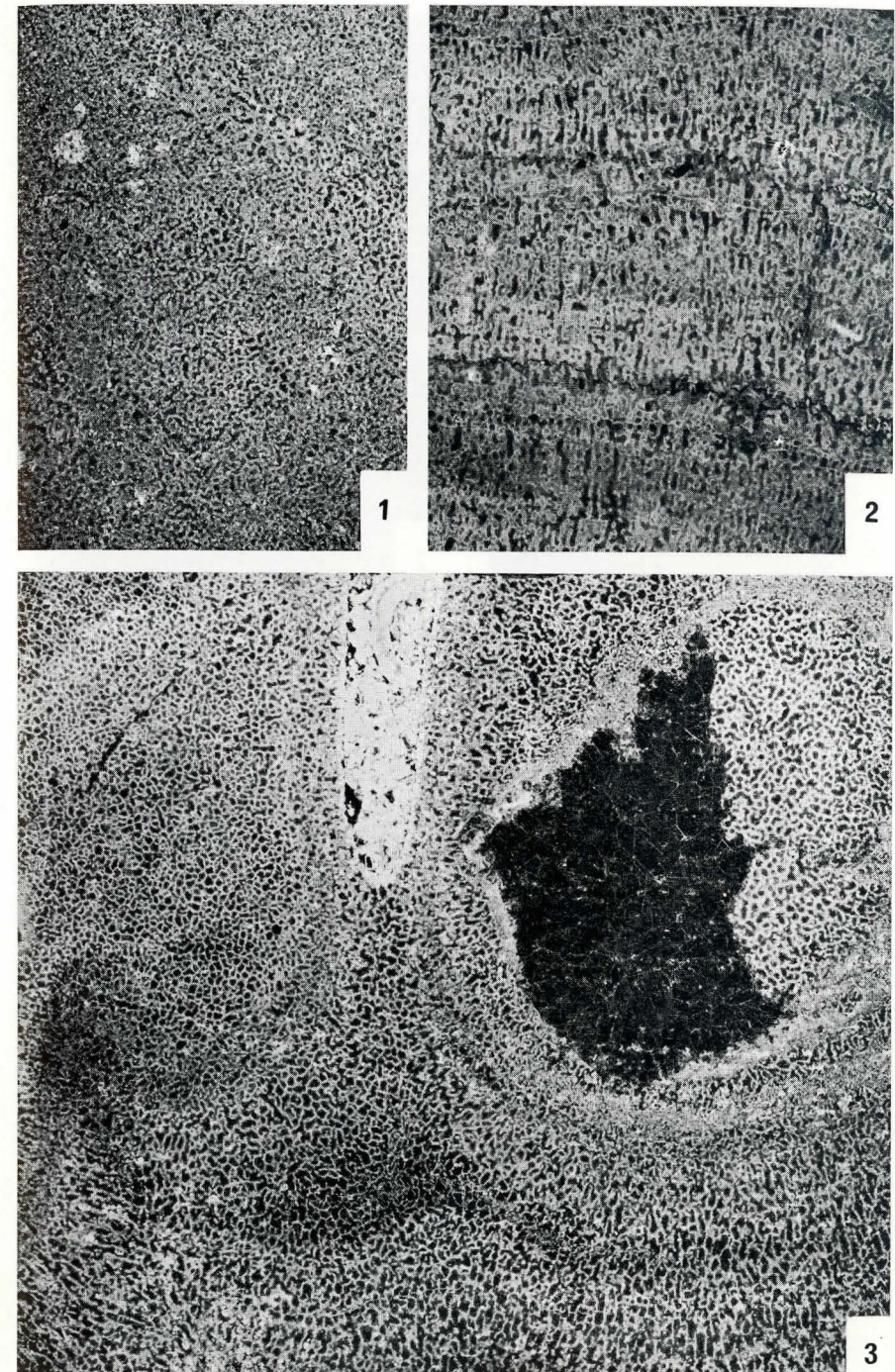
Localities: Orgon, 2091, Barremian; Le Logisson, 2270, Hauterivian

Fig. 1. Transverse section of reticulum, 2091 a,  $\times 8$ Fig. 2. Longitudinal section of latilaminar reticulum, 2091 b,  $\times 8$ Fig. 3. Partly transverse vermiculate reticulum, partly irregular vertical reticulum, 2270 a,  $\times 8$ 

## TABLA 15

*Steineria cf. romanica* (DEHORNE)

Nahajališča: Orgon, 2091, barremij; Le Logisson, 2270, hauterivij

Sl. 1. Prečni presek retikula, 2091 a,  $\times 8$ Sl. 2. Podolžni presek latilaminarnega retikula, 2091 b,  $\times 8$ Sl. 3. Deloma prečni črvasti deloma podolžni nepravilni retikul, 2270 a,  $\times 8$ 



## PLATE 16

*Steineria tabulata* n. sp.

