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LOWER CRETACEOUS MICROSOLENINA (SCLERACTINIA) FROM PROVENCE (SOUTHERN FRANCE)

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Abstract: In the Lower Cretaceous (Urgonian) limestones of the Provence region (South France) shallow-water scleractinian corals are very common. This paper concentrates on corals from the suborder Microsolenina. They represent 34 taxa (including 5 new species) belonging to 14 genera from two families: Microsolenidae and Latomeandridae. This coral assemblage is representative for the late Early Cretaceous Tethyan realm but also shows some endemism. Its characteristic feature is the abundance of hydnophoroid specimens from the genus *Hydnophoromeandraraea* Morycowa. The Barremian–Early Aptian age of the studied corals is based on foraminifera (mainly orbitolinids), dasycladale algae and rudists, and agrees with that of the whole studied coral fauna.

Key words: Scleractinian corals, Microsolenina, Barremian–Lower Aptian, Provence, SE France.

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INTRODUCTION

Barremian–Early Aptian scleractinian corals associated with shallow water carbonate platform systems have a significant record in Provence (SE France), where some fossil bearing localities have been reported since the 19 th century (de Fromentel, 1862) and subsequently revised by Alloiteau (1957). During the last decade, our investigations performed on coral faunas of the foregoing region and stratigraphic interval, have led to the recognition of 23 genera belonging to 15 families (Masse & Morycowa, 1994; Morycowa & Masse, 1998). Our faunal census includes the description of two new genera, belonging to the Rhipidogyrina, and eight new species. The relatively high number of specimens belonging to the genus *Hydnophoromeandraraea* was emphasized as this character tends to give to the Provence fauna an original trait.

The objective of the present paper is to complement our earlier findings by the description of representatives of the Microsolenina, which were only briefly addressed in our previous investigations dealing with hydnophoroid forms, *i.e*. the genus *Hydnophoromeandraraea*, to which two species were ascribed (Masse & Morycowa, 1994).

The coral assemblage studied here comprises 34 taxa (among them 11 are left in open nomenclature and 5 new ones) belonging to 14 genera from two families.

MATERIAL AND METHODS

The corals presented in this paper were collected by Jean-Pierre Masse. The taxonomical study carried out by the first author of this paper was based only on loose specimens, on fragments of coralla in zoogenic limestone debris, and on thin sections made from these specimens.

The assemblage consists mainly of colonial, sporadically pseudocolonial (phaceloid) and solitary forms. Thin-lamellar and massive colony growth forms are predominant and ramose ones are rare. Most of the coral colonies are small, range from several centimeters up to 12 cm in size, and the thickness of lamellar coralla (platy-lamellar; Rosen *et al.*, 2000) does not usually exceed 4 cm, and of massive ones 12 cm.

The state of preservation of these coral skeletons differs slightly, due to their palaeoecological situations, type of sediments in which they occurred, and their diagenesis.

In the majority of specimens their surfaces are more or less abraded, in some others, as from the Lower Aptian of les Gardettes (Ventoux massif) the external colony parts are very porous, limonized and slightly silicified. Therefore, most of the specimens have been studied chiefly on the basis of thin sections, on which in places traces of the original microstructure and micromorphology have been recognized.

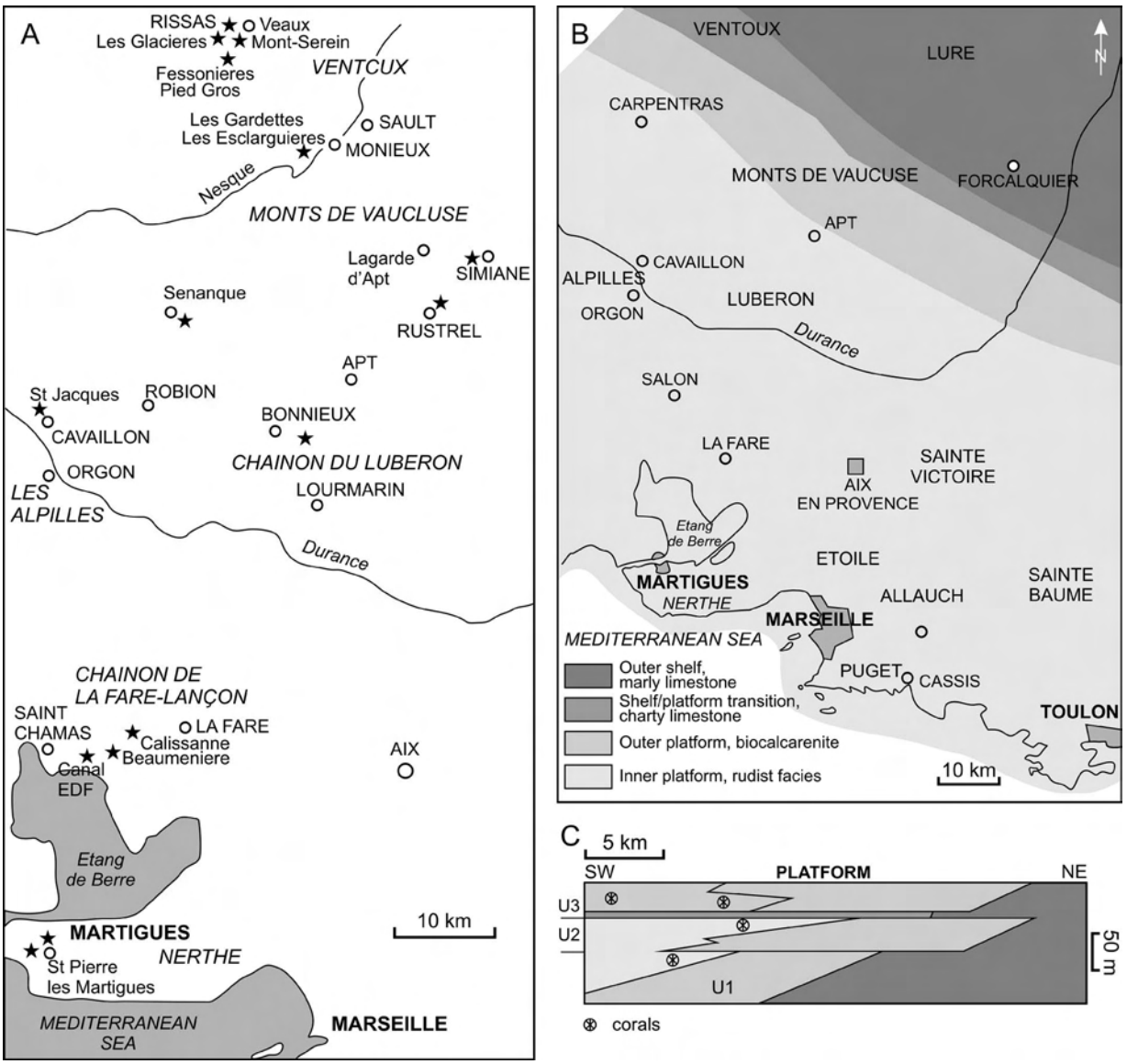


Fig. 1. **A** – Geographic sketch map showing the main locations of scleractinians (★) examined herein; B – Early Cretaceous palaeogeography of SE France (modified after Masse, 1976); **C** – Stratigraphic cross section of the Early Cretaceous platform carbonates from Provence showing the coral-bearing-sediments (U1-U3)

The coral fauna considered contains about 100 specimens (whole coralla and fragments), from which *ca.* 160 transverse and longitudinal thin sections were made mainly in the Institute of Geological Sciences, Jagiellonian University of Kraków. These investigations were carried out with the help of the optical and scanning electron microscope. The mineralogical analyses of the skeleton based on X-ray diffraction patterns indicate that the main material of coral skeleton is calcite.

The specimens described below are housed in the Museum of the Institute of Geological Sciences, Jagiellonian University, Kraków (coll. J.-P. Masse and E. Morycowa, acronym: UJ 137P). Particular specimens have their number and the thin sections made from them have the specimen number with letters. Parts of sectioned specimens are in Jean-Pierre Masse's collection in Marseille.

GEOGRAPHIC AND STRATIGRAPHIC FRAMEWORK

Microsolenina corals described herein were found in the Barremian and Lower Aptian carbonates outcropping in Basse-Provence and Haute-Provence, respectively (Fig. 1A). This distribution is due to the distinctive palaeogeographies of the two stratigraphic intervals. During the Barremian, the Provence platform was extending from the present day Mediterranean coastline to the southern margin of the Monts-de-Vaucluse (Fig. 1B). During the latest Barremian and up to the late Early Aptian, the antecedent system was split into two distinct platforms: the North Provence platform and the South Provence platform, separated by the South Provence Basin (Fig. 1B, C). This configuration acknowledges the preferential distribution of corals in the northern part of the study area.

Barremian localities

Early Barremian corals were collected at three localities, two of them: the so-called l'Enfourna biostrome, in the La Fare-Lançon area, and the Martigues coral-beds, were described earlier by Masse (1977, 1980), concerning their stratigraphic context and the anatomy and sedimentology of coral bodies, with limited information on the taxonomy of the coral assemblages. The third locality, Combe de Bonnieux, in the Luberon mountain, was briefly mentioned by Masse (1976).

The l'Enfourna biostrome possesses a lenticular elliptical shape and is interbedded within fine grained biocalcarenites and muddy, cherty packstones (Masse, 1977, 1980). Its stratigraphic position in the lowermost Barremian derives from the age of the underlying grainstones, with orbitolinids: *Praedictyorbitolina claveli* Schroeder, usually observed at the Hauterivian–Barremian transition, in correspondence with the biozonation of Schroeder *et al.* (2002), and that of the overlying beds with *Salpingoporella genevensis* (Conrad) and *Similiclypeina paucicalcarea* (Conrad), the LO (last occurrence) of which is in the upper part of the Lower Barremian (Masse, 1993).

At Martigues, coral-beds which are interbedded between bioclastic grainy sediments and rudist dominated ones (Masse, 1977), also contain rich and diverse stromatoporoid and chaetetid faunas, including: *Actinostromaria orthogonalis* Turnšek et Masse, *Burgundia wetzeli* (Hudson), *Steineria romanica* (Dehorne), *Chaetetopsis krimholzi* Yaworsky, and *Varioparietes separatus* Schornf (Turnšek et Masse, 1973). Orbitolinid foraminifera associated with this fauna include: *Valserina broennimanni* Schroeder *et al.*, *Praedictyorbitolina carthusiana* Schroeder *et al.*, and *Urgonina alpillensis* (Foury), which characterize the lowermost Barremian according to the biozonation of Schroeder *et al.* (2002), and Charollais *et al.* (2003).

The coral beds found at the Combe de Bonnieux overlying fine grained packstones with cherts and are capped by biocalcarenites with a micropalaeontological assemblage [*Palaeodictyoconus cuvillieri* Foury, *Falsolikanella danilovae* (Radoicic)] with a broad Barremian stratigraphic significance (Masse, 1976).

The coral biostrome outcropping at canal EDF, near Saint-Chamas (Fig. 1A), described by Masse (1980), is interbedded between fine bioclastics and coarse coral and rudist dominated rudstones, and is tentatively ascribed to the lowermost Upper Barremian. This stratigraphic interpretation is based on the micropalaeontological assemblage found in the underlying biocalcarenites, which yield *Salpingoporella genevensis* and *Similiclypeina paucicalcarea* (LO in the upper part of the Lower Barremian), whereas the assemblage found within the biostrome contains *Paracoskinolina reicheli* (Guillaume) and *Palaeodictyoconus actinostoma* Arnaud-Vanneau et Schroeder, mainly found in the Upper Barremian.

Coral beds observed at Saint-Pierre-les-Martigues (railway station), briefly described by Masse (1976), are interbedded within rudist limestones. This is the type locality of *Donacosmilia massaliensis* described by Morycowa and Masse (1998). The Late Barremian age of the coral beds is based on: *Paracoskinolina reicheli* and *Palaeodictyoconus actinostoma*.

The biostrome of Notre-Dame de Beau-Regard, at Orgon, is located at the transition between bioclastics and rudist beds (Masse, 1980). The Late Barremian age of the corresponding beds is based on the presence of *Palaeodictyoconus actinostoma* and *Paracoskinolina maynci*. From the same locality but in overlying beds, the so-called "Orgon chalks" (Urgonian stratotype in the sense of d'Orbigny, 1850), contain isolated corals. The "Orgon chalks" are currently placed in the latest Barremian (Sarasini ammonite Zone), an age based on the presence of: *Orbitolinopsis buccifer* Arnaud-Vanneau et Thieuloy, *Pseudocyclammina allobrogensis* Arnaud-Vanneau, and *Sabaudia capitata* Arnaud-Vanneau; this assemblage is also found in the Bedoulian, nevertheless caprinid rudists which mark the Lower Aptian, are absent from the Orgon rudist fauna.

Bedoulian (Lower Aptian) localities

The Sault biostrome (Fig. 1A), the organisation of which was outlined by Masse (1967, 1976), is ascribed to the lowermost Bedoulian; an assumption mainly based on the presence, in the underlying marly and cherty beds, of ammonites belonging to the Sarasini Zone. This lense-like biostrome, with a silicified fauna, first studied by de Fromentel (1862), is the type locality of the genus *Saltocyathus* Morycowa et Masse (type species *S. urgonensis*), *Diplocoenia saltensis* de Fromentel, and *Clausastrea saltensis* Alloiteau (Morycowa & Masse, 1998). Microsolenina tend to be concentrated in the lower part of the biostrome, where lamellar forms are predominant. South to the village of Sault, localities found in the vicinity of Saint-Christol: Moulin d'Aumage and les Cougnoux, appear to be at the same stratigraphical level as the Sault biostrome, also yield silicified specimens, and represent probably the southern extent of the biostrome in question. Westward, in the Nesque canyon, coral beds with silicified colonies are present at Les Gardettes & Les Fayols, where they represent the distal termination of rudist rich limestones, a geometry figured by Masse (1979, fig. 2).

The stratigraphic succession of Rustrel (Fig. 2) illustrative of the "Urgonian trilogy", i.e. U1, U2, U3 lithostratigraphic units (Leenhardt, 1883), is marked by two main coral bodies. The lower one, at Côteau de Mery gorge, is stratigraphically interbedded between the U1 biocalcarenites and U2 rudist dominated unit, and is ascribed to the lower Bedoulian, due to the presence of caprinid rudists associated with *Palorbitolina lenticularis* (Blumenbach) and *Orbitolinopsis buccifer* Arnaud-Vanneau et Thieuloy. A rich coral assemblage, including 8 different genera, was described earlier from these beds (Masse & Morycowa, 1994; Morycowa & Masse, 1998).

On the western flank of the Mont-Ventoux (Fig. 3A), a relatively thick (5 to 15 m) coral unit is also interbedded between the U1 biocalcarenites and the U2 rudist rich unit; several sites yield coral specimens: Fessonières, Pied-Gros, Lanrageade. The same beds outcrop on the northern flank of the massif.

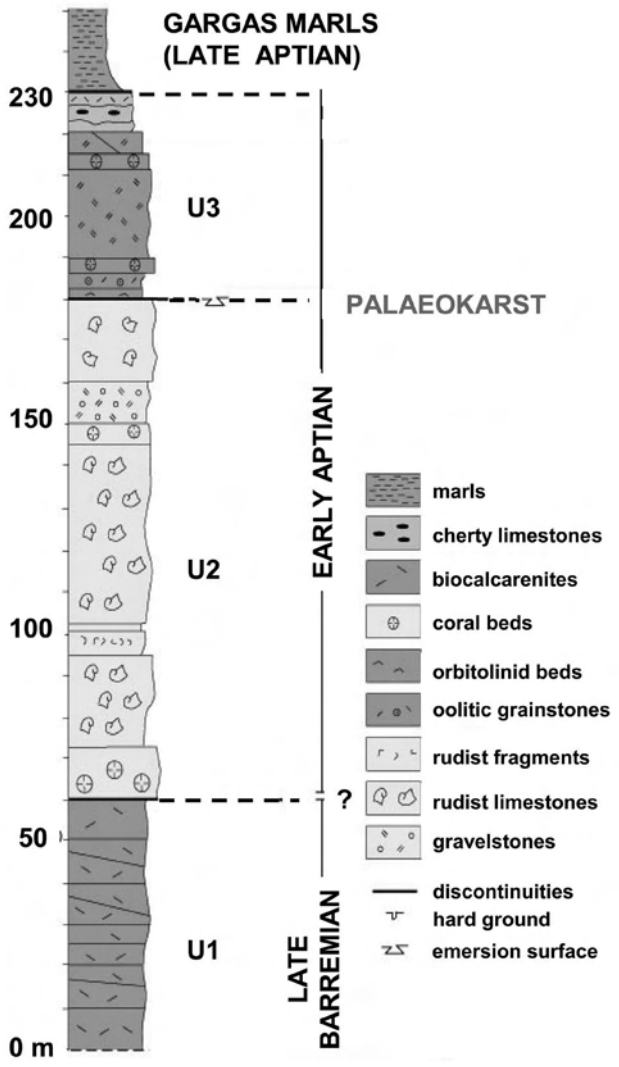


Fig. 2. Stratigraphic section of the Lower Cretaceous succession (Urgonian trilogy) in the Monts de Vaucluse (Rustrel) showing the position of coral-bearing limestones (U1-U3)

In the overall Monts-de-Vaucluse and Mont- Ventoux area, the rudist formation U2 contains isolated specimens of corals, which have been collected in the following localities: La Gabelle, Simiane-Les Estèves, Lagnes, and on the western flank of the Mont-Ventoux.

In the southwestern part of the Monts-de-Vaucluse, close to the Senanque Abbey (near Gordes), the topmost part of the U2 formation is marked by coral mounds which have been sampled. Large colonies mixed with rudists (Caprinidae) are found in the same stratigraphic position in the Mercurotte valley near Saint-Chamas, on the southern margin of the North Provence platform. These two localities are ascribed to the upper part of the lower Bedoulian.

Upper Bedoulian corals (Deshayesi Zone) were sampled at Rustrel in the U3 formation, where they are associated with bioclastic sediments (upper coral bed).

GENERAL CHARACTERISTIC OF THE PROVENCE MICROSOLENINA

Palaeoenvironmental remarks

The scleractinian corals under discussion occur commonly *in situ* in the precisely dated Lower Cretaceous (Barremian–Lower Aptian) sediments of Urgonian facies in Provence (*i.a.*, Masse, 1976). This coral assemblage is not representative of all the corals associated with these limestones. It concerns only the taxa from the suborder Microsolenina, complementing our earlier findings (Masse & Morycowa, 1994) with new specimens from this suborder.

The sedimentological and faunal analyses suggest that the corals studied are of zooxantellate type (*i.a.* Masse & Morycowa, 1994). Their size and shape (in majority lamellar and massive) indicate also that they grew in more or less shallow, euphotic, relatively calm-water depositional environment, periodically influenced by turbulent high-energy events, causing heavy influx of sediments, which played an obstructive role in unconstrained colony development, or even interrupted coral growth, as indicated *i.a.*, by common colony growth as mound-like form composed of foliaceous increments (Fig. 3B).

In some areas of these generally shallow-water depositional environment sequences of the Lower Cretaceous (Barremian–Lower Aptian), the lamellar and sublamellar microsolenine corals are more numerous than other coral colony forms. Generally, they predominate in the lower part of the coral buildups, *e.g.* in the Sault biostrome. Quite a large number of dispersed lamellar colonies can also be observed, *i.a.* in one of the good expoures in the Ventoux region indicated here in Fig. 3A. The buildups with dominating lamellar microsolenids are known, *i.a.* from many Upper Jurassic rocks of western and central Europe (see *i.a.* Roniewicz & Roniewicz, 1971; Morycowa, 1974; Geister & Lathuilière, 1991; Insalaco, 1996). There are suggestions that the main control on their development was a low light marine environmental condition caused by depth or turbidity (*cf.* Geister & Lathuilière, 1991; Morycowa & Roniewicz, 1995; Insolaco, 1996).

Coral growth forms and taxonomic diversity of examined Microsolenina assemblage

The Provence corals from the suborder Microsolenina are representative for the late Early Cretaceous Tethyan realm but also show some endemism. Their characteristic feature is the abundance of hydnophoroid specimens from the genus *Hydnophoromeandraraea* Morycowa, family Microsolenidae. The hydnophoroid corals from this family are known to date only in the Lower Cretaceous, but already in some Jurassic meandroid colonies with disintegration of regular continuous collines can be observed. For example, *Meandrarea gresslyi* (Koby, 1888, pl. 109, fig. 1, Pictet collection, No. D4853) has hydnophoroid monticules with about 16 septes within long collines. Similar features can be obseved in Koby's figures of, *i.a. Comoseris interrupta* Koby (Koby, 1880–1889, pl. 111, fig. 3, 4). This trend of disintegration of meandroid coral structure occurs not only

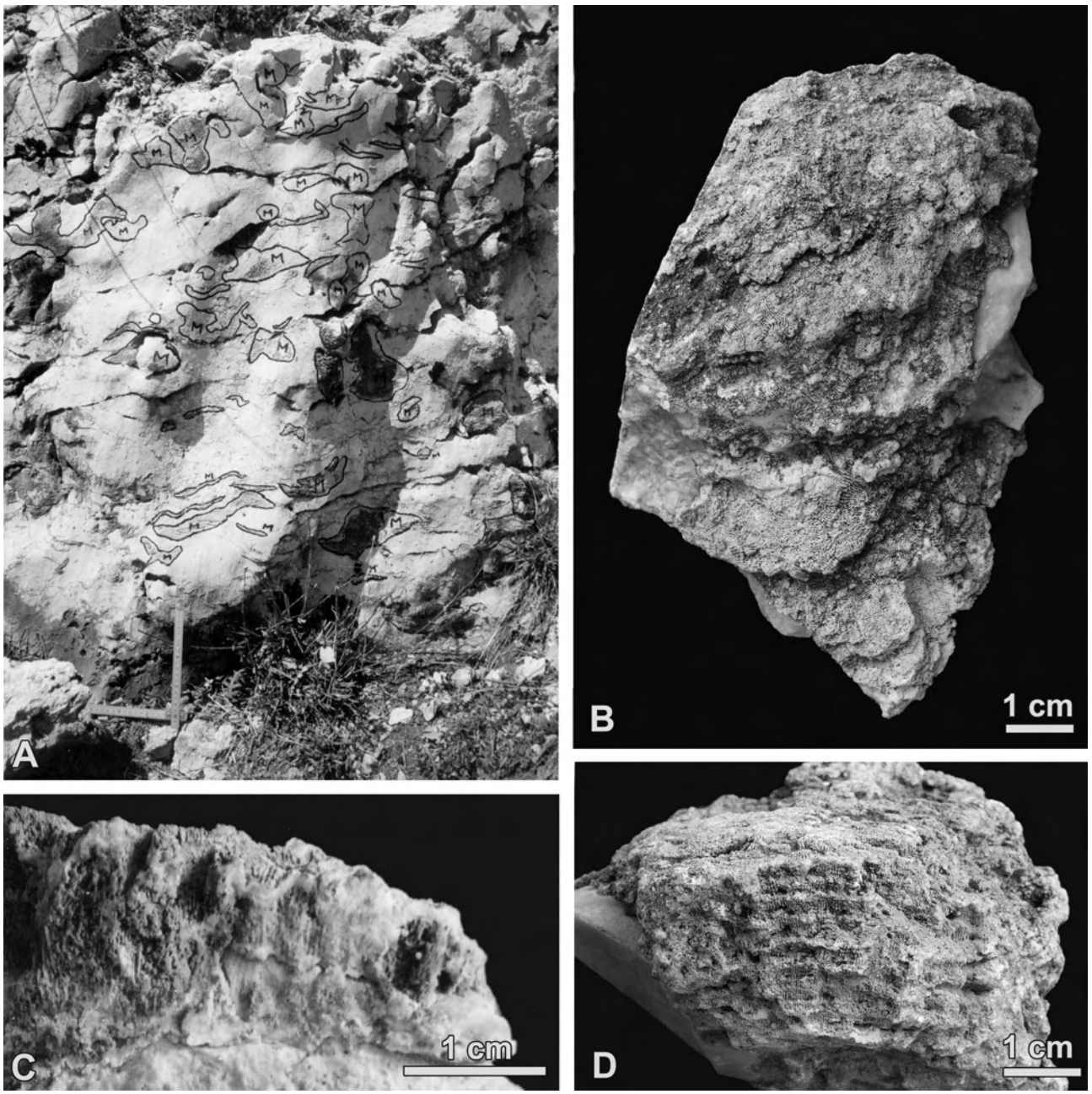


Fig. 3. Characteristic colony shapes: **A** – Massif du Ventoux (south-western side) showing the shapes and density of coral colonies; **B–D** – Lower Bedoulian–Monts de Vaucluse. Les Gardettes-Nesque gorge: B – submassive colony built of several thin superposited lamellar increments, *Hydnophoromeandraraea provencensis* (No. 230); **C** – sublamellar colony with upper surface slightly convex, *Microphyllia meandrinoides* (No. 218); D – Lateral surfaces of massive colony showing well marked regular growth-bands, *Hydnoseris subagariciformis* sp.n. (No. 233)

in micosolenids, but also *i.a.* in faviids (Morycowa, 1971, table 6), for instance in the meandroid *Eugyra: E. interrupta* de Fromentel.

All the Microsolenina studied are taxonomically rather diversified. 34 taxa (among them 5 new species) belonging to 14 genera have been identified. The family Microsolenidae is represented only by colonial forms from 7 genera: *Microsolena*, *Polyphylloseris*, *Eocomoseris*, *Comoseris*, *Meandrarea, Hydnoseris*, and *Hydnophoromeandraraea*. From the family Latomeandridae there are, apart from colonial corals, sporadic solitary and phaceloid (pseudocolonial) coralla. Seven genera occur here: solitary *Epistreptophyllum,* phaceloid *Latomeandra* and colonial: *Dimorphastrea*, *Microphyllia*, *Fungiastraea*, *Mixastraea*, and *Ovalastrea*.

