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LIASSIC CORAL PATCH REEF ABOVE THE "LITHIOTID LIMESTONE" ON TRNOVSKI GOZD PLATEAU, WEST SLOVENIA

LIASNI KORALNI KOPASTI GREBEN NA »LITIOTIDNEM APNENCU« V TRNOVSKEM GOZDU, ZAHODNA SLOVENIJA

DRAGICA TURNŠEK, STANKO BUSER & IRENA DEBELJAK

ABSTRACT

UDC: 563.6(116.2)(497.4)
551.762:563.6(497.4)

Liassic coral patch reef above the "Lithiotid limestone" on Trnovski gozd plateau, west Slovenia

In the village Gozd on Trnovski gozd plateau, west Slovenia, locality of Liassic reef building corals has been discovered. Twelve species are described systematically, four of them are new: *Protoheterastraea trnovensis* n. sp., *Apocladophyllia gozdensis* n. sp., *Phacelophyllia bacari* n. sp. and *Heterastraea angelae* n. sp. Corals form at least a 70 m long and 4 m thick patch reef. It was located at the northern margin of the Dinaric Carbonate Platform. Coral limestone lies directly above "Lithiotid limestone" containing Domerian bivalves. According to this, also the described corals are attributed to the Domerian, i.e. Upper Pliensbachian.

Key words: Corals, Jurassic, Liassic, Pliensbachian, Domerian, Slovenia

IZVLEČEK

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Liasni koralni kopasti greben na "litiotidnem apnencu" v Trnovskem gozdu, zahodna Slovenija

V vasi Gozd v Trnovskem gozdu je najdeno nahajališče liasnih grebenskih koral. Sistematično je opisanih 12 vrst, ki pripadajo 8 rodovom. Štiri vrste so nove: *Protoheterastraea trnovensis* n. sp., *Apocladophyllia gozdensis* n. sp., *Phacelophyllia bacari* n. sp. in *Heterastraea angelae* n. sp. Korale grade vsaj 70 m dolg in 4 m debel kopasti greben, ki je uspeval na severnem robu Dinarske karbonatne platforme. Koralni apnenec leži tik na "litiotidnem apnencu", ki vsebuje domerijske školjke. Zato smo tudi korale lahko uvrstili v domerij, oziroma v zgornji pliensbachij.

Ključne besede: korale, jura, lias, pliensbachij, domerij, Slovenija

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INTRODUCTION

At small village Gozd on the Trnovski gozd plateau (SW Slovenia), the coral locality has been found by amateur paleontologist and fossil collector Stane Bačar. The agricultural area was trench-ploughed by the proprietor Tratnik and corals were dug out. The surrounding of the locality was thoroughly researched in June 2003.

The finding place is situated on the grassy slope above the road Col–Kovk–Otlica, 200 m east of small village Gozd, 3 km northwest of Col (Fig. 1).

The coral reef has been traced about 70 m in length on the southern side of the road. It is probably prolonged towards the north but we were not able to trace it laterally. The reason is that the whole area has been covered with earth.

Coral limestone lies just above the "Lithiotid limestone", which contains diverse bivalve fauna, that in the late Pliensbachian, i.e. Domerian, massively inhabitet shallow marine regions of the western and southern margins of the Tethys. Bivalves absolutely dominated these tropical ecosystems during the Liassic; coral reefs, on the contrary, were very scarce in that time.

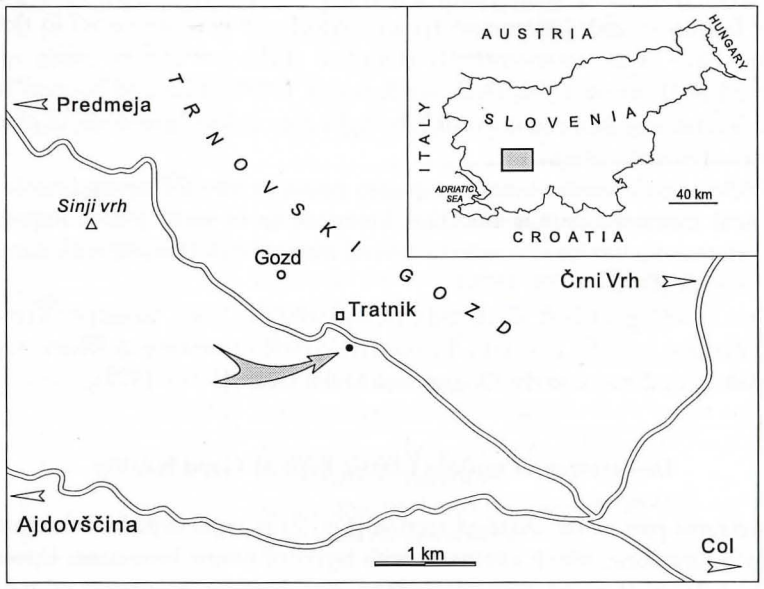

Figure 1. Location map of the Gozd locality
Slika 1. Položajna skica najdišča Gozd

The new coral locality is important because it is the second locality of Liassic reef-building corals in Slovenia and on the entire Dinaric Carbonate Platform researched so far. Till now, the only locality of this age has been described from Gorenja Brezovica, southwest of Ljubljana (Turnšek & Buser 1999, Turnšek & Košir 2000). Individual corals have been observed in some other middle Liassic localities (Buser 1965, Buser & Debeljak 1996) but have not been studied in detail.

From the new locality at Gozd, 52 specimens of corals were collected and 55 thin sections were made for the paleontological research.

Coral specimens are stored in the collection of Stane Bačar of the Museum in Ajdovščina; thin sections are kept in the Ivan Rakovec Institute of Paleontology ZRC SAZU in Ljubljana.

GEOLOGICAL SETTING

Liassic succession on Trnovski gozd plateau

In Trnovski gozd, the complete carbonate succession of the Jurassic is developed. Upper Triassic layered stromatolitic Main Dolomite and in some places Dachstein Limestone gradually pass upwards into the Lower Liassic white micritic limestone and coarse-grained dolomite. Triassic/Jurassic boundary is defined lithologically and by the occurence of Lower Jurassic algae *Palaeodasycladus mediterraneus* and *P. barrabei* (Buser 1986).

Middle Liassic in southern Slovenia is characterised by so-called "Lithiotid horizon" with lithiotid bivalves comprising three morphologically similar species: *Lithiotis problematica*, *Cochlearites loppianus* and *Lithioperna scutata*, which are now attributed to three different families. They have large, dorso-ventrally elongated shells and can be easily recognised in outcrops (Buser & Debeljak 1996, Debeljak & Buser 1998). "Lithiotid horizon" on Trnovski gozd plateau is relatively thin and is overlain by light-grey oolitic limestone, in places alternating with layers of micritic limestone.

The middle Liassic oolitic limestone passes upwards into the upper Liassic oolitic and finally crinoidal limestone with ooids. This limestone is in some places impregnated with brownish ferriferous hydroxide. It contains several metres thick horizon with numerous upper Liassic brachiopods (Buser 1973, 1979).

In the area of villages Gozd, Kovk and Col, and west of Čaven, the upper Liassic crinoidal and oolitic limestone laterally pass into the massive coarse-crystalline dolomite. Upwards they both concordantly continue into the Dogger and Malm beds (Buser 1978).

Description of middle Liassic beds at Gozd locality

The lowermost part of the detailed section (Fig. 2) is represented by the middle Liassic micritic layered limestone, which alternates with layers of oolitic limestone. Upwards follows 50–80 cm thick layer of white marly limestone with massive occurence of middle Liassic bivalves. The colour of marly matrix in this lumachelle is green-gray when fresh and yellow-brown on weathered surface. The layer with bivalves can be traced in the length of approximate-

ly 250 m on the northern side of the road. The composition of diverse bivalve association changes laterally within the same layer. Unfortunately, it was impossible to reconstruct the exact spatial distribution of different species, because only three isolated surface outcrops can be observed on a grassy slope under the road.

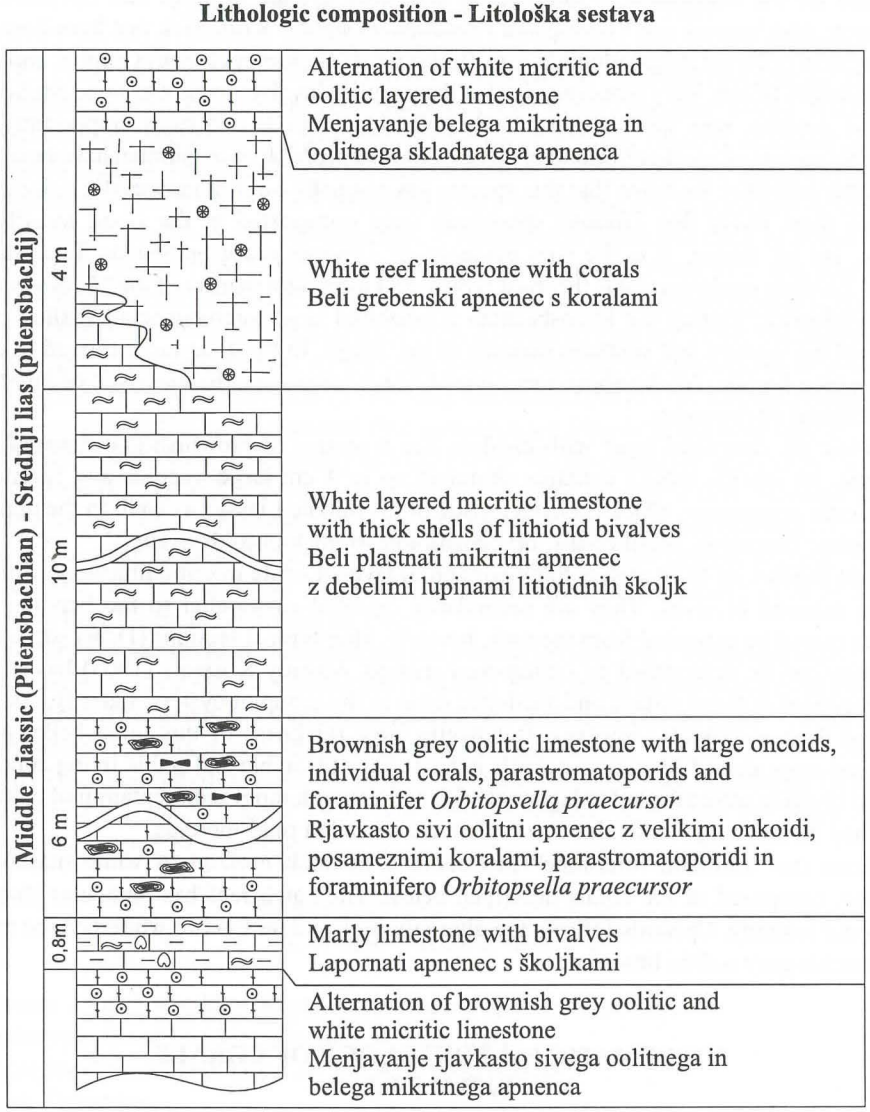

Figure 2. Stratigraphic column of middle Liassic beds in Gozd locality
Slika 2. Stratigrafski stolpec srednjeliasnih plasti v najdišču Gozd

Well preserved bivalve shells can be easily extracted out of marly limestone. Stane Bačar obtained up to 35 cm large isolated specimens of *Lithioperna scutata* (Dubar) which is quite a rarity. Edges of *Lithioperna* shells are extremely thin and fragile and therefore difficult to prepare out from the matrix. Gregarious mytilids of different forms, characteristic of tidal and intertidal environment, obviously began the colonisation of the muddy bottom. They provided a firm base for the attachment of *Lithioperna* and other byssate bivalves like *Gervilleioperna* Krumbeck, *Mytiloperna* von Yhering and *Pseudopachymytilus* Krumbeck that have been found together with different megalodontids, e.g. *Pachyrisma* (*Pachymegalodon*) Gümbel and *Pachyrisma* (*Durga*) Böhm. Very numerous is also the peculiar bivalve genus *Opisoma* Stoliczka. In the same outcrop, rare specimens of terebratulid brachiopods and more importantly, some smaller fragments of another lithiotid bivalve – *Lithiotis problematica* Gümbel have been found. From other localities we know that this species has normally built monospecific colonies. It is therefore most likely that *Lithiotis* specimens were transported in the Gozd locality post-mortem. By all means, it is the first evidence of *Lithiotis problematica* on Trnovski gozd plateau. *Lithiotis problematica* is the most typical and important marker of the "*Lithiotis* facies" found worldwide. During the Pliensbachian it inhabited large interconnected shallow marine regions of the western and southern margins of the Tethys. In the Toarcian it thrived in eastern margin of the Pacific. All the above mentioned bivalve taxons are characteristic of intertidal to upper subtidal environment.

Above the described layer with bivalves lies 6 metres of brownish-gray layered oolitic limestone. Its sparitic matrix contains abundant up to 4 cm large oncoids and foraminifers *Orbitopsella praecursor*, which is characteristic of the middle Liassic, as well. In the upper part of the oolitic limestone, small corals, bryozoans and stromatoporoids occur.