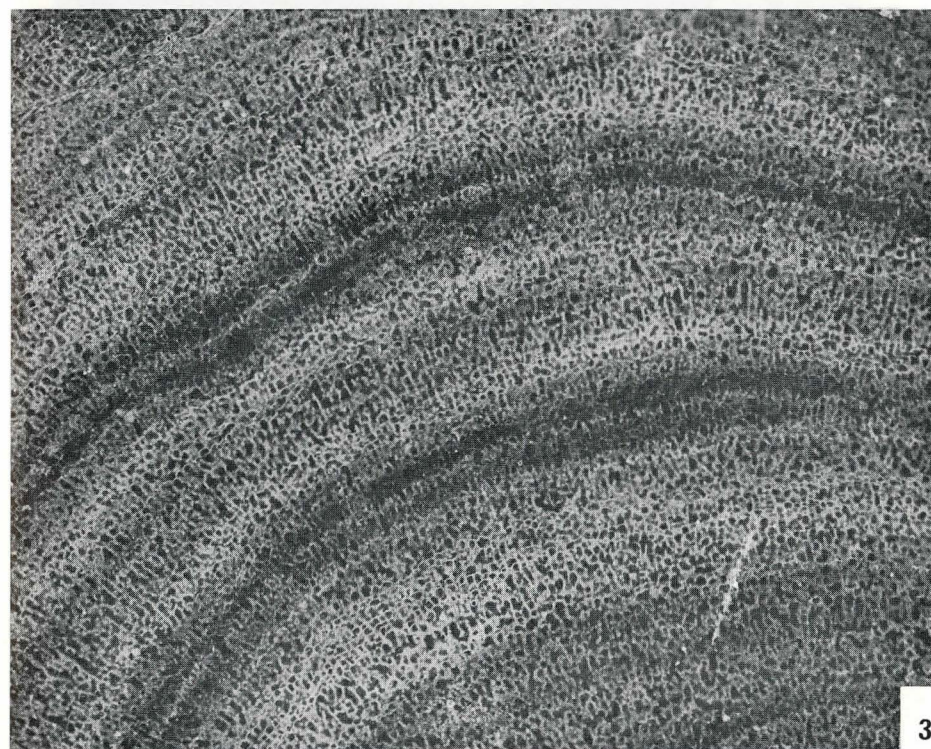
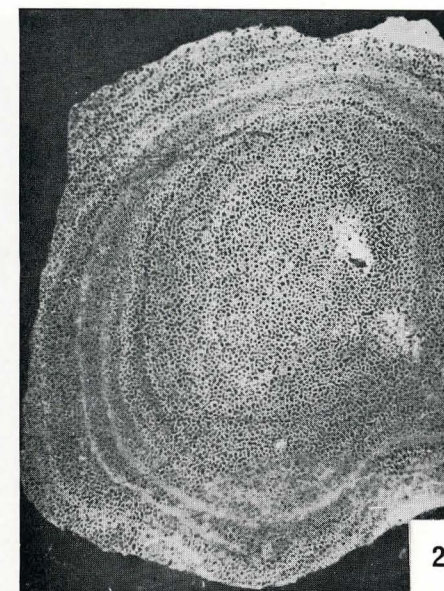
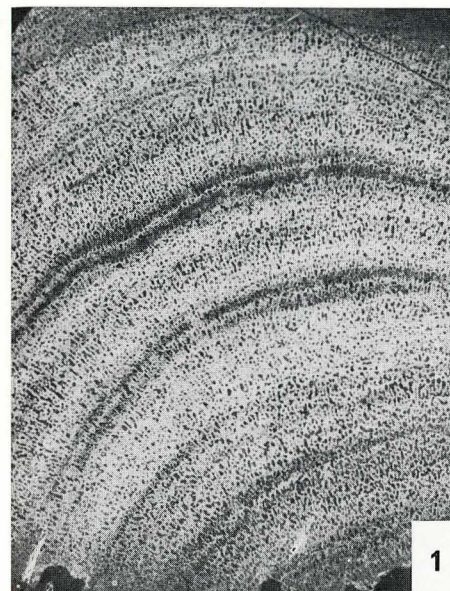
Locality: La Mounine, 3123 C, Hauterivian

Fig. 1. Longitudinal section of latilaminar reticulum, 3123 C a,  $\times 4$ Fig. 2. Transverse section of vermiculate and closed reticulum, 3123 C b,  $\times 4$ Fig. 3. Longitudinal section of the same reticulum as on fig. 1. Note abundant tabulae,  $\times 8$ 

## TABLA 16

*Steineria tabulata* n. sp.

Nahajališče: La Mounine, 3123 C, hauterivij

Sl. 1. Podolžni presek latilaminarnega retikula, 3123 C a,  $\times 4$ Sl. 2. Prečni presek retikula s črvastimi in zaprtimi elementi, 3123 C b,  $\times 4$ Sl. 3. Podolžni presek retikula s sl. 1. Značilne so številne tabule,  $8 \times$ 



## PLATE 17

*Steineria tabulata* n. sp.

Locality: La Mounine, 3125 B, holotype, Hauterivian

Fig. 1. Longitudinal section of irregular reticulum with abundant tabulae, 3125 B a,  $\times 8$ Fig. 2. Transverse section of vermiculate reticulum, 3125 B b,  $\times 8$ 

## TABLA 17

*Steineria tabulata* n. sp.

Nahajališče: La Mounine, 3125 B, holotip, hauterivij

Sl. 1. Podolžni presek nepravilnega retikula s številnimi tabulami, 3125 B a,  $\times 8$ Sl. 2. Prečni presek črvastega retikula, 3125 B b,  $\times 8$ 

1



2



## PLATE 18

*Promillepora provencensis* n. sp.

Localities: Martigues, 8, Barremian; Orgon, 16 (holotype), Barremian

- Fig. 1. Radial section of coenosteal branch, showing latilaminar reticulum, 8 a,  $\times 4$   
 Fig. 2. Tangential longitudinal section of coenosteal branch, 8 b,  $\times 4$   
 Fig. 3. Radial section of coenosteal branch, showing irregular reticulum and rare tubes, 16 a,  $\times 4$

## TABLA 18

*Promillepora provencensis* n. sp.