Among the discussed Microsolenidae, the most common are colonies with the following growth forms: thick and thin-lamellar (Figs 3A, 14A, E), sublamellar, with

Table 1

List of the Microsolenina corals with their stratigraphic and geographic distribution in Provence

Species \ Distribution	Number of specimens	Provence: Chainon de la Fare	Chainon des Alpilles	Massif du Luberon	Massif de Vaucluse	Massif du Ventoux	Massif du Rissas
Microsolena guttata Koby	6						
Microsolena texana Wells	2						
Microsolena aff. *agariciformis* Etallon	1						
Microsolena parva sp.n.	4						
Microsolena sp.	1						
Polyphylloseris icaunensis (d'Orbigny)	1						
Polyphylloseris distefanoi (Prever)	4						
Eocomoseris raueni Löser	3						
Comoseris aff. *minima* Beauvais	4						
Comoseris aptiensis Baron-Szabo	1						
Comoseris sp.	2						
Meandrarea lorioli (Koby)	3						
Meandrarea meandroides Koby	4						
Meandrarea granulata (de Fromentel)	1						
Meandrarea subataciana (Reig Oriol)	2						
Meandrarea robusta sp.n.	2						
Meandrarea sp.	1						
Hydnoseris paragaricites sp.n.	2						
Hydnoseris radiata sp.n.	1						
Hydnoseris sp.	1						
Hydnophoromeandraraea volzi Morycowa	4+13						
Hydnophoromeandraraea provencensis Masse et Morycowa	13 + 9						
Hydnophoromeandraraea aff. *provencensis* Masse et Morycowa	4						
Hydnophoromeandraraea magna sp.n.	1						
Epistreptophyllum sp.	3						
Latomeandra minor Reig Oriol	1						
Dimorphastrea bellula d'Orbigny	1						
Microphyllia meandrinoides (Reuss)	2						
Microphyllia gemina Eliašova	2						
Microphyllia sp. 1	1						
Microphyllia sp. 2	1						
Fungiastraea sp.	2						
Mixastraea westfalica Löser	1						
Ovalastrea regularis (d'Orbigny)	1						
Microsolenina gen. and sp. indet.	15						

Lower Barremian Upper Barremian Lower Aptian

non-flat calicular surface (Fig. 3C) and submassive, composed, *i.a.* of thin lamellar increments (Fig. 3B). The massive colonies are usually subhemispherical in form (Fig. 17A). Characteristic but rare, are ramose colonies (Fig. 6D).

The corals from the Latomeandridae are composed of predominantly lamellar (*i.a.* Fig. 23A) and sublamellar colonies (Fig. 22A, B). Phaceloid (Fig. 21F) and solitary corals (Fig. 20A, B) are poorly represented (altogether two species).

It should be mentioned that on several lateral colony surfaces regular growth bands, with density about 4 per 1 cm, have been preserved. Traces of colony attachment area are sporadically preserved in some massive colonies (*i.a.* Fig. 16E).

State of preservation of coral skeleton microstructure and micromorphology

The microstructure of the skeletons is an important suprageneric taxonomical criterion, both for living (see Chevalier, 1971, 1975) and for fossil scleractinians, and together with such features as growth forms, morphology of corallites and micromorphology of their skeletons makes possible their taxonomic identification. Molecular investigations of scleractinian DNA and RNA sequences (*i.a.* Veron, 1995; Romano, 1996; Romano & Palumbi, 1996) gradually modify the data concerning phylogenetic relations of coral families and suborders, hitherto based mainly on skeleton morphology and microstructure. Unfortunately, in the present state of knowledge, the results of molecular studies cannot be directely applied to entirely extinct groups of corals (see *i.a.* Cuif *et al.*, 2003). Thus, the analysis of the microstructural features is based on traditional methods which may also be of use in the future for comparison with the data obtained by other methods.

There is convincing evidence that nearly all (see Stolarski *et al.*, 2007) skeletons of scleractinian corals were aragonitic. However, the fossil scleractinian skeletons are commonly poorly preserved, on account of alteration and recrystallization of originally aragonitic skeletons in calcite, or sometimes replacement by silica (Morycowa, 1964, 1980). The coral skeletons from Provence are commonly altered, *i.e.* recrystallized, and some of them are also silicified, but the traces of original microstructure are, in places, preserved. The approximate trabecula diameters were assessed then from the preserved trabecular outlines (see *i.a.* Roniewicz & Morycowa, 1993) and/or from their density measured along the septal plate, in transverse section (Fig. 4B, C). The state of preservation of skeletal microstructure and micromorphology of Microsolenina corals, and the way of their measuring and interpretation are exemplified by one of the species of the genus *Microsolena*, in Fig. 4A–F.

Biostratigraphic and palaeogeographic distribution of discussed corals

In total, 34 taxa described here (Table 1) from the Barremian–Lower Aptian of Provence represent 14 genera and two families from the suborder Microsolenina. The stratigraphic distribution of examined corals, based on 18 species identified with certainty (Table 2), *i.e.* without aff., cf. and the new species, is relatively wide, from the Late Berriasian to Senonian. However, over half of them (from 18) are known from the Barremian–Aptian, mainly Lower Aptian (7 species in Barremian, 12 species in Aptian).

The whole assemblage is characterized by the presence of:

– surviving Jurassic relict taxa, *e.g. Comoseris* aff. *minima* Beauvais and *Microsolena* aff. *agariciformis* Etallon;

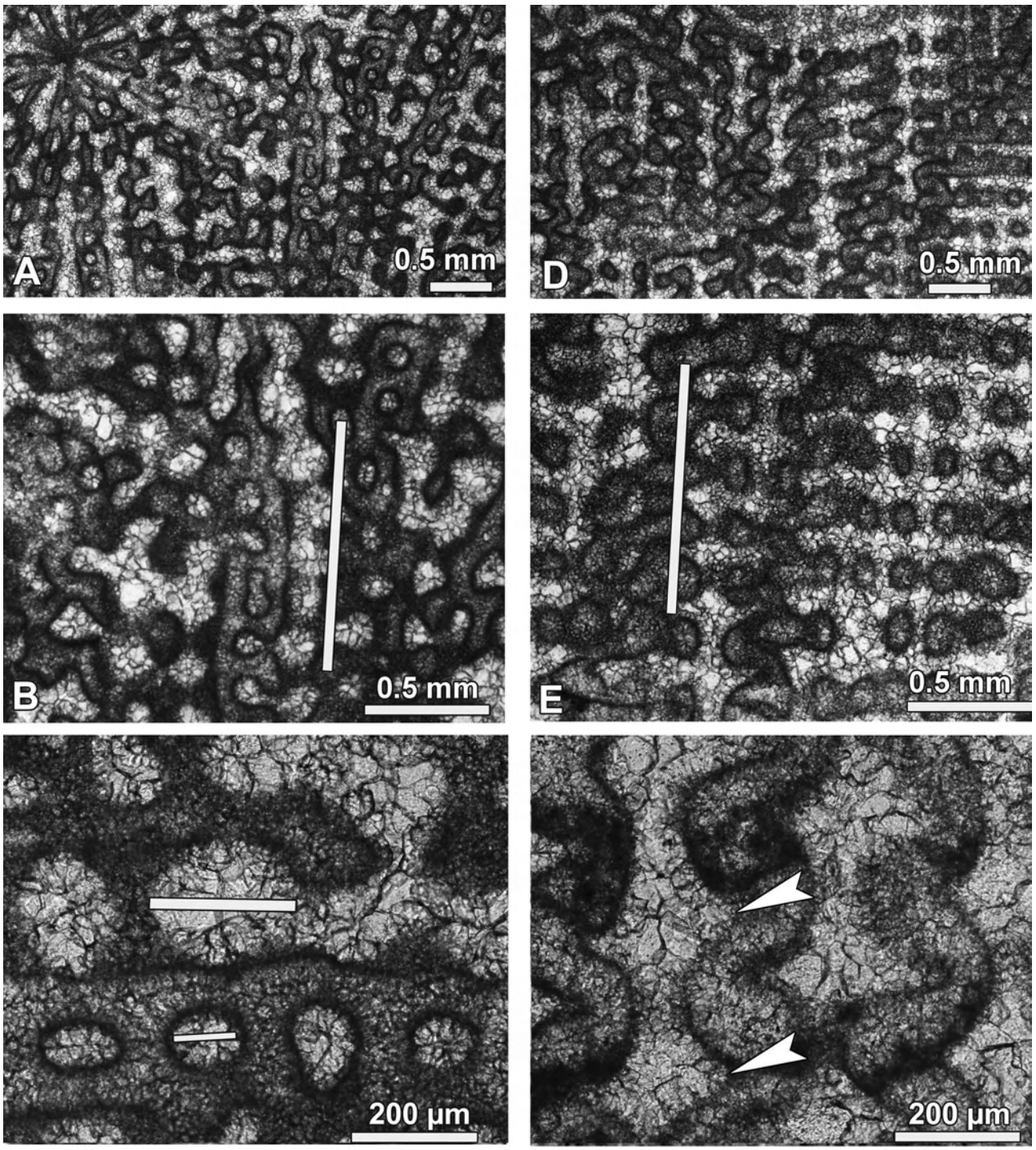
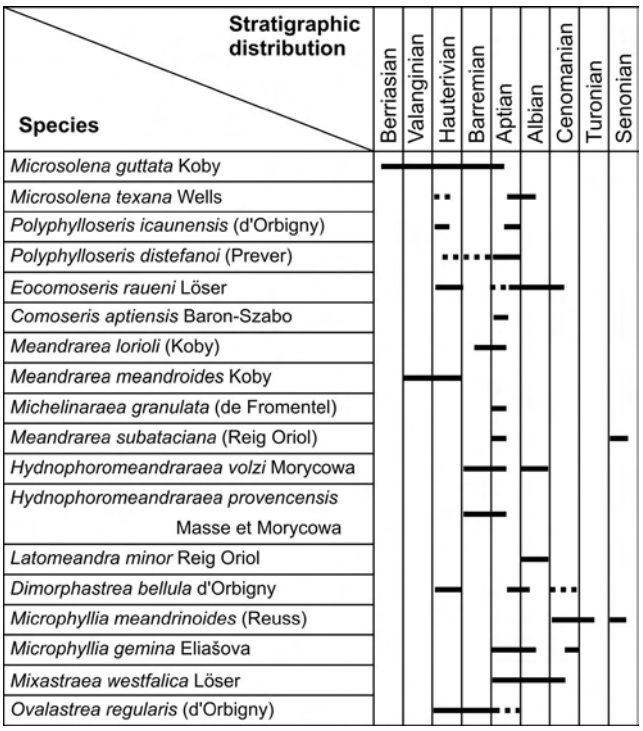


Fig. 4. State of preservation of the studied microsolenid skeletons and the way of interpretation of preserved traces of their microstructure and micromorphology, exemplified by species from the genus *Microsolena* (Microsolenidae). **A–F** – *Microsolena guttata* Koby, No. 66. A–C – transverse section of equal in thickness, regularly porous septa, B – way of estimating trabecular density on the basis of preserved trabecular outlines (bar = 1 mm); C – Enlarged detail from Fig. 4A, showing the transverse section of septal trabeculae passing alternatively across pennula area (large rounded forms) and between them (smaller forms). Approximate diameters of these trabeculae assessed on the basis of the outlines of particular trabeculae measured along septal plate direction (white shorter bar); D–F – septal trabeculae in longitudinal thin section: D – tangential section (at right) showing regular porous septum and pennules arranged in horizontal rows. At centre and left, the micromorphology of pennular trabeculae in longitudinal section is visible. E – enlarged detail from Fig. 4D showing successive pennulae regularly spaced along the trabeculae; their density is shown by 1 mm bar; F – trabeculae perpendicular to the septal plate, showing pennules with upwardly directed edges (arrows). Ornamentation of pennular edges not preserved. Pennules of the two neighbouring septa are alternating, hence the difference in the width of radial elements in transverse section is observed (Fig. 4A–C)

Table 2

Stratigraphic distribution of coral species from the suborder Microsolenina from Provence



– abundance of specimens from the family Microsolenidae (from the genus *Microsolena Meandrarea* and *Hydnophoromeandraraea*;

– typical Early Cretaceous species (Barremian–Aptian), such as: *Microsolena guttata* Koby, *Meandrarea lorioli* (Koby), *Hydnophoromeandraraea volzi* Morycowa, *H. provencensis* Masse & Morycowa), *Dimorphastrea bellula* d'Orbigny;

– appearance of taxa hitherto only documented from the Late Cretaceous, such as *Microphyllia meandrinoides* (Reuss);

– new taxa, perhaps endemic (5 new species in this paper, and one new species from the genus *Hydnophoromeandraraea* formerly described in Masse & Morycowa, 1994);

– another distinct character of the assemblage discussed here is the absence of taxa characteristic of the so-called shallow-water Lower Cretaceous Microsolenina assemblages in Europe, such as, *i.a. Dermoseris* Koby*; Latiastraea* Beauvais, *Periseris* Ferry, *Synastrea* Milne Edwards et Haime.

SYSTEMATIC PALAEONTOLOGY

Alloiteau's systematics (1952, 1957), is generally accepted, with emendations and supplements introduced by Morycowa and Roniewicz (1995). The coral structure terminology is used according to Alloiteau (1952, 1957) and Wells (1956), with some additional terms concerning the microstructure and micromorphology of microsolenid skeletons (Gill, 1967, 1968). The corallum growth forms, *i.a.* pseudocolonial (= phaceloid) are used according to Coates and Jackson (1985).

The majority of the families and even some suborders show the characteristic structure of trabeculae and trabecular diameters, more or less stable in relation to the dimensions of radial elements. The micromorphology (= ornamentation) of radial elements is another important taxonomic criterion of supergeneric taxonomic groups, connected with microstructure. In the case of the Microsolenina, the important features are thick (mainly larger than 100 μm, even to *ca.* 300 μm; Morycowa & Roniewicz, 1994), compound trabeculae (*cf.* Morycowa & Roniewicz, 1995, p. 363) of radial elements. They are composed by primary (main) trabeculae, mono- and/or polycentres (in thin section) with secondary (lateral; term used after Jell, 1969) ones, regularly diverging from the main trabecular body and giving a characteristic micromorphology on the lateral radial elements plates, as *e.g.* pennules and menianes. The latter two terms are used after Gill (1967):

– pennules (lat., sing. *pennula*, pl. *pennulae*) – are serially and regularly arranged collar-like forms (balconies) along the trabeculae; edges of pennules directed upwards (Fig. 4E, F);

– mi-pennules – asymmetrically expensions on only one septal flank;

– meniane (lat., sing. *menianum*, pl. *meniana*) – are more or less long collar-like forms (flange-like forms) developed mainly from coalescing of pennules. Their origins can be diverse and characterize particular supragenetic coral groups

Other skeletal elements such as pali (lat., sing. *palus*), paliform lobes, columella, endotheca and exotheca, type of budding, are usually considered as diagnostic at generic level.

In the synonymies of the species, apart from the first species description, other publications having descriptions and/or illustrations are listed. "*Non*" is put before those species names, which do not represent the species discussed and these species are not considered in the "Overall distribution". The species, whose identification seems to be doubtful are marked with "?", both in the synonymy lists and "Overall distribution".

Synonyms are given as found in the literature (without modifications)

Abbreviations and terminology used in descriptions:

D – corallum diameter (two perpendicular diameters; in mm);
H – height of corallum (maximum; in mm);
d cor – corallite diameter;
d cal – calice diameter;
d mont – monticule diameter (=short colline);
d trab – diameter of trabeculae;
c-c – distance between centres of corallites;
c-c in series – distance between centres of corallites of the same series;
l col – length of collines;
col-col – distances between collines of adjacent corallite series;
w series – width of corallite series (width between the walls);
l series – length of corallite series;
S – number of septa in the corallite;
S1, S2-Sn – septa (radial elements) of succeesive size orders (which may or may not correspond to cycles);
den s – density of septa per mm (measured in the wall zone or in the outer zone of corallites);
den trab – density of trabeculae measured along the septal plate, in transverse section. (as skeletons are recrystallized, preserved trabecular outlines are considered);
den dis – density of endothecal elements (longitudinal section) per mm;
den pen – density of pennulae per mm in longitudinal section;

den men – density of menianes per mm in longitudinal section;
den mont – density of monticules measured along the collines. (monticules-short collines of hydnophoroid type).
den growth bunds – density of the growth bands
(...) – less frequent values are presented in brackets;
((...)) – sporadic values.
Initials used in the text refer to: the first author (E.M) and second author (J.-P.M).

List of the identified taxa

Order SCLERACTINIA Bourne, 1900
Suborder MICROSOLENINA Morycowa et Roniewicz, 1995
Family MICROSOLENIDAE Koby, 1890
Genus *Microsolena* Lamouroux, 1821
Microsolena guttata Koby, 1898
Microsolena texana Wells, 1932
Microsolena aff. *agariciformis* Etallon, 1859
Microsolena parva sp.n.
Microsolena sp.
Genus *Polyphylloseris* de Fromentel, 1857
Polyphylloseris icaunensis (d'Orbigny, 1849)
Polyphylloseris distefanoi (Prever, 1909)
Genus *Eocomoseris* Melnikova, Roniewicz et Löser, 1993
Eocomoseris raueni Löser, 1993
Genus *Comoseris* d'Orbigny, 1849
Comoseris aff. *minima* Beauvais, 1964
Comoseris aptiensis Baron-Szabo, 2002
Comoseris sp.
Genus *Meandrarea* Etallon, 1859
Meandrarea lorioli (Koby, 1896)
Meandrarea meandroides Koby, 1898
Meandrarea granulata (de Fromentel, 1862)
Meandrarea subataciana (Reig Oriol, 1992)
Meandrarea robusta sp.n.
Meandrarea sp.
Genus *Hydnoseris* M. Beauvais, 1982
Hydnoseris paragaricites sp.n.
Hydnoseris radiata sp.n.
Hydnoseris sp.
Genus *Hydnophoromeandraraea* Morycowa, 1971
Hydnophoromeandraraea volzi Morycowa, 1971
Hydnophoromeandraraea provencensis Masse et Morycowa, 1994
Hydnophoromeandraraea aff. *provencensis* Masse et Morycowa, 1994
Hydnophoromeandraraea magna sp.n.
Family LATOMEANDRIDAE de Fromentel, 1861
Genus *Epistreptophyllum* Milaschewitsch, 1876
Epistreptophyllum sp.
Genus *Latomeandra* Milne Edwards et Haime, 1849
Latomeandra minor Reig Oriol, 1975
Genus *Dimorphastrea* d'Orbigny, 1850
Dimorphastrea bellula d'Orbigny, 1850
Genus *Microphyllia* d'Orbigny, 1849
Microphyllia meandrinoides (Reuss, 1845)
Microphyllia gemina Eliašová, 2004
Microphyllia sp. 1
Microphyllia sp. 2
Genus *Fungiastraea* Alloiteau, 1952
Fungiastraea sp.
Genus *Mixastraea* Roniewicz, 1976
Mixastraea westfalica Löser, 1993
Genus *Ovalastrea* d'Orbigny, 1849
Ovalastrea regularis (d'Orbigny, 1850)

Suborder MICROSOLENINA Morycowa et Roniewicz, 1995

Corals from the families Microsolenidae and Latomeandridae (suborder Microsolenina) have many common features (Morycowa & Roniewicz, 1995), as radial elements built by compound pennular trabeculae and porous radial elements; regularly porous in Microsolenidae and irregularly (mainly at the distal and/or at the distal/internal septal parts) in the Latomeandridae. Remarks on these families have been given, *i.a.* in Morycowa and Roniewicz (1995).

Family MICROSOLENIDAE Koby, 1890
Genus *Microsolena* Lamouroux, 1821
Type-species: *Microsolena porosa* Lamouroux, 1821

Microsolena guttata Koby, 1898
Figs 4, 5A–C

v*1898. *Microsolena guttata*: Koby, p. 83, pl. 21, figs 1, 1a, 2, 2a, 2b.
non 1961. *Microsolena guttata* Koby: Bendukidze, p. 31, text-fig. 8, pl. 3, fig. 6a, b.
non 1974. *Microsolena guttata* Koby: Turnšek & Buser, pp. 21, 37, pl. 11, fig. 1.
1981. *Microsolena guttata* Koby: Turnšek & Mihajlović, p. 35, pl. 41, figs 1-5.
*non*1984. *Microsolena* sp. cf. *M. guttata* Koby, 1898: Scott, p. 342, pl. 2, fig. 11.
1985. *Microsolena guttata* Koby, 1898: Sikharulidze, pp. 47-48, pl. 22, fig. 2.
1987. *Microsolena* cf. *guttata* Koby, 1897: Bugrova, pp. 80, 100, text-fig. 4d, pl. 2, fig. 6.
1988. *Microsolena guttata* Koby, 1897: Kuzmicheva & Aliev, p. 172, pl. 7, fig. 1.
1996. *Microsolena guttata* Koby1898: Császár & Turnšek, p. 430, fig. 7 (2).
non 2001. *Microsolena guttata* Koby, 1897: Idakieva, p. 13, pl. 2, fig. 2.
non 2001. *Microsolena* cf. *guttata* Koby 1898: Löser, p. 47.

Material: One colony: No. 278 and five colony fragments: Nos. 17/1, 61, 66, 187 and 437; 9 thin sections: Nos. 17/1a, 66a-b, 278a-c, 437a-c.

Dimensions (in mm):

	Provence specimens	Koby, 1898
c-c	4-7	5-6
c-c in series	(3.5) 4-6 (7)	
S	30-*ca.* 50	30-48
den s	9-10/2	10/2
den pen	4-5/1	
den trab	(4) 5-6/1	
D No. 17/1 H	50×80 23	
D No. 61 H	50×50 *ca.* 55	
D No. 66 H	60×80 *ca.* 90	
D. No. 187 H	35×60 22	
D No. 278 H	60×75 *ca.* 10	
D No. 437 H	33×(1/2) 30 max. 20	

Description: Lamellar and massive, thamnasterioid colonies. Calices shallow, in some peripheral parts of colony arranged in subconcentric series. Septa regularly porous, confluent, generally thin and equal in thickness, differentiated in three or four size orders. About 12 septa S1 reach or almost reach the axis. Septal anastomosis present. Columella small, parietal or absent. Synapticulae abundant, dissepiments rare, thin, subhorizontal.

Remarks: *Microsolena guttata* Koby is common in the Lower Cretaceous Tethyan coral facies. In the literature, some specimens identified as *M. guttata* have larger corallite diameters or lower septal density. For example, *Microsolena* cf. *guttata* Koby described by Löser (2001) from the Lower Hauterivian of France (Dép. Aube: Troyes, Vallières) differs from the type specimen in considerably lower density of radial elements (den s in *M. guttata* is 10/2 mm; in *M.* cf. *guttata* described by Löser: den s = 5–6/2 mm). Also *M. guttata* from the Hauterivian of Crimea (Bendukidze, 1961), from the Barremian–Aptian of West Slovenia (Turnšek & Buser, 1974; Turnšek, 1997) and from the Lower Barremian of Bulgaria (Idakieva, 2001) have lower septal density (6–7/2 or 6-8/2 mm). Herein these forms have not been assigned to *M. guttata*.

Microsolena guttata closely resembles *Microsolena kugleri* Wells (Wells, 1948) from the Lower Cretaceous (Barremian–Aptian) of Trinidad, but differs from it (after Wells, 1948, p. 615) only in a slightly larger distance between calices (in *M. kugleri*: c-c = 3–5, den s = 5/1, S ca. 36). It is necessary to compare the type specimens of these two species and to check if *M. kugleri* could be the junior synonym of *M. guttata* Koby. According to Wells (Wells, 1932, p. 252) *M. texana* Wells from the Albian of central Texas (Lower Glen Rose) resembles also *M. guttata,* but differs from it in larger corallites (distance between calicular centres in *M. texana* = 7.5 mm and the number of septa in calices = 40–50). It should be mentioned that in some specimens identified as *M. guttata* the distance of calicular centers is 6–7.5 or even up to 8 mm (*e.g.* Sikharulidze, 1985; Bugrova, 1987). It seems that the difference between *M. guttata* and *M. texana* lies in the density of their radial elements (*cf.* Wells, 1932, pls. 35, fig. 2 and 37, fig. 5).

Occurrence of the studied specimens:
Lower Barremian – Chainon de la Fare (l'Enfourna biostrome): Nos 17/1, 187, 437.
Lower Bedoulian – Massif de Vaucluse (Sault biostrome): Nos 61, 66; Moulin d'Aumage (Vicinity of Sault): No. 278.

Overall distribution:
Neocomian (?Hauterivian) – Hungary: Mecsek Mts (Jánosipuszta).
Berriasian to Valanginian – Turkmenistan: Great Balkhan.
Hauterivian – Lower Barremian – Georgia.
Hauterivian – France: Dépt. Doubs (Morteau); Georgia (Muhura).
Barremian – Azerbaidjan: Kubatlinskij region.
Barremian–Lower Aptian – Eastern Serbia: Žljebine, Prošta.

Microsolena texana Wells, 1932
Fig. 4D–F

1932. *Microsolena texana*: Wells, p. 252, pl. 35, fig. 2; pl. 37, fig. 5.
1982. *Microsolena texana* Wells, 1932: Kuzmicheva, p. 108, pl. 2, fig. 4a, 4b.
non 1998. *Microsolena* cf. *texana* Wells: Schöllhorn, p. 99, fig. 42, pl. 24, fig. 3.
?2001. *Microsolena* cf. *texana* Wells 1932: Löser, p. 47.

Material: Three fragment of colonies: Nos. 244, 246/1 and 434; 7 thin sections: Nos. 244a-d, 246/1a, 434a-b.

Dimensions (in mm):

	Provence specimens
c-c	4.5-8
S	40-50 (*ca.* 12 S1)
den s	7-8/2
den trab	4 (5)/1
den pen	3-4/1
D No. 434 H	35×60 35

Remarks: Colony lamellar with superficial calices. In corallite diameters and the number of septa Provence corals correspond to those described as *Microsolena texana* Wells (Wells, 1932).

Slightly larger corallite diameters and lower septal density differentiate *M. texana* from *M. guttata* Koby.

Microsolena cf. *texana* from the Upper Aptian of Spain (region Cataluna) presented by Schöllhorn (1998), have subcerioid colony structure and subconfluent radial elements (pl. 24, fig. 3), thus it appears not to belong to the genus *Microsolena*.

It should be remarked here that Kuzmicheva (1982) erroneously gave the density of septa for *M. texana* as 3 per 2 mm, because her plate (pl. 2, fig. 4a) shows this density to be ca. 7 per 2 mm.

Occurrence of the studied specimens:
Lower Barremian – Chainon de la Fare (l'Enfourna biostrome): No. 434.
Lower Aptian (Bedoulian) – Massif de Vaucluse: Les Gardettes-Nesque gorge: Nos 244, 246/1.

Overall distribution:
?Early Hauterivian – France (Dépt. l'Aube, Vallières).
Upper Aptian – Uzbekistan (Bucharskaya Oblast).
Lower Albian – USA: Texas.

Microsolena aff. *agariciformis* Etallon, 1859
Fig. 6A–C

1859. *Microsolena agariciformis*: Etallon, p. 523.

Material: 1 colony: No. 184/4 and 3 thin sections: No. 184/4a-c.

Dimensions (in mm):

	No. 184/4	Etallon, 1859
d		6-7
c-c	5.5-9.5	
S	*ca.* 50-90	70-80 (96), very thin
den s	8-10/2	
den trab	5-6 (7)/1	
den pen	4-(5)/1	
D fragm H	37×50 *ca.* 40	

Description: Lamellar colonies. Calices unordered, shallow, with small central pit of about 1.5 mm. Septa regularly porous, very thin, equal in thickness, straight and/or slightly flexuous. Columella monotrabecular if present. Synapticulae and thin flat dissepiments present.