Then follows up to 10 metres thick horizon of layered white micritic limestone with rock-building lithiotid bivalves. They are secondarily oriented subparallel to the bedding plane. Bivalves cannot be extracted from the rock, however, after typical sections (Debeljak & Buser, 1998) they can be determined as *Lithioperna scutata*. Already Kossmat (1905) has observed such specimens at Gozd village and attributed them in the group of oysters. Later Buser (1973) described them as lithiotid bivalves. Relativelly large thickness of this lumachelle, micritic matrix and large size of *Lithioperna* shells indicate very favorable and stable living conditions. Lithiotid bivalves were adapted to lagoonal environment with rapid sedimentation of calcareous mud. They formed large lenticular accumulations, so-called mud-mounds.

Above the "Lithiotid limestone" lies about 4 m thick horizon of white massive reef limestone, composed of the corals described below. The patch reef has lenticular shape and wedges out laterally. Upwards follows the alternation of middle Liassic white layered micritic and brownish-grey oolitic limestone.

SYSTEMATIC PALEONTOLOGY OF CORALS

by D. Turnšek

The systematics of Liassic corals from Gozd is in suprageneric categories based on a combination of so far known modern systems of corals (Beauvais 1986, Roniewicz 1989,

Morycowa & Roniewicz 1990, Senowbari-Daryan & Stanley 1994, Turnšek & Košir 2000, Roniewicz & Stolarski 2001, and others).

Subordo: Amphiastraeina Alloiteau 1952
Familia: Amphiastraeidae Ogilvie 1897

Genus: *Protoheterastraea* (Volz 1896) Wells 1937

Volz (1896, 90) established a new genus *Hexastraea* and described two species: *H. fritschi* and *H. leonhardi*. Because the name *Hexastraea* had been already occupied before, Wells (1937) renamed it into *Protoheterastraea*. For the type species he wrongly chose *P. leonhardi*, althought the *P. fritschi* is the first described by Volz, and is therefore the legitimate type species of the genus.

Montanaro Gallitelli in 1974 described a very interesting single coral and determined it as *Protoheterastraea leonhardi*. Nevertheless, *P. leonhardi* is phaceloid form as stated by Volz (see Volz 1896: pl. 11, figs. 21–25; figs. 22–25 are individual corallites of it, and here I do not agree with Roniewicz & Michalik 2002: 151, who consider the mentioned figures to be solitary corals). A year later Montanaro Gallitelli (1975: 23) redescribed her forms and assigned them into a new genus *Zardinophyllum*. At the same time the species *Protoheterastraea fritschi* was ascribed to the genus *Volzeia* by Cuif (1974: 352), but Melnikova (1975: 106) described her new genus *Quenstedtiphyllia* and designated *Protoheterastraea fritschi* as the type species.

All the revisions were unnecessary as Volz (1896: 90) described the new genus *Hexastrae*a (= *Protoheterastraea*) with the very clear diagnosis which among others accented the very branching colony, septa in hexameral system, endotheca of bars, marginal budding of "Taschenknospung", similar to that of *Mitrodendron* Quenstedt, and major septum present. All these characteristics can be found also in our new material where they interlace even in the same colony, and they fit the observations of Volz.

The very precise study of *Quenstedtiphyllia fritschi* (in fact, it is *Protoheterastraea fritschi*) was made by Roniewicz and Stolarski (2001: 34–45). They stated all the above mentioned main characteristics of the genus and found out that there are similarities between pachythecallins and amphiastraeins. For this reason they proposed *Quenstedtiphyllia* to be ascribed to their new subfamily Quenstedtiphylliinae, family Amphiastraeidae, subordo Pachythecallina. In my opinion, if *Pachythecaliina* (Eliašova 1976) and *Amphiastraeina* (Alloiteau 1952) are grouped, *Amphiastraeina* must have priority.

Protoheterastraea trnovensis n. sp.
Pl. 1, figs. 1–5, pl. 2, figs. 1–3

Name: After Trnovski gozd plateau where the species was found.
Holotype: Gozd I/3644, collection of Stane Bačar.
Type locality: Village Gozd on Trnovski gozd plateau.
Age: Domerian.
Diagnosis: *Protoheterastraea* with 5–6 first septa, major septum present, wall pachytheca, budding Taschenknospung, endoteca of tabulate and long dissepiments, dimensions: d = 3–8 mm, s = 6–12.

Material: Gozd–5, Gozd–7, Gozd–I/3619, –I/3622, –I/3625, –I/3644.

Description: Phaceloid colony has circular corallites which bud laterally in the manner of Taschenknospung. Inside the wall, the new buds are formed between wall and dissepiments or septa. Wall breaks and along dissepiments or septa new buds separate from the mother corallite laterally, sometimes also in circles. Some corallites have septa radially arranged, without any buds. Corallites are covered with thick epitheca. Septa are arranged in regular or irregular hexameral symetry, in 1–2 cycles only, the first septum being sometimes longer and causing bilaterality. Five to six septa are longer, some of them reach the centre, some are shorter, sometimes all 5–6 septa reach only a half of a corallite or even less. Second cycle of septa is incomplete, 1 to 6 second septa are developed. Lateral side of septa is smooth. Endotheca is of thick outstanding tabulate to long dissepiments. There is no columella. Microstructure is fibrous in wall and of indistinct mini- to medium-sized trabeculae in septa arranged centrally. Also in dissepiments midseptal line and perpendicular fibres can be seen.

Dimensions: Colony (specimens 20–170 mm wide, 20–100 mm high) d = 3–8 mm, s = 6–12.

Comparison: From the Upper Triassic species known so far (compare Volz 1896, Wells 1937, Melnikova 1975, 1984, Cuif 1972, 1974, 1977, Turnšek et al. 1982, Turnšek 1997, Roniewicz & Stolarski 2001), the new species differs in the lowest number of septa. All the previous species have septa of 3–4 cycles (approx. 20–48). In some of our corallites, septa resemble those of *Zardinophyllum* (Montanaro Galittelli 1975, Roniewicz & Michalik 1991, 1998) and Pachythecaliids (Cuif 1975, 1977, 1980) which have no endotheca or it is only poorly developed. In some oblique sections, septa are similar to those of *Intersmilia djartyrabatica* from the Liassic of Pamir (Melnikova & Roniewicz 1976: 105, pl. 24, figs. 2–4) which differ as well in larger number of septa. Similar thick wall and short smooth septa are mentioned by Dulai (1995: 52, pl. 5, figs. 5–9, 11, textfigs. 3/1–6) in *Ceratocoenia* sp. from the Domerian of Hungary which has the same dimensions (d = 3–8, s = 5–9) but it is a solitary form. In very abundant endotheca it resembles the *Lepidophyllia chocolatensis* (Wells 1953) from the Lower Jurassic of Peru and British Columbia, which was ascribed to the genus *Phacelostylophyllum* by Stanley & Beauvais (1994). Nevertheless, this later is a stylophyllid coral.

Genus: *Hispaniastraea* Turnšek & Geyer 1975

Hispaniastraea ramosa Turnšek & Geyer 1975

Pl. 3, figs. 1–4

1975 *Hispaniastraea ramosa* n. sp. Turnšek & Geyer in: Turnšek, Seyfried & Geyer, 139, pl. 22.

1991 *Hispanastrea ramosa* Turnšek & Geyer. Prinz, 167, pl. 2, fig. 5.

1994 *Hispaniastraea ramosa* Turnšek, Seyfried & Geyer. Senowbari-Daryan & Stanley, 52–53, pl. 1, figs. 4–8, textfig. 5.

Short description: Cerioid colony has irregular bulbous form 70x50x30 cm large. Corallites are parallel, they divide along opposite septa into two to four branches. Septa are short in one to two incomplete orders, main septum is developed. Two or three or four to six septa grow

inwards, the others are short and hidden in wall. Wall is septothecate. Endotheca is of numerous tabulate dissepiments. Microstructure is fibrous, in wall and septa fibres run in the same direction.

Dimensions:

	Gozd	Turnšek et al.	Prinz	Stanley
d =	0.5–1 mm	0.5–1 mm	≤1 mm	0.4–0.9 mm
s =	10–12 (2–6+s2)	12	–	10–16

Comparison: The specimen form Gozd has the same diameter of corallites as *H. ramosa*. It differs in less septa growing inwards. In comparison with other material, there are some differences in endotheca. In our specimens the dissepiments are numerous, endotheca is mentioned also in diagnosis (Turnšek, Seyfried & Geyer 1975). But in specimens of Chile (Prinz 1991) and Peru (Senowbari-Daryan & Stanley 1994) no endotheca was mentioned which could perhaps be explained with the destruction of some elements. In vertical section, our specimens resemble some chaetetids but Senowbari-Daryan & Stanley (1994) agreed with the decision that *Hispaniastraea* belonged to corals. Therefore, the mentioned differences allow us to attribute the specimen from Gozd to *H. ramosa*.

Distribution: Upper Sinemurian–Lower Pliensbachian of Murcia in Spain, Pliensbachian of Chile.

Material: Gozd–I/4512, Domerian.

Family: Cyclophylliidae Roniewicz 1989

Genus: *Thecactinastraea* Beauvais 1986

Thecactinastraea fasciculata Beauvais 1986

Pl. 4, figs. 1–5

1986 *Thecactinastraea fasciculata* nov. sp. Beauvais, 33–34, pl. 5, fig. 1, textfig. 21.

Short description: Colony is phaceloid, budding marginal. Corallites are long, subparallel, densely spaced. Septa are radially arranged, of equal thickness, or thinner in the axial part, where they are partly dissociated or interlace with dissepiments and form some kind of parietal or papillose columella which can be seen in some sections only. They bear rare lateral granulae. Endotheca is of large dissepiments which are spread all over the coralite. Wall is epithecate. Microstructure is of fibres in wall and of indistinct medium-sized trabeculae with midline in septa.

Dimensions:

	Gozd	Beauvais
d =	10–15 mm	6–12 mm
s (in adult) =	60–68	approx. 60

Comparison: Our specimens are consistent with the first description. Beauvais noted that there are no "planchers", i.e. tabulate dissepiments, however, they can be seen in some sections.

BEAUVAIS (1986) attributed this genus to *Archaeocoeniina*, RONIEWICZ & MORYCOWA (1989) listed it among genera with thick trabecular microstructure. Because of the thick wall and densely spaced corallites it was classified among the cyclophylliids (TURNŠEK & KOŠIR 2000).

Distribution: Domerian of Morocco.

Material: Gozd–I/3930, –I/4492, Domerian.

***Thecactinastraea krimensis* Turnšek 2000**

Pl. 5, figs. 1–3

2000 *Thecactinastraea krimensis* n. sp. TURNŠEK in: TURNŠEK & KOŠIR, 86–87, pl. 2, figs. 1–5, pl. 3, figs. l–3.

Short description: Phaceloid colony has long subcircular corallites, often densely spaced. Septa are subcompact, trabecular axial prolongations form parietal columella. Wall is septothecate to epithecate. Endotheca is of long dissepiments. Microstructure is fibrous in wall and indistinct in septa.

Dimensions:

	Gozd	Krim
d =	6–10 (12) mm	6–9 mm
s =	30–48	38–45

Comparison: The specimens from Gozd fit with those of Krim in south Slovenia, some rare corallites being a little larger.

Distribution: Upper Pliensbachian of Krim in south Slovenia.

Material: Gozd–1,–8, Gozd–I/4541, Domerian.

Subordo: Stylinina Alloiteau 1952

Familia: Cladophylliidae Morycowa & Roniewicz 1990

Genus: *Cladophyllia* Milne Edwards et Haime 1851

***Cladophyllia dresnayi* (Beauvais 1986)**

Pl. 6, figs. 1–5

1986 *Stylosmilia dresnayi* nov. sp. BEAUVAIS, 41, pl. 8, fig.3.

Short description: Phaceloid colony shows lateral budding under a sharp angle. Corallites are subcircular to round, free or in some cases connected with each other. Wall is well preserved costotheca which is filled with the stereom and encircled with outer epithecate wall. Septa are compact, they are axially thickened in the form of auriculae. They have lateral rare granulae. Endotheca is of tabulate and vesicular dissepiments which sometimes form horizontal plates. Columella is not distinct, it is rarely preserved, sometimes it can be styliform or trabecular. Microstructure of septa is of mini- to medium-sized trabeculae with midline, in the wall it is mainly recrystallized.

Dimensions:

	Gozd	BEAUVAIS
colony	130x100x50 mm	–
d =	2–3 mm	1.5–2.5 mm
s =	(24) 27–40	32–36

Comparison: On an average, the corallites of our specimens are somehow larger than the above mentioned by BEAUVAIS but they are similar in all other structures. In some of our corallites, septotheca with costae is seen, but in the same colony all these corallites are encircled with outer wall. It prooves that this species belongs to *Cladophyllia* and not to *Stylosmilia*. BEAUVAIS showed namely the colony (pl. 8, fig. 3b) with compact corallite walls and only one corallite (pl. 8, fig. 3a,) with costate wall; it is without columella. The structure of the species corresponds to the revised description of the genus *Cladophyllia* made by MORYCOWA & RONIEWICZ (1990), and partly by LATHUILIERE (2000). LATHUILIERE distinguished *Stylosmilia* from *Cladophyllia* in tabuloid dissepiments instead of vesicular ones. In our specimens, dissepiments are more tabulate in axial part and more vesicular in peripheral part.

Distribution: Domerian of Morocco. Similar forms determined as *Stylosmilia* are mentioned by MELNIKOVA & BOJKO (1998) in Liassic of Pamir and by DULAI (1995) in Domerian of Bakony in Hungary, both with "theca" and they probably belong to *Cladophyllia*.

