

SOME NEW AND INADEQUATLY KNOWN JURASSIC
FORAMINIFERS FROM CENTRAL CROATIA

With 15 plates

Two new species: *Mesoendothyra croatica* n. sp. and *Lituonella dinarica*¹ n. sp. are described. Some new data and comments are given on the genera *Haurania*, *Labyrinthina*, *Pfenderina*, *Kurnubia*, *Orbitopsella*, *Protopenoroplis* and *Nautiloculina*. For some of the described species the stratigraphic range is discussed or enlarged.

CONTENTS

INTRODUCTION	55
SYSTEMATIC DESCRIPTIONS	56
<i>Haurania</i>	56
<i>Labyrinthina</i>	59
<i>Mesoendothyra</i>	64
<i>Lituonella</i>	67
<i>Pfenderina</i>	71
<i>Kurnubia</i>	77
SHORT REMARKS ON SOME OTHER GENERA	79
SUPPLEMENT	81
REFERENCES	81
SUMMARY (IN CROATIAN)	84

INTRODUCTION

In the years 1965–1966 intensive field explorations of Jurassic rocks were carried out in the area extending S. W. from Karlovac towards the Velika Kapela mountain, and S. E. towards the Lička Plješevica mountain, which resulted in a large collection of samples for micropaleontologic investigations. To now over 1,000 thin-sections have been prepared and elaborated, about 200 of which proved to be of interest for further paleontologic studies. The collected samples derive mainly from stratigraphically measured sequences of Jurassic sediments, but a considerable amount also derive from detached outcrops. The biostratigraphic results

¹ This species is synonymous with *Parurgonina caelinensis* Cuvillier, Foury & Pignatti Morano, 1968.

of this work are presented in a separate paper (Gušić, 1969). As to paleontologic investigations, attention was paid to foraminifers, the Dasycladaceae being already submitted to a number of previous investigations (Radoičić 1962, 1965; Nikler & Sokač 1967; Sokač & Nikler 1967, 1969). In contrast to the Dasycladaceae, foraminifers have only been cited in stratigraphic papers in lists of fossils (Nikler, Sokač & Ivanović 1964; Radoičić 1964, 1966; and in some of the above-cited algologic papers as accompanying fossils).

The investigations were carried out by means of random thin-sections only, due to the character of the rocks (=pure hard limestones), which is an obvious weakness. It appears to be justified, though, to put forward some new data and comments concerning in particular the internal structure and some other characteristic features of the foraminifers investigated.

Thanks are due to Professor Dr. V. Kochansky-Devidé for her continuing assistance during the work and her helpful criticism of the manuscript.

SYSTEMATIC DESCRIPTIONS

Family Lituolidae de Blainville, 1825

Genus *Haurania* Henson, 1948

Synonym: *Bramkampella* Redmond, 1964

In the first description of this genus, Henson (1948 a) expressly mentioned only the presence of the transversal subepidermal partitions, but judging from the pictures (Henson 1948a, pl. 15, fig. 5-7), although they are not completely clear, the presence of another type of subepidermal structures, i. e. parallel subepidermal partitions, may also be assumed. Hence the genus *Bramkampella* Redmond (1964 b) has to be considered as a younger synonym, as it was already supposed by Maync (1965, p. 39) and accepted by M. Neumann: »... dans la zone sous-épidermique on observe la présence des cloisons transverses et parallèles...« (Neumann, 1967, p. 176). Judging also from our available sections, the conclusion seems probable that such a consideration should be accepted as a generic characteristic of the genus *Haurania*. The reason why different opinions have been held lies probably in the insufficient clarity of Henson's pictures. Consequently, the name *Bramkampella* falls within the synonymy of the genus *Haurania*.

Besides, some pillar-like structures extending between the two adjacent septa seem to be present in some of our specimens (pl. I, fig. 1). The same can be seen also in Henson's specimens, refigured in Loeblich & Tappan (1964, fig. 379: 6) and in some later authors (Sartoni & Crescenti; Maync; Dondi, Papetti & Tedeschi, etc.).