Microstructure: Density of septal trabeculae are 11 to 13 per 2 mm and their diameters have approximately 100–120 μm.

Remarks: *Microsolena agariciformis* Etallon is common in the Upper Jurassic of Europe. The species has recently been described from Tithonian–Valanginian of Bulgaria (Roniewicz, 2008). In Lower Cretaceous some forms showing close similarity to it occur (Tab. 3). They have been described as *Microsolena* cf. *agariciformis* from the Aptian–Albian of Greece (Löser & Raeder, 1995)

Table 3

Dimensions of the Lower Cretaceous *Microsolena* species related to Upper Jurassic *Microsolena agariciformis* Etallon, 1859

	M. cf. *agariciformis* Etallon		*M.* aff. *agariciformis* Etallon, Morycowa & Decrouez, 2006	*M. agariciformis* Etallon, Roniewicz, 2008
	Löser & Raeder, 1995	Löser, 2001		
c-c	(6) 7-8 (9)	7-9	5.5-9	6-12
S	8-100	80-90	*ca.* 50-100	
den s	8-10/2	6-8/2	6-7/2	21/5 (=8.4/2)
den pen			4/1	18/5 (=3.6/1)
den trab	5-6 (7)/1		8-9/2	11/2

and from the Hauterivian of France (Löser, 2001), as well as from the Lower Aptian of Switzerland as *Microsolena* aff. *agariciformis* (Mory- cowa & Decrouez, 2006). To show differences between the Lower Cretaceous specimens closely resembling or identical with the Jurassic *Microsolena agariciformis* a direct comparison should be carried out.

Occurrence of the studied specimens:

Lower Barremian – La Fare area: l'Enfourna biostrome: No. 184/4.

Overall distribution:

Microsolena agariciformis Etallon: is known from the Oxfordian–Tithonian of Europe, rare occurrences were attested in the Tithonian–Valanginian (Roniewicz, 2008). Forms similar to this species have been described from Hauterivian, Lower Aptian and Aptian/Albian sediments (Löser & Raeder, 1995; Löser, 2001; Morycowa & Decrouez, 2006).

Microsolena parva sp.n.
Fig. 7

Holotype: No. UJ 137P/279, Fig. 7A–E.

Type-level: Lower Aptian.

Type-locality: France: Provence – Massif de Vaucluse: Moulin d'Aumage (vicinity of Sault).

Derivation of the name: (Lat.) *parvus* – small; refers to very small calices.

Diagnosis: Corallites arranged in series. Diameters of shallow calicinal fossettes from 0.8 to 2 mm; distances between their centres in series from 2.5 to 6.5 and between series from 4 to 7 mm. Septa rather thick, subequal in thickness, highly perforated, with density 7 per 2 mm. Their number ranges from 16 to 36, of which 6 to 12 approach the corallite axis. Internal septal margin thin and slightly wavy. The density of trabeculae in transverse section of radial elements is 3–4 per 1 mm, of pennules in their longitudinal section 3–4 per 1 mm. Columella feeble, parietal. Synapticulae and dissepiments rare.

Material: 2 colonies: Nos. 279 and 274 and 3 fragments of colonies: 64, 122, 197; 20 thin sections: Nos. 64a-i, 122a-d, 197a. 274 a-b, 279a-d.

Dimensions (in mm):

	No. 279, holotype	No. 274	Other specimens
d cal	0.8-2		
c-c in series	2.5-6.5	2.5-6.5	(2.5) 3.5-7.5
c-c between series	(3.5) 4-7	4.5-7.5 (9)	3.5-9.5
S	16-36	20-*ca.* 30	12-24 (30)
den s	7/2	7-8/2	7/2
den trab	3-4/1	3-4/1	3-4/1
den pen	3-4/1	3/1	3-4/1
D H	95×130 max. 20		No. 64: 60×70 30

Description: Lamellar, thamnasterioid colonies. Corallites arranged in series. Calices small, shallow. Septa rather thick, subequal in thickness, regularly perforated, differentiated in S1-S4 size orders, of which 6 to 12 S1 reach the centres and the ones between series are subparallel. Dissepiments low, pennules well developed, with edges distincly directed upwards. Synapticules rather rare. Columella small, parietal. Budding intercalicular.

Microstructure: The skeletons are recrystallized, but the outlines of trabeculae are preserved. Their diameters in peripheral septal part are *ca.* 200 µm and in the inner septal part *ca.* 100–130 µm.

Remarks: On account of the small calices, corallites disposed in series, the number of radial elements and the density of pennules and trabecules, the new species shows a close relationship to the Oxfordian *Microsolena foliosa* Roniewicz (1976, p. 105, pl. 33, fig. 1, 2a-b, 3). However, it differs from the latter in larger distances between corallite centres. In *M. foliosa* it is only from 3 to 5 mm. Our new species differs from *Microsolena exigua* Koby (Koby, 1887), also characterized by very small calices, in considerably lower density of radial elements and in larger distances between corallite centres.

Occurrence of the studied specimens:

Upper Barremian (lower part) – Chainon des Alpilles (Orgon-Notre-Dame de Beau Regard biostrome): No. 197.

Lower Aptian (L. Bedoulian) – Massif de Vaucluse (Sault biostrome): No. 64.

Moulin d'Aumage (Vicinity of Sault) – No. 279; Les Sautarels (near Sault): No. 274;

Rustrel (côteau de Mery): No. 122.

Microsolena sp.
Fig. 6D, E

Material: One small branch fragment: No. 13 and 1 thin section along the branch: No. 13a.

Dimensions (in mm):

length of branch (fragment)	*ca.* 30
width of branch	12
c-c between two corallites	*ca.* 11
den s	6-7/2
den pen	4/1

Remarks. Fragment of the branch with only a few large corallites, showing microsolenid features. Radial elements about 60 to 70. With only one small branch fragment and one thin section we cannot state the specific placement of this form.

Occurrence of the studied specimens:

Lower Barremian – Chainon de la Fare (l'Enfourna biostrome).

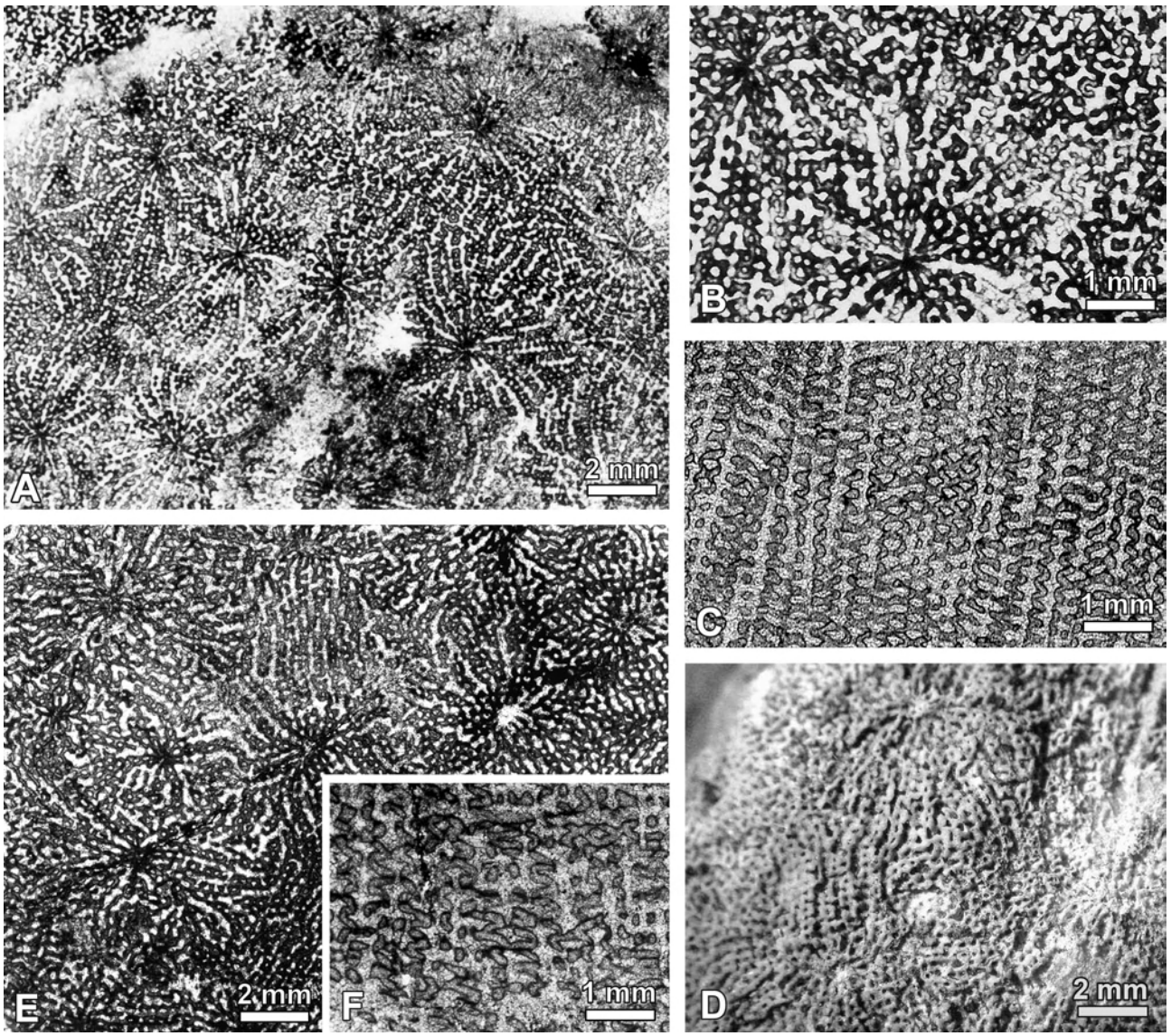


Fig. 5. **A–C** – *Microsolena guttata* Koby: A – transverse thin section (No. 66a); B – fragment from Fig. 5A showing arrangement of radial elements; C – longitudinal thin section (No. 66b), perpendicular to septal surface, showing regularly distributed pennules. **D–F** – *Microsolena texana* Wells, No. 246: D – upper surface of colony with superficial calices; E, F – same species: E – transverse thin section (No. 244a); F – longitudinal thin section (No. 244b)

Genus *Polyphylloseris* de Fromentel, 1857
Type-species: *Polyphyllastrea convexa* d'Orbigny, 1850

Polyphylloseris icaunensis (d'Orbigny, 1950)
Fig. 8A–C

1850. *Polyphyllastrea icaunensis*: d'Orbigny (2), p. 94.
1857. *Polyphylloseris icaunensis*: de Fromentel, p. 68.
1925. *Polyphylloseris icaunensis* d'Orbigny sp.: Corroy, p. 312, pl. 9, fig. 3.
1998. *Polyphylloseris icaunensis* (d'Orbigny, 1950): Schöllhorn, p. 102, pl. 25, fig. 3.

Material: 1 colony: No. 11; 5 thin sections: No. 11a-e.

Dimensions (in mm):

	No. 11	*P. icaunensis* (de Fromentel); de Fromentel, 1857	*P. icaunensis* de Fromentel; Schöllhorn, 1998
d of cones	4-6	d calices: 6	5-6
c-c	4.5-6.5 (7.5-8.5)		
S	40-60	*ca.* 60	*ca.* 60
den s	7-8/2		
den trab	4-5/1		
den pen	7-8/2		
den dis	6-7/2		
D fragm H	(1/2) 50×100 11: *ca.* 40		

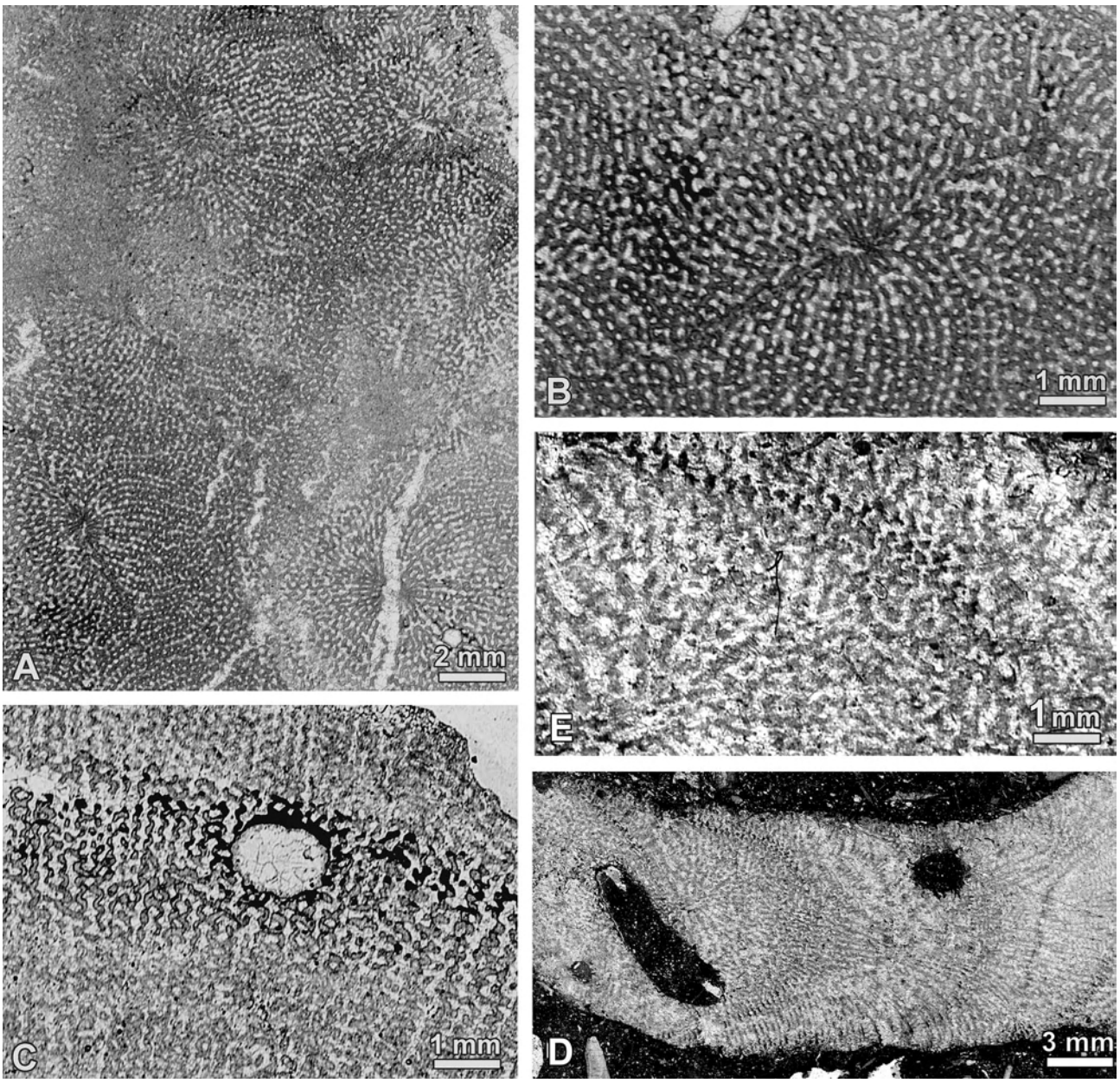


Fig. 6. **A–C** – *Microsolena* aff. *agariciformis* Etallon: A – transverse thin section (184/4a) showing fine corallite skeleton structure; B – same thin section displaying well marked septal porosity; C – longitudinal thin section (No. 184/4b). **D, E** – *Microsolena* sp. : D – lateral branch surface in transverse section (No. 13a); E – close-up of corallite from Fig, 6D showing periaxial region of septa and monotrabecular columella

Description: Colonies massive with calicular surfaces convex, not well preserved, but in places protruding calices with small central pits are visible. Radial elements subconfluent, nonconfluent, and in places confluent, regularly porous, subequal in thickness, differentiated into three or four orders. The 12 to 16 primary septa (S1) extend to the corallite central zone where their internal edges form a ring of trabecular projections. Septal faces bear prominent pennules. Synapticules not frequent. Columella absent or small, monotrabecular, visible only in thin section. Endothecal elements rare. Budding intercalicinal.

Remarks: The parameters of the specimen described here are comparable to those given in de Fromentel, 1857 to *Polyphyllastrea Icaunensis* d'Orbigny, 1950 (d'Orbigny, 1850, t. II, p. 94). It should be mentioned that the holotype *Polyphylloseris icaunensis* (d'Orb.) has never been illustrated, but the specimen attributed to this species (Hauterivian–Fontenoy) from the Peron collection was presented by Corroy (1925, pl. 9, fig. 3).

In the number of radial elements and distances between the corallite centres, *P. mammillata* Eguchi (Eguchi, 1951) from the Lower Cretaceous of Japan is closely related to *P. icaunensis*. According to Eguchi (1951, p. 39), the differences between these two species lie only:" in possessing calices with somewhat shallower calicular fossette and irregular size." It seems likely that these differences may be due to intraspecific variability and the Japanese species could be included in the synonymy of *P. icaunensis*.

In the literature, we find several species from the genus *Polyphylloseris* whose parameters are similar to those of *P. icaunensis*

Table 4

Comparison of dimensions of the Lower Cretaceous species from the genus *Polyphylloseris* de Fromentel

	P. convexa (d'Orbigny,1850); de Fromentel, 1857	*P. conophora* (Felix, 1891)	*P.distefanoi* (Prever, 1909	*P. mammillata* Eguchi, 1951	*P. japonica* (Eguchi, 1951)	*P. simondsi* Wells, 1932
d cal		pl. 23, fig. 9: *ca.* 4-5		2-6	d cone 4	3-5
c-c			5-9	5-7	6	*ca.* 7
den s					7-8/2	
S	*ca.* 76	50-60	38-44	40-60	50-60	40-50

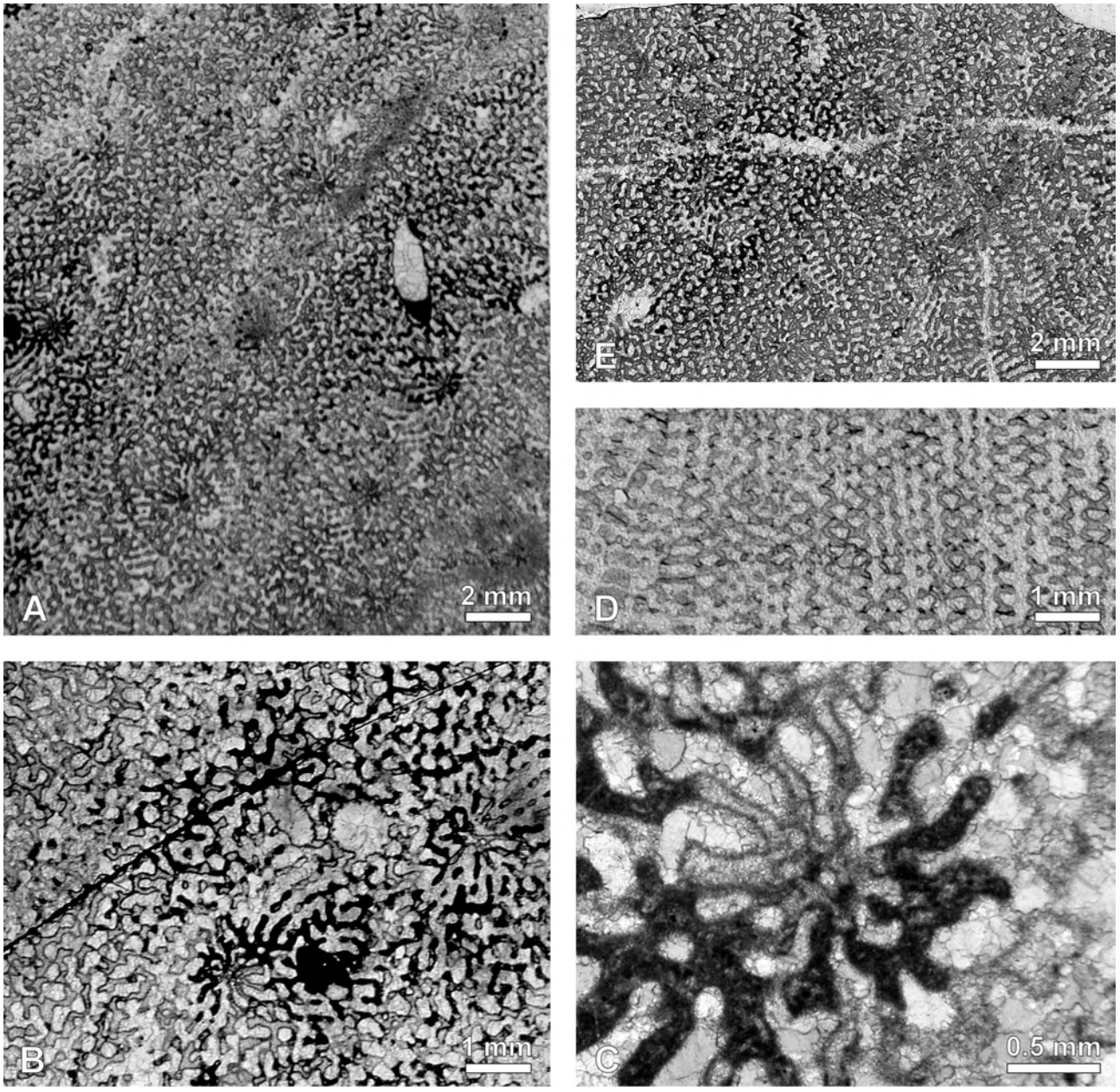


Fig. 7. *Microsolena parva* sp.n., No. 279, holotype: **A** – transverse thin section (279a) showing small corallites arranged in series; **B, C** – detail from Fig. 7A: B – Skeleton not well preserved but outlines of thick trabeculae are marked; C – Corallite with slightly wavy septa S1; **D** – longitudinal, partly tangential septal section (No. 279b) displaying pennules coalescing into menianes (at left); **E** – transverse thin section (No. 279c) showing corallites arranged in series

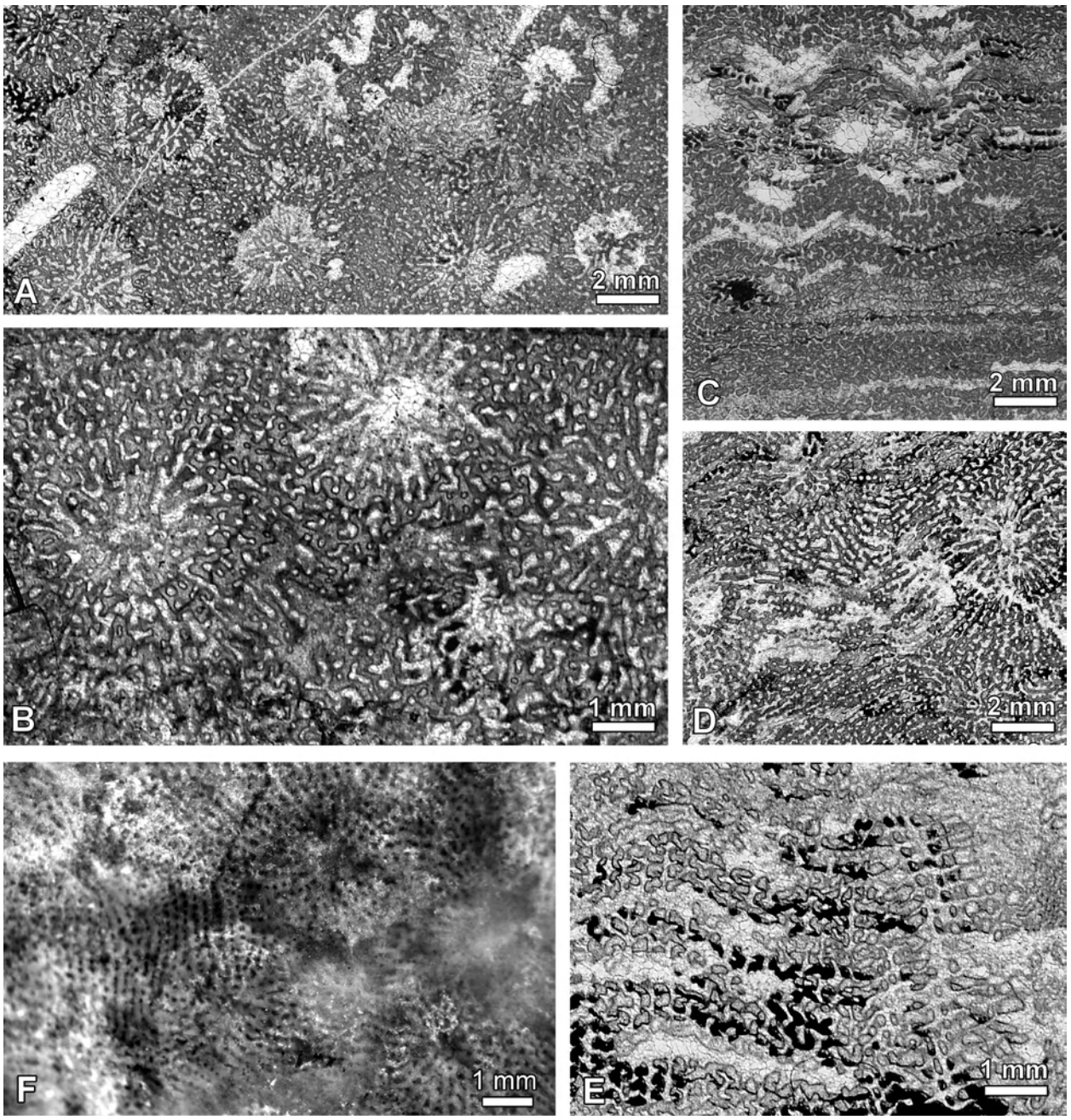


Fig. 8. **A–C** – *Polyphylloseris icaunensis* (d'Orbigny), No. 11: A, B – transverse thin section (11a) showing corallites with porous, anastomosing and mainly sub- and nonconfluent radial elements; C – longitudinal thin section (No. 11b). **D–F** – *Polyphylloseris distefanoi* (Prever): D – transverse thin section (No. 12a) showing equal in thickness, regularly porous radial elements; E – longitudinal thin section (No. 12b), partly tangential to the septal surfaces (at right); F – calicular surface showing slightly elevated calices with rather large central pit

(Table 4). They are *i.a. Polyphylloseris polymorpha* Felix (Felix, 1891), *Polyphyllastrea simondsi* Wells (Wells, 1932), and *Mastophyllia japonica* Eguchi (Eguchi, 1951). Imprecise descriptions of these species do not allow a more detailed comparison.

Polyphylloseris icaunensis (d'Orbigny) differs from the well-known *Polyphylloseris convexa* d'Orbigny (d'Orbigny, 1850) in less numerous radial elements (S in *P. convexa* = *ca*. 76) and in their subequal thickness (in *P. convexa*: "alternativement grosses et petites"; de Fromentel, 1857, p. 69). It should, however, be remarked that *P. convexa* presented by Koby (18989, pl. 21, fig. 4a) from the Urgonian of Switzerland has radial elements mainly subequal in thickness, and only in places are these of lower orders slightly more exert, though not thicker.