Material: Gozd–10, Gozd–I/3642, –I/3645, –I/3942, Domerian.

Genus: *Apocladophyllia* Morycowa & Roniewicz 1990

***Apocladophyllia gozdensis* n. sp.**

Pl. 7, figs. 1–5

Name: After the village Gozd where species was found.

Holotype: Gozd–I/3943, collection of Stane Bačar.

Type locality: Village Gozd on Trnovski gozd plateau.

Age: Domerian.

Diagnosis: *Apocladophyllia* with rare apophyses, dimensions d = 1.8–2.3 mm, cc = 3–5 mm, s = 30–35.

Material: Gozd–I/3623, –I/3943, –I/4514, –I/4503, and Gozd–3.

Description: Phaceloid colony has dense subcircular corallites connected in some cases by apophyses (lateral extenses). Corallites divide along the opposite septa. Septa are subcompact, radially to bilaterally arranged, with sharp and small lateral granulae, which make their outline wavy. Some of them are thickened in axial parts in the form of auriculae. Columella is substyliform or missing, the axial part of corallites is very outstanding. It is not clear whether it is massive columellar structure or a secondarily filled place. Wall is septotheca, thickened by stereome which in outermost part looks epithecate. Endotheca is of subhorizontal well developed tabulate and vesicular dissepiments. Microstructure is recrystallized, it may be of minitrabeculae.

Comparison: The new species fits in with the characteristics of the genus (see MORYCOWA and RONIEWICZ 1990: 176–184), and differs from the other species in the dimensions of corallites (*A. nowaki*: d = 2.7–3.8; *A. koniakensis*: d = 1.3–1.8), in much more outstanding axial structure, and in scarce apophyses in which it approaches the genus *Cladophyllia*.

Subordo: Faviina Vaughan & Wells 1943
Familia: Montlivaltiidae Dietrich 1926
Genus *Rhabdophyllia* Milne Edwards & Haime 1851

***Rhabdophyllia phaceloida* Beauvais 1986**
Pl. 8, figs. 1–6

1986 *Rhabdophyllia phaceloida* nov. sp. BEAUVAIS, 43, pl. 8, fig. 6, pl. 10, fig. 1, pl. 11, fig. 3.

Short description: Colony is phaceloid with subcylindric to irregularly branched corallites. They bud intratentacularly in several directions. Septa are compact, with rare axial trabecular prolongations which form parietal columella. They are irregularly radially arranged and bear lateral sharp granulae. Endotheca is very abundant, it is made of tabulate and large vesicular dissepiments. The wall is septothecal. Microstructure is generally not recognizable, in some cases maybe of medium-sized trabeculae.

Dimensions:

	Gozd	BEAUVAIS
d =	4–8 mm	3–10 mm
s =	approx. 60	30–95

Comparison: Our specimen fits with the BEAUVAIS species and with the revised description of the genus made by Roniewicz (1976: 64–65). In the septothecal wall it resembles the genus *Retiophyllia* Cuif 1966 which has no columella.

Distribution: Upper Carixian of Jebel Takerma, Morocco.

Material: Gozd I–3626, –I/4516, Domerian.

Subordo: Fungiina Verrill 1865
Familia: Cuifastraeidae Melnikova 1983
Genus: Phacelophyllia Beauvais 1986

Remarks: Liassic corals show an intermediate form with Triassic and Upper Jurassic ones. Here I omit the "Triassic" subordo *Archaeofungiina* (BEAUVAIS 1980) and follow RONIEWICZ (1989) who classified Cuifastraeidae to the subordo Fungiina Verrill 1865.

The genus *Phacelophyllia* (BEAUVAIS 1986) is very similar to *Gillastraea* Melnikova (1983), and I was inclined to join them together. Nevertheless, they differ in "compact septa and trabecular columella" in *Gillastraea* and "compact to subcompact septa and papillose columella" in *Phacelophyllia*. So I ascribed our numerous specimens to the *Phacelophyllia*. I ascribe this genus to the family Cuifastraeidae because of the menianes similar to those of *Gillastraea*.

***Phacelophyllia termieri* Beauvais 1986**
Pl. 9, figs. 1–3

1986 *Phacelophyllia termieri* nov.sp. BEAUVAIS, 39, pl. 7, fig. 2, textfig. 27.

Short description: Phaceloid colony with corallites, round to irregular, because of budding. Septa are thin, subcompact with pores in axial parts, laterally pennulated, menianes sometimes well seen in vertical section. Wall is septothecate to synapticulo-archaeothecae. Endotheca is of vesicular dissepiments, which are always limited to the interspace of two neighbouring septa, and of numerous synapticulae. Columella is papillose. Microstructure is poorly preserved, in septa it can be of thick trabeculae.

Dimensions:

	Gozd	BEAUVAIS
d =	6–9 mm	5–12 mm
s =	approx. 48–96	65–98
menianes	4/1	–

Comparison: Our specimens differ from the first description of the species in somewhat denser corallites, which are surely the result of the stage of budding. They resemble the species *Gillastraea delicata* MELNIKOVA (1983: 51) which differs in "perfectly compact" septa (see also RONIEWICZ 1989: 92) and in trabecular columellar structure.

Distribution: Domerian of Morocco.

Material: Gozd–4, –11, Gozd–I/3620, –I/3640, –I/3643, –I/3929, –I/3931, –I/3956, –I/4519, Domerian.

***Phacelophyllia fasciata* (Beauvais 1986)**
Pl. 9, fig. 4

1986 *Myriophyllum fasciatum* nov. sp. BEAUVAIS, 37, pl. 9, fig. 1, textfig. 25.

Short description: Phaceloid colony has subcylindric corallites, budding lateral. Septa thin, radially arranged, subcompact with pores in axial part, or "with trabecular projectings into the axial cavity forming large papillose columella" (BEAUVAIS 1986: 37). There are lateral sharp granulae or pennulae and menianes. Wall is synapticulothecal, somewhere it is thin epitheca. Endotheca is of synapticulae. Microstructure is of medium-sized to thick trabeculae, recrystallized.

Dimensions:

	Gozd	BEAUVAIS
d =	5–9 mm	6.5–10.5 mm
s =	60–90	55–80

Comparison: The genus *Myriophyllum* is solitary, therefore *M. fasciatum* does not belong to it. BEAUVAIS actually noted that *M. fasciata* has no pennulae, but we can see them on her figures (BEAUVAIS 1986: pl. 9, fig. 1b, similar to those of *Phacelophyllia termieri* in the same

work on pl. 7, figs. 2b, c). In our specimens it is obvious that septal ornamentations and their axial prolongations differ in different sections: in some corallites there are septa with lateral granulae only, in the others there are septa with lateral sharp granulae and pennulae. Menianes can be seen in some vertical sections only. So I am sure that "*Myriophyllum fasciatum*" can be transfered to the genus *Phacelophyllia*.

Distribution: Domerian of Morocco.

Material: Gozd–9 (pars), Gozd–I/3945, –I/4498, –I/4515, Domerian.

***Phacelophyllia bacari* n. sp.**

Pl. 10, figs. 1–3, pl. 11, figs. 1–5

Name: After Stane Bačar who found the species.

Holotype: Gozd–I/3934, collection of Stane Bačar.

Type locality: Village Gozd on Trnovski gozd plateau.

Age: Domerian.

Diagnosis: *Phacelophyllia* with dense circular to irregular corallites of dimesions: d = 3–5 mm. s = 96+s6.

Material: Gozd–I/3621, –I/3623, –I/3627, –I/3646, –I/3647, ?–I/3932, –I/3934, –I/3944, –I/3946, –I/3958, –I/4125, –I/4134, –I/4540.

Description: The colony is phaceloid, up to 200 mm large. Corallites are circular to very irregular, often densely spaced. On the surface they are rather outstanding, as they always protrude from the rock. They bud laterally in different directions. Septa are thin, subcompact with pores in axial part. Cycles of septa differ slightly in thickness. They have sharp lateral granulae and pennulae with menianes. Columella is papillose, well developed. Endotheca is of rare short dissepiments and synapticulae. Microstructure is of medium-sized to thick trabeculae, recrystallized.

Comparison: The new species differs from the other species of *Phacelophyllia* in smaller corallites and their denser growth. In dense growth of corallites it resembles the Liassic species *Ellysastraea moorei* (Duncan 1867: 30, pl. 6, figs. 10–15) which is subcerioid. In growth and the form of corallites it is also very similar to the Liassic *Rhabdophyllia phaceloida* Beauvais (1986: 43–44, pl. 8,fig. 6, pl. 10, fig. l, pl. 11, fig. 3) from Morocco, which has many dissepiments and lacks synapticulae. In the structure of septa and columella it is similar to *Aggomorphastraea barraki* Alloiteau (1958: 96–98, pl. 3, figs. 1–3, textfig. 14) from Bathonian of Madagascar, which differs in inner wall. This genus is mentioned also in Liassic of Pamir by Melnikova & Bojko (1998).

Subordo: Stylophyllina Beauvais 1981

Familia: Stylophyllidae Frech 1890

Genus: *Heterastraea* Tomes 1888

***Heterastraea tomesi* (Duncan 1867)**

Pl. 12, figs. 1–2

1867 *Isastraea tomesi*. Duncan, 46–47, pl. 15, fig. 20.

1976 *Heterastraea tomesi* (Duncan). Beauvais, 59–61, pl. 12, fig. 6., pl. 13, fig. 1, textfigs. 21–25.

1991 *Heterastraea tomesi*. Negus, 253, table 1.

Short description: Colony is cerioid, corallites are irregularly polygonal. Budding is intracalicinal, by division. Septa are thin, subcompact, of almost equal thickness, in 4 to incomplete 5 cycles. Lateral granulae form oblique "horizontal carinae" or menianes (?). There is no columella, but axial space can be filled with some kind of "septal spines". Wall is septothecate, massive. Endotheca is of numerous vesicullar dissepiments. Microstructure is fibrous in wall and indistinct in septa, very poorly preserved.

Dimensions:

	Gozd	Beauvais
d =	3–5 mm	2.5–10 mm
s =	40–48+s, 8–9 (14)/2	32–48+s

Comparison: Beauvais explained the microstructure as fibrous (see Beauvais 1976: 60, textfig. 24). Roniewicz & Morycowa (1989: 349) ascribed the microstructure of *Heterastraea* to be the stylophyllid one, as well. In structure of wall and septa, our specimens show some similarities with the genus *Phacelophyllia*. Nevertheless, microstructure is too poorly preserved to allow classification of *Heterastraea* to fungiids.

Distribution: Hettangian, Sinemurian, Pliensbachian of England.

Material: Gozd–I/3625, –I/3957, –I/4132, Domerian.

***Heterastraea angelae* n. sp.**

Pl. 12, figs. 3–5, pl. 13, figs. 1–4

Name: After my late sister Angela.

Holotype: Gozd–6.

Type locality: Village Gozd on Trnovski gozd plateau.

Age: Domerian.

Diagnosis: *Heterastraea* with dimensions: colony 100x70x60 mm, d = (3–7)x(4–10) mm, cc = 3–10, s(c) = 96–150 (15–18/2).

Material: Gozd–6, –11, –13, and Gozd–I/3933.

Description: Cerioid colony has polygonal to irregularly elongated corallites. Budding is intracalicinal in more directions. Septa are numerous, developed in six cycles of equal thickness, subcompact, slightly wavy, axially they are free or they prolongate into the centre with some kind of spines. Lateral granulae may join into the subhorizontal bars. Columella in some corallites is absent, in the others the axial space is filled with septal spines. Wall is septothecate or costothecate, compact. Septa of sixth cycle can be clearly seen in thin sections of allmost all corallites. Endotheca is of numerous vesicular dissepiments. Microstructure is fibrous in wall and indistinctly thick trabecular in septa, very poorly preserved.

Comparison: The new species differs from all the other species of the genus in almost completely developed sixth cycle of septa (costae), although the diameter of its corallites is not

larger. The highest number of septa has so far been known in *Heterastraea endothecata* (DUNCAN 1867: 53–54, pl. 12, figs. 17–21) which has not more than 96 septa, i.e. 5 cycles. Similar cerioid species with numerous septa is *Monstroseris iranica* MELNIKOVA (1989: 72, pl. 13–14) from Rhaetian of Iran which differs in better developed septal spines.

DISCUSSION AND CONCLUSIONS

The age of corals in Gozd was determined with regard to the stratigraphic position and with the comparison with other coral localities elsewhere in the world. Coral patch reef lies directly above the "Lithiotid limestone" which is of Domerian age (BUSER & DEBELJAK 1996) and under the Upper Liassic beds with brachiopods (BUSER 1973, 1978, 1979). We presume that corals correspond to the upper part of "Lithiotid horizon" or can be a little younger. Therefore, they are attributed to the uppermost Pliensbachian, i.e. Domerian. Coral species found in Gozd have been known from several localities of northern and southern margin of the Tethys. The majority of them are of Domerian age which corresponds to the supposed age of Gozd locality (see Table 1).