Nahajališča: Martigues, 8, barremij; Orgon, 16, holotip, barremij

- Sl. 1. Radialni presek cenostilne vejice, ki kaže latilaminarni retikulum, 8 a,  $\times 4$   
 Sl. 2. Tangencialni podolžni presek cenostilne vejice, 8 b,  $\times 4$   
 Sl. 3. Radialni presek cenostilne vejice, ki kaže nepravilni retikul in redke cevi, 16 a,  $\times 4$

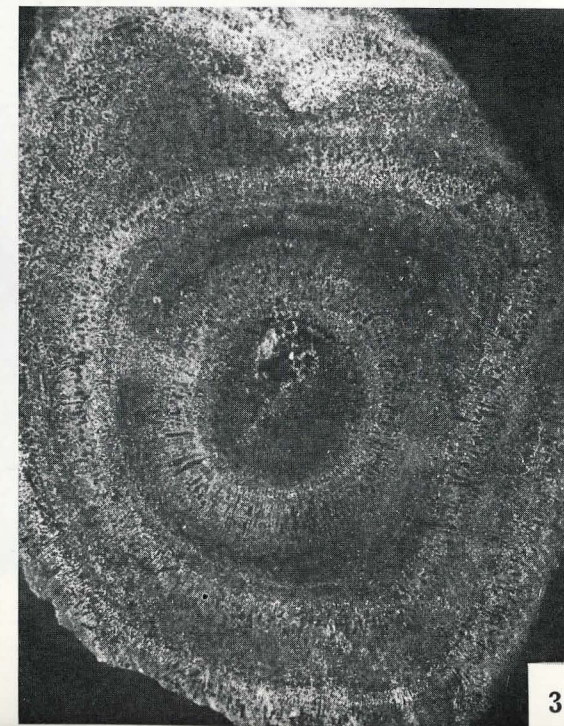
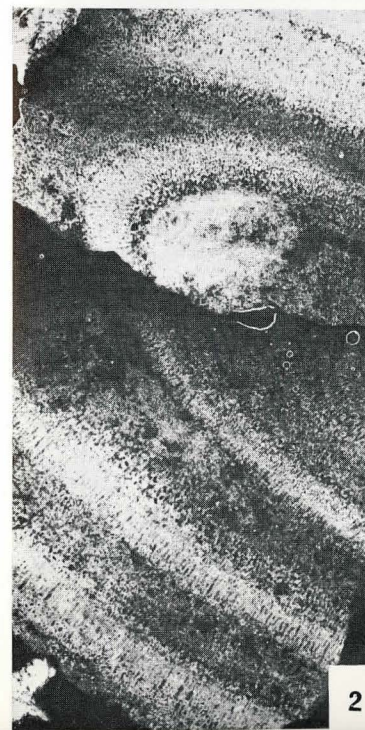
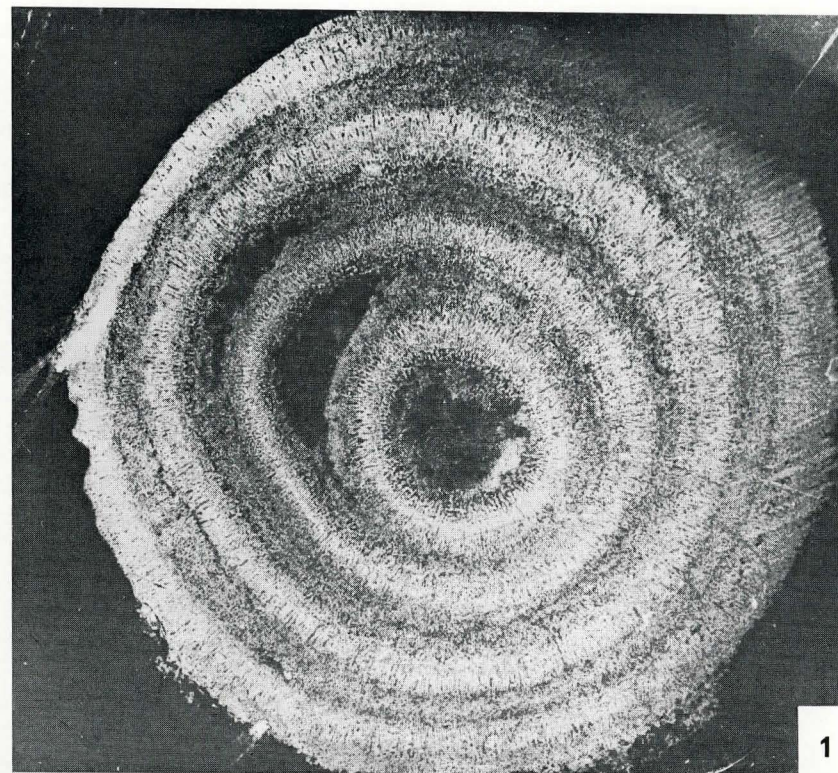




PLATE 19

*Promillepora provencensis* n. sp.