Occurrence of the studied specimens:
Lower Barremian – Chainon de la Fare: (l'Enfourna biostrome).

Overall distribution:
Lower Hauterivian – France: Dépt. Yonne (Fontenoy, Gy l'Evêque).
Upper Aptian – Spain: Catalonian Pyrenées.

Polyphylloseris distefanoi (Prever, 1909)
Fig. 8D–F

1909. *Microsarea distefanoi*: Prever, p. 71, pl. 2, fig. 6, 6a.

?2001. *Polyphylloseris distefanoi* (Prever), Löser, p. 47, pl. 3, fig. 6.
?2006. *Polyphylloseris distefanoi* (Prever); Löser & Ferry, 484-485, fig. 6 (7, 8).

Material: 4 incomplete colonies: Nos 12, 20, 116, 449; 6 thin sections: Nos 12a-c, 20a-c, 116a, 449a.

Dimensions (in mm):

	Provence specimens
d cal	3-4
c-c	(4.5) 5-9
S	30-*ca.* 50
den s	6-7/2
den trab	4-5/1
den pen	4/1
D No. 12 H	60×60 max 60
D No. 116 fragm. H	*ca.* 40×40 45

Remarks: Lamellar and massive colonies having, in places, slightly elevated calices. The corallite diameters, shape of calices and the number of radial elements indicate that these specimens represent the species described by Prever, 1909 as *Microsarea distefanoi*.

This species has been described since the 1960s as *Microsolena distefanoi,* a species widely distributed in the Lower Cretaceous Tethyan province, rarely in the Cenomanian. It should be noted that the identification of this species was usually made on the basis of thin sections and parameters corresponding to the typical species. The revision of the holotype made by Löser (in Löser & Ferry, 2006) showed that on account of elevated calices and dominating subconfluent radial elements this taxon belongs to the genus *Polyphylloseris* de Fromentel (de Fromentel, 1957). Thus, numerous specimens described in the litterature as *Microsolena distefanoi* from Cretaceous need to be re-examined.

Polyphylloseris distefanoi and *P. icaunensis* closely resemble each other. They differ mainly in the number of radial elements, up to 44 in the former and about 60 in the latter. The illustrations of the two species, in Corroy (1925) and in Prever (1909) suggest, that these differences also lie in the height of the calices and diameter of calicular central fossettes. In *P. distefanoi* the calices are less protruding and central fossettes are larger than in *P. icaunensis*.

Occurrence of the studied specimens:
Lower Barremian – Chainon de la Fare (l'Enfourna biostrome): Nos. 12; 449;
Lower Bedoulian – Massif de Vaucluse: Rustrel (côteau de Mery): No. 116.

Overall distribution:
Albian (see Masse *et al.*, 1998) – Italy (Abruzzi, Monti d'Ocre).
? Lower Hauterivian – France, Dépt. Aube (Vallières).
?Barremian – France: Dépt. Ardeche and Drôme.

Genus *Eocomoseris* Melnikova, Roniewicz and Löser, 1993
Type-species: *Eocomoseris ramosa* Melnikova, 1993

Eocomoseris raueni Löser, 1993
Fig. 9

1993. *Eocomoseris raueni* Löser: in: Melnikova *et al.*, pp. 7-8, pl. 2, figs 1-6.
1994. *Eocomoseris raueni* Löser 1993: Löser, p. 51, text-figs 42, 43, pl. 1, fig. 3; pl. 4, fig. 1; pl. 8, fig. 3; pl. 11, figs 5, 6.
1997. *Eocomoseris raueni* Löser, 1993: Baron-Szabo p. 84, pl. 14, fig. 5; pl. 15, fig. 1, *non* figs 2 and 4.
2003. *Eocomoseris raueni* Löser, 1993: Baron-Szabo *et al.*, p. 211, pl. 38, figs 7, 8.
2005. *Eocomoseris raueni* Löser in Melnikova, Roniewicz and Löser, 1993: Götz *et al.*, p. 877, fig. 8G.

Material: Several fragments of branches: Nos. 4758/7, 4760/1, 4760/9; 3 thin sections with transverse and longitudinal sections: Nos. 4758/7a-b; 4760/9a.

Dimensions (in mm):

	Provence specime ns	Holotype, Löser, 1993
D branches	*ca.* 13-20	
H. branches (incomplete)	*ca.* 50	
c-c	(1.5) 2-3.5	(1.5) 2-3 (3.5)
S	12-26	20-24-30
den s	5-7/2	7-8/2
den trab	3-4/1	
d trab		100-200 µm
den men	3-4/1	3/1
den dis	6/2	

Remarks: Colony ramose, thamnasterioid-subcerioid. The parameters and features of the specimens from Provence correspond to those described as *Eocomoseris raueni* Löser (Löser in Melnikova *et al.*, 1993).

Occurrence of the studied specimens:
Middle part of the Barremian (base of Upper Barremian?) – Chainon de la Fare: Canal EDF (Saint-Chamas): Nos: 4758/7, 4760/1, 4760/9.

Overall distribution:
Hauterivian – Eastern Spain: Maestrat Basin.
?Lower Aptian – Germany/Austria: Algäu Schrattenkalk.
Upper Aptian–Albian – Central Iran: Esfahan Basin (Dizlu).
Lower Cenomanian – Germany: Westphalia.

Genus *Comoseris* d'Orbigny, 1849
Type-species: *Pavonia meandrinoides* Michelin, 1843

Comoseris aff. *minima* Beauvais 1964
Fig. 10

v1964. *Comoseris minima*: L. Beauvais, p. 237, pl. 30, fig. 5; pl. 31, fig. 1.

Material: 4 specimens: Nos.: 15, 35, 190, 252; 7 thin sections: Nos. 35a, 190a-e, 252a.

Dimensions (in mm):

	Provence specimens	*C. minima* Beauvais; Beauvais, 1964
w series	3-7	3-8
c-c in series	1.5-3	1-2
S in isolated corallites	36-42	
S in corallites in series	12-24	16-22
den s in wall zone	6-7 (8)/2	7-8/2
den pen	3/1	
d trab	3-4/1	7-9/2
D No. 190 H	60×80 *ca.* 50	

Description: Fragments of massive and lamellar, meandroid colonies. Corallite series closed, more frequently with linearly arranged subdistinct calices, marked by roundish shallow fossa and

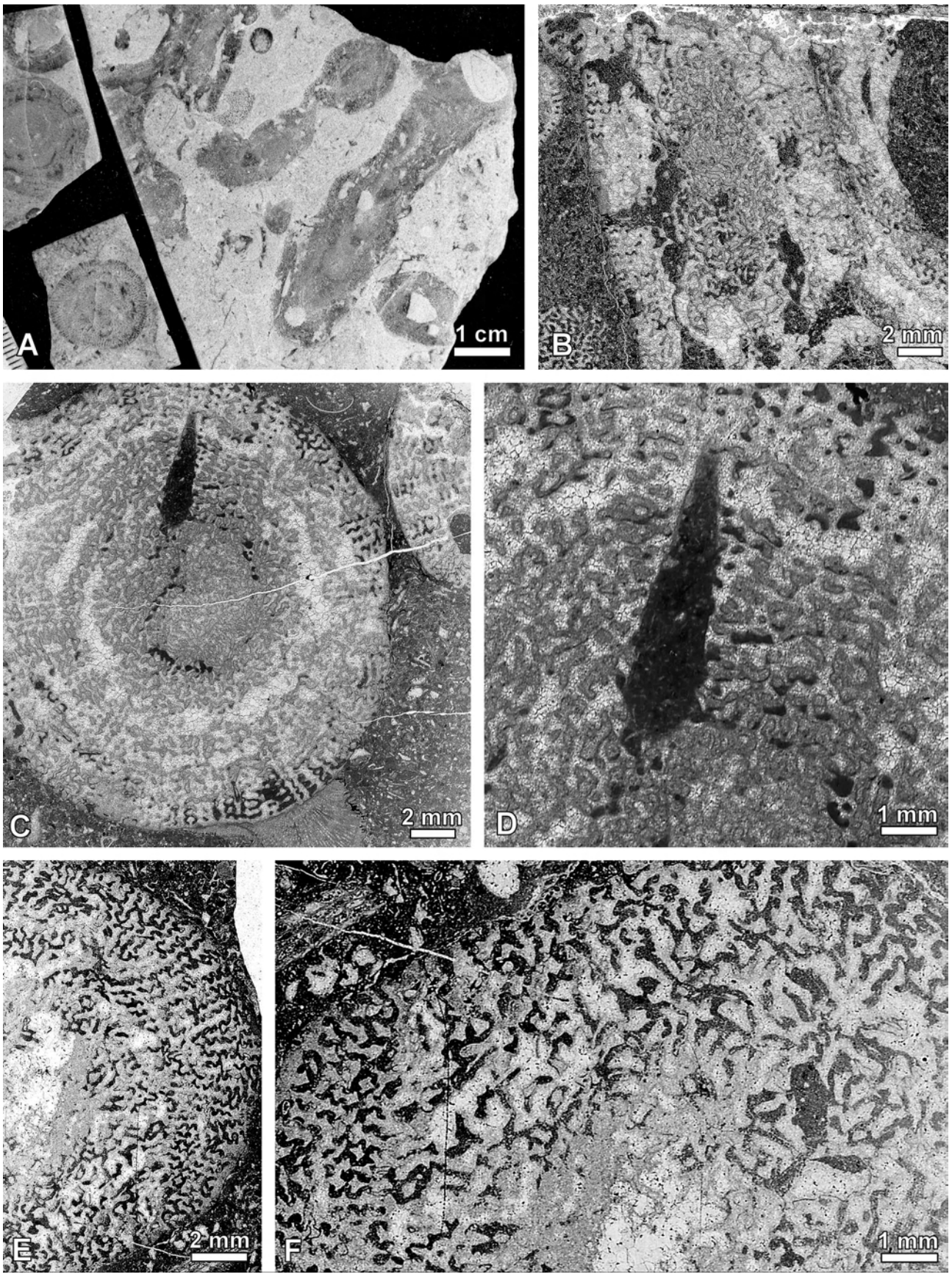


Fig. 9. **A–D** – *Eocomoseris raueni* Löser, No. 4758/7: A – polished section of several colony branches; B – fragment of branch in longitudinal section (thin section No. 4758/7b); C – thin section across the branch (No. 4758/7a) showing microsolenid skeleton structure; D – enlarged view of fragments from Fig. 9C. **E, F** – *Eocomoseris raueni* Löser, No. 4760/9: E – fragment of branch in transverse section; F – branch in transverse section (4760/9a) showing small subthamnasterioid corallites

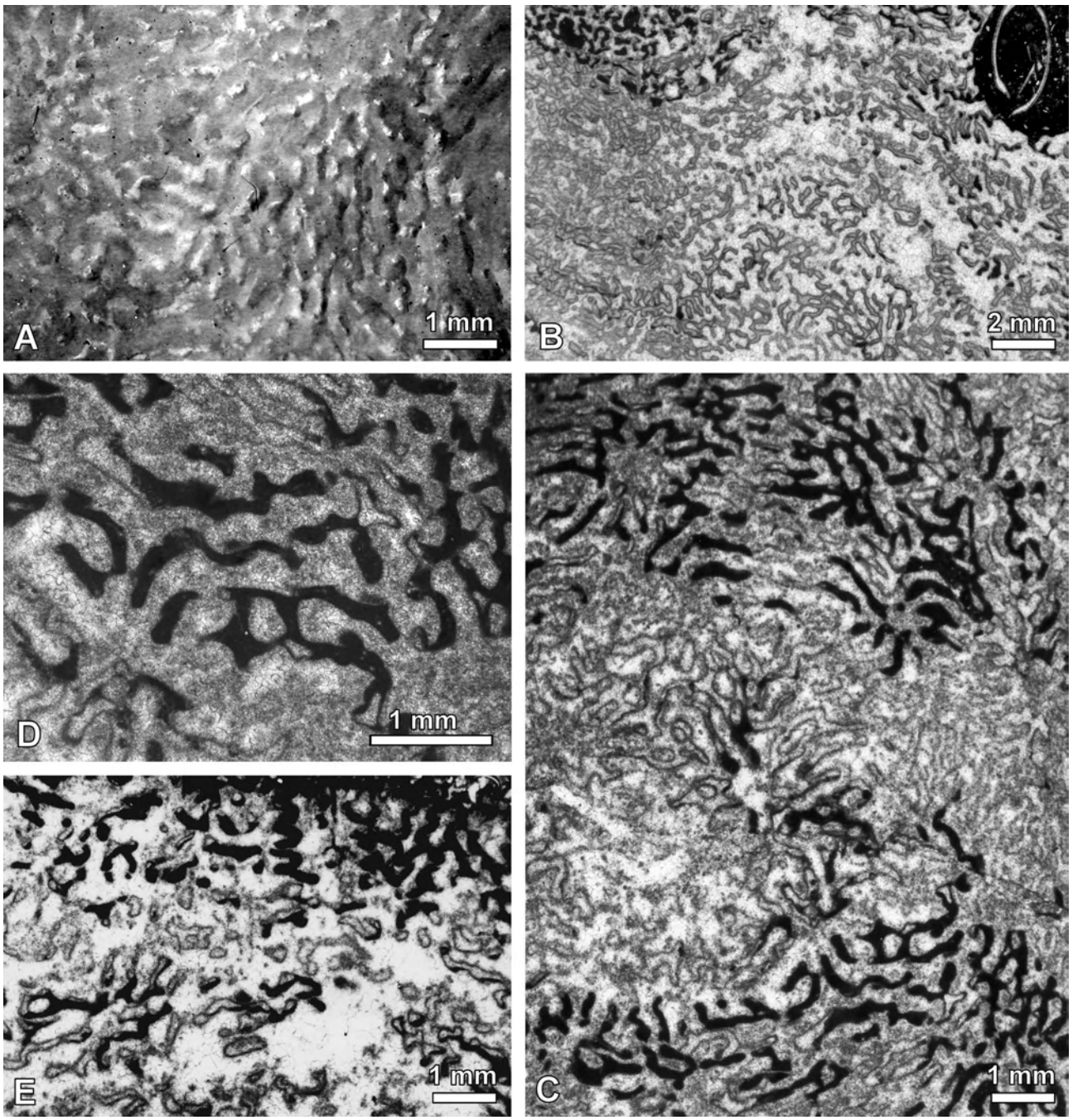


Fig. 10. *Comoseris* aff. *minima* Beauvais, No. 190: **A** – colony fragment showing shallow calices, arrangement of radial elements and trabecular columella; **B** – tranverse thin section (No. 190a); **C** – same thin section. Enlarged part to show arrangement of corallites in series; **D** – enlarged detail from Fig. 10C, outlines of septal trabeculae well preserved; **E** – section subtangential to the septal surface (thin section No. 190b) showing well-expressed pennules joined into menianes

slightly converging septa. Collines tholiform. Wall incomplete, synapticular. Radial elements subequal; 10 to 12 of them reach the centre. Columella monotrabecular.

Remarks: Specimens correspond in dimensions of calicinal series and the density of calices to *Comoseris minima* Beauvais (L. Beauvais, 1964), a species widely distributed in the Upper Jurassic of Europe.

Some Lower Cretaceous specimens close to the Jurassic *C. minima* were described, *i.a*., from the Albian (as *C*. aff. *minima*: Georgia; Sikharulidze, 1979) and from the Lower Aptian of the Helveticum Allgäu Schrattenkalk (as *C.* cf. *minima*; Baron-Szabo, 1997). The former has considerably denser septa in comparison with the *C. minima* holotype (den s: 10–11/2 mm), whereas the latter was redescribed by Baron-Szabo (2002) as a new species *Comoseris aptiensis* (see Baron-Szabo, 1997, pl. 14, figs 1–3, 6 and 2002, pl. 98, figs 1–3, 6) without any information about changing its specification.

Occurrence of the studied specimens:

Lower Barremian – Chainon de la Fare: l'Enfourna biostrome: No. 15.

Upper Barremian (lower part) – Chainon des Alpilles: Orgon – Notre-Dame de Beau Regard biostrome: Nos 35 and 190.

Lower Aptian (lower Bedoulian) – Massif de Vaucluse: Gardettes – Nesque gorge: No. 252.

Overall distribution:
C. minima Beauvais (1964) is known from the European Upper Jurassic but specimens closely resembling it, were described also from the Lower Cretaceous (*i.a.* Sikharulidze, 1979).

Comoseris aptiensis Baron-Szabo, 2002
Fig. 11

1997. *Comoseris* cf. *minima*: Baron-Szabo, 1997, p. 84, pl. 14, figs 1-3, 6.
2002. *Comoseris aptiensis* sp. nov.: Baron-Szabo, p. 13, pl. 98, figs 1-3, 6.7.
2006. *Comoseris* sp.: Morycowa & Decrouez, p. 822, pl. 12, figs 4, 5.

Material: 1 specimens: No. 4435/2; 4 thin sections: No. 4435/2a-d.

Dimensions (in mm):

	Provence specimens
l series	5-16 (-30)
w series	3-6.5 (9)
c-c in series	1.5-3
d (isolated corallites)	1.5-3 (4)
d (calices in series)	2-2.5
S in isolated corallites	32
S in corallites in series	12-24
den s in wall zone	6-8/2
den pen	3/1
den trab	3-4/1
D H	60×90 55

Description: Massive, meandroid colony with flat lower and convex upper surfaces. Corallite series straight and flexuous, closed, frequently with linearly arranged subdistinct calices marked by roundish shallow fossa and slightly converging septa. Valley-septa occur in places. Collines tholiform, partly composed of densely, linearly arranged monticules (see Fig. 11B, C). Radial elements subequal, sub- and nonconfluent; about 12 of them reach the centre. Wall synapticular, in places incomplete. Columella monotrabecular.
Remarks: *C. aptiensis* (according to Baron-Szabo, 2002) differs from *C. minima* in having larger corallite centre distance (in *C. minima*: c-c is 1–2 mm, in *C. aptiensis*: 1.5–3). The differences in parameters between *C. minima* and *C. aptiensis* are small; they may be within intraspecific variability. However, it seems likely that there are other differences between these two species not mentioned by the creator of *C. aptiensis*, such as the type of collines between corallite series.

The specimen from Provence is assigned to *C. aptiensis* on account of *i.a.,* similar type of collines (*cf.* Baron-Szabo's illustrations: 1997, pl. 14, fig. 1 and in 2002: pl. 98, fig. 1). They are partly typical of *Comoseris* (tholiform, more or less continous), but in places composed of linearly arranged monticules (Fig. 11C) like in *Hydnoseris* collines (Fig. 16B).

In the width of series and form of corallite series, the Provence specimen resembles the Cretaceous *Comoseris jireceki* Toula (1889, p. 88, pl. 7, fig. 5) and *C. oldhamiana* Stoliczka (1873, p. 46, pl. 10, fig. 3). However, the descriptions of both mentioned species are not sufficient for their precise comparison with *C. aptiensis*.

C. aptiensis from Provence differs from *C. bargyensis* Morycowa & Decrouez (Morycowa & Decrouez, 1993) from the Lower Aptian of the French Alps in narrower width of series and in denser septa (den s in *C. bargyensis*: 5–6/2 mm).

The specimens ascribed to *Comoseris* sp. from the Helvetic Zone of central Switzerland (Morycowa & Decrouez, 2006) are close to the *C. aptiensis* from Provence, but differ in slightly less dense radial elements in collines (in *Comoseris* sp.: den s= 5–7/2).
Occurrence of the studied specimens:
Lower Aptian – Massif du Ventoux: Fessonières-Pied Gros: No. 4435/2.
Overall distribution:
Lower Alpian – Germany/Austria: Algäu Schrattenkalk; Switzerland: Alps, Helvetic Zone.

Comoseris sp.
Fig. 12

Material (in mm): Two colonies Nos: 188 and 186; 7 thin sections: Nos 188a-e, 186a-b.

Dimensions (in mm):

d	*ca.* 2
w series	2-4
S	12-ca. 30
den s	8-10/2
den trab	5-6/1
den men	4/1
den dis	4-5-/1
D fragm. No. 188 H	35×35 25

Description: Massive, meandroid colonies. Lower colony surfaces flat, calicular surface strongly convex. Corallite series multiple subradially arranged, frequently uniserial and closed. In general they are poorly defined. Collines tholiform and low. Corallite centres distinct or subdistinct and in places joined by lamellar septal plate. Radial elements nonconfluent, subequal in thickness, regularly porous. They belong to two or three size orders. The faces of radial elements covered with pennules, often joined into menianes. Synapticulotheca well marked. Multiplication of the corallites by intracalicular, terminal budding.
Remarks: These corals have the features in common with *Comoseris* but differ from all known species from this genus in the predominantly uniserial, subradially arranged corallite series.
Occurrence of the studied specimens:
Lower Barremian – Chainon de la Fare: l'Enfourna biostrome: Nos 186, 188.

Genus *Meandrarea* Etallon, 1859
Type-species: *Meandrarea marcouana* Etallon, 1859

Etallon (1859, p. 528) distinguished the genus *Meandrarea* and designated *Meandrarea marcouana* Etallon as its type-species. The diagnostic features of the genus include distinct calices in monolinear series joined by collines with confluent, porous (as in *Microsolena*) radial elements. But in the literature also corals with sub- and/or indistinct calices in series were described as *Meandrarea*. For instance, Upper Jurassic specimens identified by Koby as *M. gresslyi* (Koby, 1888, pl. 109, fig. 1 and 2, but not pl. 109, fig 3 – which belongs to the Haplareidae, not to the Microsolenidae) have indistinct and subdistinct calices, which does not agree with the diagnosis of this genus. That was the reason why in his revision Alloiteau distinguished aside *Meandrarea,* the genus (Alloiteau, 1952) or subgenus *Michelinaraea* (Alloiteau, 1957), with type-species *Meandrina ataciana* Michelin, 1847. According to Alloiteau, a *Michelinaraea* is *Meandrarea* with indistinct or

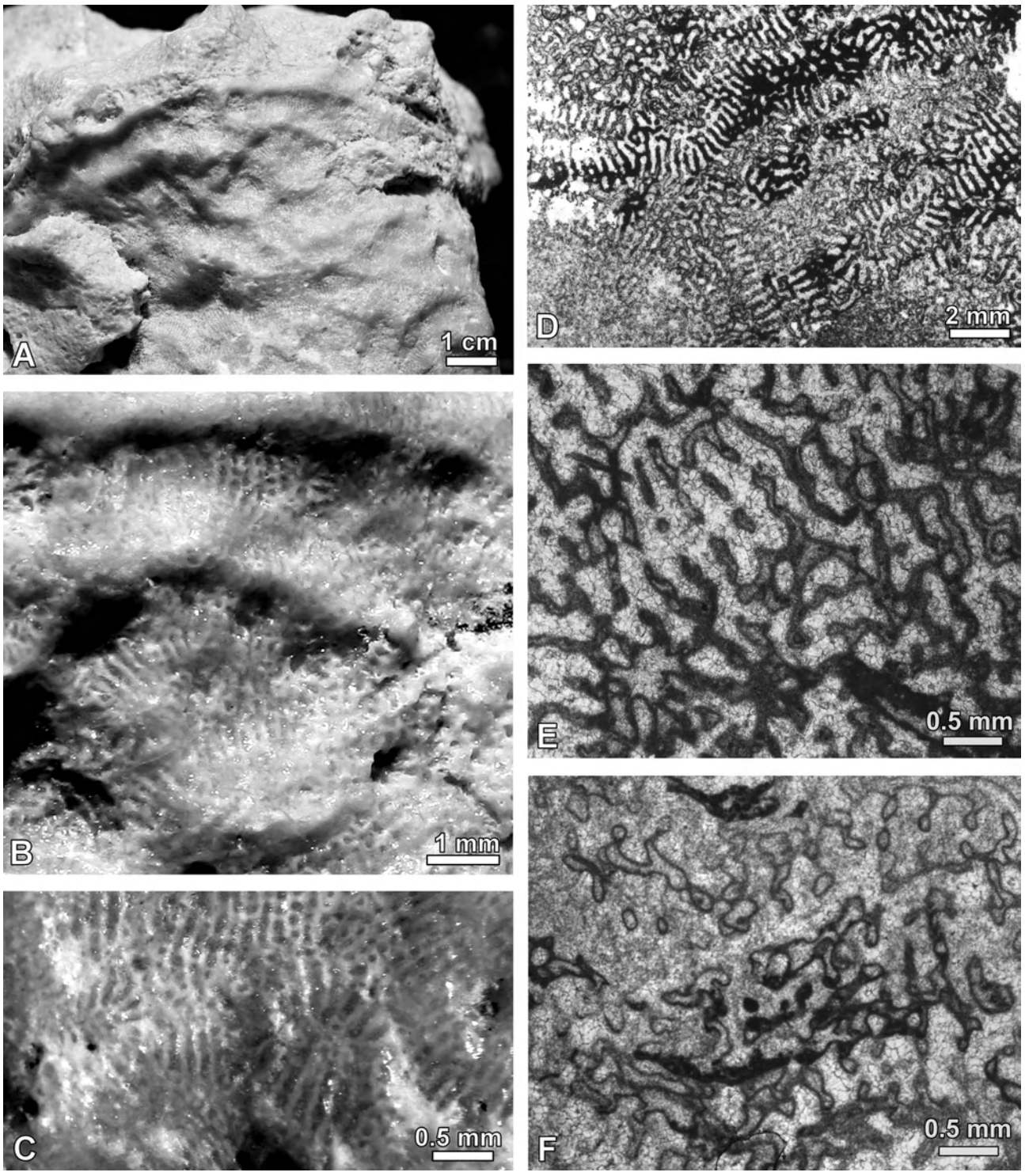


Fig. 11. *Comoseris aptiensis* Baron-Szabo, No. 4435/2: **A** – upper surface of colony showing arrangement of corallite series; **B** – same specimen presenting the collines (wall) connecting corallite series, composed, in places, by monticules; **C** – detail from Fig. 11B to show enlarged monticules; **D** – transverse section of corallum (thin section No. 4435/2a); **E** – enlarged view of fragment from Fig. 11D showing small corallites with radial elements equal in thickness and monotrabecular columella; **F** – fragment of longitudinal and partly subtangential corallite section (No. 4435/2b) showing the arrangement of septal trabeculae

subdistinct calices. However, our present knowledge on Jurassic–Cretaceous *Meandrarea* and Cretaceous *Michelinarea* points to gradual variations of this feature, regarded by Etallon as diagnostic at the genus level. Thus it is not possible to retain the genus or subgenus *Michelinarea*. In this paper we accept only the genus *Meandrarea* Etallon.

Meandrarea lorioli (Koby, 1897)
Fig. 13A–E

v1897. *Latimaeandra Lorioli*: Koby, 1896: p. 46, pl. 9, fig. 7

Material: 3 colonies: Nos: 113, 131, 391; 9 thin sections: Nos:113a-b, 131a, 391a-f.