Paleoecologically, the coral locality in Gozd, lying directly on the "Lithiotid limestone" enabled us to establish the short-time environmental change within the shallow water facies in late Domerian time. Lithiotid bivalves were adapted to the muddy substratum in restricted areas of carbonate platform with low water energy and high sedimentation rate (BUSER & DEBELJAK 1996, DEBELJAK & BUSER 1998). They populated lagoons and tidal inlets protected from the northerly lying deep sea of the Slovenian Basin by oolitic shoals. Corals, contrarywise, required higher water energy for their life. All the corals found at Gozd locality are hermatipic (reef-building). They could thrive only in clear, fresh and well oxygenated water. Sudden environmental change at the end of Pliensbachian caused the disappearance of bivalves. We assume that local water energy increase and possibly moderate deepening enabled the successive development of coral reef. Furthermore, in contradistinction to mud-dwelling bivalves, corals needed firm substratum for the initial attachment of their polyps. The exposed position at platform margin and globally high temperatures were also favourable for coral growth. The coincidence of convenient conditions, however, lasted only for a short time and the patch reef has been soon replaced by oolitic shoals again.

Interesting is the comparison with the locality Krim in south Slovenia (TURNŠEK & KOŠIR 2000). Only one coral species is the same. In Krim locality, in addition to phaceloid forms, corals of massive cerioid, thamnasterioid and plocoid growth are common, meanwhile at Gozd mainly phaceloid forms occur. We presume that both localities represent different, independent ecological niches.

Table 1: List of coral species from Gozd locality and their stratigraphic distribution elsewhere. G – age in Gozd (Upper Domerian), + – age in other localities. He – Hettangian, Si – Sinemurian, Plie – Pliensbachian, C – Carixian (Lower Pliensbachian), Do – Domerian (Upper Pliensbachian), To – Toarcian.

Tabela 1: Seznam fosilnih vrst iz Gozda z njihovo stratigrafsko razširjenostjo drugod po svetu. G – starost v Gozdu (zgornji domerij), + – starost v drugih najdiščih. He – hetangij, Si – sinemurij, Plie – pliensbachij, C – kariksij (spodnji pliensbachij), Do – domerij (zgornji pliensbachij), To – toarcij.

	He	Si	Plie		To
			C	Do	
Heterastraea tomesi	+	+	+	+G	He, Si, Plie: England
Hispaniastraea cf. ramosa		+	+	+G	Si, Plie: Spain, Chile
Rhabdophyllia phaceloida			+	G	C: Morocco
Thecactinastraea fasciculata				+G	Do: Morocco
Phacelophyllia termieri				+G	Do: Morocco
Phacelophyllia fasciata				+G	Do: Morocco
Cladophyllia dresnayi				+G	Do: Morocco
Thecactinastraea krimensis				+G	Do: Slovenia (Krim)
Protoheterastraea trnovensis n. sp.				G	
Apocladophyllia gozdensis n. sp.				G	
Phacelophyllia bacari n. sp.				G	
Heterastraea angelae n. sp				G	

POVZETEK

Liasni koralni kopasti greben na "litiotidnem apnencu" v Trnovskem gozdu, zahodna Slovenija

V zaselku Gozd v Trnovskem gozdu (sl. 1) je amaterski paleontolog in zbiralec fosilov Stane Bačar našel nahajališče liasnih koral. Te so bile namreč izkopane ob melioraciji travnatega zemljišča, ki ga je opravil lastnik zemljišča Tratnik. V juniju 2003 je bilo nahajališče natančneje raziskano. To novo nahajališče koral je pomembno zato, ker je šele drugo opisano liasno nahajališče v Sloveniji in na celotni Dinarski karbonatni platformi. Doslej je bilo iz tega obdobja natančno raziskano nahajališče koral iz Gorenje Brezovice jugozahodno od Ljubljane (TURNŠEK & BUSER 1999, TURNŠEK & KOŠIR 2000). Posamezne korale se sicer pojavljajo na več krajih, vendar niso bile paleontološko obdelane. Iz nahajališča v Gozdu smo za paleontološke raziskave zbrali 52 vzorcev in naredili 55 zbruskov.

Nahajališče leži na južni strani ceste Col–Kovk–Otlica, 200 m pred Tratnikovo domačijo, dobre 3 km severozahodno od Cola. Zasledena dolžina grebena južno od ceste je okoli 70 m in debelina 4 m. Njegovo nadaljevanje sega verjetno tudi na severno stran ceste, vendar ga nismo mogli slediti, ker so na zrigolano ozemlje navozili veliko količino zemlje.

Ugotovljeno je, da so korale zgradile kopasti lečasti greben in leže tik na "litiotidnem apnencu". Detajlni profil liasnih skladov v Gozdu je prikazan na sliki 2.

Sistematično je opisanih 12 vrst koral, ki pripadajo 8 rodovom. Štiri vrste so nove: *Protoheterastraea trnovensis* n. sp., *Apocladophyllia gozdensis* n. sp., *Phacelophyllia bacari* n. sp. in *Heterastraea angelae* n. sp. Korale so uvrščene v podredove Amphiastraeina, Stylinina, Faviina, Fungiina in Stylophyllina. En rod je znan že iz triasa (*Protoheterastraea*), štirje so vezani na lias (*Thecactinastraea*, *Hispaniastraea*, *Phacelophyllia*, *Heterastaea*), trije pa se pojavljajo v celotni juri (*Cladophyllia*, *Apocladophyllia*, *Rhabdophyllia*). Vse koralne vrste iz Gozda so prikazane na razpredelnici v angleškem tekstu. Poleg koral so v grebenu še stromatoporoidi, briozoji, polži, foraminifere, alge, mikroproblematika in drugo.

Starost koral smo lahko določili po stratigrafski legi in primerjavi z drugimi najdišči po svetu. Korale leže tik na "litiotidnem apnencu", ki je domerijske starosti (Buser & Debeljak 1996, Debeljak & Buser 1998), in pod zgornjeliasnimi krinoidnimi in oolitnimi apnenci z brahiopodi (Buser 1973, 1978, 1979). Domnevamo torej, da je koralni horizont nekoliko mlajši od litiotidnega apnenca in ga uvrščamo v zgornji del srednjega liasa, to je v zgornji pliensbachij oziroma domerij. To starost potrjujejo tudi primerjave z drugimi nahajališči v svetu. Koralne vrste najdene v Gozdu so bile doslej znane iz več nahajališč severnega in južnega obrobja Tetide. Največ jih je uvrščenih v domerij, kar ustreza tudi našemu nahajališču (glej razpredelnico v angleškem besedilu).

Paleoekološko je najdba liasnih koral v Gozdu pomembna za ugotovitev lokalne spremembe okolja ob koncu domerija. Za razliko od litiotidnih školjk, ki so uspevale v zatišnem, lagunskem okolju s hitro sedimentacijo karbonatnega blata, so korale rabile svežo, dobro prezračeno vodo z višjo energijo. Prej blatno morsko dno je moralo postati trdno, da so se nanj lahko pritrdili koralni polipi. Splošni pogoji za rast koral so bili dani z globalno visoko temperaturo in izpostavljeno lego na obrobju platforme, dodatno pa je proti koncu domerija po vsej verjetnosti prišlo do rahle poglobitve in predvsem do povečanega pretoka vode. To je za kratek čas omogočilo rast manjših kopastih grebenov.

Zanimiva je primerjava koral z nahajališčem v Gorenji Brezovici pod Krimom (Turnšek & Buser 1999, Turnšek & Košir 2000). Samo ena vrsta je enaka. Pod Krimom so poleg vejnatih faceloidnih koral pogostne masivne cerioidne, plokoidne in tamnasteridne oblike, medtem ko v Gozdu prevladujejo vejnate korale. Domnevamo, da sta nahajališči pripadali različnima, neodvisnima ekološkima nišama.

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PLATE 1 – TABLA 1

Figs. 1–5. *Protoheterastraea trnovensis* n. sp.

1. Surface of the phaceloid colony from above. Specimen Gozd–I/3644, x 1.
2. Longitudinal thin section of corallites, dissepiments pointed out. Gozd–I/3644/3b, x 4.
3. Transverse thin section of the colony. Corallites show thick walls, shorter and longer septa in regular or irregular hexameral system, pocket buds or without them, dissepiments. Gozd–I/3644/3b, x 4.
4. Microstructure is poorly preserved. Figure shows fibrous wall with new pocket buds, and indistinct mini- to medium-sized trabeculae in short septa. Gozd–I/3644/3a, x 20.
5. Microstructure of one corallite with longer septa and dissepiments. Gozd–I/3644/3a, x 20.

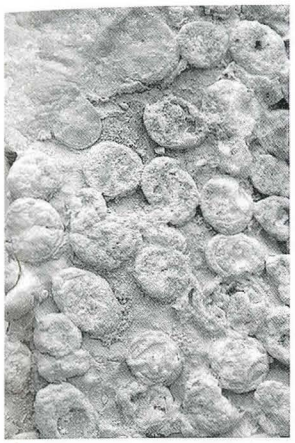
All figures are of the holotype.

Sl. 1–5. *Protoheterastraea trnovensis* n. sp.

1. Površina faceloidne kolonije od zgoraj. Vzorec Gozd–I/3644, x 1.
2. Podolžni presek koralitov, disepimenti so poudarjeni. Zbrusek Gozd–I/3644/3b, x 4.
3. Prečni presek kolonije. Koraliti kažejo debele stene, kratka in daljša septa v pravilnem in nepravilnem heksamernem sistemu, nove brste ali brez njih, disepimente. Zbrusek Gozd–I/3644/3a, x 4.
4. Mikrostruktura je slabo ohranjena. Vidi se en koralit z vlaknato steno in novimi brsti ter nejasne srednjevelike in mini trabekule v kratkih septih. Zbrusek Gozd–I/3644/3a, x 20.
5. Mikrostruktura enega koralita z daljšimi septi in disepimenti. Gozd–I/3644/3a, x 20.

Vse slike so od holotipa.

PLATE 1 – TABLA 1



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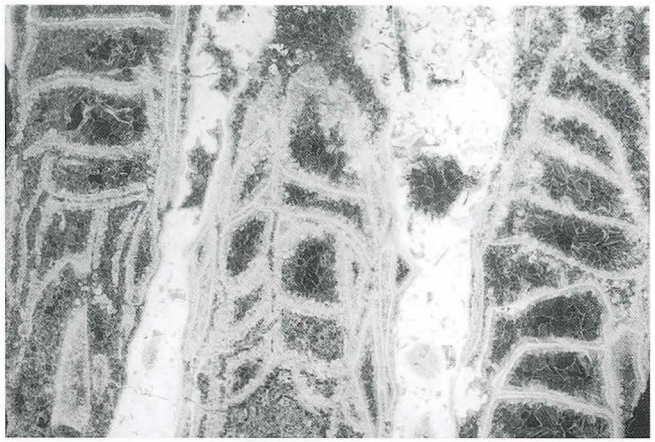

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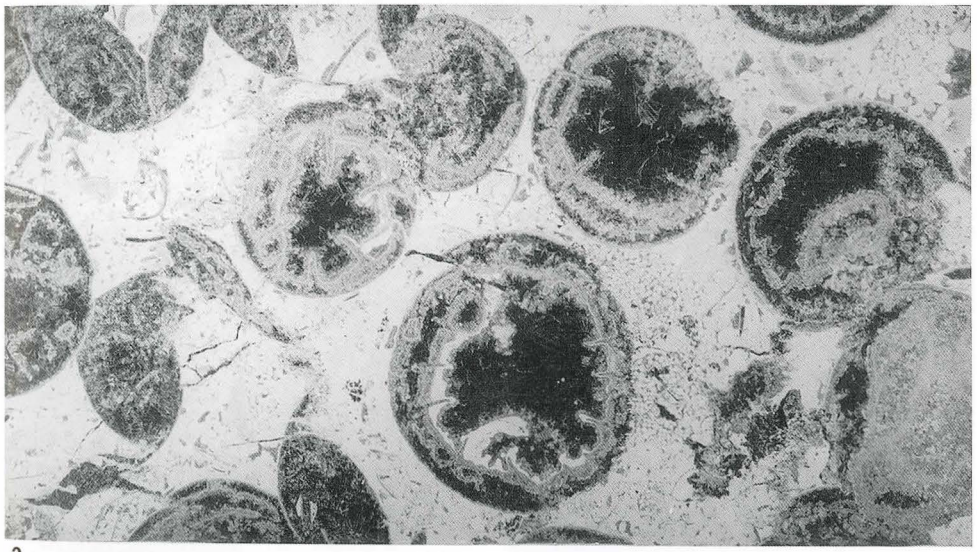

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PLATE 2 – TABLA 2

Figs. 1–3. *Protoheterastraea trnovensis* n. sp.
1. Transverse thin section of corallites showing shorter and longer septa. Gozd–7a, x 4.
2. Microstructure of one corallite with short septa. Thin section. Gozd–7a, x 20.
3. Microstructure of another corallite with longer septa and more dissepiments. Thin section Gozd–7a, x 20.

Sl. 1–3. *Protoheterastraea trnovensis* n. sp.
1. Prečni presek koralitov, ki kažejo krajša in daljša septa. Zbrusek Gozd–7a, x 4.
2. Mikrostruktura enega koralita s kratkimi septi. Zbrusek Gozd–7a, x 20.
3. Mikrostruktura drugega koralita z daljšimi septi in več disepimenti. Zbrusek Gozd–7a, x 20.