Systematic position: Loeblich & Tappan (1964) consider *Haurania* a younger synonym of the genus *Rhapydionina* S t a c h e, 1913. To support such a consideration, the authors also mention Henson's statement that »... *Haurania* is almost an isomorph of *Rhapydionina*« (Henson 1948a, p. 11). The similarity between the internal structures of both genera is indeed obvious, although *Rhapydionina* lacks parallel partitions. There is, however, an essential difference in the wall-structure. As can be seen in the pl. I-II, all of our available sections show a rather thick, distinctly arenaceous wall, typical of the Lituolidae. The same can also be seen in the figures of most other authors (Sartonì & Crescenti 1959, pl. 3, fig. 3-4; Maync 1959, pl. 23, fig. 11-12, Maync 1966a, pl. 1, fig. 16-19). Henson (1948a) in the first description also states: »Surface rough, epidermis slightly arenaceous« (op. cit., p. 12) and includes the genus into the family Lituolidae, subfam. Lituolinae. *Rhapydionina* and related forms, on the contrary, possess an imperforate porcelaneous wall, such as in all the others Soritidae.

At this point the stratigraphic position of the genera *Haurania* and *Rhapydionina* respectively should be remembered. The first Soritidae appear in the Upper Cretaceous, represented at that time only by a few relatively primitive forms, whereas their maximum development occurs in the Paleogene and later. On the contrary, an intense development of the Lituolidae in the Jurassic, and particularly in the Lias, accounts for considering the genus *Haurania* as a valid genus within the family Lituolidae.

Stratigraphic position: In the investigated material *Hauranias* are found only in the Middle Lias (Gušić, 1969), although in recent times numerous data have been published reporting findings of *Hauranias* from the Lias to the Lowermost Cretaceous (Redmond 1964 b (= *Bramkampella*); Maync 1966 a; Derin & Reiss 1966; Neumann 1967). However, it should be mentioned here that some sections, figured by Derin & Reiss (1966) and determined as *Haurania* gr. *amiji-deserta*, and which have been reported to derive from the Bajocian, cannot be determined with security as the genus *Haurania*, but can be mistaken for shallow tangential sections of some forms similar to the genus *Kurnubit* (Derin & Reiss 1966, fig. 36-37). As regards Derin & Reiss' figures 73-75, they do not seem to represent specimens of the species *H. gr. amiji-deserta*, but perhaps a new species of the genus *Haurania*? or a related lituolid genus. However, leaving all this aside, it is a fact that diverse representatives of the genus *Haurania* occur throughout the Jurassic. Especially well-preserved specimens are figured by M. Neumann (1967, pl. 33, fig. 4-7), and are reported to derive from the Bathonian of France and Morocco.

Haurania deserta Henson, 1948

Pl. II, fig. 3

- 1948a. *Haurania deserta*. - Henson, p. 12, pl. 15, fig. 1-4.
 1959. *Haurania deserta*. - Sartoni & Crescenti, p. 135, pl. 3, fig. 3.
 1962. *Haurania deserta*. - Sartoni & Crescenti, p. 189.
 1964. *Rhapydionina deserta*. - Loeblich & Tappan, p. C493, fig. 379; 4-7 (after Henson).
 1967. *Haurania deserta*. - Neuman, p. 176, fig. 112, pl. 33: 1-3 (after Henson).
 1968. *Haurania deserta*. - Nikler & Sokač, pl. 6, fig. 7.

Henson (1948 a) established two species: *H. deserta* and *H. amiji*. They differ from each other in size and in the shape of the test in the initial stage. Thus *H. deserta*, chosen as type-species, is characterized by its larger size and more conical shape of the test in the initial stage.

In the available material, a few specimens could be determined as *H. deserta*, deriving mainly from the Middle Lias of the southern slopes of the Lička Plješevica mountain (Mazin-forest). In the figured specimen (pl. II, fig. 3), one can clearly see the narrowing of the test towards the initial chamber, as well as the presence of »subepidermal cellulles«, consisting of secondary transversal and parallel partitions (= »cloisons sous-épidermiques transverses et parallèles«, Neuman 1967, p. 176).