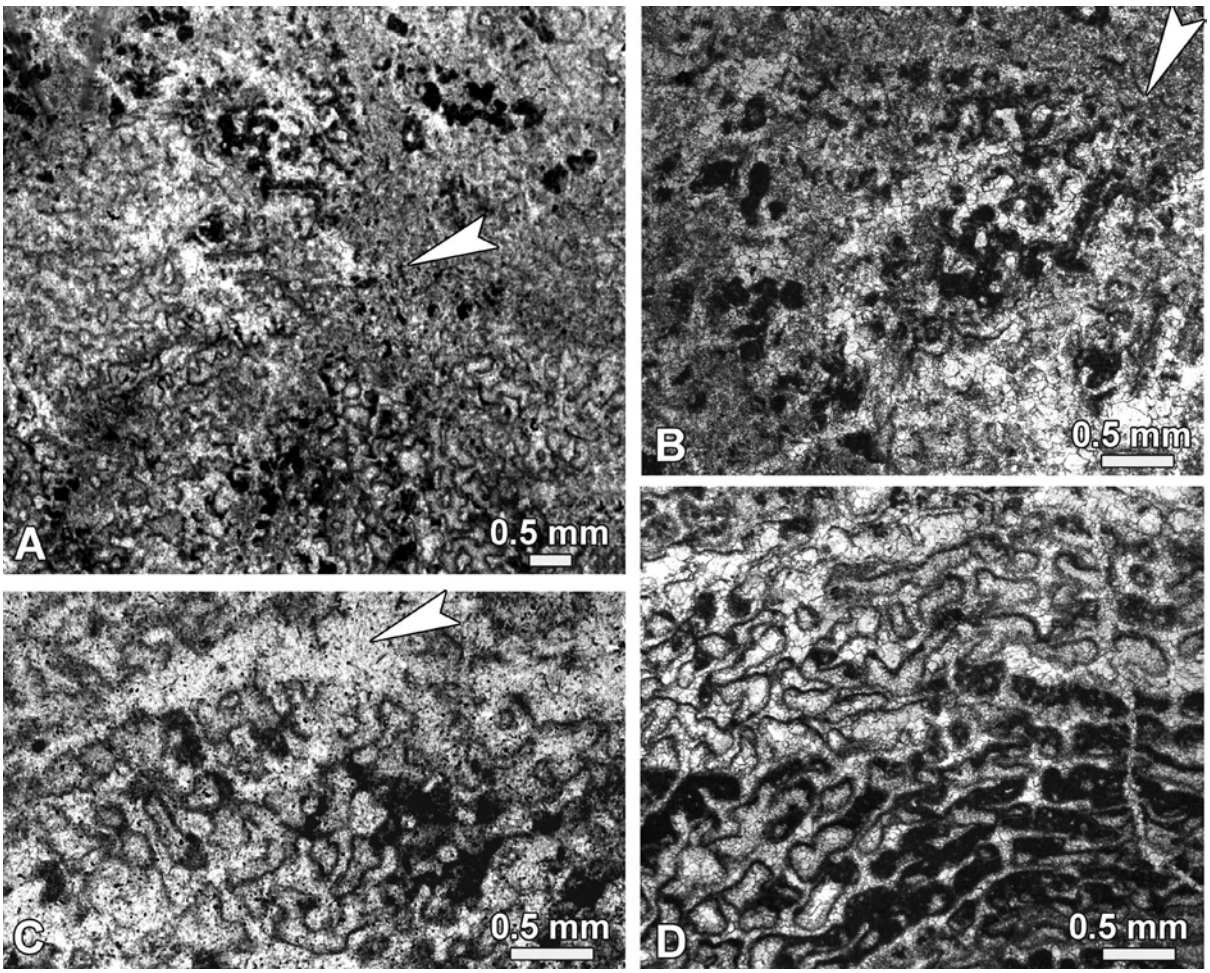


Fig. 12. C*omoseris* sp., No. 188. **A** – transverse thin section showing corallite series in subradial arrangement (thin section No. 188a). Arrows show initial points of the series; **B** – details from Fig. 12A to show subradially arranged corallite series and their initial points (arrow); **C** – same thin section. Other subradially arranged series with marked it initial area (arrow); **D** – longitudinal section (No. 188c) showing loosely packed septal trabeculae and well extended menianes

Dimensions (in mm):

	Provence specimens	Koby, 1897	Koby, holotype No. 4840, measured by E.M.
l series	3-25	1-30	
col-col	3-4.5	3-4	2.8-5
c-c in series	2.5-5		
d cal in series	2-3	1-4	
S	8-24	*ca.* 12	10-16
den s	5-6/2	12/5	5/2
den trab	3/1		4/1
D No. 131 H	15×25 10		
D No. 391 H	65×105 55		

Description: Submassive and lamellar meandroid colonies. Calicinal series very variable in length. They are straight and slightly flexuous, simple and dichotomic, closed and open. Collines tholiform composed, in places, of more or less marked hydnoporoid monticules. In series calices subdistinct, rarely distinct. Radial elements rather thick, subequal, highly perforated, parallel or subparallel in collines. Septal number from 12 up to 24, rarely to 30, of which 6 to 12 converge and point to the centres of calices. Pennules well developed. Dissepiments thin, flat. Columella parietal or in the form of one or several papilles, in places resembling elongated valley-septum.

Remarks: Alloiteau (1957, p. 316) included *Latimaeandra lorioli* Koby in his new genus *Vallimeandra* (Alloiteau, 1957, p. 289–290). As in *L. lorioli* Koby (Koby, 1897, pl. 9, fig. 7, coll. Pictet, holotype, No. 4840, Museum of Natural History, Geneva) true valley-septa do not occur, therefore this species does not belong to *Vallimendra*. *Latimaeandra lorioli* Koby is described here as *Meandrarea lorioli* (Koby).

Occurrence of the studied specimens:

Lower Aptian (Lower Bedoulian) – Massif de Vaucluse: Rustrel (côteau de Mery): Nos: 113, 131; Ventoux massif: Lanrageade: No. 391.

Overall distribution:

Upper Barremian–Lower Aptian – France: Dépt. Haute-Savoie (Reignier).

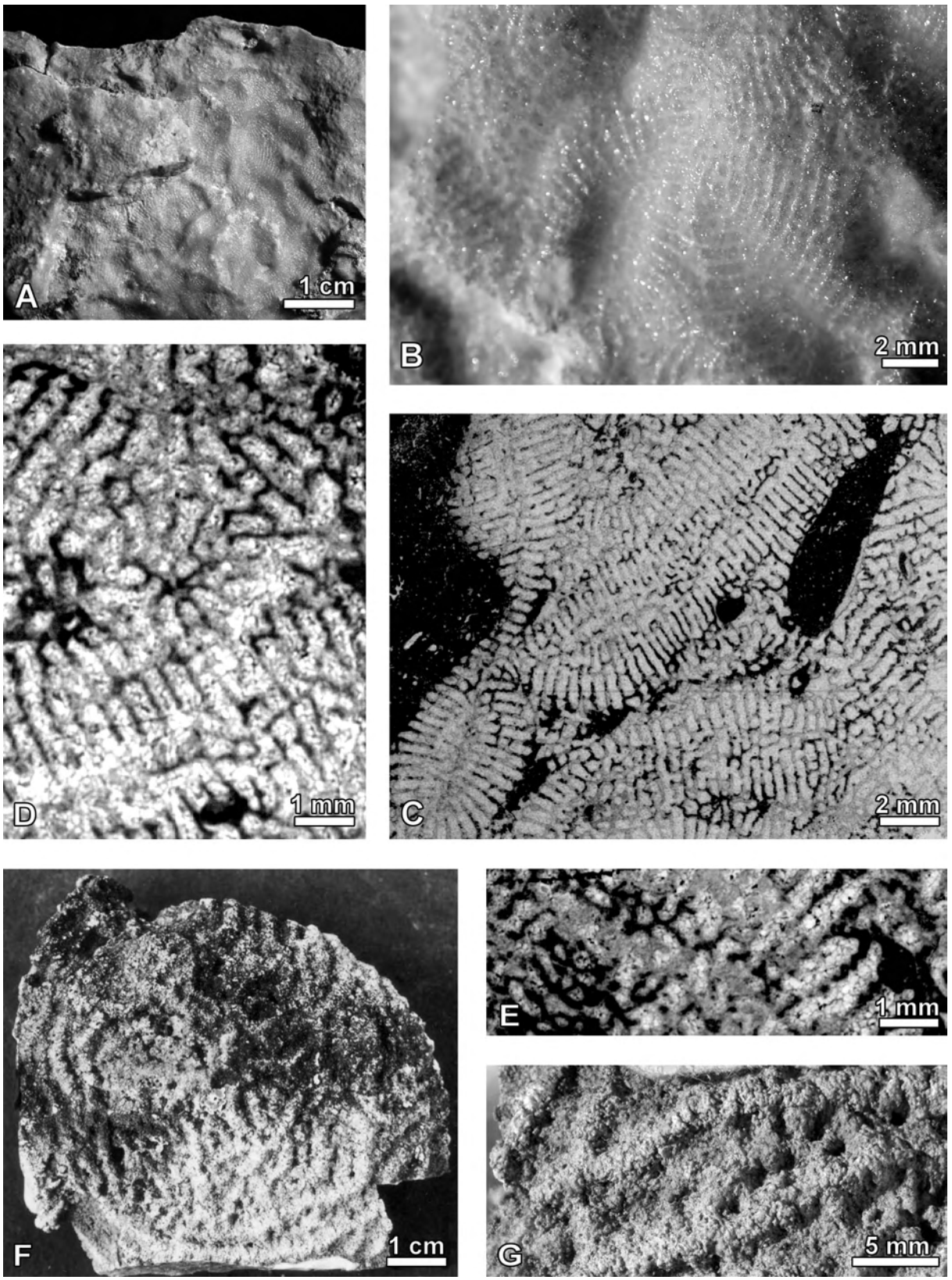


Fig. 13. **A–E** – *Meandrarea lorioli* (Koby), No. 391: A – fragment of the upper part of corallum showing short monolinear corallite series (valleys) and tholiform, often branched collines; B – detail from Fig. 13A with well marked branched collines; C – collines in tranverse thin section (No. 391a) to show confluent and subconfluent radial elements; D – same thin section presenting two corallites joined by one valley-septum-like form; E – Transversal, partly tangential septal section (thin section No. 391b) showing (at left) pennules coalescing into short menianes. **F, G** – *Meandrarea meandroides* Koby, No. 332: F – upper colony surface showing disordered corallite series in central colony part and parallel to its external border in peripheric part; G – same colony surface showing distinct calices arranged in series as well the presence of individual calices

Meandrarea meandroides Koby, 1898
Fig. 13F, G

v1898. *Maeandrarea maeandroides*: Koby, 1897, pp. 85-86, pl. 20, figs 3, 3a, 4, 4a, 5, 6.
1961. *Meandrarea meandroides* Koby: Bendukidze, pp. 33-34, pl. 7, figs 3, 4.
non 1981. *Meandrarea meandroides* Koby: Turnšek & Mihajlović, p. 33, pl. 35, fig. 2.
non 1994. *Meandrarea meandroides* Koby 1898: Löser, p. 53, text-fig. 44, pl. 11, figs 2, 3.
non 1997. *Meandrarea meandroides* Koby 1898: Baron-Szabo & Fernandez-Mendiola, p. 48, fig. 4f.
non 1999. *Meandrarea meandroides* Koby, 1898: Baron-Szabo & Gonzales-Leon, p.487, fig. 5c, h.
non 2002. *Comoseris meandroides* (Koby): 1897: Kuzmicheva, p. 182, pl. 28, fig. 4
non 2003. *Meandraraea meandroides* Koby, 1898: Baron-Szabo & Gonzales-Leon, p. 217, fig. 9c
non 2003. *Meandrophyllia meandroides* (Koby, 1898): Baron-Szabo *et al.*, pp. 210-211, pl. 37, fig. 1.
non 2004. *Meandraraea meandroides* Koby, 1896: Gameil & Aly, p. 276, pl. 3, figs 8, 9.

Material: 3 colonies: Nos 231, 232/1, 4405/3; 5 thin sections: Nos 231a, 232a, 4405/3a-b.

Dimensions (in mm):

	Provence specimens
l series	4-15 (-30)
col-col	2.5-4.5 (5)
d in series	*ca.* 1.5-2.5
d indiv.	2-3.5
c-c in series	1.5-3.5
den s	6-8/2
S (in series)	8-14
S in isolated calices	16-30
den trab	3/1
den pen	3-4/1
D No. 232/1 H	50×65 13
D No: 4405/3 H	60×80 55

Description: Lamellar, meandroid colonies. Calicinal series closed, meandering, except in the peripheric colony zone where they are arranged linearly, parallelly to the colony edge. Calices distinct, circular and deep. Collines tholiform, only in places composed of closely packed, linearly arranged short, hydnophoroid-type monticules. Radial elements confluent and subconfluent. Columella not visible. Budding intercalicinal, terminal. Septal micromorphology of microsolenid type.

Remarks: Our specimens resemble Koby's (1897) specimen *Maeandrarea maeandroides* presented in pl. 20, fig. 4, 4a.

Meandrarea meandroides from Eastern Serbia (Turnšek & Mihajlović, 1981, pl. 35, fig. 2) with regularly concentric corallite rings and a distinct central corallite (maternal) seems to belong to one of the dimorphastreoid forms: *Dimorpharea* or *Dimorphastrea*. If specimens from Iran (Baron-Szabo *et al.*, 2003) have *Meandrophyllia* character then they are Haplaraeidae and thus do not represent *Meandraraea meandroides*, whose micromorphology is typical of the Microsolenidae. The same concerns *M. meandroides* from the Aptian of Egypt (Gameil & Aly, 2004) included in the family Haplaraidae (with granular micromorphology of septa). Also the Upper Barremian–Lower Albian specimens from Mexico (Estado Sonora) described in Baron-Szabo and Gonzales-Leon (1999, 2003) do not have the characteristic features of the genus *Meandrarea* (e.g. sub- and nonconfluent radial elements and synapticular wall). *Comoseris meandroides* (Koby) described by Kuzmicheva (2002) from the Berriasian of Crimea and by Löser (1994) from the Cenomanian of Westphalia, do not belong to the Koby's species, as they possess valley-septa: this feature does not agree with the diagnosis of the genus *Meandrarea*.

Occurrence of the studied specimens:
Lower Aptian (Lower Bedoulian) – Monts de Vaucluse: Les Gardettes-Nesque gorge: Nos: 231, 232/1; Ventoux massif – Fessonières-Pied Gros: No: 4405/3.

Overall distribution:
Valanginian–Lower Hauterivian – Ukraine (Crimea: Fotisala). Hauterivian – France: Dépt. Doubs (Morteau).

Meandrarea granulata (de Fromentel, 1862)
Fig. 14D, E

v1862a. *Latimaeandra granulata*: de Fromentel, pp. 410, 430.
1877. *Latimaeandra granulata*: de Fromentel, p. 456, pl. 117, fig. 1.

Material: 1 colony fragment: No. 197/1; 1 thin section: No. 197/1a.

Dimensions (in mm):

	Specimen No. 197/1	*Latimaeandra granulata* de Fromentel; de Fromentel, 1877	Holotype, coll. de Fromentel; measured by E.M., 1971
col-col	3.5-4.5	3-4	3-6
c-c in series	1.5-3		1.5-3
d cal in series	1-2	1-4	
S	12-16	*ca.* 12	
den s	5-7/2		6/2
den trab	4-5/1		4/1
D H	25×45 15		

Remarks: Small lamellar, meandroid, colony. Collines tholiform, straight, parallel, regularly arranged in one direction. Radial elements thin, confluent, equal in thickness, regularly porous, in valleys parallel or 12 to 16 converging to point to the centres of subdistinct calices. In some calices small parietal columella can be seen.

Our small colony fragment is similar to that described in de Fromentel, 1877. The specimen from the de Fromentel collection has tholiform collines, calices subdistinct and indistinct (after de Fromentel, 1877, p. 456: "calices peu delimités"), radial elements regularly perforated.

Latimaeandra granulata de Fromentel was included by Alloiteau (1957), with reservation, into his new genus *Vallimeandra* (Alloiteau. 1957, p. 316: "*Latimaeandra granulata* genre indeterminable (peut-être *Vallimeandra*))". It should be mentioned that this specimen is closer to *Meandrarea* (Microsolenidae, corallite series without valley-septa) than *Vallimeandra* (Latomeandridae, valley-septa present) and is here described as belonging to the former.

Occurrence of the studied specimens:
Upper Barremian (lower part) – Chainon des Alpilles: Orgon-Notre-Dame de Beau Regard biostrome.

Overall distribution:
Lower Aptian (Bedoulian) – France (Vaucluse): Sault.

Meandrarea subataciana (Reig Oriol, 1992)
Fig. 14A–C

1992. *Michelinaraea subataciana*: Reig Oriol, pp. 40-41, pl. 9, figs 7, 8.
1971. *Meandraraea* (*Michelinaraea*) sp.: Morycowa, p. 123, pl. 33, fig. 3.
2006. *Meandraraea* (*Michelinaraea*) sp.: Morycowa & Decrouez, p. 824, pl.14, fig. 5.

Material: 2 colonies: Nos 60/8, 234; 5 thin sections Nos: 60/8a-c, 234a-b.

Dimensions (in mm):

	Provence specimens
col-col	(2) 3.5-4.5 (5.5)
c-c in series	2-4 (4.5)
d cal in series	1.5-3
S	10-16 (24-30)
den s	7-8/2
den trab	4/1
den pen	4/1
den dis	5-6/2
D No. 60/8 H	60×65 20-30
D No. 234 H	60×100 *ca.* 60

Description: Colony sublamellar, meandroid with rather flat upper surface. Calicinal series subparallel and concentrically arranged. Collines tholiform. Calices subdistinct. They are marked by a small depression and/or by slightly converging septa. Septa of the same thickness, regularly perforated. They are mainly parallel in the collines. Columella if present, feeble, parietal. Dissepiments rather scarce, extended. Synapticulae abundant.

Remarks: *Meandrarea subataciana* (Reig Oriol) from Provence differs from the holotype (Reig Oriol, 1992) only in slightly lesser density of radial elements in collines (in *M. subataciana*; Reig Oriol, 1992: den s = 22–23/5 mm, i.e. ca. 9/2).

On account of concentric arrangement and parameters of calicular series, *Meandrarea subataciana* (Reig Oriol) shows some resemblance to *Latimaeandraraea duboisi* Karakash (Karakash, 1907, see also Solomko, 1888) assigned by Bendukidze to *Meandrarea* (Bendukidze, 1961), but differs from the latter in smaller distances between subdistinct calicular centres (in *M. duboisi*: c-c in series = 4–7 mm) and in less numerous septa (in *M. duboisi* "4 Cyclen und einige des 5 angeordnet"; Solomko, 1888, p. 100).

The specimen from Provence does not differ from *Meandraraea* (*Michelinaraea*) sp. (Morycowa, 1971, pl. 33, fig. 3) from the Lower Aptian of the Romanian Carpathians.

Occurrence of the studied specimens:
Lower Aptian (lower Bedoulian) – Massif de Vaucluse: Sault biostrome: No. 60/8; Les Gardettes-Nesque gorge: No. 234.

Overall distribution:
M. subataciana described by Reig Oriol (1992) derived from the Lower Coniacian – France: Dépt. Aude (Bugarach).
Lower Aptian – Romania: Carpathians: Valea Izvorul Alb (Rarau); Switzerland Helvetic Alps (Reg. Lucerne, Schrattenkalk).

Meandrarea robusta sp.n.
Fig. 15

Holotype: No. UJ 137P/3605/M7, Fig. 15A–E.
Type-level: Lower Aptian (lower Bedoulian).
Type-locality: France: Provence: Ventoux massif (Northern edge).
Derivation of the name: (Lat.) *robusta* – on account of strong septa.
Diagnosis: Meandroid colony increased by intracalicinal, terminal budding. Calicinal series rather long, arranged subconcentrically. Collines tholiform. Calices subdistinct and indistinct. Distance between corallite centres in series from 1 to 2, rarely to 4 mm. Radial elements thick, subequal, regular porous with the density of 5 per 2 mm. In the calices 8 to 18 septa, mainly 8. Columella if present, monotrabecular. Density of pennulae in longitudinal section 3 per 1 mm.

Material: 2 colonies: Nos: 3605/M7, 3605/2; 5 thin sections: Nos: 3605/M7a-c., 3605/2a, b.

Dimensions (in mm):

	No. 3605/M7, Holotype
l series	to 25
col-col	2.5-5
c-c	1-2 (4)
den s (wall zone)	5/2
S (in series)	8 (-18)
den trab	3/1
den pen	3/1 (5-6/2)
D H	150×(1/2) 120 50

Description: Massive, meandroid colony with flat upper surface. Calicinal series rather long, open or closed, subconcentric in peripheral colony zone, less regular in its central one. Collines tholiform. Calices in series subdistinct or indistinct. Radial elements thick, subequal, porous, parallel or, in places, subparallel in collines, in valleys parallel or converging to the centres of subdistinct calices. Pennulae well developed. Dissepiments thin, flat. Columella generally absent, if present, monotrabecular.

Remarks: Provence specimens have been included to the genus *Meandrarea*, on account of the type of meandroid colony with monolinear series and regular porous radial elements.

Meandrarea robusta sp.n. differs from *Meandrarea subataciana* (Reig Oriol) (Reig Oriol, 1992) in thicker and less dense radial elements in the collines (in *M. subataciana*: den s = ca. 9/2) as well as in lower density of trabeculae (in *M. subataciana* 4/1mm) and menianes (in *M. subataciana* 4/1mm).

Our colonies resemble, on account of their concentric arrangement of series and corallite parametres, *Latimeandra circularis* de Fromentel (de Fromentel, 1857, p. 32, pl. 4, figs 1, 2). However, the latter has distinct calices and valley-septa. Thus this species was included by Alloiteau (1957, p. 316) into his new genus *Vallimeandra.*

Occurrence of the studied specimens: Lower Aptian (lower Bedoulian) – Ventoux massif: Northern edge: Nos 3605M7, 3605/2.

Meandrarea sp.

Material: One colony No. 105; 2 thin sections: No. 105a-b.

Dimensions (in mm):

w series	2-3.5
c-c in series	0.8-1.5
S in corallites in series	*ca.* 20
den s	10/2

Remarks: Small fragment of lamellar colony showing narrow, straight series with subdistinct calicinal fossettes. On account of poorly preserved state it is not possible to determine this coral at specific level. This coral resembles *Meandrarea meandroides*

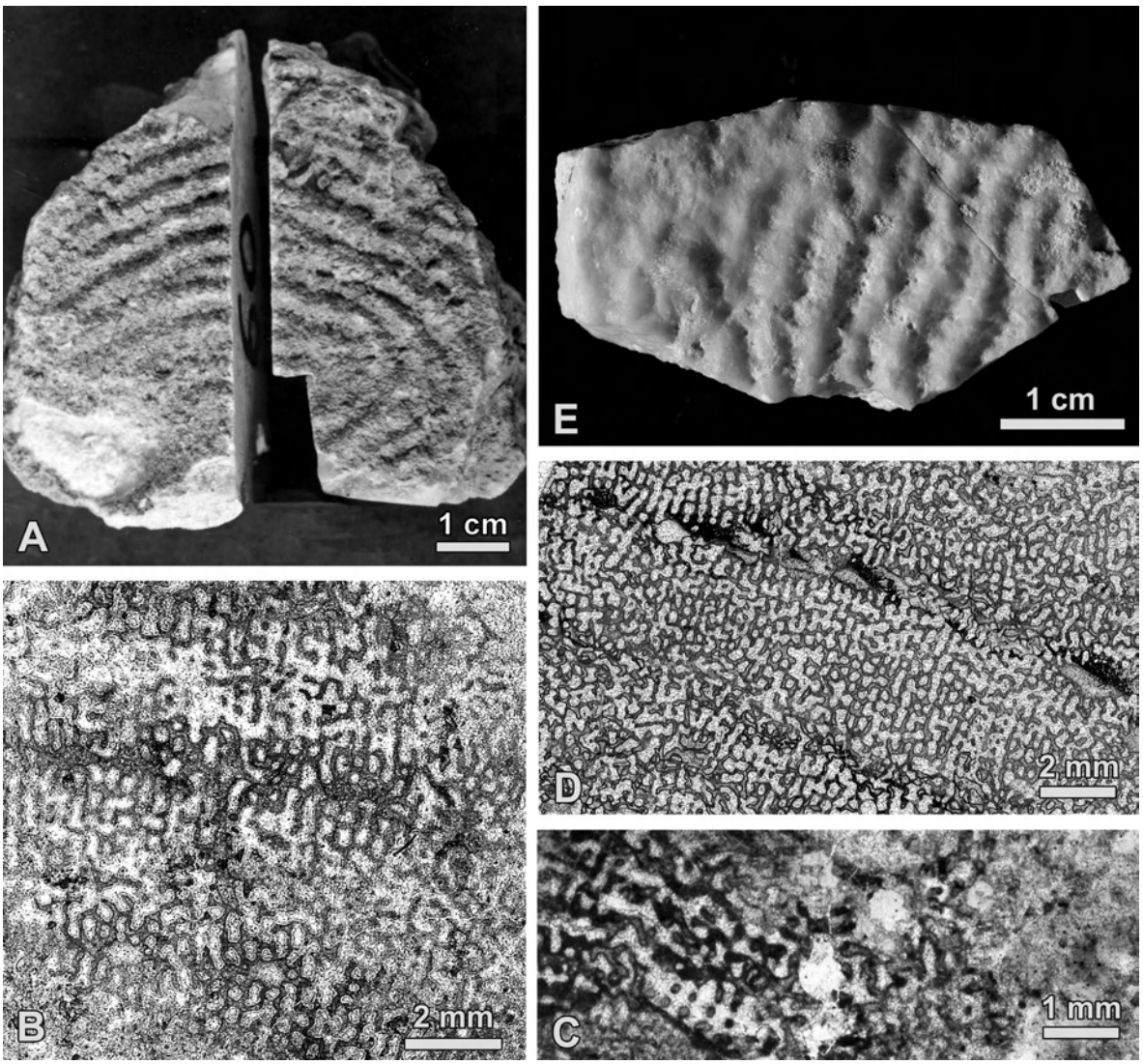


Fig. 14. A–C – *Meandrarea subataciana* (Reig Oriol), No. 60: A – upper colony surface with subconcentric corallite series; B – tranverse thin section (No. 233a) showing series with sub- and nondistinct corallites; C – longitudinal thin section. **D, E** – *Meandrarea granulata* (de Fromentel), No. 197/1: D – tranverse thin section (No. 197a) showing series with sub- and nondistinct corallites; radial elements thin, confluent, regularly porous; E – upper surface of fragmentarily preserved lamellar colony. Note that on the upper colony surface the calicinal fossettes are marked but in thin section (Fig. 14D) they are not clearly expressed

Koby (1898), but differs from it in narrower series and higher density of radial elements.