PLATE 2 – TABLA 2

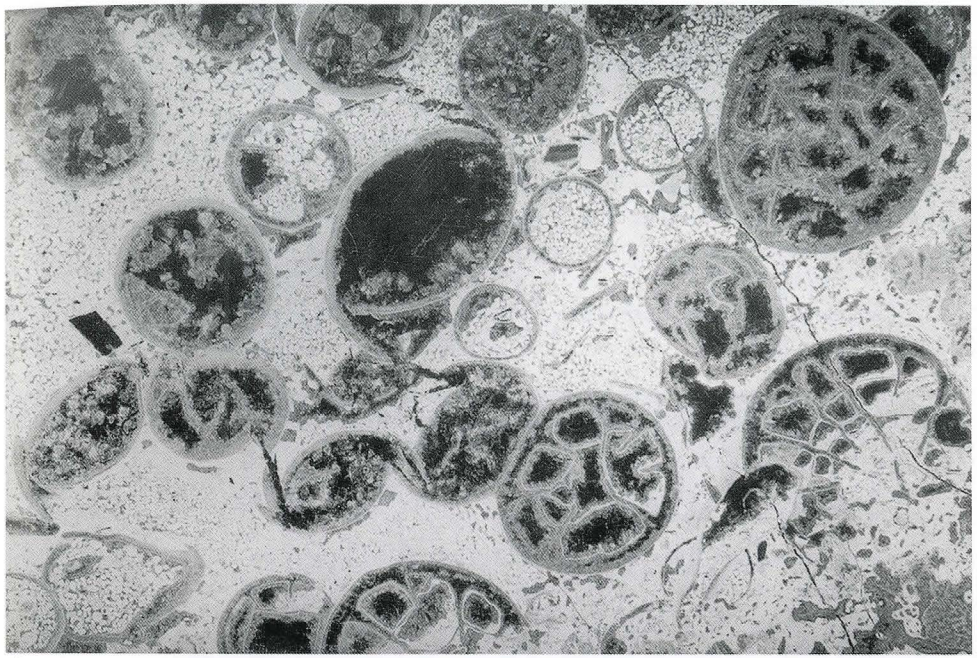

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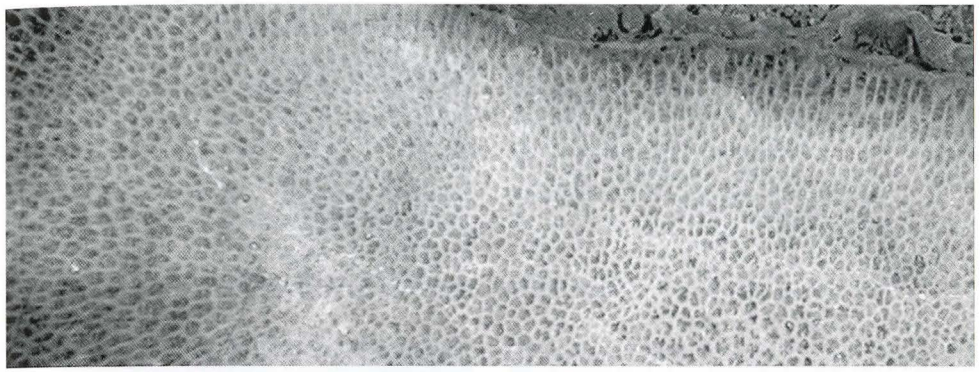
PLATE 3 – TABLA 3

Figs. 1–4. *Hispaniastraea ramosa* Turnšek & Geyer 1975
1. Polished surface of the cerioid colony. Specimen Gozd–I/4512/3, x 2.
2. Longitudinal and transverse thin section of cerioid colony. Gozd–I/4512/3a, x 4.
3. Detail from fig. 2, x 8.
4. Microstructure is fibrous; fibres run in the same direction in wall and septa. Thin section Gozd–I/4512/3a, x 20.

Sl. 1–4. *Hispaniastraea ramosa* Turnšek & Geyer 1975
1. Polirana površina cerioidne kolonije. Vzorec Gozd–I/4512/3, x 2.
2. Podolžni in prečni presek cerioidne kolonije. Zbrusek Gozd–I/4512/3a, x 4.
3. Detajl s sl. 2, x 8.
4. Mikrostruktura je vlaknata; vlakna potekajo v isti smeri v steni in septih. Zbrusek Gozd–I/4512/3a, x 20.

PLATE 3 – TABLA 3



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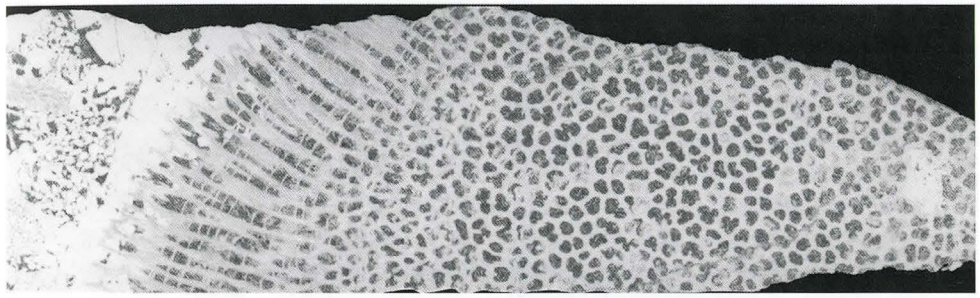

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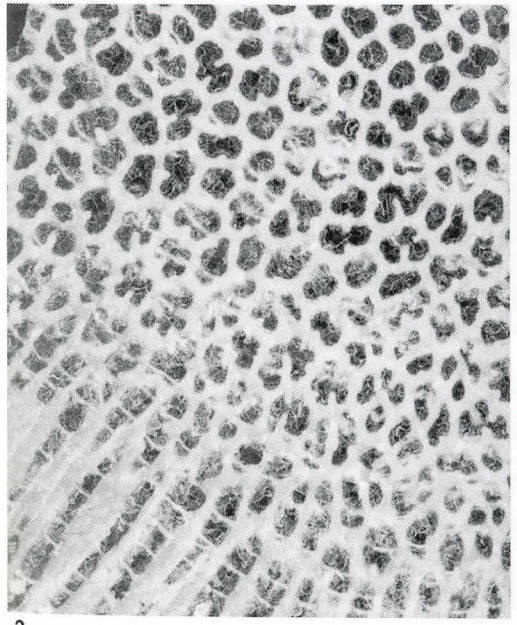

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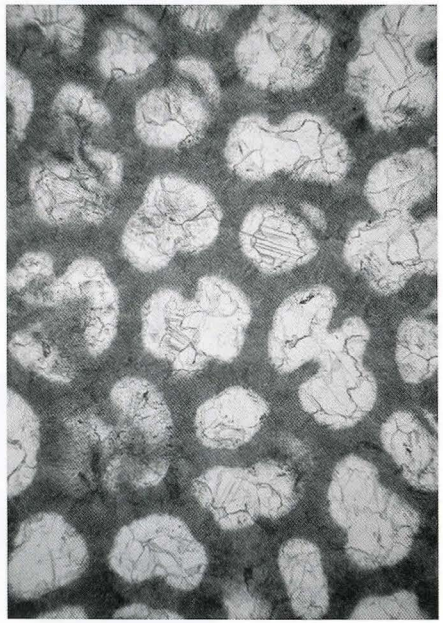

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PLATE 4 – TABLA 4

Figs. 1–5. *Thecactinastraea fasciculata* Beauvais 1986

1. Surface of the phaceloid colony showing transverse and oblique corallites. Specimen Gozd–I/3930/1, x 1.
2. The same colony as in fig. 1, polished on another side, showing transverse corallites. Specimen Gozd–I/3930/1, x 1.
3. Transverse thin section of two corallites. Note epithecate wall. Gozd–I/3930/1a, x 4.
4. Oblique thin section of one corallite. Gozd–I/3930/lb, x 4.
5. Microstructure is fibrous in wall, and of indistinct medium-sized trabeculae with midline in septa. Thin section Gozd–I/3930/la, x 20.

Sl. 1–5. *Thecactinastraea fasciculata* Beauvais 1986

1. Površina faceloidne kolonije, koraliti so prečni in poševni. Vzorec Gozd–I/3930/l, x 1.
2. Ista kolonija kot na sl. 1, polirana z druge strani, kaže prečne koralite. Vzorec Gozd–I/3930/1, x 1.
3. Prečni presek dveh koralitov. Vidna epiteka. Zbrusek Gozd–I/3930/la, x 4.
4. Poševni presek enega koralita. Zbrusek Gozd–I/3930/lb, x 4.
5. Mikrostruktura je vlaknata v steni, v septih pa kaže nejasne srednje velike trabekule z osrednjo linijo. Zbrusek Gozd–I/3930/la, x 20.

PLATE 4 – TABLA 4

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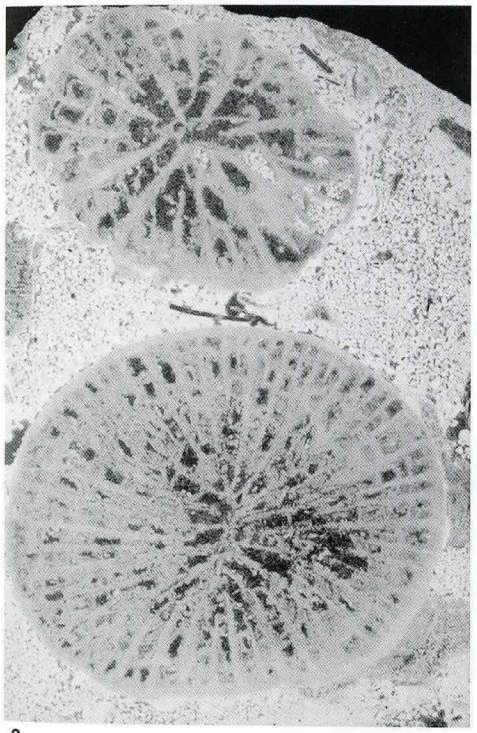

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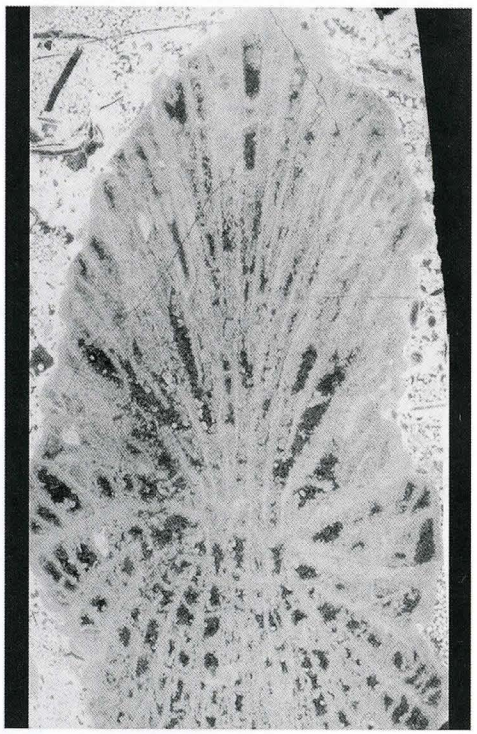

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PLATE 5 – TABLA 5

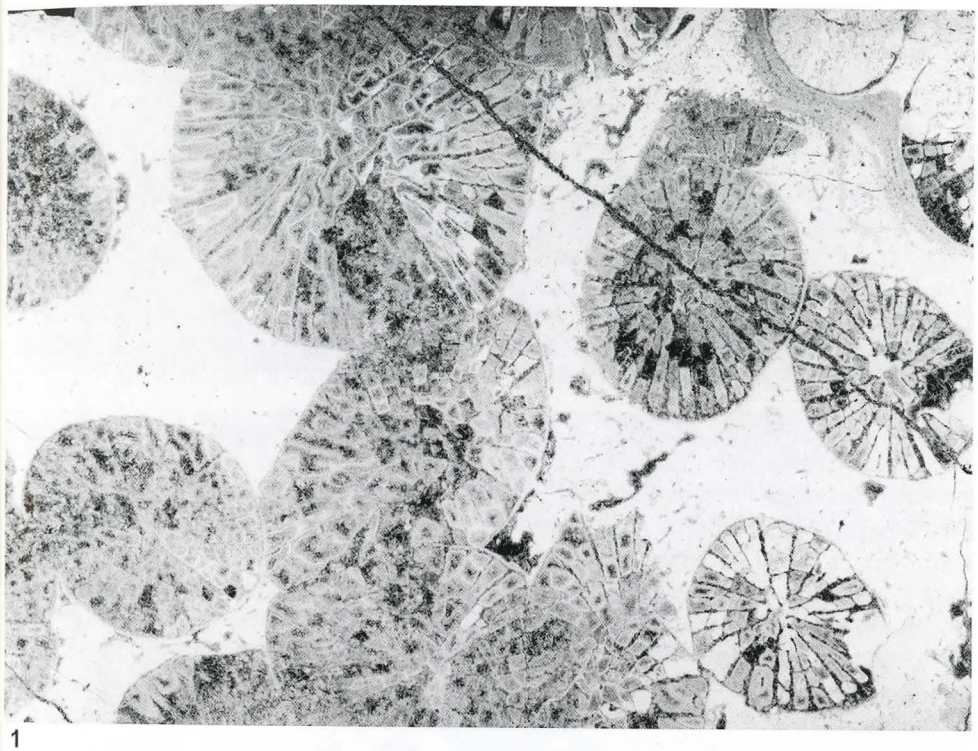
Figs. 1–3. *Thecactinastraea krimensis* Turnšek 2000

1. Transverse thin section of the phaceloid colony; note densely spaced corallites with epitheca and axial prolongations. Gozd–I/4541a, x 4.
2. Transverse thin section of another colony. Gozd–8a, x 4.
3. Microstructure is fibrous in wall and indistinctly trabecular in septa, recrystallized. Thin section Gozd–8a, x 20.