Dimensions in mm:

	Henson (1948 a)	Sart. & Cresc. (1959)	our specimen
Length of the test	1,9-2?	1,62	2,4
Diameter of the test	0,9	0,60	0,7

Haurania amiji Henson, 1948

Pl. I, fig. 1-4, pl. II, fig. 1-2

- 1948a. *Haurania amiji*. - Henson, p. 12, pl. 15, fig. 5-10.
 1959. *Haurania amiji*. - Maync, p. 371, pl. 23, fig. 11-12.
 1959. *Haurania amiji*. - Sartoni & Crescenti, p. 288, pl. 51, fig. 6.
 1962. *Haurania amiji*. - Sartoni & Crescenti, p. 288, pl. 51, fig. 6.
 1966. *Haurania amiji*. - Dondi, Papetti & Tedeschi, pl. 7, fig. 10.
 1966. *Haurania amiji*. - Canuti & Marcucci, p. 524, pl. 3, fig. 12.
 1966. *Haurania* sp. - Canuti & Marcucci, p. 525, pl. 3, fig. 9, 13-14.
 1968. *Haurania amiji*. - Nikler & Sokač, pl. 6, fig. 6, 8.

A considerable number of the investigated specimens could be determined as *H. amiji*, both by size and by displaying a well-developed planispirally coiled initial stage, followed by an uncoiled stage of cylindrical shape.

Dimensions in mm:

	Henson (1948 a)	Sart. & Cresc. (1959)	our specimens
Length of the test	0,9	1,18	0,70-1,12
Diameter of the test	0,3	0,40	0,34-0,58

Remarks: Besides the forms described above, assigned to the species *H. deserta* and *H. amiji*, some forms assignable to the genus *Haurania* were also observed, but no specific determination could be made, because of their intermediate characteristics in relation to the two Henson's species. Thus the specimen figured in pl. I, fig. 5 shows e. g. a conical shape of the test and a scarcely noticeable planispirally coiled initial stage, which are features characteristic of the species *H. deserta*, but its size, however, does not reach the smallest specimens of the species *H. amiji*. The question of whether this fact suggests that both Henson's species should be reduced to a single species, remains for the present unsolved, but it ought to be mentioned that Maync (1966 a), and, according to him, Derin & Reiss (1966), define their specimens as *H. amiji-deserta*. It should also be mentioned here that both Henson (1948 a) and Sartoni & Crescenti (1959) quote only maximal values of the length and diameter of the test for each species, so that it is impossible to determine either the range of variability, or whether and to which extent the larger specimens of *H. amiji* approach the smaller ones of *H. deserta*. As our tables of dimensions show, the differences in the size are not such that the idea of the uniformity of the two Henson's species should be a priori rejected.

Genus *Labyrinthina* Weynschenk, 1951; emend. Loeblich & Tappan, 1964; emend. Fourcade & Neumann, 1966

Synonym: *Lituosepta* Cati, 1959

According to Weynschenk (1951, 1956), the type-species of the genus, *L. mirabilis*, has a thick arenaceous wall, labyrinthic and in later stages expanding chambers. It can exist free or attached (= incrusting).

However, as noticed by Maync (1952), none of Weynschenk's sections displays a labyrinthic structure of chambers. Consequently, a revision of this genus ought to be made.

Cati (1959) described a Liassic lituolid foraminifer *Lituosepta reoarenensis*. His description runs, in short, as follows: Test elongate, of a subcylindrical shape, involutely planispirally coiled in early stages (first 2-3 whorls), afterwards rectilinear uncoiled. Wall rather thick, agglutinated of calcareous particles in calcareous cement. Inner structure simple: primary septa slightly convex towards the aperture, similar as in the

genus *Lituola*, but with secondary transversal septa (= partitions), perpendicular both to the wall and to the primary septa, extending radially from the wall towards the interior but not reaching the centre. They can stretch through several chambers. Aperture cribrate. According to Cati (1959), only A-generation is known, the proloculus of which is spherical and rather large.

Loeblich & Tappan (1964) first include the genus *Lituosepta* into the synonymy of the genus *Labyrinthina*, but for generic diagnosis they use Cati's (1959) description of the genus *Lituosepta*. At the same time they doubt the existence of incrusting (= attached) forms of this genus.