Occurrence:

Lower Aptian – Monts de Vaucluse: Rustrel.

Genus *Hydnoseris* Beauvais, 1982
Type species: *Meandrina agaricites* Goldfuss, 1926

M. Beauvais (1982) created the genus *Hydnoseris* and placed it in the family Latomeandriidae, gaving imprecise information about its septal face micromorphology, which does not agree with the diagnosis of this family (Beauvais, 1982, p. 255: "..sont ornées de granules disposes en files perpendiculaires au bord distal."). The specimens from Provence identified here as belonging to the genus *Hydnoseris* have pennular and regularly porous radial elements, thus we place them in the family Microsolenidae.

The genus *Hydnoseris* Beauvais is closely related to the genera *Meandrarea* Etallon,1859, by monolinear corallite series and *Hydnophoromeandraraea* Morycowa, 1971 by the type of colline (Table 5). Characteristic feature of this meandroid genus is the structure of collines, which are distinctly complex, i.e composed of dense, linearly arranged monticules (short collines) with radial elements sub- or nonconfluent across the collines (Fig. 16B).

Hydnoseris paragaricites sp.n.
Fig. 16

Holotype: No. UJ 137P/233/1, Fig. 16A–F.

Type-level: Lower Aptian (Lower Bedoulian).

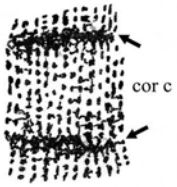
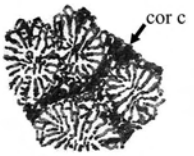
Type-locality: France: Provence: Ventoux massif (Fessonières-Pied Gros).

Derivation of the name: very close to *Hydnoseris agaricites* (Goldfuss, 1826).

Diagnosis: Calicinal series long with linearly arranged subdistinct

Table 5

Common and distinguishing characteristics of some closely related meandroid-hydnophoroid genera from the family Microsolenidae (*Meandrarea*, *Hydnoseris* and *Hydnophoromeandrarea*). cor c – corallite centres (valleys)

Genera	***Meandrarea* Etallon, 1859**		***Hydnoseris*** Beauvais, 1982	***Hydnophoromeandraraea*** Morycowa, 1971
	Meandrarea Etallon, 1859	***Michelinaraea*** Alloiteau, 1957		
Colony structure	meandroid		meandroid-hydnophoroid	hydnophoroid
Budding	intracalicinal terminal			circummural
Form of series	monolinear, straight and/or sinuous 	monolinear, straight and/or sinuous 	monolinear, straight and/or sinuous 	monolinear, continous 
Corallite centres	distinct, rarely subdistinct	indistinct, subdistinct	distinct, subdistinct	indistinct, subdistinct
Collines	tholiform		subtholiform, complex (composed of densely lineary arranged monticules {= short collines})	short collines (= monticules) elevated, circular or slightly elongated
Walls	not distinct		absent or in places synapticular incomplete	
Ambulacrum	absent		absent or rudimentary	
Septa	confluent, rarely subconfluent		subconfluent, rarely confluent and nonconfluent	
Radial element perforation	regular			
Radial element micromorphology	pennular (pennules and/or menianes)			
Columella	monotrabecular, small parietal or absent		absent or rudimentary, parietal	
Endotheca	scarce tabuloid dissepiments		vesicular and tabuloid dissepiments	scarce tabuloid dissepiments
Peritheca	absent			absent or rudimentary
Synapticules	present			
Microstructure	microsolenid type		type species should be verified; in specimens from Provence – microsolenid type	microsolenid type

roundish calicular depressions. Collines composed of hydnophoroid monticles arranged linearly. Width of series from 2 to 3.5, rarely up to 4 mm. Distance between corallite centres in series from 1.5 up to 3.0. Septa thin, subequal, regularly porous, 6–7 per 2 mm along collines, and 10–12 in calices. Density of pennulae in longitudinal section: 4 per 1 mm. Dissepiments low, synapticulae frequent.

Material: Two colonies: Nos. 233/1 and 246/2; 7 thin sections: Nos 233/1a-e; 246/2a-b.

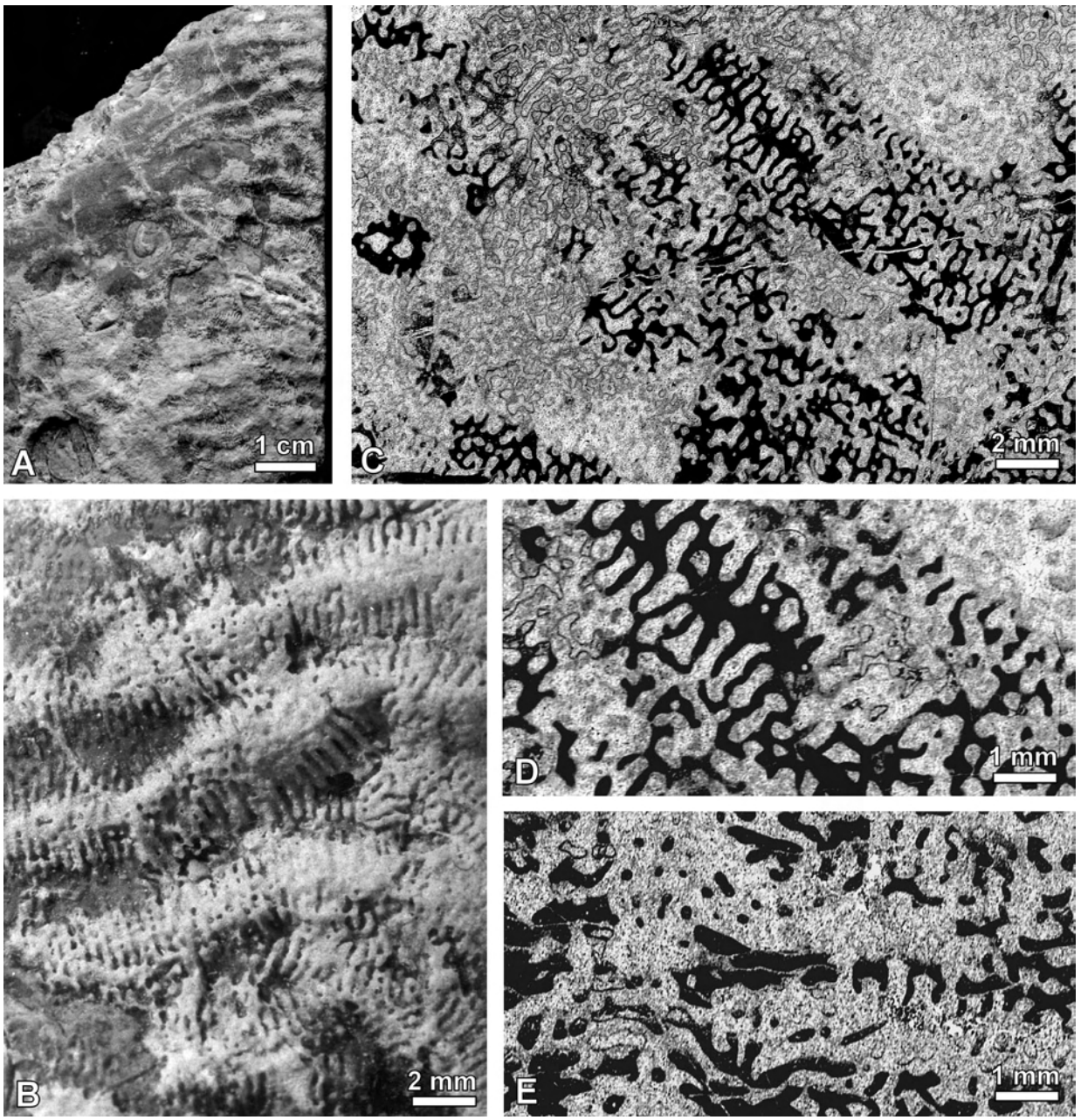


Fig. 15. *Meandrarea robusta* sp.n., No. 4455/2, holotype: **A** – upper surface of part of colony showing corallite series arranged subconcentrically; **B** – enlarged part of Fig. 15A. to show calicular series with small, sub- and nondistinct calicinal fossettes; **C** – tranverse thin section (No. 233a) of corallite series; **D** – detail from Fig. 15C: septa converging and showing centres of subdistinct calices; **E** – longitudinal thin section (No. 12b) of septa, partly tangential to the septal surfaces (at left) showing regularly porous radial element with thick menianes. Note also the presence of thin extended dissepiments

Dimensions (in mm):

	Specimen No. 233/1	Specimen No. 246/2	M. Beauvais, 1982: *Hydnoseris agaricites* (Goldfuss)
col-col.	2-3.5	2.5-3.5 (4.5)	1.5-5
c-c in series	1.2-3	*ca.* 2	2.5-4
d isolated	ca. 3		
den s	6-7/2	5-6/2	7-8/2
den mont joined	2-4/5	2/5	
S (in series)	10-12 (18)	12-18	

Dimensions continued

S (in individual corallite)	*ca.* 20		
S in mont	*ca.* 8-20		
den mont in collines	3-4.5/5		
den growth bands	4/10		
den pen	4/1	4-5/1	
D H	(1) 60×80 60	70×110 ca. 70	

Description: Colonies meandroid-hydnophoroid, massive, in the

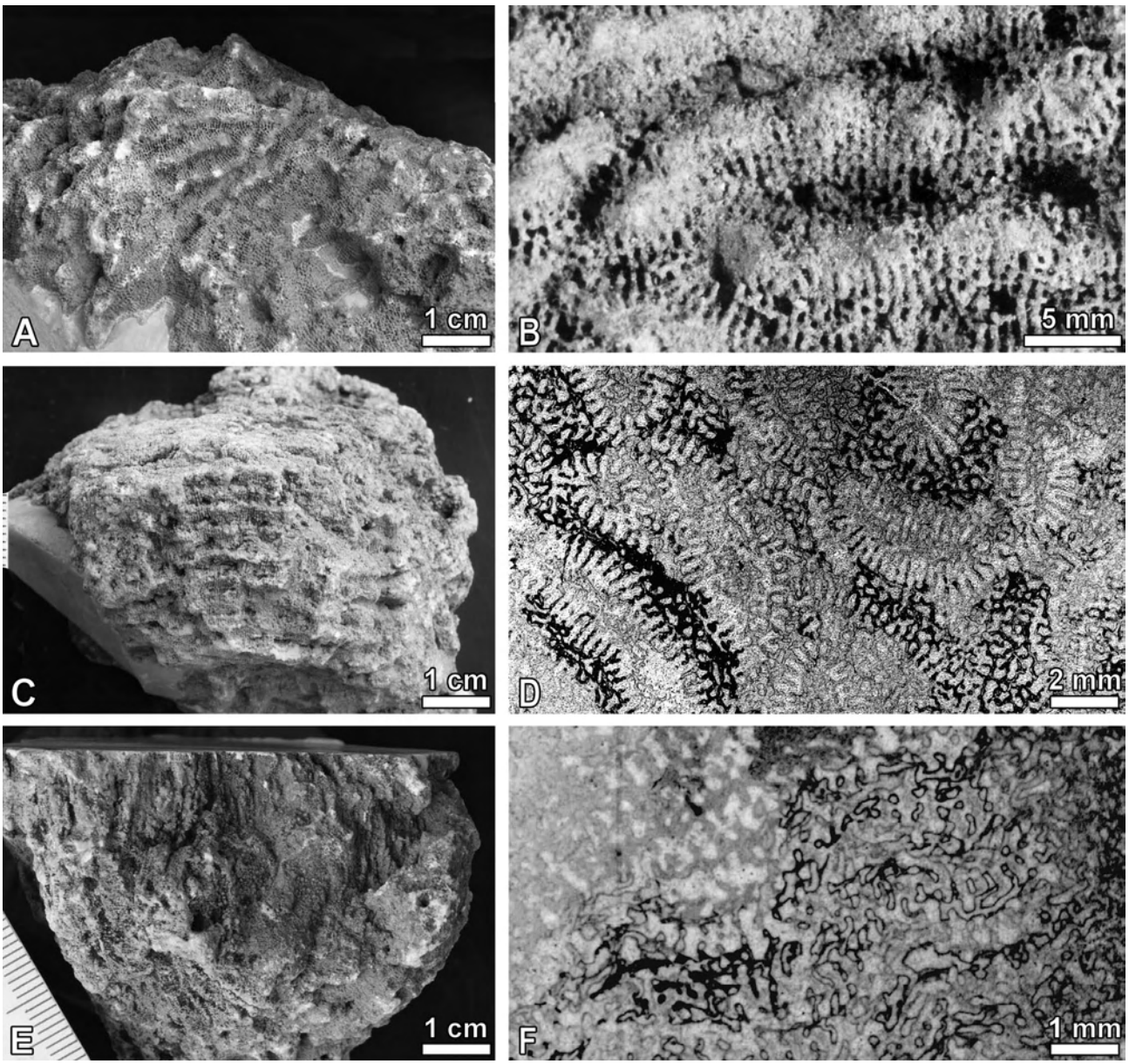


Fig. 16. *Hydnoseris paragariciformis* sp.n., No. 232, holotype: **A** – upper colony surface showing subparallelly arranged calicinal series; **B** – enlarged part from Fig 16A to show long collines composed of linearly arranged monticules; **C** – lateral view of colony to show well marked growth bands; **D** – tranverse thin section (No. 232a): complex collines clearly visible; **E** – lower, flat colony surface with trace of attachment; **F** – longitudinal section of radial elements

form of upturned cones. Their lateral surfaces bear well marked regular growth-bands. Diameter of the colony attachment area (No. 246/2) is 3×4 mm. Series narrow. Collines elevated, from 1 to 2 mm in width, built by monolinearly arranged hydnophoroid monticules. Small circular or narrow, slightly elongated ambulacra present. Calices sub- and indistinct arranged in simple rows. Subdistinct calices marked by shallow depressions and slightly converging septa. Radial elements subequal, regularly perforated. Endothecal dissepiments and synapticules frequent. Peritheca not distinct,

Remarks: The colony seems to be very close to the Upper Cretaceous *Hydnoseris agaricites* (Goldfuss) presented by M. Beauvais (M. Beauvais, 1982, (2), p. 256, fig. 104, pl. 45, fig. 4; pl. 46, fig. 2), but differs slightly from it in less wide calicinal series, less marked and denser calices. In the specimen from Provence they are subdistinct and in *Hydnoseris agaricites* (see Beauvais, 1982) they are distinct.

Occurrence of the studied specimens:
Lower Bedoulian –Vaucluse massif: Les Gardettes-Nesque gorge: Nos 233/1, 246/2.

Hydnoseris radiata sp.n.
Fig. 17

Holotype: No UJ 137/242/2, Fig. 17 A–F.
Type-level: Lower Aptian (Lower Bedoulian).
Type-locality: Provence: Massif de Vaucluse: Les Gardettes – Nesque gorge.
Derivation of the name: Meandroid-hydnophoroid colony with the series arranged radially.
Diagnosis: Meandroid-hydnophoroid colony with multiple radially arranged calicinal series. Width of series from 2.5 to 4.5 mm. Calices subdistinct and non-distinct. Collines elevated, composed of hydnophoroid monticules more or less connected with one an-

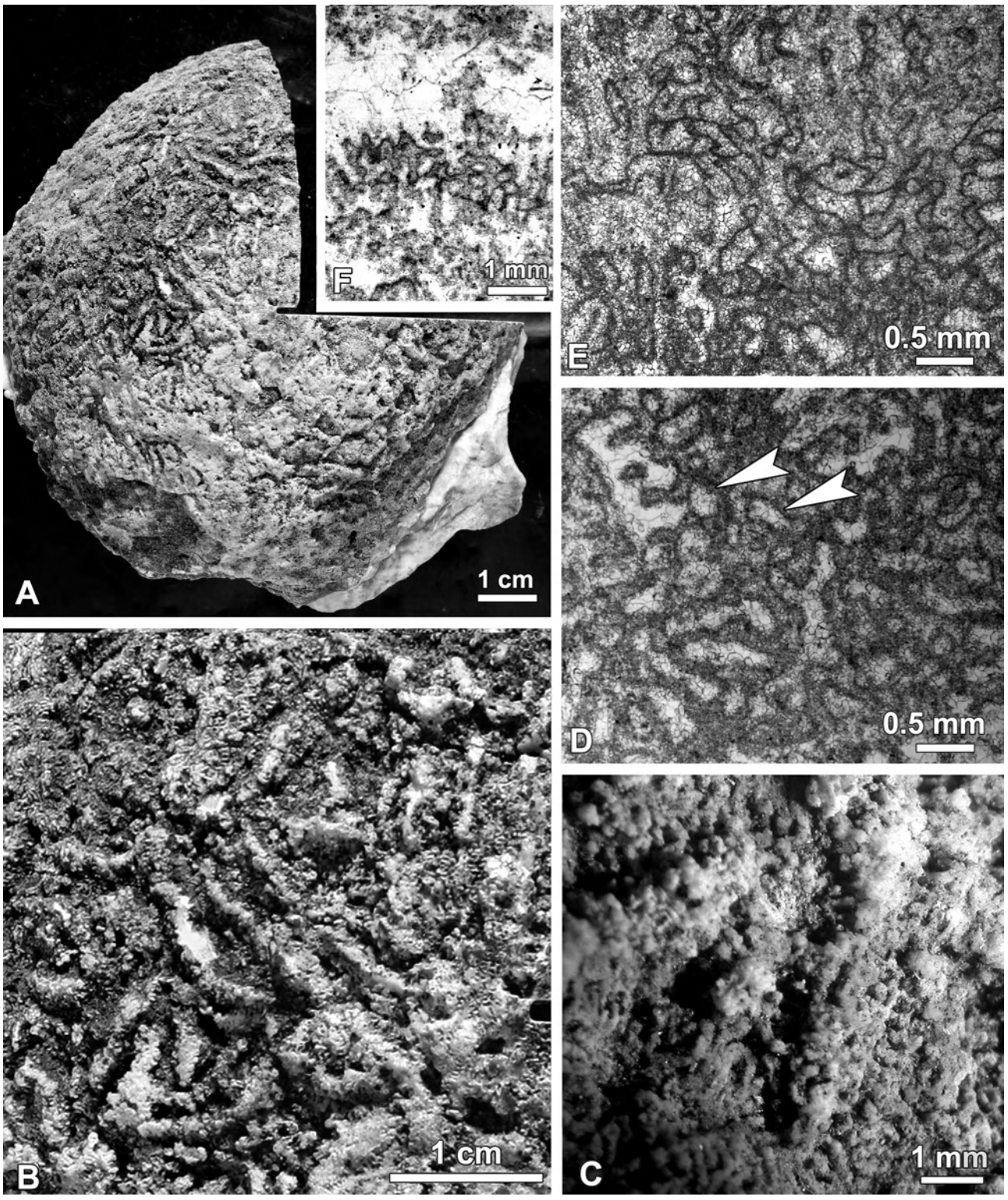


Fig. 17. *Hydnoseris radiata* sp.n., No. 188, holotype: **A** – upper colony view, several radially arranged series visible; **B** – fragment from Fig. 17A showing radially disposed corallite series; **C** – detail from Fig. 17A to show collines composed of monticules; **D** – tranverse thin section (No. 188a) showing fragments of monticules and more or less elongated columellae (arrows); **E** – longitudinal thin section (No. 188b) showing tabuloid dissepiments; **F** – septal fragment in longitudinal thin section (No. 188c)

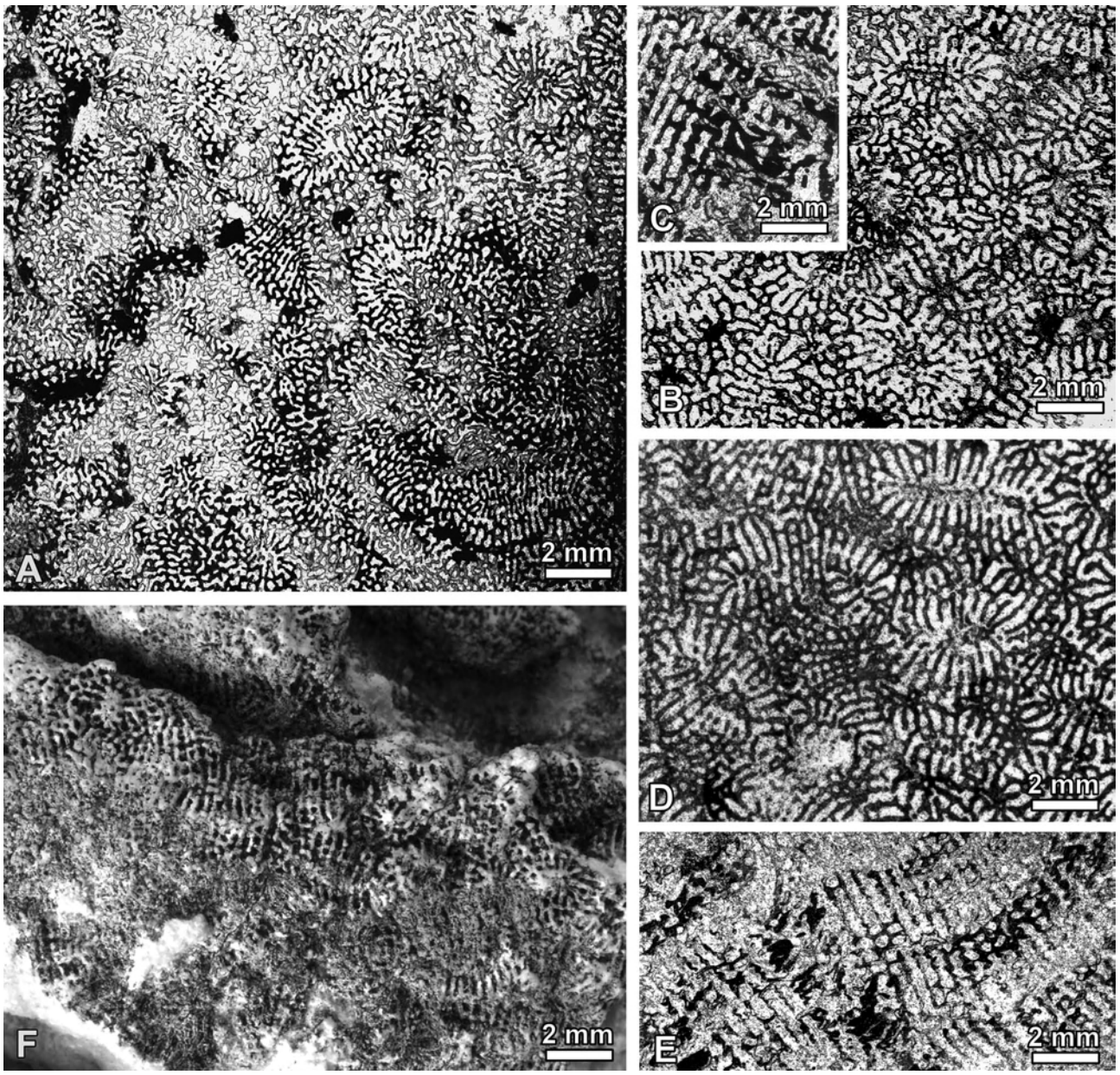


Fig. 18. **A** – *Hydnophoromeandraraea volzi* Morycowa, 1971, No. 4435/3). Tranverse thin section (No. 4435/3) showing hydnophoroid type of colony. Note thin, dense radial elements. **B, C, F** – *Hydnophoromeandraraea provencensis* Masse et Morycowa: B – tranverse thin section of corallum (No.4405/4a) and fragment of its longitudinal section in Fig. C; F – fragment of corallum (No. 230) presented in Fig. 3B. Note subparallel orientation of monticules. **D, E** – *Hydnophoromeandraraea* aff. *provencensis* Masse et Morycowa: D – tranverse thin section of corallum (No.4430a); E – longitudinal thin section (4430b) of septa

other. Distance between corallite centres in series from 1 to 2 mm. Radial elements thick, subequal, regularly porous, 6–7 per 2 mm in collines, and 12 to 20 septa in calices. Density of pennulae in longitudinal section: 3 per 1 mm.

Material: 1 colony No 242/2; 3 thin sections: No 242/2a-c.

Dimensions (in mm):

l mont	1-3
den mont (col complex)	3-4/5
col-col	2.5-4.5
den s	6-7/2
c-c in series	1-2

Dimensions continued

S in series	12-20
den trab	3/1
den pen	3/1
D H	115×120 max. 60

Remarks: Colony submassive with the lower surface almost flat and the upper convex. This species differs from other hydnophoroid-meandroid colonies in multiple radially arranged calicinal series within the colony. In this structure our colony resembles the rhipidogyrid colonies of, *i.a. Wellsimeandra morycowae* Idakieva et Tchechmedjieva from the Barremian of Prebalkan Central (Idakieva & Tchechmedjieva, 2003).

Occurrence of the studied specimens:
Lower Bedoulian – Massif de Vaucluse: Les Gardettes-Nesque gorge.

Hydnoseris sp.

Material: 1 colony: No: 236/2; 1 thin section: No; 236/2a.

Dimensions (in mm):

l series	3-15
l mont	1.5-4
den mont in colline	3-5/10
col-col	3-5 (6.5)
c-c	1.5-4
den s	6-7/2
S (in calices)	*ca.* 18
S in mont	16-30
den trab	4/1
den pen	3-4/1
D H	80×110 max. 60

Remarks: Massive colony. Series long, open. Collines tholiform, straight and subparallel, short or long, complex, i.e. composed of monticules, closely linearly packed. The specimen described here seems to be similar to the Upper Cretaceous *Hydnoseris hydnophylloides* Oppenheim (Oppenheim, 1930). However, it differs from the latter in narrower series and in denser calices.

Occurrence:
Lower Aptian (lower Bedoulian) – Ventoux massif-Western edge: 236/2.

Genus *Hydnophoromeandraraea* Morycowa, 1971
Type species: *Hydnophoromeandraraea volzi* Morycowa, 1971

Hydnophoromeandraraea volzi Morycowa, 1971
Fig. 18A

v1971. *Hydnophoromeandraraea volzi*: Morycowa, pp. 124- 125, pl. 33, fig. 4; pl. 34, fig. 1; pl. 36, fig. 2; text-fig. 36.
v1994. *Hydnophoromeandraraea volzi* Morycowa: Masse & Morycowa, p. 443, pl. 3, figs 1a, b, 2a, b, 3a, b, 4.
1997. *Hydnophoromeandraraea volzi* Morycowa: Baron-Szabo, p. 85, pl. 14, fig. 4.
2002. *Hydnophoromeandraraea volzi* Morycowa: Baron-Szabo, p. 450, pl. 98, fig. 4.
v2002. *Hydnophoromeandraraea volzi* Morycowa: Morycowa & Marcopoulou-Diacantoni, p. 59, fig. 35C.
v2006. *Hydnophoromeandraraea volzi* Morycowa: Morycowa & Decrouez, p. 824, pl. 11, fig. 7.