Sl. 1–3. *Thecactinastraea krimensis* Turnšek 2000

1. Prečni presek faceloidne kolonije; koraliti so tesno drug ob drugem, z epiteko in aksialnimi podaljški. Zbrusek Gozd–I/4541a, x 4.
2. Prečni presek druge kolonije. Zbrusek Gozd–8a, x 4.
3. Mikrostruktura je vlaknata v steni in nejasno trabekularna v septih, prekristalizirana. Zbrusek Gozd–8a, x 20.

PLATE 5 – TABLA 5



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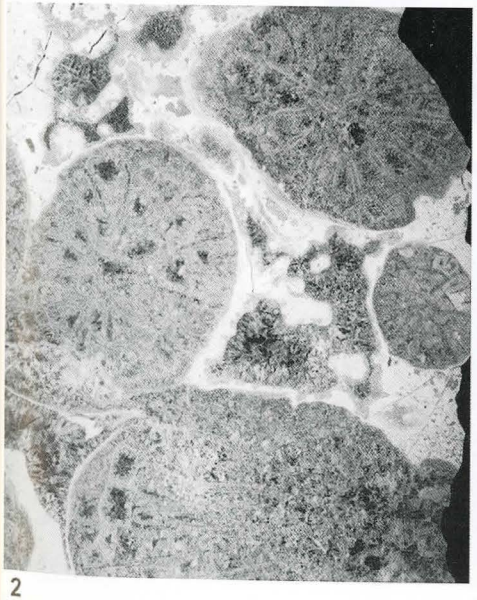

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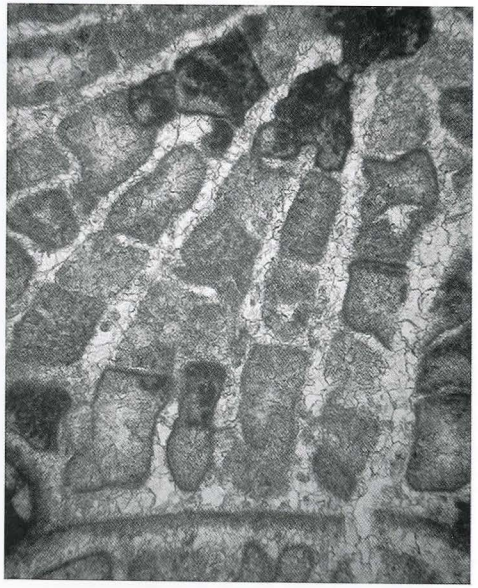

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PLATE 6 – TABLA 6

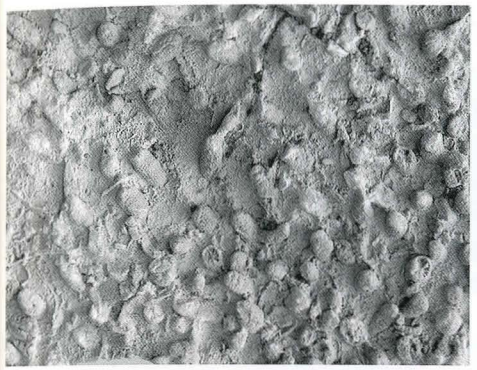
Figs. 1–5. *Cladophyllia dresnayi* Beauvais 1986

1. Surface of the phaceloid colony from above. Specimen Gozd–10, x 1.
2. Transverse thin section of several corallites. Gozd–10a, x 4.
3. Transverse thin section of another colony. Gozd–I/3642/lb. x 4.
4. Detail from fig. 3, x 8. Note axial auriculae and epitheca encircling inner septotheca.
5. Microstructure in transverse section shows mini- to medium-sized trabeculae with midsepta line in septa; in wall it is mainly recrystallized. Thin section Gozd–I/3642/lb, x 20.

Sl. 1–5. *Cladophyllia dresnayi* Beauvais 1986

1. Površina faceloidne kolonije od zgoraj. Vzorec Gozd–10, x 1.
2. Prečni presek nekaj koralitov. Gozd–10a, x 4.
3. Prečni presek druge kolonije. Gozd–I/3642/1b, x 4.
4. Detajl s sl. 3, x 8. Vidijo se aksialne aurikule in epiteka, ki obkroža septoteko.
5. Mikrostruktura v prečnem preseku kaže mini- do srednje velike trabekule z osrednjo linijo septih; v steni je v glavnem prekristalizirana. Zbrusek Gozd–I/3642/lb, x 20.

PLATE 6 – TABLA 6



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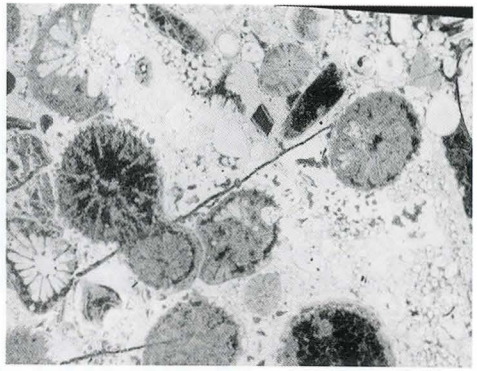

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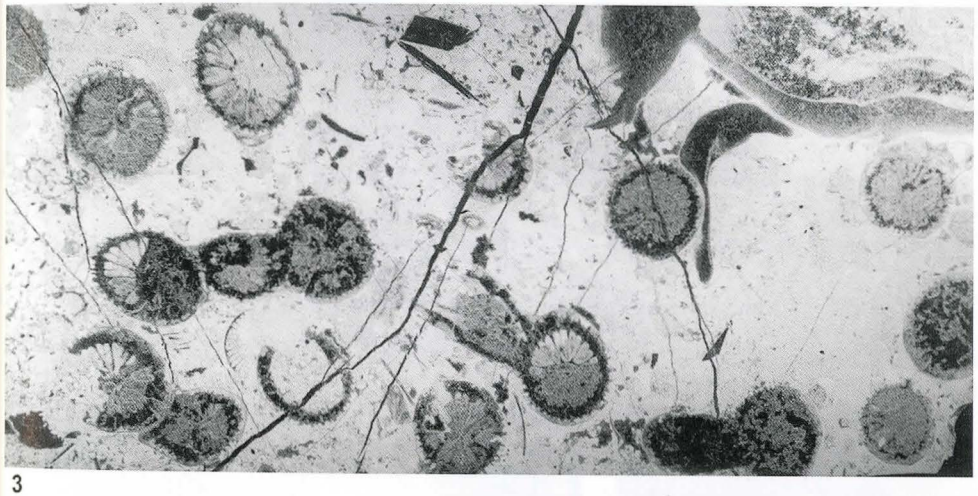

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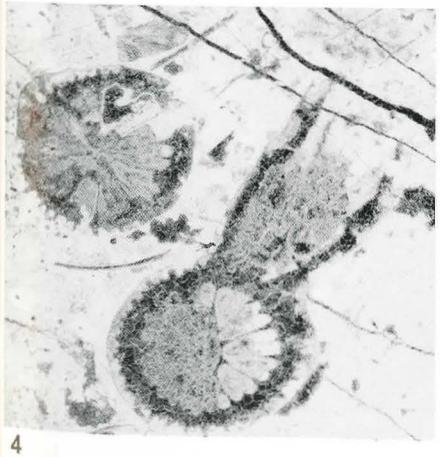

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PLATE 7 – TABLA 7

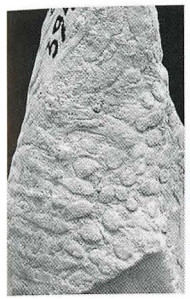
Figs. 1–5. *Apocladophyllia gozdensis* n. sp.
1. Surface of the phaceloid colony from above. Specimen Gozd–I/3943/1, x 1.
2. Longitudinal thin section; note tabulate and vesicular dissepiments. Gozd–I/3943/1b, x 4.
3. Transverse thin section of closely spaced corallites with apophyses. Gozd–I/3943/1a, x 4.
4. Detail from fig. 3, x 8.
5. Microstructure in transverse section shows minitrabeculae, recrystalized. Thin section Gozd I/3943/1a, x 20.

All figures are of holotype.

Sl. 1–5. *Apocladophyllia gozdensis* n. sp.
1. Površina faceloidne kolonije od zgoraj. Vzorec Gozd–I/3943/1, x 1.
2. Podolžni presek kolonije; lepo se vidijo tabulatni in vezikularni disepimenti. Zbrusek Gozd I/3943/1b, x 4.
3. Prečni presek z gostimi koraliti in apofizami. Zbrusek Gozd–I/3943/1a, x 4.
4. Detajl s sl. 3, x 8.
5. Mikrostrukura v prečnem preseku kaže prekristalizirane minitrabekule. Zbrusek Gozd–I 3943/1a, x 20.

Vse fotografije so od holotipa.

PLATE 7 – TABLA 7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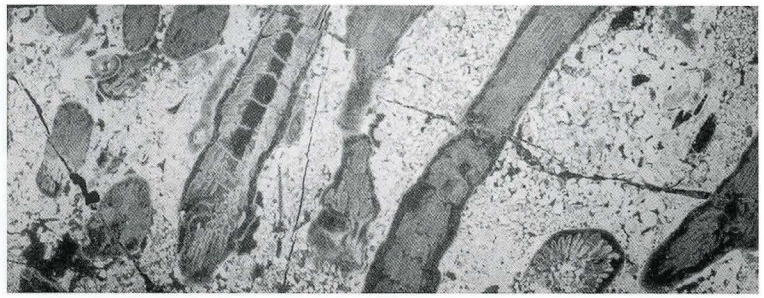
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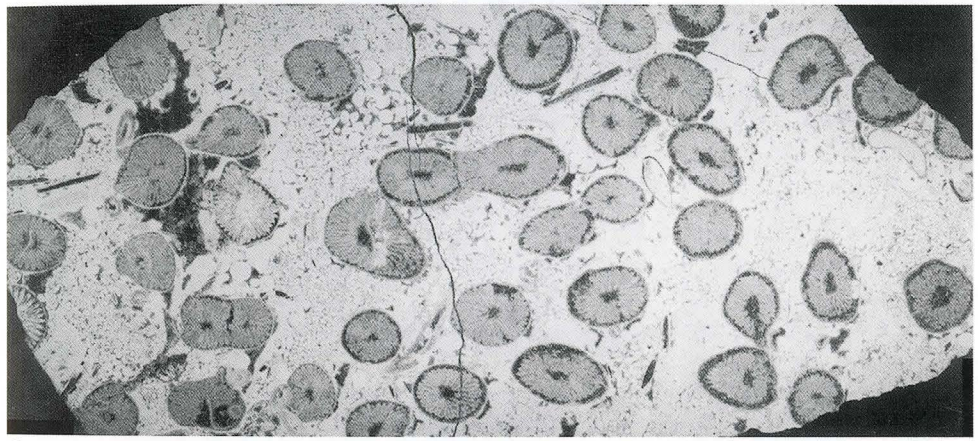
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PLATE 8 – TABLA 8

Figs. 1–6. *Rhabdophyllia phaceloida* Beauvais 1986

1. Surface of the phaceloid colony with oblique corallites, Specimen Gozd–I/3b26/2, x 1.
2. Polished surface of the same colony with transverse and partly oblique corallites. Specimen Gozd–3626/2, x 1.
3. Polished surface of another colony. Gozd–I/4516, x 1.
4. Transverse thin section of round and irregularly ramifying corallites. Note inner septotheca and parietal columella. Gozd–I/3626/lc, x 4.
5. Longitudinal thin section of two corallites, note different dissepiments. Gozd–I/3626/la, x 4.
6. Microstructure of septa in transverse section is not recognizable. Thin section Gozd–I/3626/lc, x 20.

S1. 1–6. *Rhabdophyllia phaceloida* Beauvais 1986

1. Površina faceloidne kolonije z okroglimi in nepravilno razraščenimi koraliti. Vzorec Gozd–I/3626/2, x 1.
2. Polirana površina iste kolonije z okroglimi in deloma poševnimi koraliti. Vzorec Gozd–I/3626/2, x 1.
3. Polirana površina druge kolonije. Vzorec Gozd–I/4516, x 1.
4. Prečni presek okroglih in nepravilno razraščenih koralitov. Vidni sta notranja septoteka in parietalna kolumela. Zbrusek Gozd–I/3626/lc, x 4.
5. Podolžni presek dveh koralitov, vidni različni disepimenti. Zbrusek Gozd–I/3626/la, x 4.
6. Mikrostruktura sept v prečnem preseku ni prepoznavna. Zbrusek Gozd–I/362b/lc, x 20.