Locality: Orgon, 16 (holotype), Barremian

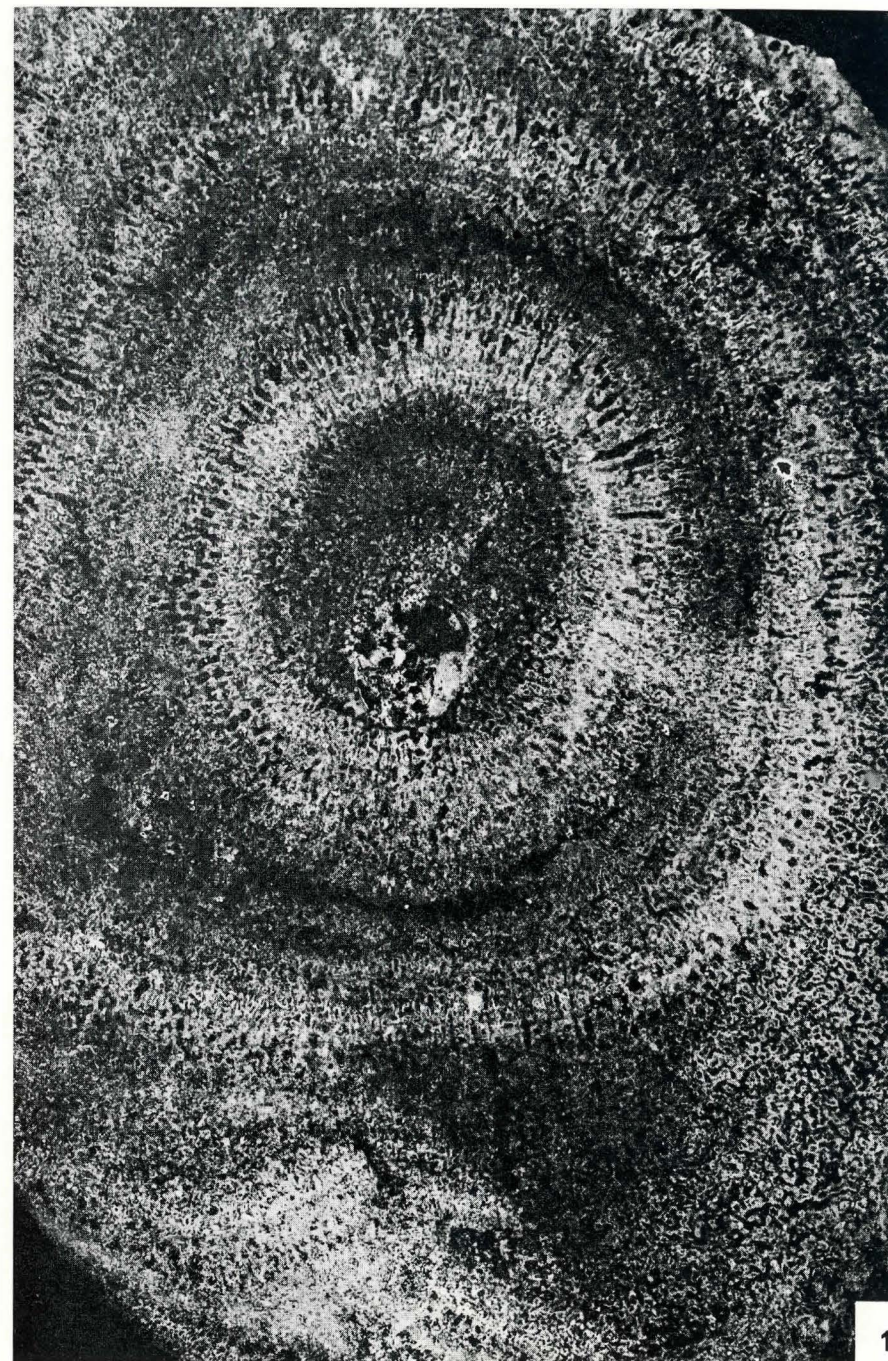
Radial section of reticulum, 16 b,  $\times 8$

TABLA 19

*Promillepora provencensis* n. sp.

Nahajališče: Orgon, 16, holotip, barremij

Radialni presek retikula, 16 b,  $\times 8$





## PLATE 20

*Burgundia wetzeli* (HUDSON)

Locality: Martigues, 7, Barremian

Fig. 1. Radial section of coenosteal branches, showing lamellate reticula, 7 b,  $\times 4$ Fig. 2. Transverse section of vermiculate reticulum, 7 c,  $\times 4$ Fig. 3. Part of radial reticulum from fig. 1, laminae very common,  $\times 8$ 

## TABLA 20

*Burgundia wetzeli* (HUDSON)

Nahajališče: Martigues, 7, barremij

Sl. 1. Radialni presek cenostilne vejice z značilnim lamelnarnim retikulom, 7 b,  $\times 4$ Sl. 2. Prečni presek črvastega retikula, 7 c,  $\times 4$ Sl. 3. Del radialnega retikula s sl. 1,  $\times 8$ 



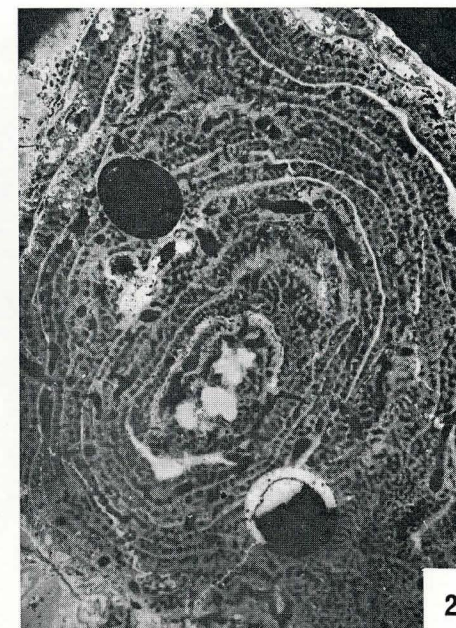
## PLATE 21

*Burgundia semiclathrata* (HAYASAKA)

Locality: La Mounine, 3123 B, 3125 B, Hauterivian



1



2



3

## TABLA 21

*Burgundia semiclathrata* (HAYASAKA)

Nahajališče: La Mounine, 3123 B, 3125 B, hauterivij

Sl. 1. Radialni presek cenostilne vejice z močno lamelarnim retikulom, 3123 B a,  $\times 4$ Sl. 2. Radialni presek lamelarnega retikula, 3125 B d,  $\times 4$ Sl. 3. Radialni presek retikula z močnimi koncentričnimi lamelami in kratkimi nepravilnimi stebrički in cevkami, 3123 B a,  $\times 8$



PLATE 22

*Burgundia massiliensis* n. sp.