Material: 4 specimens: Nos, 44, 49, 184/3, 4435/3 and 6 thin sections: Nos 44a, 49a, 184/3 a, b, 4435/3a-b.

Moreover, 13 specimens presented in Masse & Morycowa, 1994: Nos: 5/1-2, 16, 189/1-3, 191, 235, (*non* 242), 254, 376/1-3 and 9 thin sections + 2 new.

Dimensions (in mm):

	Provence specimens
l col simple	2.5-5
col complex	to *ca.* 10
col-col	2-4
d mont	2-3×2.5-3.5

Dimensions continued

den s	(6) 7-9/2
den trab	3-6/1
den pen	3/1
D (all specimens)	30-50×30×70
H (all specimens)	*ca.* 15-30

Remarks: Massive and lamellar hydnophoroid colonies. The description of the newly presented specimens does not differ from that in Masse and Morycowa, 1994.

Occurrence of the studied specimens:
Lower Barremian – Chainon de la Fare: l'Enfourna biostrome: No. 184/3.
Upper Barremian – Chainon des Alpilles: Orgon (U2): Nos 44, 49.
Lower Aptian (lower Bedoulian) – Massif du Ventoux: Fessonières-Pied Gros: No. 4435/3.

Overall distribution:
Barremian–Lower Aptian – France: Provence (Barremian: La Fare and Orgon.
Lower Aptian – Massif du Mont-Ventoux.
Lower Aptian – Romania (Carpathians, Reg. Rarău); Austria/Germany (Helvetic Zone, Allgäu, Schrattenkalk); Upper Schrattenkalk of Hergiswil (Lucerne region, Helvetic Zone of central Switzerland).
Albian – Greece: Hellenides (Parnassos: Agrostylia).

Hydnophoromeandraraea provencensis
Masse et Morycowa, 1994
Figs 18B–F, 19A–D

1994. *Hydnophoromeandraraea provencensis*: Masse & Morycowa, p.443-444, fig. 6; pl. 2, fig. 5a-b, 6a-b.
?2006. *Hydnophoromeandraraea* cf. *provencensis* Masse et Morycowa, 1994: Löser and Ferry, p. 484, fig. 6 (1, 2).

Material: 13 specimens: Nos: 14, 96, 115; 136, 148, 228, 230, 239, 245, 394, 353, 4405/2, 4405/4, 18 thin sections: Nos: 14a, b; 96a, 115a, b; 136a; 148a, b; 228a, 239a, b; 394a-c; 4405/2a, b; 4405/4a, b.

Moreover 9 specimens were presented in Masse & Morycowa, 1994: Nos: 92/1, 126, 127, 132, 135, 137, 157, 241, 335; 8 thin sections (+ 6 new).

Dimensions (in mm):

	Provence specimens
l col	1.5-4 (4.5)
d col single	1.8-2.5×2-4 (4.5)
col-col	(1.5) 2.5-4.5 (5)
den s	5-6/2
den trab	3-4/1
den pen	3-4/1
den growth bands	3-4/10
D No. 14 H	(fragm.) 35×40 10
D No. 230 H	75×80 max. 50
D No. 239 H	(1/2) 35×60 80
D No. 245 H	(1/2) 75×140 max. 60
D No. 394 H	(1/4) 60×90 max. 65

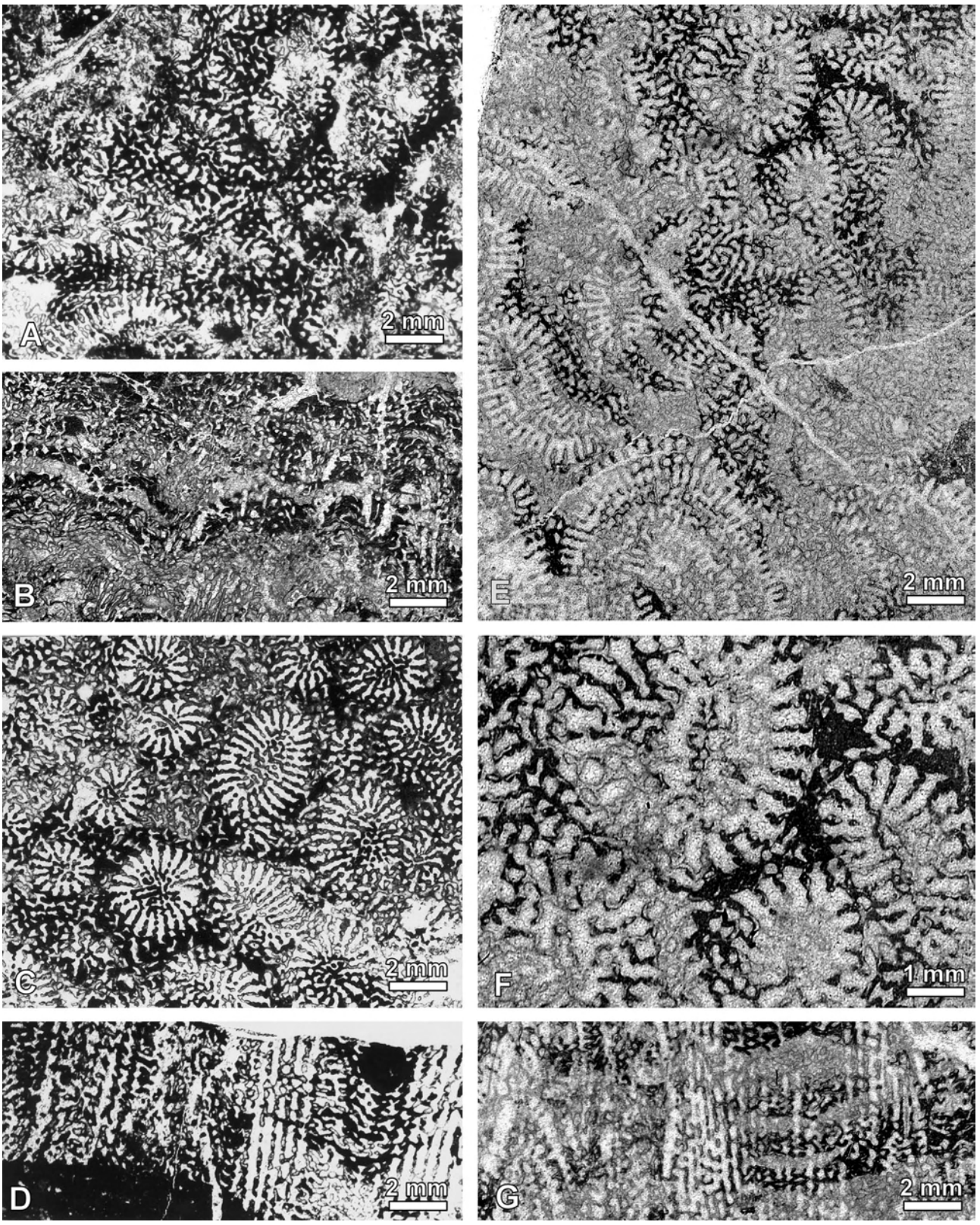


Fig. 19. **A–D** – *Hydnophoromeandraraea provencensis* Masse et Morycowa: A – transverse thin section (No. 148a) of corallum part; B – longitudinal, partly tangential septal section (thin section No. 148b) to show pennulate septa (at left, top); C – corallum in thin section (No. 14a) showing round and oval sections of monticules; D – longitudinal section, partly tangential to the septal surface (thin section No. 14b). Pennules coalescing into menianes. **E–G** – *Hydnophoromeandraraea magna* sp.n., No. 4402/1, holotype: E – thin section of corallum (No. 4402/1a) showing corallite series divided by large monticule sections; F – enlarged part of Fig. 19E displaying sections of rounded and elongated monticules; G – longitudinal thin section (No. 4402/1b) of radial elements to show its microsolenid character

Remarks: Colonies thin- and thick-lamellar, as well as massive. Specimens presented here as *Hydnophoromeandraraea provencensis* in colony structure, colline dimensions and septal density do not differ from those described in Masse and Morycowa (1994). Only in some colonies (Nos: 394, 353) collines are arranged along one direction.

According to Löser and Ferry (2006), *Hydnophoromeandraraea* cf. *provencensis* described by them from the Barremian of southern France (Ardèche and Drôme) differs from the typical species (Masse & Morycowa, 1994) only in denser septa (7/2).

Occurrence of the studied specimens:

Lower Barremian – Chainon de la Fare: l'Enfourna biostrome: No. 14; Massif du Luberon: Lourmarin (= Combe de Bonnieux): No 148.

Lower Aptian (lower Bedoulian) – Massif de Vaucluse: Rustrel (côteau de Mery): Nos 115, 136; Rustrel U3 – No 96; Les Gardettes-Nesque gorge: Nos 228, 230, 253, 239, 245; Massif du Ventoux: Lanrageade: Nos 390; 394, Fessonières-Pied Gros: Nos 4405/4, 4430/1-2.

Overall distribution:

Barremian – France, Provence: Chainon de la Fare; ?Dépt. Ardèche and Drôme.

Lower Aptian – France, Provence: Massif de Vaucluse: Rustrel; Massif du Ventoux.

Hydnophoromeandraraea aff. *provencensis*
Masse et Morycowa, 1994
Fig. 18D, E

Material: 4 specimens: Nos 99, 390, 4419/5, 4430/1; 8 thin sections: Nos: 99a-c, 390a, b; 4430/1a-c.

Dimensions (in mm):

	Provence specimens
l col single	(1) 2-5
d col single	2-4×4-5
col complex	7-10 (2-3 monticules)
col-col	3-5 (6)
den s	(4) 5-6/2
den trab	3/1
den pen	3/1
D No. 390 H	55×70 *ca.* 45
D No 4430/1 (fragm.) H	50×65 45

Remarks: Colonies lamellar and massive. On account of septal density the specimens are nearest to *H. provencensis*, however, they differ from the latter in rather common complex collines, composed in places by joining two to six monticules.

Occurrence of the studied specimens:

Lower Aptian (lower Bedoulian) – Massif du Ventoux: Fessonières-Pied Gros: Nos 4419/5, 4430/1; Lanrageade: No. 390.

Lower Aptian (Upper Bedoulian) – Massif de Vaucluse: Rustrel U3-99.

Hydnophoromeandraraea magna sp.n.
Fig. 19E–G

Holotype: No.UJ 147P/4402/1, Fig.19 E–G.

Type-level: Lower Aptian.

Type-locality: France: Provence – Massif du Ventoux, Ouest des Ramayettes.

Derivation of the name: (Lat.) *magnus* – on account of large colline diameters.

Diagnosis: Hydnophoroid colony. Calices indistinct. Monticules circular and oval, or 2–3 of them joined monolinearly. The length of individual monticules is 3.5–6.5 mm, distance between them are 2.5–4.5 mm; density of radial elements: 5–7/2 mm, density of pennules in longitudinal septal sections: 3–4/1 mm and density of septal trabeculae in transverse section: 3–4 per 1 mm. Dissepiments thin-walled, flat. Synapticules present.

Material: 1 colony No.: 4402/1; 5 thin sections No. 4402/1a-e.

Dimensions (in mm):

col-col	2.5-4.5 (6.5)
d mont	(1.5) 2.5-4×3.5-6.5
den s	5-7/2
den trab	3-4/1
den pen	3-4/1
D No. 4402/1 H	60×80 *ca.* 40

Description: Thick-lamellar colony with indistinct calices. Monticules round and oval, or complex, composed of 2–3 monticules. They are arranged without any direction (chaotic), rarely linearly or coiled. Septa porous, thick, subequal in thickness, subconfluent or nonconfluent in the collines. Synapticulae and dissepiments rather scarce.

Remarks: This specimen resembles *H. provencensis*, from which it differs in larger collines, the presence of collines coiled (Fig. 19F) and in denser radial elements.

Occurence of the studied specimens:

Lower Aptian (Bedoulian) – Massif du Ventoux: Ouest des Ramayettes.

Family LATOMEANDRIDAE de Fromentel, 1861
Genus *Epistreptophyllum* Milaschewitsch, 1876
Type species: *Epistreptophyllum commune*
Milaschewitsch, 1876

Epistreptophyllum sp.
Fig. 20

Material: 3 coralla No. 368; 2 thin sections: No. 368a-b.

Dimensions (in mm):

D basal part	6×6; 5×6
D calicinal part	10×11; 12×14
H	*ca.* 10
S	*ca.* 100
den s	11-13/2

Description: Solitary, small, trochoid specimens with subcircular, slightly concave calices and narrow base of attachment. Radial elements very thin, subequal in thickness, dense, with not numerous pores in distal and internal septal part. Septa arranged into four to five size orders. The S1 septa almost reach the corallite axis, septa S2 to S5 gradually shorter. Septal faces covered with rather flat pennules. Columella papillar. Endothecal elements poorly visible.

Remarks: These specimens represent, in our view, the genus *Epistreptophyllum* Milaschewitsch (see Pandey & Lathuilière, 1997). *Trochoplegmopsis* Roniewicz from the Upper Jurassic (Roniewicz, 1976) is very close to this genus. The relationship between the two mentioned genera should be verified.

Occurrence of the studied specimens:

Upper Barremian – Chainon des Alpilles: Orgon, N.D. de Beauregard: No. 368.

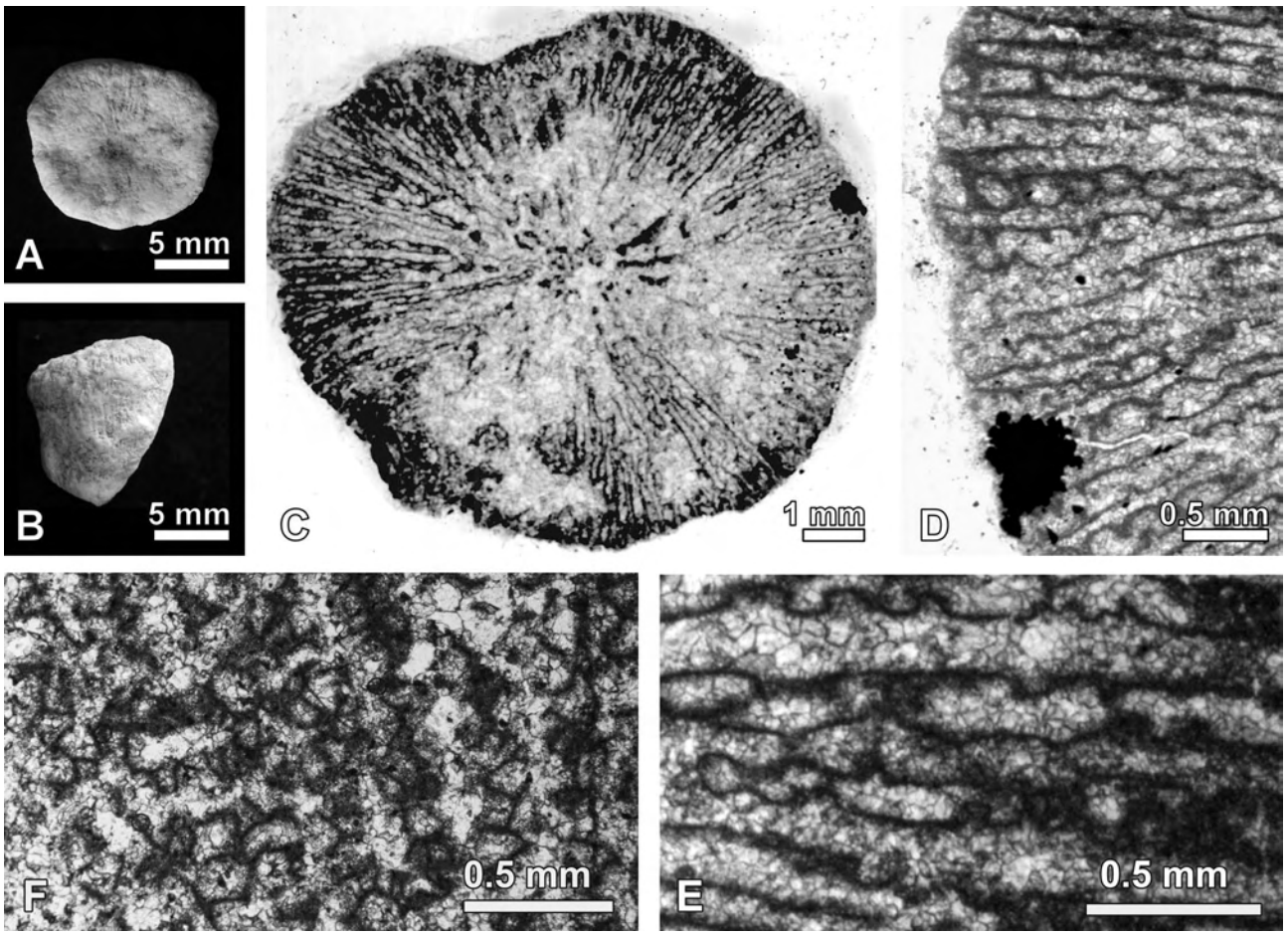


Fig. 20. *Epistreptophyllum* sp., No. 368: **A** – calicular corallite surface; **B** – lateral view of corallum; **C** – transverse thin section (No. 368a) of corallum showing thin, dense radial elements; **D, E** – enlarged parts of Fig. 20C to show the traces of septal micromorphology (skeleton in white); **F** – corallum skeleton in longitudinal thin section (No. 38b)

Genus *Latomeandra* Milne Edwards et Haime, 1849
Type species: *Lithodendron plicatum* Goldfuss, 1826

Latomeandra minor Reig Oriol, 1995.
Fig. 21F, G

1995. *Latomeandra minor*: Reig Oriol, pp. 38-39, pl. 6, figs 8, 9.
2002. *Latomeandra minor* Reig Oriol: Morycowa & Marcopoulou-Diacantoni, pp. 52-53, fig. 28C, D.

Material: One fragment of phaceloid corallum: No. 320; 1 thin section: No. 320a.

Dimensions (in mm):

d cor	6-8×8-10
S	*ca.* 60-70 (S1-S4)
den s	5-6/2
c-c	8-13

Remarks: Phaceloid corallum with slightly oval corallites. Corallum budding lateral with lamellar linkages. Costo-septa thin, subcompact, differentiated into three or four size orders. They are generally subequal in thickness, in places septa S4 are slightly thinner. On lateral surfaces of radial elements well-developed pennules occur (Fig. 21G). The specimen does not differ from that from Spain (Reig-Oriol, 1975). It differs from *L. minor* from Greece (Morycowa & Marcopoulou Diacantoni, 2002) in slightly smaller corallite diameters and slightly less numerous radial elements (Greek specimen: d – 8–11 × 12–14 mm; S – ca. 80).

The species described here is similar to *Latomeandra juettneri* Eliášová from the uppermost Jurassic–lowermost Cretaceous of the External Carpathians (Eliášová, 1990), but differs from it in smaller corallites and less numerous radial elements (in the holotype of *Latomeandra juettneri*: d corallites = 5–20 mm and S = 96).

Occurrence of the studied specimens:
Lower Aptian – Massif de Vaucluse: Lagnes.
Overall distribution:
Upper Albian – Spain: Cataluna (Marmella, Tarragona).
Albian – Central Greece: Parnassos (Agrostylia).

Genus *Dimorphastrea* d'Orbigny, 1850
Type-species: *Dimorphastrea grandiflora* d'Orbigny, 1850

Dimorphastrea bellula d'Orbigny, 1850
Fig. 21A–E

v1850. *Dimorphastrea bellula*: d'Orbigny, (2), p. 93.
1851. *Dimorphastrea bellula*: Milne Edwards & Haime, p. 108
v1857. *Dimorphastraea bellula*: de Fromentel, p. 66, pl. 10: 8-10.
1857. *Dimorphastraea bellula*: Milne Edwards & Haime, p. 108.
1886. *Dimorphastrea bellula*: de Fromentel, pp. 583-584, pl. 170: figs. 1a-b, 2.

v1898. *Dimorphastraea bellula*: Koby, p. 74, pl. 17, figs. 2, 2a, 3.
?1936. *Dimorphastrea bellula* d'Orbigny 1849: Hackemesser, p. 56.
1961. *Dimorphastraea bellula* d'Orbigny: Bendukidze, p. 27.
1967. *Dimorphastraea bellula*: Gill, p. 73, pl. 8: 2, 2a.
1993. *Dimorphastraea bellula* d'Orbigny 1850: Baron-Szabo, p. 162, pl. 5: 2a-c.

Material: 1 incomplete colony: No. 62; 2 thin sections: No. 62a-b.

Dimensions (in mm):

	Specimen from Provence	de Fromentel, 1857	de Fromentel, 1886	Koby, 1898
d cal central	10	10	12	12
d cal in series			4	
c-c between central calice and first ring	8-10			5-8
c-c in series	2-6			
c-c of two neighbouring series	*ca.* 7-10			
S in central corallite	*ca.* 70	32	56	50-60
S in calices in series	11-24	1 ring-10; others 18-20		(E.M.: 20-32)
den s	8-10/5 (3-4/2)		8/4	10/5
den pen (sect. trans.)	4/2		4-6/2 (in photo.)	(E.M.: 4/1)
den pen (sect. long.)	5/2			
D	100×105			
H	max. 60			

Remarks: Incomplete massive colony with central calice and partly four calice rings preserved. Its features and measurements correspond to the species *Dimorphastaea bellula* d'Orbigny (*cf.* de Fromentel, 1957; Koby, 1898).

Occurrence of the studied specimens:
Lower Aptian (lower Bedoulian) – Massif de Vaucluse: Sault biostrome.

Overall distribution:
Lower Hauterivian – France: Dép. Haute-Marne (Saint Dizier) and Dép. Yonne (Gy-l'Evęque, Leugny).
Hauterivian – Dépt. Doubs (Morteau); Ukraine: Crimea (Simferopol, Sably).
Upper Aptian–Lower Albian – N Spain, prov. Guernica (Playa de Laga).
?Cenomanian – Greece: Giona massif (Panourgias = Dremisa in Hackemesser, 1936).

Genus *Microphyllia* d'Orbigny, 1849
Type-species *Meandrina soemmeringii* Münster in Goldfuss, 1829

Microphyllia meandrinoides (Reuss, 1845)
Fig. 22

1845-1846. *Astraea meandrinoides* Reuss: Reuss, p. 61, pl. 43, fig. 2a-c.
1857-1961. *Latimaeandra? Meandrinoides*: Milne Edwards & Haime (2), p. 547.
1887. *Latimaeandra meandrinoides*: Poèta, p. 40.
non 1989. *Microphyllia meandrinoides* (Reuss 1845-1846): Löser, p. 139, pl. 26, figs 6-8, text-fig. 41.
1994. *Microphyllia meandrinoides* (Reuss, 1945): Eliašova, pp. 4-5, pl. 2, fig. 3a-c; pl. 4, fig. 2; pl. 8, fig. 1.
1997. *Microphyllia meandrinoides* (Reuss, 1945): Eliašova, p. 261, fig. 13.
1998. *Microphyllia meandrinoides* (Reuss, 1945): Baron- Szabo, p. 151, pl. 10, fig. 5.

Material: 1 colony: No. 218 and 1 colony fragment No. 86/4; 6 thin sections: Nos. 218a-b; 86/4a-d

Dimensions (in mm):

	No. 218:	No. 86/4	Eliašová, 1994
w series	4-7 (10)-if 2 coral. across series	5-8	3-6 (9-if there are 3 corallites across series)
l series	*ca.* 20-40	*ca.* 20-40	
c-c	3.5-7.5	3.5-5	3-5
d single	3.-6.5		d: 5-7(8); (2) 3.4
den s (in wall)	6-7/2	7-8/2	(5) 6-7/2
S	*ca.* 24-40	*ca.* 20-46	cal single: 40-48
den pen		3/1	4/1
D	70×90	60×80	
H	*ca.* 20	55	

Description: Corallum lamellar, meandroid. Calices distinct, arranged mainly in long and straight monolinear series, only occasionally less regular series occur. The series are joined by a tectiform, thin septo-synapticulotheca. Single corallites rare. Radial elements are non- or subconfluent. Septa thin, subequal in thickness, irregularly perforated. Septal anastomosis and valley-septa present. Septal ornamentation of latomeandrid type. Synapticulae not abundant. Columella parietal, in places only one papilla occurs. Budding intracalicinal, terminal.

Remarks: The features of investigated specimens agree with those described as *Microphyllia meandrinoides* from the Upper Cretaceous, in M. Beauvais (1982) and Eliašová (1994). Our specimens, however, have slightly larger width of series.

The specimens described as *M. meandrinoides* from the Cenomanian of Saxony (Löser, 1989) (having, i.a. denser radial elements: 4–5/1 mm) was assigned by Eliašová (2004) to her new species *Microphyllia geminata*.

A very close species to *M. meandrinoides*, however with narrower width of series, is *Microphyllia* sp. ind. 1 from the Barremian–Lower Aptian from the Polish Outer Carpathians (Morycowa, 1964, p. 92, pl. 27, fig. 1; pl. 29, fig. 4).

Occurrence of the studied specimens:
Lower Aptian (lower Bedoulian) – Massif de Vaucluse: Les Gardettes-Nesque gorge: No. 218; Rustrel U3: No. 86/4.

Overall distribution:
Cenomanian–Lower Turonian – Czech Republic: Reg. Bohemian.
Campanian – Spain: Catalonia (Prov. Lleida).

Microphyllia gemina Eliašová, 2004
Fig. 23E–G

2004. *Microphyllia gemina* sp.n.: Eliašova, p. 165.
1964. *Microphyllia* sp.ind. 1: Morycowa, p. 92, pl. 27, fig. 1; pl. 29, fig. 4.
1989. *Microphyllia meandrinoides* Reuss: Löser, p. 139, pl. 26, figs 6-8, fig. 41.
1994. *Microphyllia* sp.: Eliašova, p. 5 pl. 4, fig. 3; pl. 8, fig. 2.

Material: Two colony fragments: Nos 185/1, 185/2; 3 thin sections No. 185/1a-b, 185/2a.