Finally, Fourcade & Neumann (1966) carried out a revision of the genus *Labyrinthina* using material from Spain. They too consider the genus *Lituosepta* to be synonymous with the genus *Labyrinthina*, and neither does the generic diagnosis they propose differ essentially from Cati's (1959) description of the genus *Lituosepta*. At the same time the authors mention with all reason that Weynschenk (1951, 1956) under the name of *L. mirabilis* described a heterogeneous material, and consequently some of Weynschenk's specimens should be eliminated from the genus *Labyrinthina*. That refers primarily to the incrusting (= attached) specimens (Weynschenk, 1951, pl. 112, fig. 5, 8; 1956, pl. 1, fig. 4, 6). Hence, the revised diagnosis for the genus *Labyrinthina* proposed by Fourcade & Neumann (1966) runs, briefly, as follows: Test free, arenaceous, microgranulated, non-labyrinthic; initial stage involutely planispirally coiled, adult stage uncoiled. Proloculus globular. Chambers partially divided by thin partitions (»cloisons«), perpendicular both to the test-wall and to the septa (»septa«). Aperture in planispiral stage at first basal, afterwards central, and finally in the uncoiled stage cribrate. – As is evident, and as has been already mentioned, that description neither differs essentially from the Cati's (1959) description of the genus *Lituosepta*, which proves the fact, as in Loeblich & Tappan (1964), that the two genera should be considered synonymous. The diagnoses given by both Fourcade & Neumann (1966) and by Loeblich & Tappan (1964) really correspond with the essential characteristics of the forms described by Weynschenk (1951, 1956) under the name of *L. mirabilis*, keeping in mind the remark that the uncoiled stage in Weynschenk's species (= type-species) is not always developed.

However, neither Cati (1959) nor Fourcade & Neumann (1966) noticed the existence of interseptal pillars or buttresses in the uncoiled stage. These pillars can be seen in both longitudinal and transversal sections of the uncoiled stage, and seem to be present not only in *L. recoarensis* but also in other species of the genus (Fourcade & Neumann, 1966, pl. 1, fig. 10, 11, pl. 2, fig. 1; our specimens *Labyrinthina* n. sp. A: pl. V, fig. 4, etc.). It seems justified, therefore, that

the presence of interseptal pillars in the chambers of the uncoiled stage should be considered as a generic characteristic of the genus *Labyrinthina*.

Moreover, the detailed description of the species *L. mirabilis* given by Fourcade & Neumann (1966) is based on specimens which, judging from Fourcade & Neumann's pictures, must not be, in the present author's opinion, identified with the Weynschenk's forms. On the contrary, it seems presumable that we are here dealing with a phylogenetically more progressive form. For instance, the number of chambers in the uncoiled part of the test, in the single figured Weynschenk's specimen with the uncoiled stage developed (Weynschenk, 1951, pl. 112, fig. 9; 1956, pl. 1, fig. 8), amounts to 6 at the most, whereas all the specimens figured by Fourcade & Neumann (1966), cut by approximately longitudinal (= medial or some axial) sections, show more than 10 chambers in the uncoiled stage. Furthermore, according to Fourcade & Neumann's (1966) statement, the number of chambers in the uncoiled stage can amount to 17. At the same time another important feature should be emphasized: it seems that all the specimens described and figured by Fourcade & Neumann (1966) possess a well-developed uncoiled stage, which means that this feature proved to be a constant characteristic in Fourcade & Neumann's forms. As regards the specimen figured by Fourcade & Neumann (1966) in pl. 2, fig. 2, which the authors state it represents a »section transverse médiane d'un individu peu déroulé«, there seems to be no difference between it, and the figs. 3, 8 and 9 on the same plate, that is – more or less oblique sections, by which either the coiled stage alone, or, additionally, only a few chambers of the uncoiled stage are cut. Moreover, the Spanish specimens are of somewhat larger size, and the cribrate aperture in the uncoiled stage is clearly developed, whereas it is hardly noticeable in the Weynschenk's specimen (Weynschenk, 1951, pl. 112, fig. 9; 1956, pl. 1, fig. 8).