Locality: La Mounine, 3125 C, holotype, Hauterivian

Fig. 1. Different sections of coenosteal branches, showing axial vermiculate and peripheral laminate reticula, 3125 C a,  $\times 4$

Fig. 2. Radial section of coenosteal branch, 3125 C b,  $\times 4$

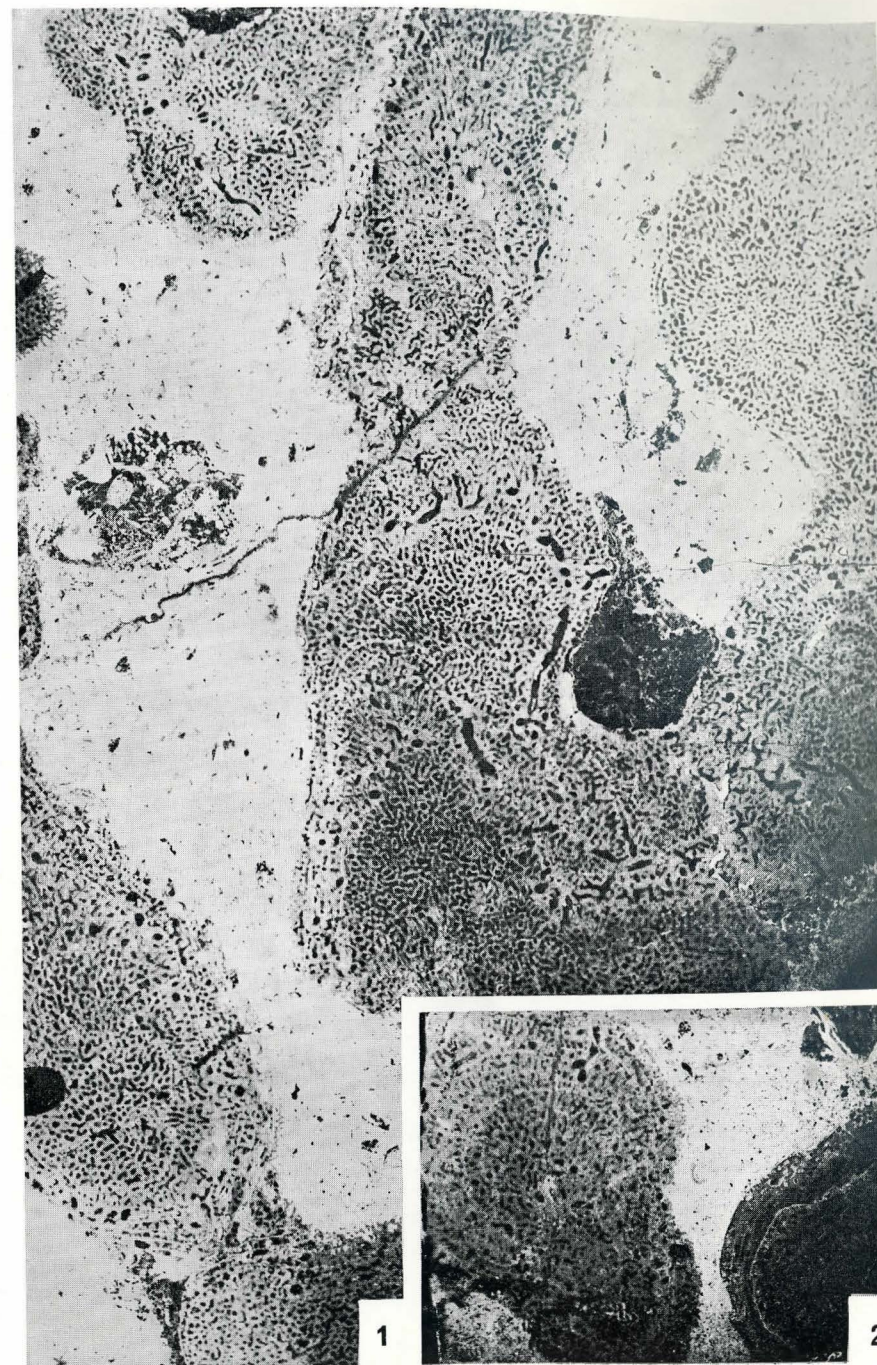
TABLA 22

*Burgundia massiliensis* n. sp.

Nahajališče: La Mounine, 3125 C, holotip, hauterivij

Sl. 1. Različni preseki cenostilnih vejic, ki kažejo aksialne črvaste in periferne lamelarne retikule, 3125 C a,  $\times 4$

Sl. 2. Radialni presek cenosteja, 3125 C b,  $\times 4$





## PLATE 23

*Burgundia massiliensis* n. sp.

Locality: La Mounine, 3125 C, holotype, Hauterivian

Fig. 1. Longitudinal section of two coenosteal branches, with wide axial vermiculate reticulum and peripheral laminae, 3125 C c,  $\times 8$

Fig. 2. Radial section of coenosteal branch. Note astrorhizal tubes between axial and peripheral reticula, 3125 C e,  $\times 8$