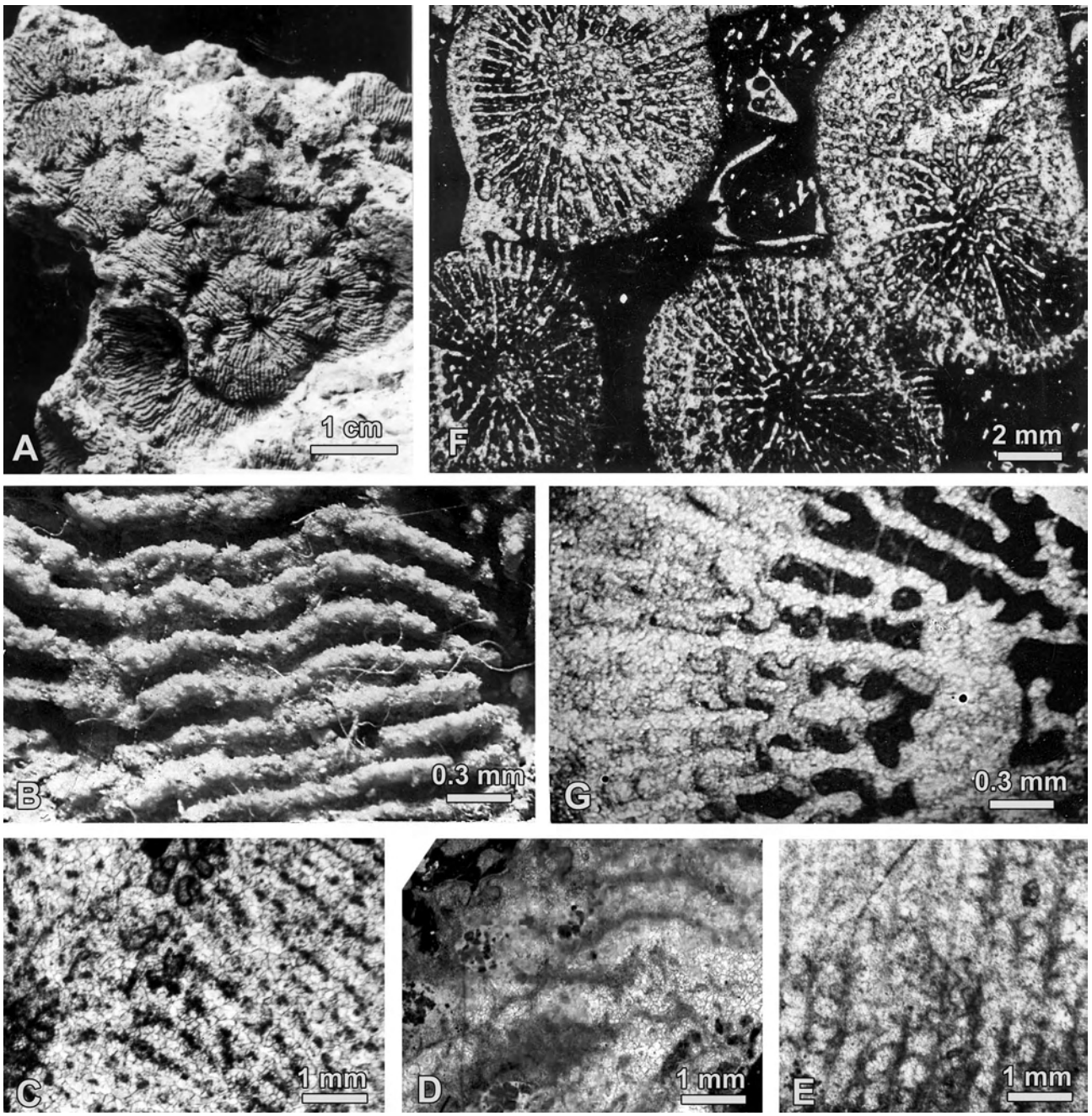


Fig. 21. **A–E** – *Dimorphastrea bellula* d'Orbigny, No 320: A – upper surface of colony; B – enlarged part of the same colony showing traces of septal micromorphology; C – some septa in transverse thin section (No. 62a); D – longitudinal thin section (No. 62b) displaying extended, vesicular dissepiments; E – longitudinal thin sectiom (No. 62c) presenting pennulate radial elements. **F, G** – *Latomeandra minor* Reig Oriol: F – transverse thin section (No. 320a) of part of phaceloid corallum; G – same thin section displaying traces of radial element micromorphology

Dimensions (in mm):

	Provence specimens
w series	3-4
l series	6-20
d individ.	2.5-3.5
c-c	2.5-4
S cal isolated	24-32
S cal in series	18-24
den s	8-9/2

Dimensions continued

D No. 185/1 H	45×65 13
D No. 185/2 H	60×80 ca. 60

Description: Fragments of massive colony with narrow, straight and flexuous corallite series. Radial elements thin, developed in 2–3 size orders. About 16 septa S1 reach the corallite centre. Columella small, parietal. Wall synapticular.

Remarks: This specimen corresponds to that described by Morycowa (1964) as *Microphyllia* sp.ind. 1 from the Polish Outer

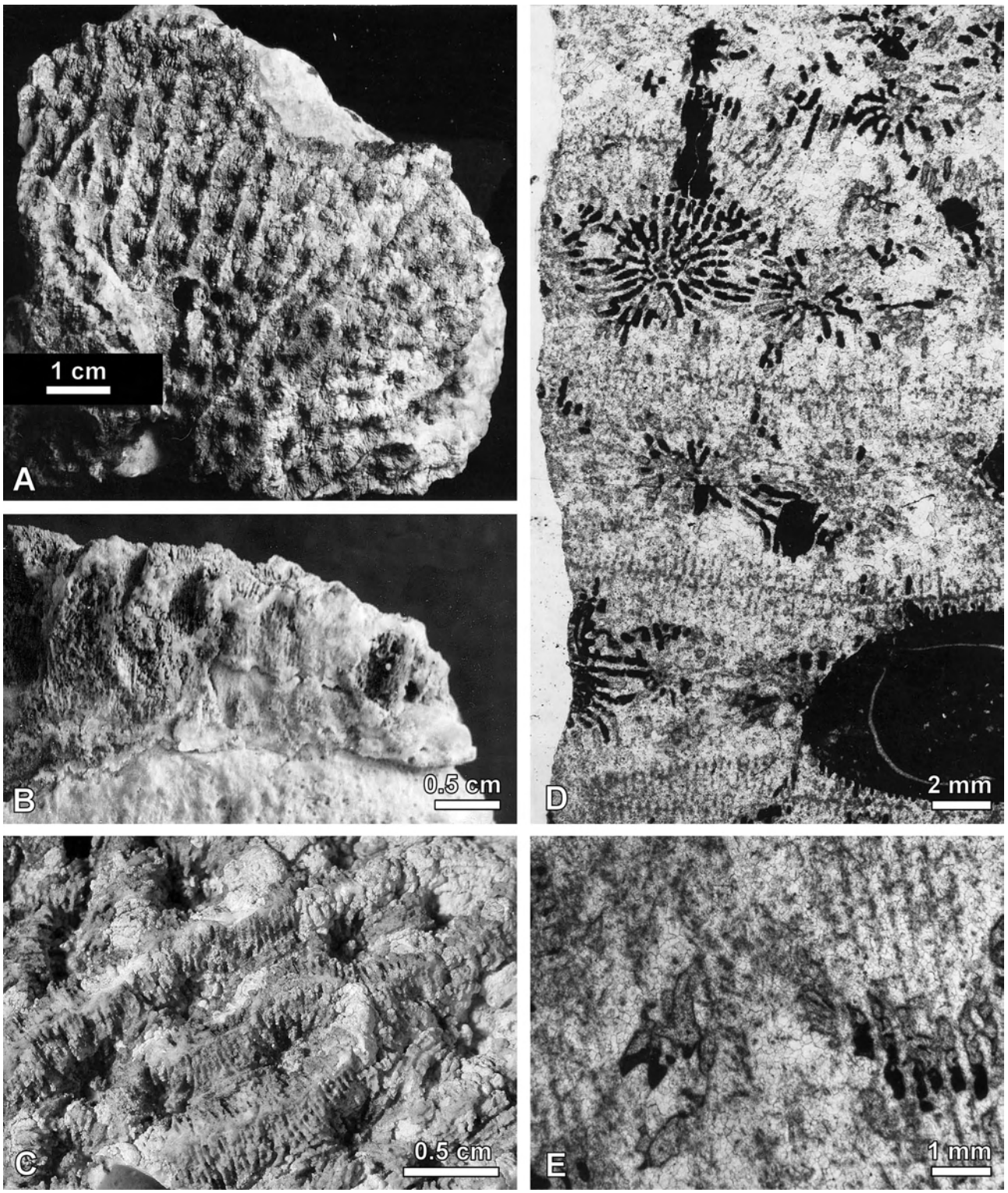


Fig. 22. *Microphyllia meandrinoides* (Reuss): **A** – upper surface of colony showing the arrangement of corallite series (specimens No. 218); **B** – lateral view of the same colony; **C** – same corallum upper surface to show corallite series divided by thin elevated wall; **D** – same species (No. 86). Transverse section crossing corallite series; **E** – longitudinal thin section (No. 86b) of radial elements

Carpathians (Morycowa, 1964), but differs in slightly denser radial elements in the wall (den s in the Carpathian species = 16–20/5 mm). *Microphyllia cretacica* Kuzmicheva (Kuzmicheva, 2002), with similar width of series and number of septa, differs from Provence species in considerably less dense radial elements in the wall zone (den s= 6/2 mm).

Our species resembles on account of septal density *Microphyllia densecostata* Sikharulidze (Sikharulidze, 1979), but differs from it in larger calicinal series (width of series in *M. densecostata* w = 1.8–2.0 (2.5) mm).

Occurrence of the studied specimens:
Lower Barremian – Chainon de la Fare: l'Enfourna biostrome: Nos: 185/1, 185/2.
Overall distribution:
Barremian–Lower Aptian – Polish Outer Carpathians (Trzemesna, Jastrzębia).
Upper Cenomanian – Czech Republic (Bohemian); Germany (Saxony).

Microphyllia sp. 1
Fig. 23A–D

Material: one colony No. 232/2, 3 thin section No. 232/2a-c.

Dimensions (in mm):

l series	6-13 (2-3 corallites)
w series	3-7.5
d cal in series	*ca.* 2
d cal single	3.5-5 ((7-8))
c-c in series	3-5.5
S (in single corallite)	*ca.* 60 (in d-8)
S (in series)	16-24
den s	6-8/2
D	60×90
H	13

Description: Colony lamellar. Both single calices and calicular series deep. Corallite series short and closed, composed of two to four corallites. Wall exert, synapticular. Radial elements subequal in thickness, irregularly perforated, belonging to three size orders. Valley-septa present. Columella parietal, in some calices additionally with one central papilla.
Remarks: The calicular surface of the specimen rather well preserved, but the thin sections made from the skeleton shows its silification and destruction.

Generally, the parameters and septal micromorphology of the Provence specimen resembles *Latimaeandraraea Paronai* Prever (Prever, 1909) from Albian (age after Masse *et al.*, 1998) from Italy (Abruzzi: Monti d'Ocre). However, Prever's species was recognized by Löser (in Löser & Raeder, 1995) as belonging to the genus *Latiastraea* Beauvais, 1964 and not to *Microphyllia*.
Occurrence of the studied specimen:
Lower Aptian (lower Bedoulian) – Massif du Rissas.

Microphyllia sp. 2

Material: 1 colony: No. 257; 2 thin sections No. 257a, b.

Dimensions (in mm):

l series	6-20
w series	2.-5.5
d individ.	3-5
c-c	2-5
S individ. cal	24-*ca.* 40
S cal in series	18-24
den s	5-6 (7)/2
D	60×80
H	ca. 80

Description: Submassive colony built of several thin lamellae superimposed. Upper surface abraded with only a small fragment of corallite series preserved. Series short, composed of two to five corallites, closed, often divided. Collines tectiform. Calices individual and in series rather deep. Those in series have septal connections. Costosepta subequal in thickness. Columella small, parietal.
Remarks: As only small (4×4 cm) external fragment of colony has been preserved, and two thin sections are not sufficienty informative, its specific identification is impossible.
Occurrence of the studied specimens:
Lower Bedoulian – Massif de Vaucluse: Les Gardettes-Nesque gorge.

Genus *Fungiastraea* Alloiteau, 1952
Type-species: *Fungiastraea laganum* Alloiteau, 1952

Fungiastraea sp.
Fig. 24C

Material: Two colony fragments: No. 30/2 and No. 59; 3 thin section: 30/2a and 59a, b.

Dimensions (in mm):

	Provence specimens
c-c in series	4-7
c-c between series	5-10
S	24-*ca.* 40
den s	4-5 S1/2; 6-8/2 S1-S2
D No. 30 H	34×45 *ca.* 25
D No. 59 H	(fragm.): 25×40 10-15

Description: Fragment of a massive (No. 30), thamnasterioid colony and of a lamellar one, composed of two foliaceous plates (No. 59). Calices partly ordered in series. Septa slightly differentiated in length (S1-S2 and n S3) and thickness, with several pores in internal septal borders. Columella feeble, made of trabecular projections of septal internal borders. Septal faces with short pennules. Synapticulae abundant, dissepiments rare.
Remarks: These specimens belong to the genus *Fungiastraea* but their state of preservation does not allow a specific identification.
Occurrence of the studied specimens: Upper Barremian (lower part) – Chainon des Alpilles: Orgon-Notre-Dame de Beau Regard biostrome: No. 30/2.
Lower Aptian (Bedoulian) – Massif de Vaucluse: Sault: No. 59.

Genus *Mixastraea* Roniewicz, 1976
Type species: *Mixastraea danubica* Roniewicz, 1976

Mixastraea westfalica Löser, 1993
Fig. 24D

1993. *Mixastraea westfalica* Löser: p. 104, pl. 1, text-figs 1, 2.
1994. *Mixastraea westfalica* Löser: Löser, pp. 40-42, pl. 7, fig. 3; pl. 12, fig. 12, text-figs 28-32.
1996. *Mixastraea westfalica* Löser: Baron-Szabo & Steuber, p. 26, pl. 14, figs 3, 4.
1999. *Mixastraea westfalica* Löser: Baron-Szabo & Gonzáles-León, p. 491, fig. 6d.
2002. *Mixastraea westfalica* Löser: Morycowa & Marcopoulou-Diacantoni, p. 56, fig. 36C-F.
2002. *Mixastraea westfalica* Löser: Baron-Szabo, p. 141, pl. 101, pl. 102, fig. 1.
?2003. *Mixastraea westfalica* Löser: 1993: Baron-Szabo & Gonzáles-León, p. 221, fig. 9A.

Material: 1 specimen: No. 147, 2 thin sections: No. 147a, b.

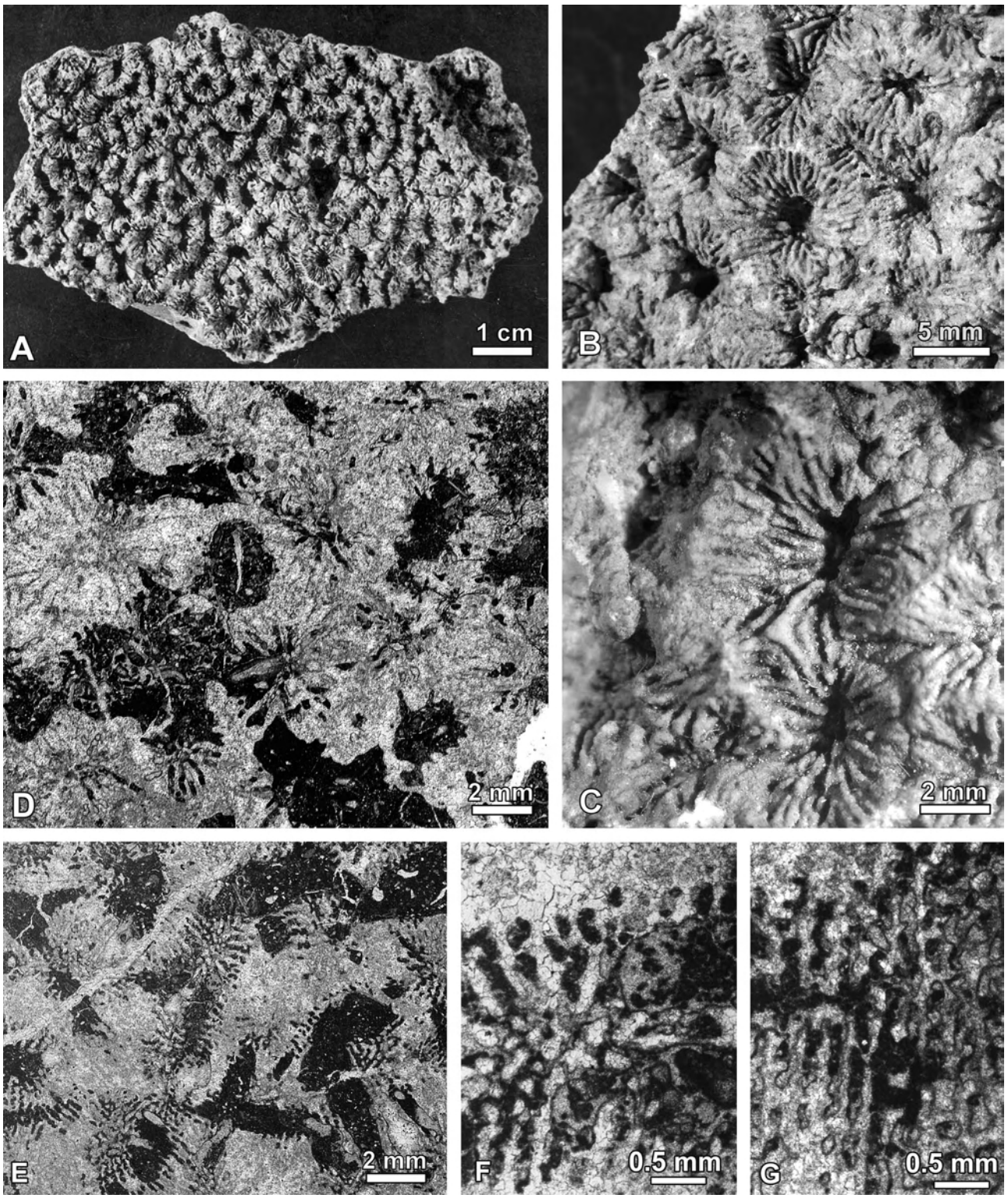


Fig. 23. A–D – *Microphyllia* sp., No. 232/2: A – upper surface of lamellar colony. Note deep calices in individual forms and in series; B, C – enlarged parts of same colony; D – poorly preserved skeleton visible in transverse section. **E–G** – *Microphyllia gemina* Eliašová: E – transverse thin section (No. 185/1a) of corallum showing narrow corallite series; F – same thin section with enlarged view of corallite; G – longitudinal thin section (185b) of radial elements

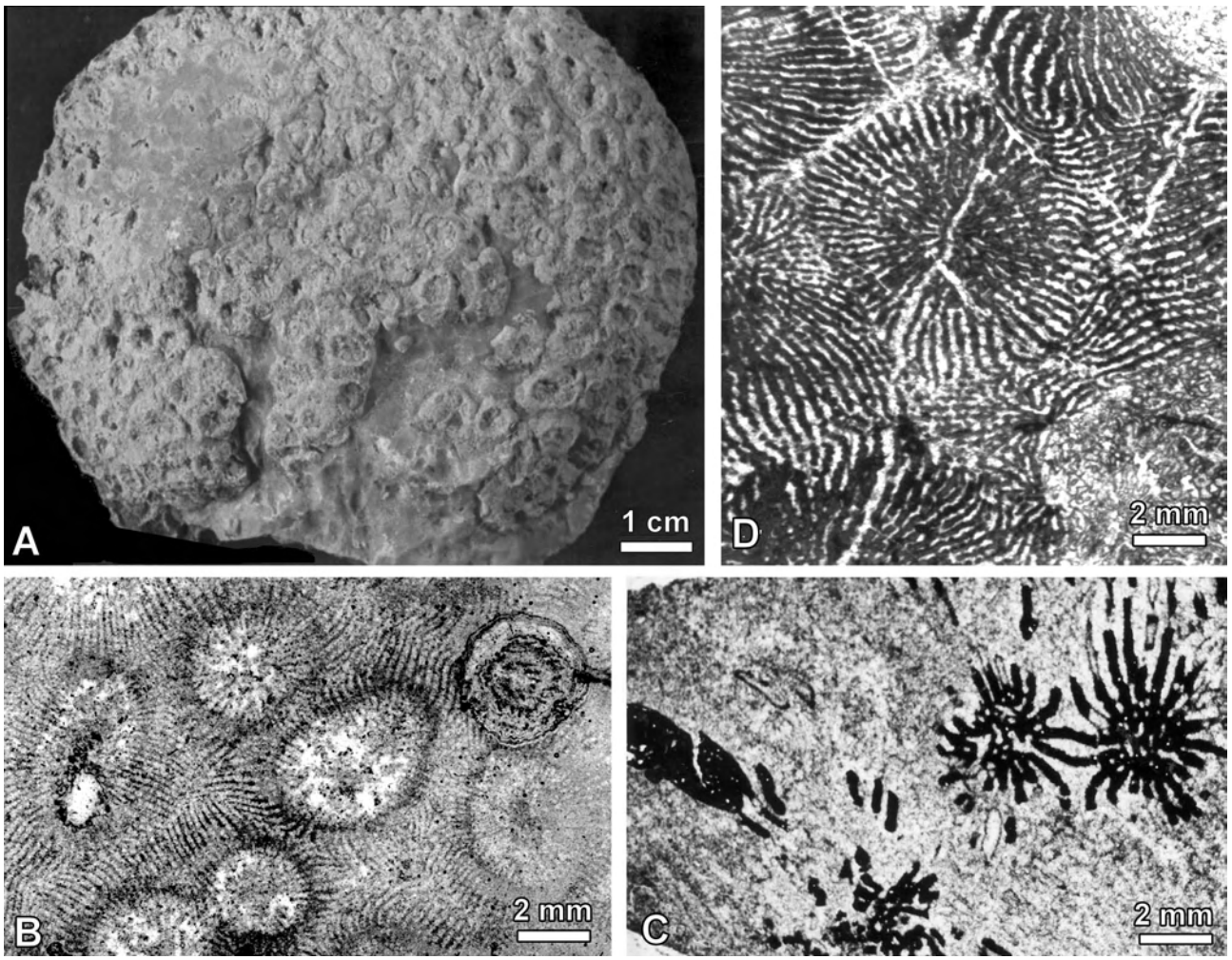


Fig. 24. **A, B** – *Ovalastrea regularis* (d'Orbigny), No. 4443/1: A – upper surface of colony showing calice with elevated rim (wall); B – transverse section of corallites (thin sction 4443/1a) displaying very thin and dense costae. **C** – *Fungiastraea* sp., fragment of colony in transverse thin section (No. 30a). **D** – *Mixastraea westfalica* Löser, transverse thin section (No. 147a) of corallites

Dimensions (in mm):

	Provence specimen	Holotype; Löser, 1993a
d cor	6-11	6-13
c-c	10-14; 8-11	
S	60-80	(55) 60-80 (100)
den s (well reg.)	6-7/2	6/2
den pen	5-6/2	5/2
den trab	3-4/1	

Description: Fragment of massive, cerioid colony. Corallites subpolygonal. Budding marginal with lamellar linkage. Septa thin, subequal, non- and subconfluent, irregularly porous, differentiated into three or four size orders. Internal edges of septa S1 with elongated trabecular lobes. Septal anastomosis present. About 20 septa reach the centre. Columella papillar.Wall incomplete, septothecal. Synapticulae occur mainly in the periphery of corallites. Endotheca built by rather large, thin dissepiments.

Remarks: This specimen differs from the Upper Jurassic *M. danubica* Roniewicz (Roniewicz, 1976, p. 98, pl. 28, figs 2a, b, 3, 4) mainly in less numerous septa (the latter has 80–120).

From *Mixastraea polyseptata* Morycowa & Marcopoulou-Diacantoni (2002) from the Albian of Subpelagonian Unit, Parnassos area (Central Greece) it differs in larger corallite diameters and in thicker and less numerous septa.

Occurrence of the studied specimens:
Lower Barremian – Massif du Luberon: Lourmarin (= Combe de Bonnieux): No. 147/1.

Overall distribution:
Aptian – Central Greece: near Delfi-Arachova.
Upper Aptian–Early Albian – Mexico: Tuape area.
?Middle Albian – Mexico: Lampazos area.
Albian – Greece: Parnassos (Agrostylia).
Lower Cenomanian – Germany: Westphalia.

Genus *Ovalastrea* d'Orbigny, 1849
Type species: *Astrea caryophylloides* Goldfuss, 1826

Ovalastrea regularis (d'Orbigny, 1850)
Fig. 24A, B

v*1850. *Ellipsocoenia regularis*: d'Orbigny, II, p. 92.
1857. *Favia regularis*; de Fromentel, p. 37.
1857. *Favia* ? *regularis*: Milne Edwards (2), p. 433.
1935. *Ellipsocoenia regularis* d'Orb.: Cotreau, p. 30-31, pl. 73, fig. 25, 26.

1964. *Ellipsocoenia regularis* d'Orbigny, 1849: Morycowa, p. 95, pl. 31, figs 1-3.
?1995. *Ellipsocoenia regularis* d'Orbigny, 1850: Löser & Raeder, p. 49.
2000. *Ellipsocoenia regularis* d'Orbigny, 1849: Tchechmedjiva, p. 13-14, pl. 4, figs 2.

Material: One colony: No. 4443/1, 3 thin secions No. 4443/1a-c.

Dimensions (in mm):

d cal	3-4.5, (3×4, 3×5)
d (during budding)	5.5-6
c-c	(3.5) 4-8 (9.5)
S	ca. 50-70
den s (wall reg.)	8-10/2
D	80×95
H	ca. 15

Description: Corallum sublamellar, subspherical, with lower surface flat and upper surface slightly convex. Calices rounded and suboval with elevated calice rim (wall). Septa in corallites from 50 to 70, arranged in three or four size orders. The costae in the wall zone are from 8 to 10 per 2 mm depending on corallite diameters. Costosepta very thin, equal in thickness.

Remarks: The species from the Hauterivian of Fontenoy (Paris Basin), originally assigned to *Ellipsocoenia* (d'Orbigny, 1850), was subsequently placed by de Fromentel (1862) in *Favia*. Later authors put this species again in genus *Ellipsocoenia* (*i.a*. Cottreau, 1935; Morycowa, 1964). Here, this species is considered as belonging to the genus *Ovalastrea*, since *Ellipsocoenia* d'Orbigny, 1850 turned out to be a younger synonym of *Ovalastrea* d'Orbigny, 1849 (*cf.* L. Beauvais, 1964, Roniewicz, 1976).

E. regularis from Provence differs neither from those from the d'Orbigny collection (Museum National d'Histoire Naturelle, Paris, the holotype, No. 5272) nor from Lower Cretaceous of the Polish Carpathians (Morycowa, 1964).

Occurrence of the studied specimens:
Lower Aptian (Lower Bedoulian) – Massif du Ventoux: Fessonières-Pied Gros.

Overall distribution:
Hauterivian – France: Paris Basin: Dépt. Yonne (Fontenoy).
Lower Barremian – Bulgaria: Central Forebalkan (Reg. Veliko Tarnovo).
Barremian–Lower Aptian – Poland: Outer Carpathians (Trzemesna, Jastrzębia).
?Aptian – Greece, Levadia.

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