Considering everything mentioned above, it seems that Fourcade & Neumann (1966) failed to establish a new species which could be chosen as type-species, because of its well-developed generic characteristics. Therefore it is proposed here that the forms described by Fourcade & Neumann (1966) under the name of *L. mirabilis*, should be considered as a new species of the genus *Labyrinthina*, for which the new name, *L. neumannae*, is proposed. The specimen figured in Fourcade & Neumann (1966), pl. 1, fig. 10 is designated the holotype of the new species. – Hence the differences mentioned by Fourcade & Neumann (1966) in relation to the species *L. recoarensis* (Cati) in fact represent the differences between the new species (*L. neumannae*) and *L. recoarensis* (Cati), but cannot be applied to Weynschenk's simple and primitive forms (= *L. mirabilis*).

According to Weynschenk (1956), *L. mirabilis* derives from the Upper Jurassic (Malmian) deposits. Sartoni & Crescenti (1962) restrict its stratigraphic position in the southern Apennines to the lower part of the Kurnubia palastiniensis cenozoone, which would correspond to the Callovian, or to the beginning of the Malm respectively. This conforms with the occurrence of *L. mirabilis* in the investigated material. Accepting the above, the appearance of a more progressive form in the Kimmeridgian, though under the name of *L. mirabilis* (according to Fourcade & Neumann, 1966), becomes phylogenetically justifiable. – With the species *L. recoarensis* the case is obviously quite different. This species also shows better developed generic characteristics than *L. mirabilis*, but nevertheless we cannot trace its development from the Weynschenk's species, as *L. recoarensis* occurs earlier – in the Lias. On the contrary, here we must assume the existence of a parallel evolution from a hypothetical common ancestor.

Labyrinthina mirabilis Weynschenk, 1951

Pl. III, fig. 1–3, 4?

- 1951 (pars). *Labyrinthina mirabilis*. – Weynschenk, p. 793, text-fig. 1–2, pl. 112, fig. 4, 6, 7, 9.
 1956 (pars). *Labyrinthina mirabilis*. – Weynschenk, p. 283, pl. 1, fig. 5, 7, 8.
 1962 (pars?). *Labyrinthina mirabilis*. – Sartoni & Crescenti, p. 272, pl. 46, fig. 4?, 6.
 1966. *Labyrinthina mirabilis*. – Radoičić, pl. 117, fig. 1–2.
 1966 (pars). *Labyrinthina mirabilis*. – Fourcade & Neumann, p. 234, pl. 1, fig. 1–3 (after Weynschenk).
 1967 (pars). *Labyrinthina mirabilis*. – Neumann, pl. 32, fig. 5 (after Weynschenk).

The representatives of this species in the investigated material occur only in the Lower Malmian deposits, accompanied sometimes by *Kurnubia palastiniensis* and other Lower Malmian microfossils. – In some of the figured specimens (pl. III, fig. 1–2, 4?) a spherical proloculus can be seen, followed by 2–3 planispirally coiled whorls. An uncoiled stage – growth of chambers in a rectilinear manner – can follow, consisting of maximally 4 observed chambers. It does not look very probable that the form figured in pl. III, fig. 1 represents an incompletely preserved specimen, with the uncoiled part of the test subsequently broken. On the contrary, it seems more likely that an uncoiled stage has not been developed at all, which conforms with what is already known about this species. Interseptal pillars appear to be present in the chambers of the uncoiled stage (pl. III, fig. 3).

The specimen figured in pl. III, fig. 4 also derives from the Lower Malmian deposits, but looks somewhat different (outer shape, shape of the individual chambers) from the more typical forms, although the differences are not easy to define precisely. However, assuming that the specimen should be assigned to the species *L. mirabilis*, it appears presumable that we are concerned with specimens belonging to the same species, but to different generations. If so, it may be the question of the A₁ and A₂-generations, which appears acceptable on account of the presence of rather large proloculi in both cases (compare all the specimens of that species figured in pl. III). However, due to the lack of more well-preserved material, this presumption cannot be ascertained.