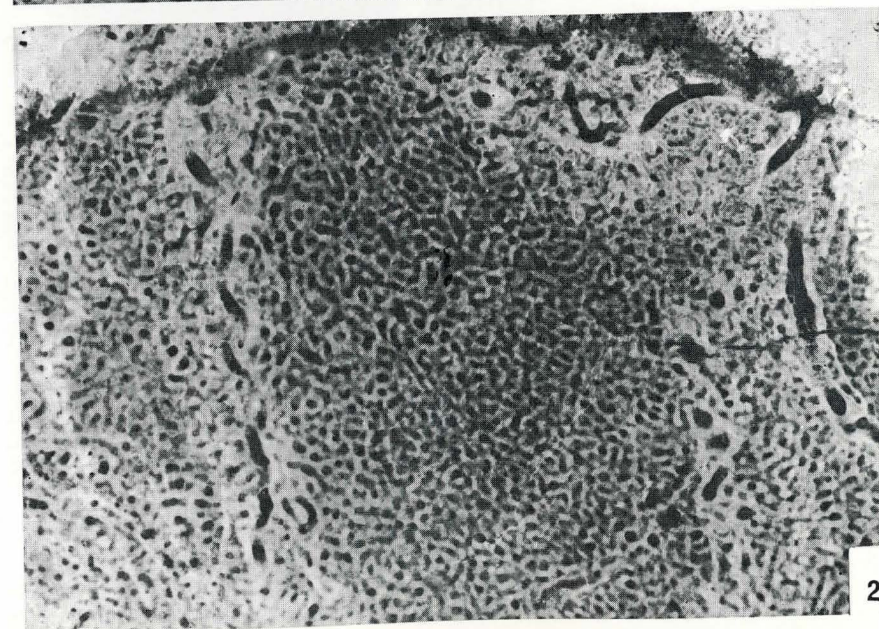
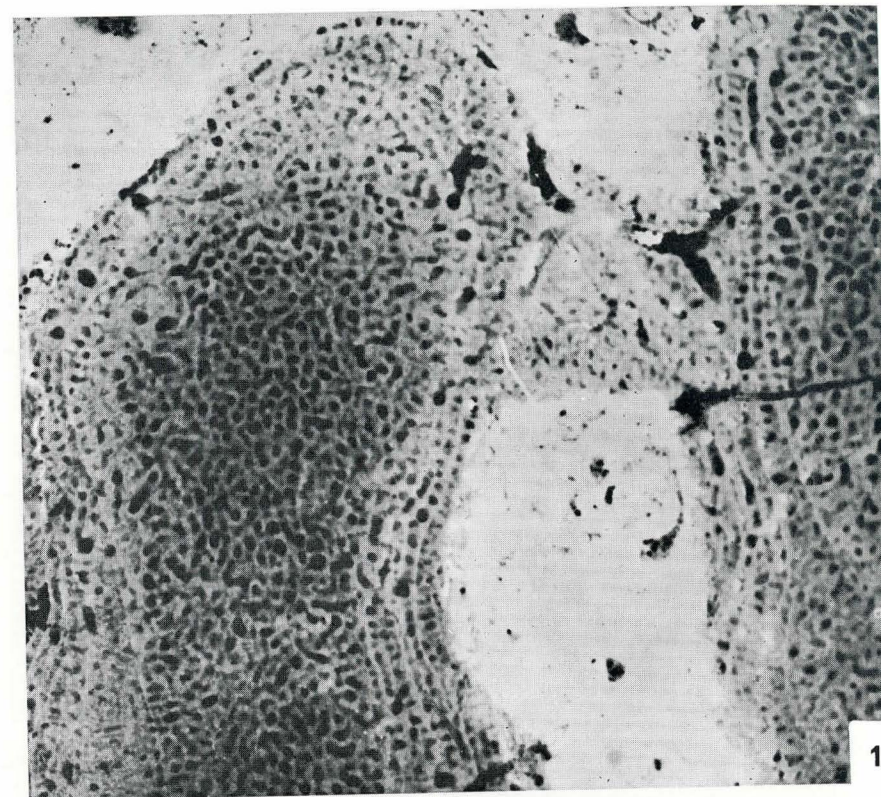
## TABLA 23

*Burgundia massiliensis* n. sp.

Nahajališče: La Mounine, 3125 C, holotip, hauterivij

Sl. 1. Podolžni presek cenostilne vejice s širokim aksialnim črvastim retikulom in ožjim lamelarnim perifernim retikulom, 3125 C c,  $\times 8$

Sl. 2. Radialni presek cenostilne vejice. Astrorizne cevi so v glavnem na prehodu med aksialnim in perifernim retikulom, 3125 C e,  $\times 8$





## PLATE 24

*Chaetetopsis favrei* (DENINGER)

Locality: Orgon, 21, Barremian

Fig. 1. Longitudinal section of coenosteum, showing tubular structure, 21 a,  $\times 8$ Fig. 2. Transverse coenosteum showing roundish, and irregular sections of tubes, 21 b,  $\times 8$ *Chaetetopsis krimholzi* YAWORSKY

Locality: Cot de Mery, 15, Bedoulian

Fig. 3. Longitudinal section of tubular reticulum with tabulae, 15 a,  $\times 8$ Fig. 4. Transverse coenosteum with polygonal and round sections of tubes, 15 b,  $\times 8$ 

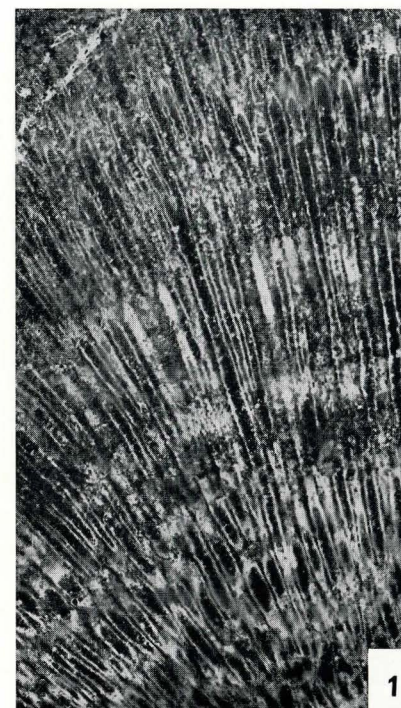
## TABLA 24

*Chaetetopsis favrei* (DENINGER)