PLATE 8 – TABLA 8

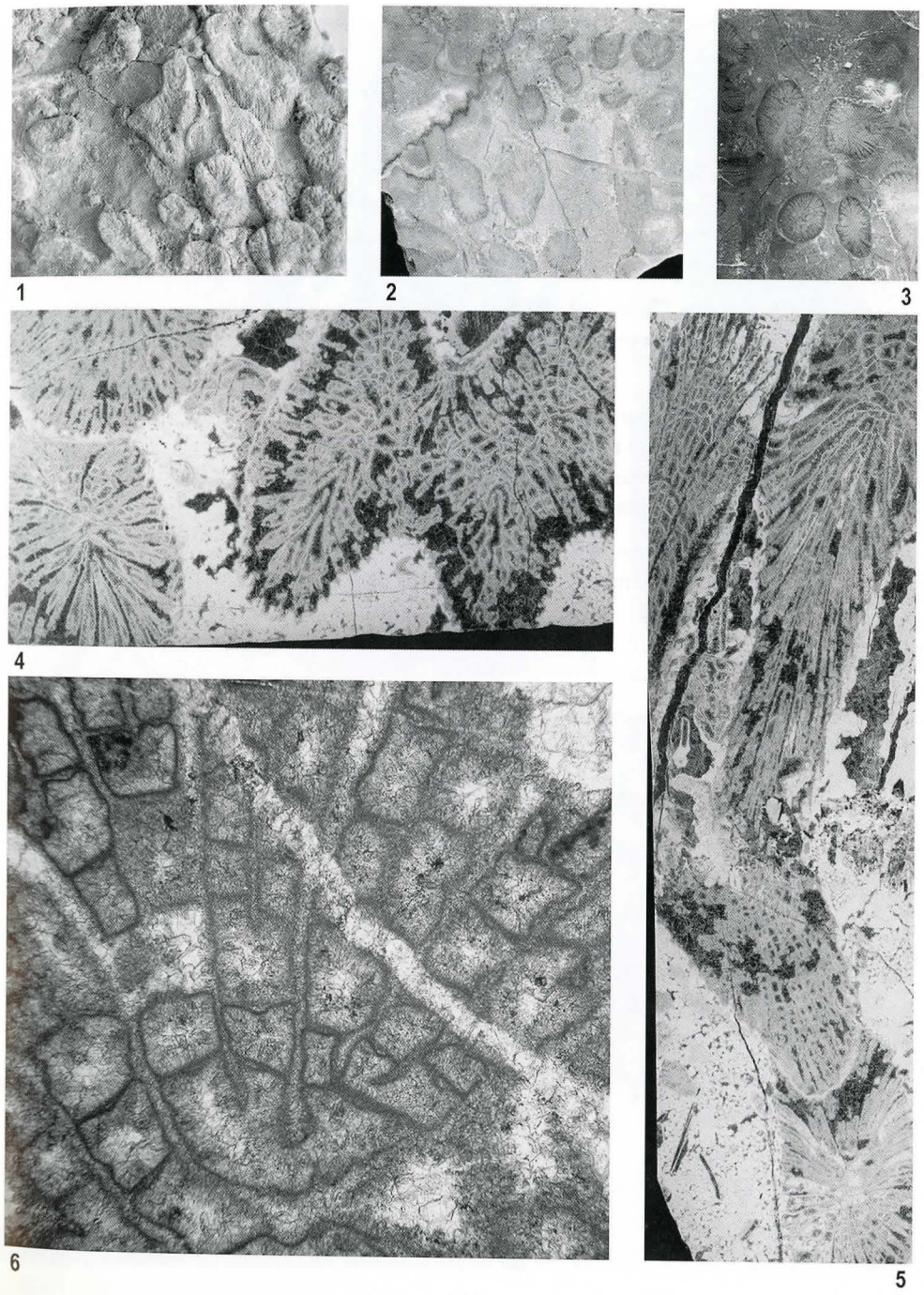


PLATE 9 – TABLA 9

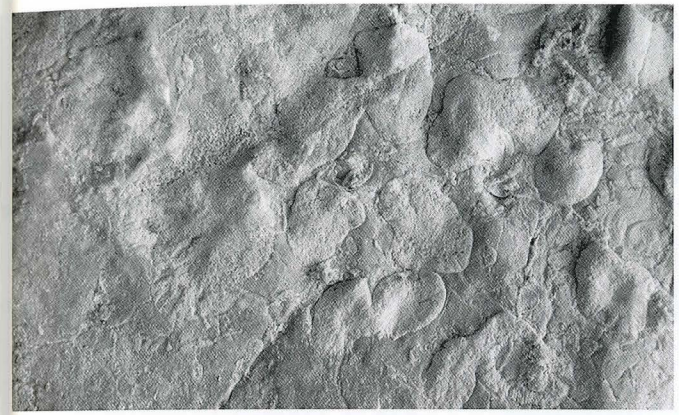
Figs. 1–3. *Phacelophyllia termieri* Beauvais 1986
1. Surface of the phaceloid colony from above. Specimen Gozd–I/3643/2, x 1.
2. Transverse thin section of corallites. Gozd–4a, x 4.
3. Longitudinal thin section; note pennulae and menianes. Gozd–4b, x 7.

4. *Phacelophyllia fasciata* (Beauvais 1986)
Transverse thin section; note axial papillose area in some corallites. Gozd–9a, x 4.

S1. 1–3. *Phacelophyllia termieri* Beauvais 1986
1. Površina faceloidne kolonije od zgoraj. Vzorec Gozd–I/3643/2, x 1.
2. Prečni presek koralitov. Zbrusek Gozd–4a, x 4.
3. Podolžni presek; vidne so penule in meniane. Zbrusek Gozd–4b, x7.

4. *Phacelophyllia fasciata* (Beauvais 1986)
Prečni presek koralitov; v nekaterih je vidna papilozna aksialna struktura. Zbrusek Gozd–9a, x 4.

PLATE 9 – TABLA 9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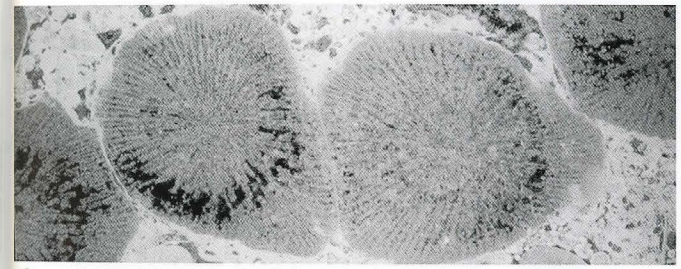
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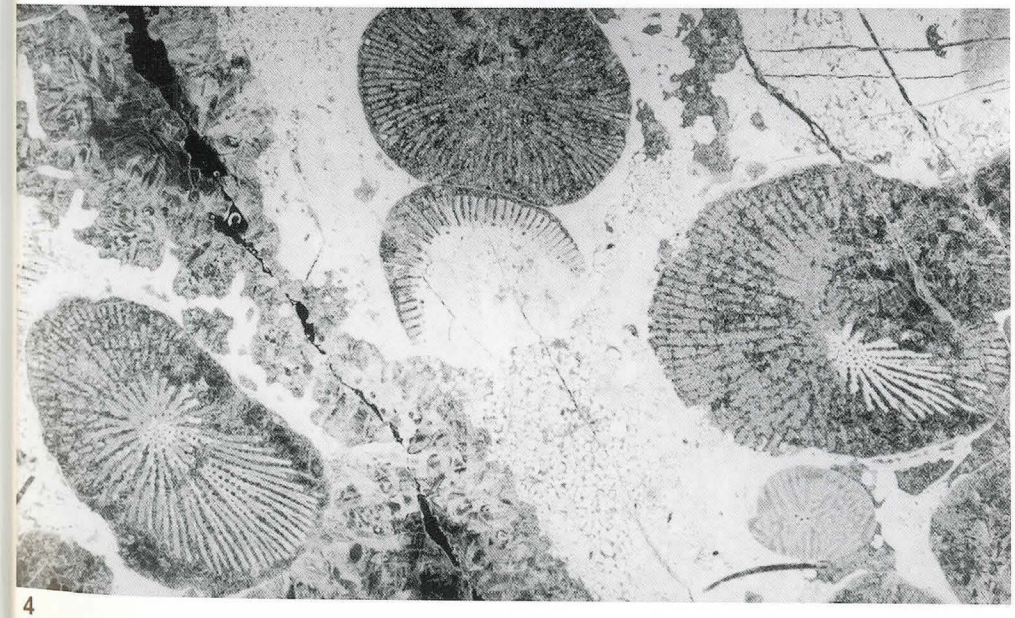
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PLATE 10 – TABLA 10

Figs. 1–3. *Phacelophyllia bacari* n. sp.
1. Transverse and partly longitudinal thin section of corallites. Note axial papillose structu and menianes in some corallites. Gozd–I/3646a, x 4.
2. Detail from fig. 1, x 8.
3. Microstructure showing medium-sized to thick trabeculae and menianes, recrystalized. Thi section Gozd–I/3646a, x 20.

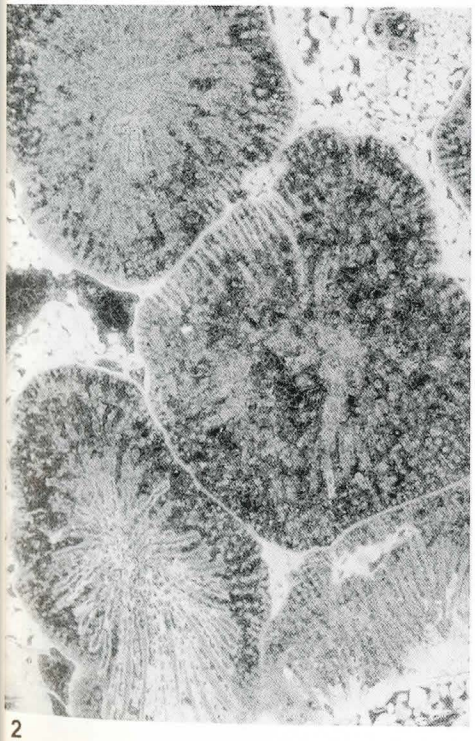
All figures are of holotype.

Sl. 1–3. *Phacelophyllia bacari* n. sp.
1. Prečni in deloma podolžni presek. V nekaterih koralitih so vidne meniane in aksialn papilozna struktura. Zbrusek Gozd–I/3646a, x 4
2. Detajl s sl. 1., x 8.
3. Mikrostruktura kaže srednje do debele trabekule in meniane, prekristalizirano. Zbruse Gozd–I/3646a, x 20.

Vse slike so od holotipa.

PLATE 10 – TABLA 10

1



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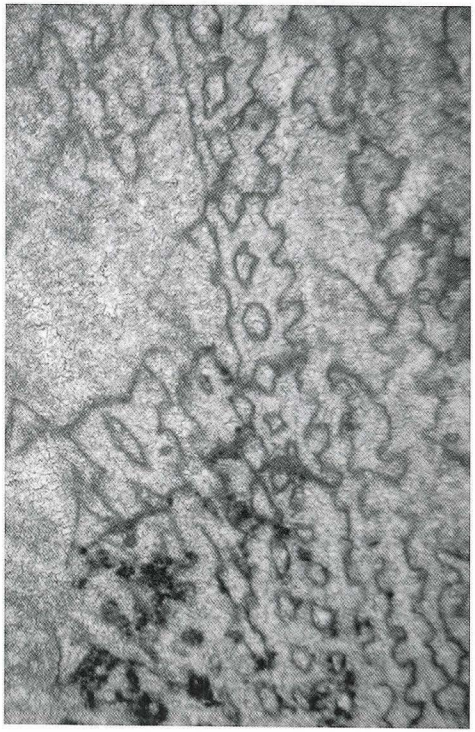

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PLATE 11 – TABLA 11

Figs. 1–5. *Phacelophyllia bacari* n. sp.
1. Surface of the phaceloid colony. Specimen Gozd–I/3623, x 1.
2. Longitudinal thin section of one colony. Gozd–I/3934b, x 4.
3. Transverse thin section with densely spaced corallites. Gozd–I/3934a, x 4.
4. Detail from fig. 3, x 8.
5. Transverse thin section of a colony. Gozd–I/4134/lb, x 4.

Sl. 1–5. *Phacelophyllia bacari* n. sp.
1. Površina faceloidne kolonije. Vzorec Gozd–I/3623, x 1.
2. Podolžni presek druge kolonije. Zbrusek Gozd–I/3934b, x 4.
3. Prečni presek z gostimi koraliti. Zbrusek Gozd–I/3934a, x 4.
4. Detaj1 s sl. 3, x 8.
5. Prečni presek kolonije. Zbrusek Gozd–I/4134/1b, x 4.