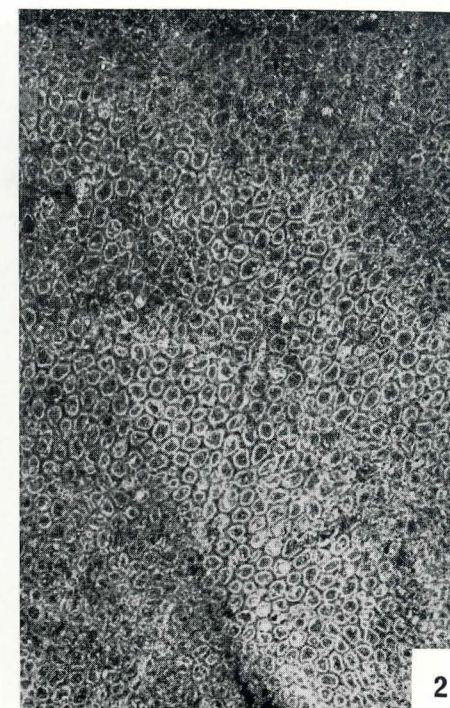
Nahajališče: Orgon, 21, barremij

Sl. 1. Podolžni presek cenosteja s tubularno zgradbo skeleta, 21 a,  $\times 8$ Sl. 2. Prečni cenostej, ki kaže okroglaste in nepravilne preseke cevi, 21 b,  $\times 8$ *Chaetetopsis krimholzi* YAWORSKY

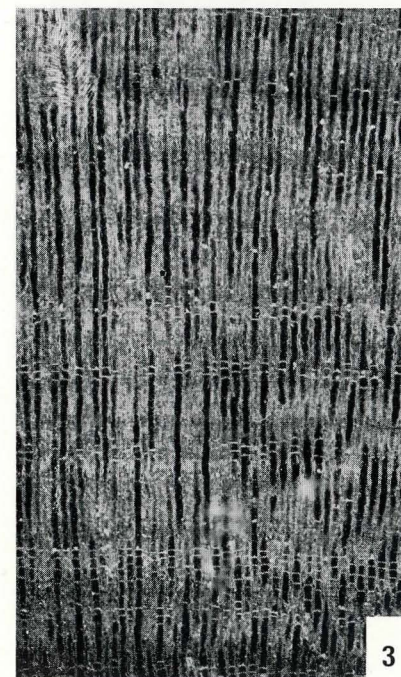
Nahajališče: Cot de Mery, 15, bedoulij

Sl. 3. Podolžni presek tubularnega retikula s tabulami, 15 a,  $\times 8$ Sl. 4. Prečni cenostej s poligonalnimi in okroglastimi preseki cevi, 15 b,  $\times 8$ 

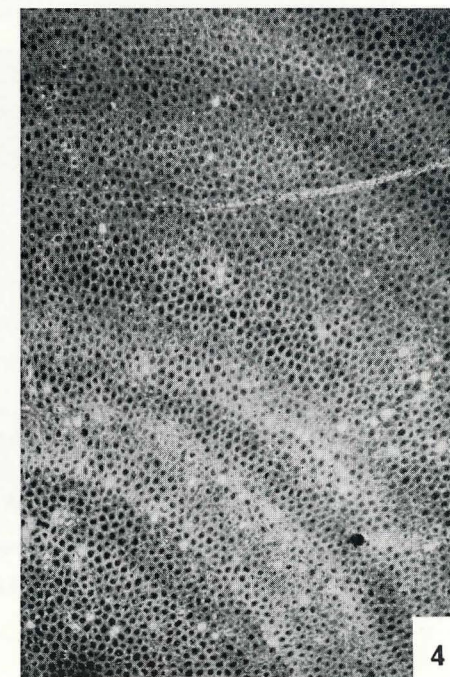
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## PLATE 25

*Varioparietes* cf. *lamellosus* SCHNORF

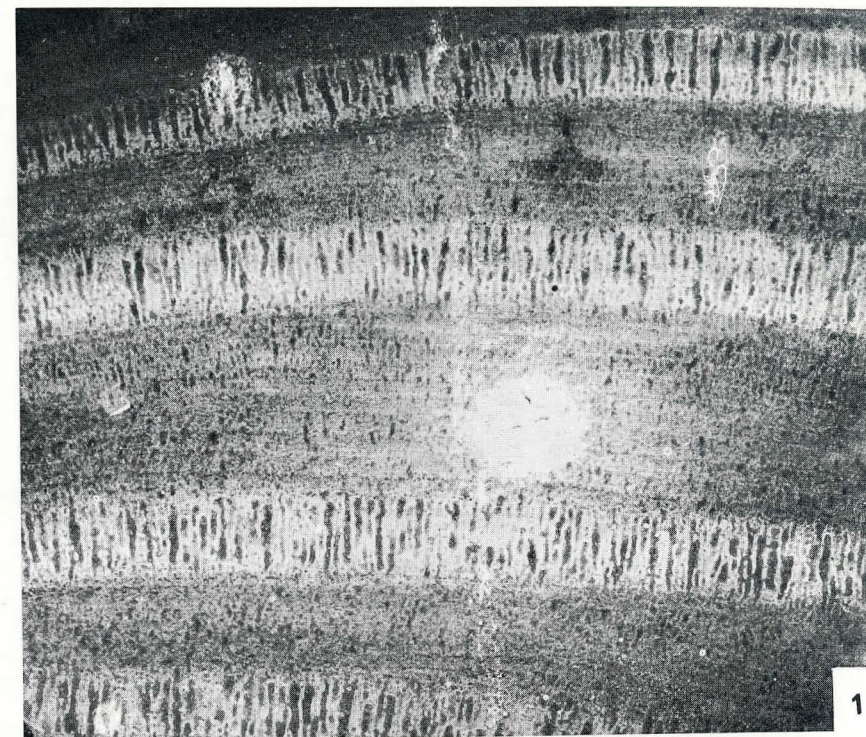
Locality: Canal EDF, 23, Barremian

Fig. 1. Longitudinal section of latilaminate reticulum, showing wide dense zones, 23 b,  $\times 8$ Fig. 2. Transverse section of tubular reticulum, note latilamellae, 23 a,  $\times 8$ 

## TABLA 25

*Varioparietes* cf. *lamellosus* SCHNORF

Nahajališče: Canal EDF, 23, barremij

Sl. 1. Podolžni presek latilaminarnega retikula, 23 b,  $\times 8$ Sl. 2. Prečni presek retikula, 23 a,  $\times 8$ 

1



2



## PLATE 26

*Actinostromaria orthogonalis* n. sp.

Locality: La Mounine, Hauterivian

Fig. 1. Orthogonal microstructure of longitudinal reticulum, 3131 a, holotype  $\times 130$ *Disparistromaria urgonica* n. sp.

Locality: Souvarel, Barremian

Fig. 2. Orthogonal microstructure of longitudinal reticulum, 3252 a,  $\times 130$ *Disparistromaria urgonica* n. sp.

Locality: Le Faron, Bedoulian

Fig. 3. Orthogonal microstructure, showing dark axial line. Orthogonal fibres are blot out a little, but they can be seen, 2753 a, holotype,  $\times 130$ *Actostroma hudsoni* n. sp.

Locality: Les Tarlans, Bedoulian

Fig. 4. Microstructure of longitudinal reticulum is without axial dark line, fibres are not orthogonal. It belongs to badly preserved heterogonal (?) microstructure, as mentioned by HUDSON at the genus *Actostroma*, 1, holotype,  $\times 130$ 

## TABLA 26

*Actinostromaria orthogonalis* n. sp.

Nahajališče: La Mounine, hauterivij

Sl. 1. Ortogonalna mikrostruktura podolžnega retikula, 3131 a, holotip,  $\times 130$ *Disparistromaria urgonica* n. sp.

Nahajališče: Souvarel, barremij

Sl. 2. Ortogonalna mikrostruktura podolžnega retikula, 3252 a,  $\times 130$ *Disparistromaria urgonica* n. sp.

Nahajališče: Le Faron, bedoulij

Sl. 3. Ortogonalna mikrostruktura z nekoliko prekrizaliziranimi vlakni, vendar so še jasno vidna, 2753 a, holotip,  $\times 130$ *Actostroma hudsoni* n. sp.

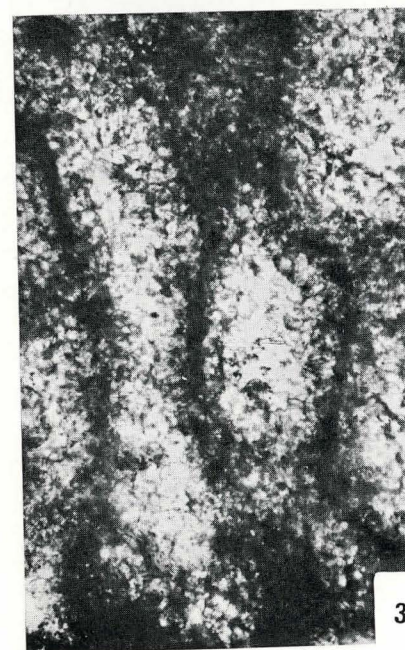
Nahajališče: Les Tarlans, bedoulij

Sl. 4. Mikrostruktura podolžnega retikula brez temne osrednje črte in brez ortogonalnih vlaken. Morda je to slabo ohranjena heterogonalna mikrostruktura (?), kakršno omenja HUDSON pri rodu *Actostroma*, vzorec 1 a, holotip,  $\times 130$ 

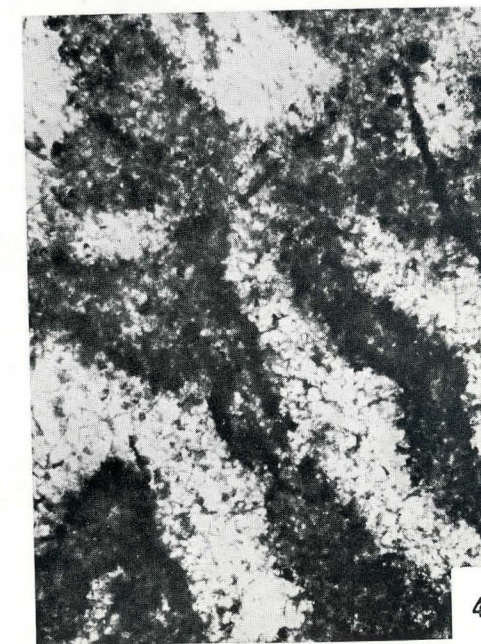
1



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4



## PLATE 27

*Tosastroma magna* n. sp.

Locality: Martigues, Barremian

Fig. 1. Clinogonal microstructure of longitudinal reticulum, 12 a, holotype,  $\times 130$ *Steineria tabulata* n. sp.

Locality: Le Logisson, Hauterivian

Fig. 2. Clinogonal microstructure of vertical reticulum, note abundant tabulae, 2750 a,  $\times 45$ Fig. 3. Microstructure of the same reticulum as on fig. 2,  $\times 130$ *Burgundia massiliensis* n. sp.

Locality: La Mounine, 3125 C a, holotype Hauterivian

Fig. 4. Granular homogeneous microstructure of vertical elements, and zonated or unilateral microstructure of horizontal lamellae,  $\times 45$ 

## TABLA 27

*Tosastroma magna* n. sp.

Nahajališče: Martigues, barremij

Sl. 1. Klinogonalna mikrostruktura podolžnega retikula, 12 a, holotip,  $\times 130$ *Steineria tabulata* n. sp.

Nahajališče: Le Logisson, hauterivij

Sl. 2. Klinogonalna mikrostruktura vertikalnega retikula, vidne so številne tabule, 2750 a,  $\times 45$ Sl. 3. Mikrostruktura dela retikula s sl. 2,  $\times 130$ *Burgundia massiliensis* n. sp.

Nahajališče: La Mounine, 3125 C a, holotip, hauterivij

Sl. 4. Homogena zrnata mikrostruktura vertikalnih elementov in zonarna ali unilateralna mikrostruktura horizontalnih lamel,  $\times 45$ 