PLATE 11 – TABLA 11

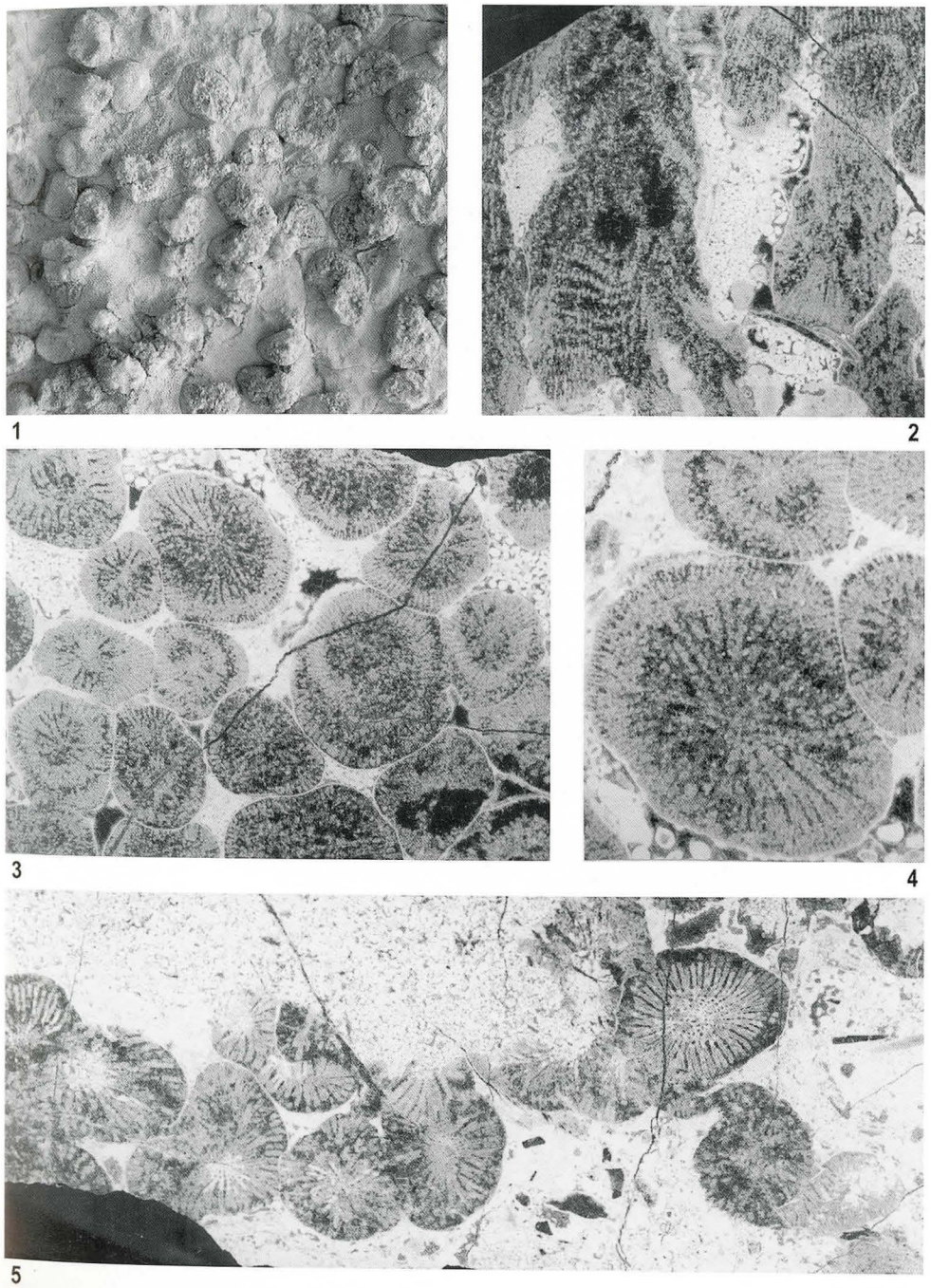


PLATE 12 – TABLA 12

Figs. 1–2. *Heterastraea tomesi* (Duncan 1867)
1. Transverse thin section of the cerioid colony. Gozd–I/4132b, x 4.
2. Longitudinal thin section. Gozd–I/4132a, x 4.

Figs. 3–5. *Heterastraea angelae* n. sp.
3. Surface of the ceriod colony. Specimen Gozd–6, x 1.
4. Oblique longitudinal thin section. Gozd–6b, x 4.
5. Transverse thin section, Gozd–6a, x 4.

Specimen Gozd–6 is a holotype.

Sl. 1–2. *Heterastraea tomesi* (Duncan 1867)
1. Prečni presek cerioidne kolonije. Zbrusek Gozd–I/4132b, x 4.
2. Podolžni presek iste kolonije. Zbrusek Gozd–I/4132a, x 4.

Sl. 3–5. *Heterastraea angelae* n. sp.
3. Površina cerioidne kolonije. Vzorec Gozd–6, x 1.
4. Poševno podolgovati presek. Zbrusek Gozd–6b, x 4.
5. Prečni presek. Zbrusek Gozd–6a, x 4.

Vzorec Gozd–6 je holotip.

PLATE 12 – TABLA 12

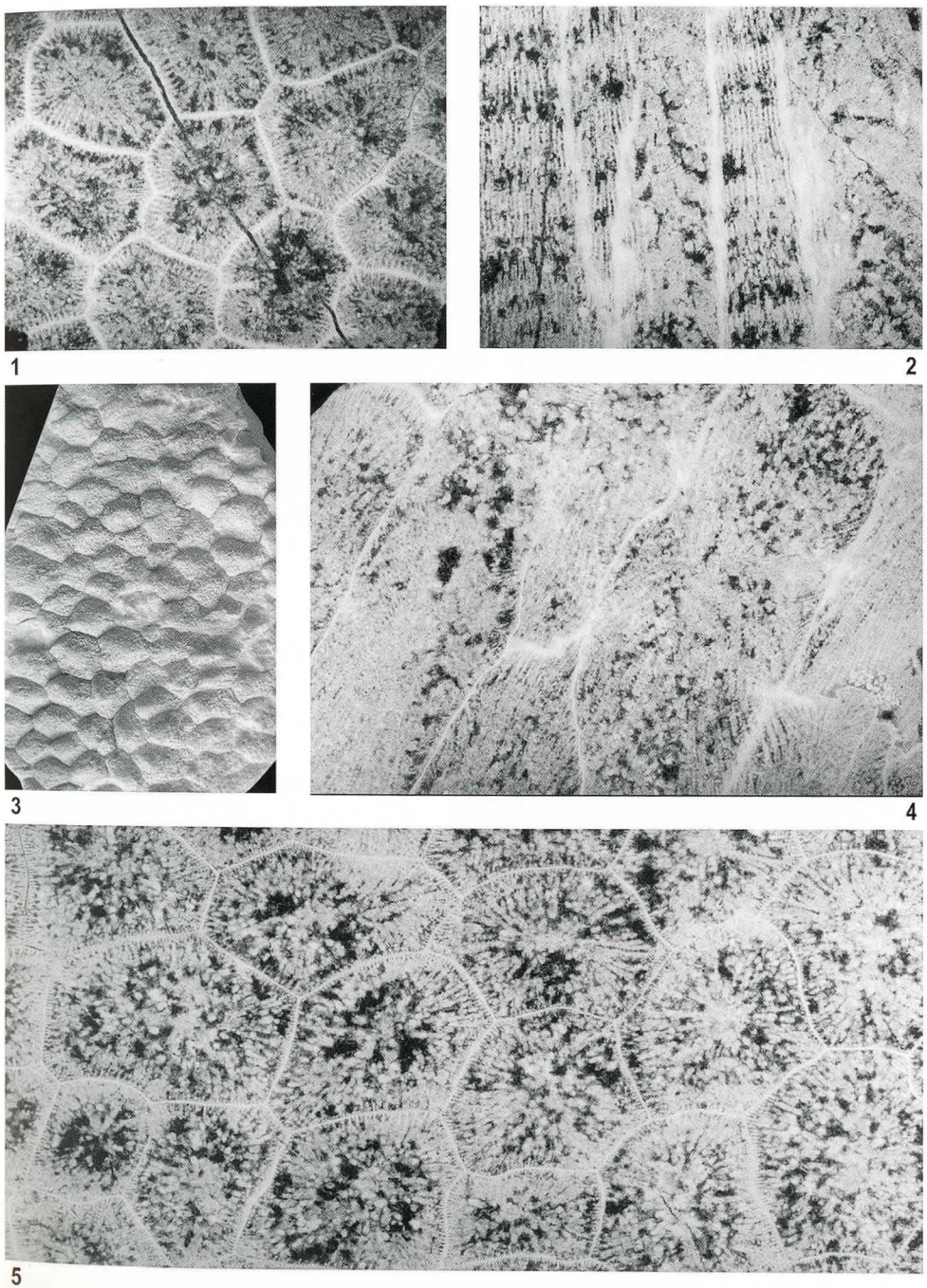


PLATE 13 – TABLA 13

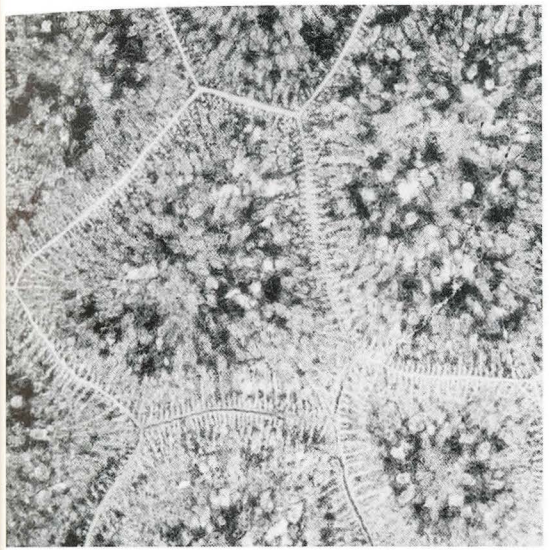
Figs. 1–4. *Heterastraea angelae* n. sp.
1. Transverse thin section (detail from pl. 12, fig. 5). Gozd–6a, x 7.
2. Microstructure in transverse thin section, not clear. Gozd–6a, x 15.
3. Transverse thin section of another colony. Gozd–13b, x 4.
4. Longitudinal thin section. Gozd–13a, x 4.

Specimen Gozd–6 is a holotype.

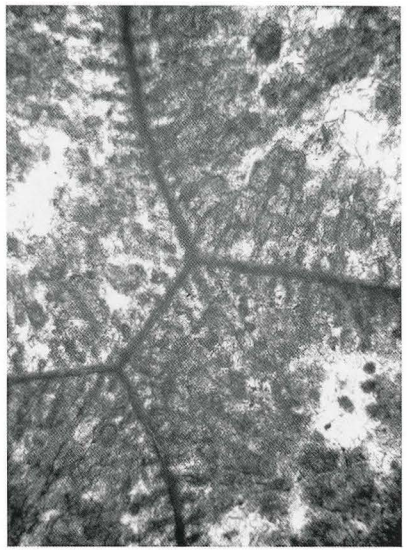
Sl. 1–4. *Heterastraea angelae* n. sp.
1. Prečni presek (detajl s tab. 12, sl. 5). Zbrusek Gozd–6a, x 7.
2. Mikrostruktura v prečnem preseku, ni jasna. Zbrusek Gozd–6a, x 15.
3. Prečni presek druge kolonije. Zbrusek Gozd–13b, x 4.
4. Podolžni presek. Zbrusek Gozd–13a, x 4.

Vzorec Gozd–6 je holotip.

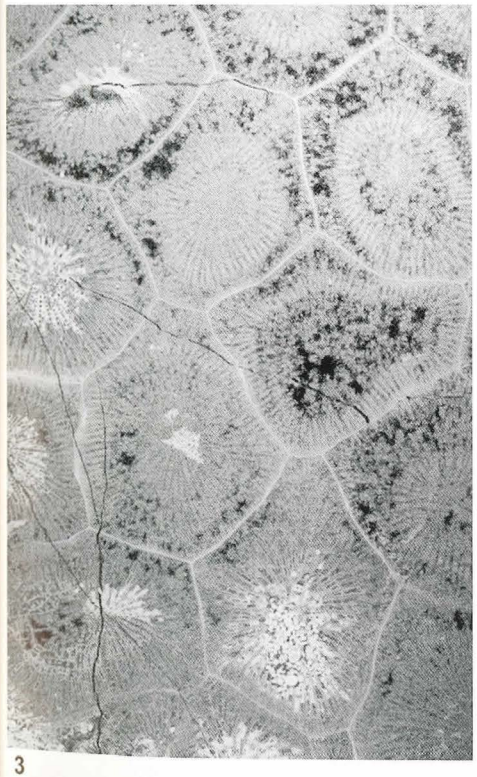
PLATE 13 – TABLA 13



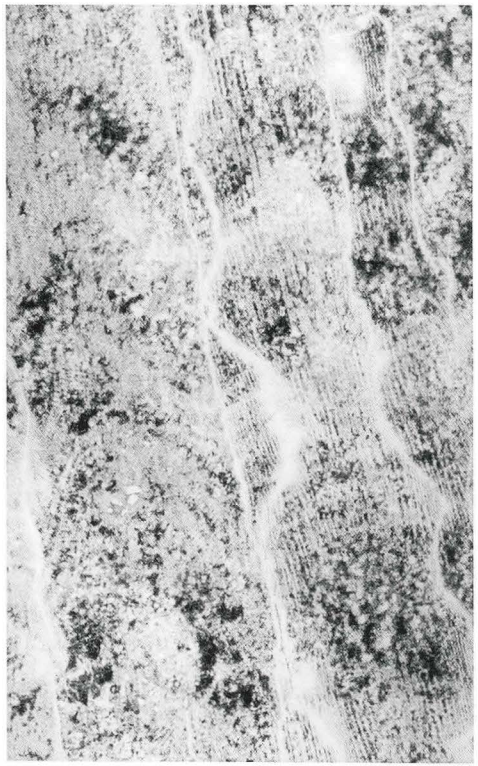
1



2



3



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