Dimensions in mm:	specimen in pl. III, fig. 4	Other specimens
Length (= height) of the test	1,00	0,90–1,52
Diameter of the coiled part	0,63	ca 1,00
Length of the uncoiled part	0,37	0,00–0,55
Diameter of the uncoiled part	0,50	
Diameter of the proloculus	0,013	ca 0,007
Number of whorls	2–3	3–4
Number of chambers in the uncoiled part	2–3?	3–4

Labyrinthina recoarensis (Cati), 1959

Pl. IV, fig. 1–2; pl. V, fig. 5–6

1959. *Lituosepta recoarensis*. – Cati, p. 104, tex-fig. 1; pl. 1, fig. 1–14.
 1959. *Lituosepta recoarensis*. – Sartoni & Crescenti, p. 134, pl. 2, fig. 6.
 1962. *Lituosepta recoarensis*. – Sartoni & Crescenti, p. 274, pl. 13, fig. 2; pl. 47, fig. 7.
 1964. *Labyrinthina recoarensis*. – Loeblich & Tappan, p. C 245, fig. 156: 4–6.
 1965. *Lituosepta recoarensis*. – Pirini, p. 1172, pl. 101, fig. 6–8.
 1966. *Labyrinthina recoarensis*. – Fourcade & Neumann, p. 234, fig. 1, pl. 1, fig. 4–9 (after Cati).
 1966. *Labyrinthina recoarensis*. – Canuti & Marcucci, p. 522, pl. 3, fig. 1–7.
 1966. *Lituosepta recoarensis*. – Radoičić, pl. 114, fig. 2; pl. 145, fig. 1; pl. 152, fig. 2.
 1967. *Labyrinthina recoarensis*. – Neumann, p. 173, fig. 110; pl. 32, fig. 1–4 (after Cati).
 1968. *Lituosepta recoarensis*. – Nikler & Sokač, pl. 6, fig. 2–3.

There is nothing of importance to be added to the detailed and adequate description of Cati (1959), except, as already mentioned, the presence of interseptal pillars in the uncoiled stage. Here should only be emphasized the differences between the species *L. recoarensis* and *L. mirabilis*, as the differences described by Fourcade & Neumann

(1966) do not conform with the relationship between the species *L. mirabilis* and *L. recoarensis*, which has been explained in the discussion on the genus. In general, *L. recoarensis* is a more developed and more progressive species, although its phylogenetic development, as already mentioned before, cannot be traced from *L. mirabilis*. – The uncoiled stage is, in contrast to *L. mirabilis*, constantly present and quite well-developed. It may consist of up to 8–10 chambers (according to C a t i – 6), the cribrate aperture and the presence of transversal secondary septa being clearly visible. There are also some differences concerning the dimensions and the proportions of the dimensions of some structural details (the height of the chambers, etc.).

Labyrinthina n. sp. A

Pl. V, fig. 1–4

In a number of thin-sections from the Liassic limestones, deriving mainly from the southern slopes of the Lička Plješevica mountain (Mazin-forest), some specimens have been noticed, assignable to the genus *Labyrinthina* and showing certain similarities to *L. recoarensis*. However, they differ from *L. recoarensis* by having an even more developed uncoiled stage consisting of up to 14 chambers. The chambers are lower and more closely spaced, so that a certain part of the uncoiled stage contains 1,5 times more chambers than an equally long part of the test in *L. recoarensis*. On the other hand, the planispirally coiled part is very poorly developed, occupying only 1/5–1/6 of the whole length (=height) of the test, in comparison to 1/3–1/2 in *L. recoarensis*. Consequently, this new species may be considered even more progressive (specialized). Interseptal pillars are clearly developed (pl. V, fig. 4).

Dimensions in mm of the specimen figured in pl. V, fig. 4:

Length (height) of the test	1,60
Diameter of the coiled part	0,32
Length of the uncoiled part	1,16
Diameter of the uncoiled part	0,46
Thickness of the test-wall	0,036
Thickness of the septa	0,04
Max. height of the chambers	0,06

Genus *Mesoendothyra* Dain in Bykova & al., 1958

Dain (in Bykova & al., 1958) established the genus *Mesoendothyra* for a Upper Jurassic (Kimmeridgian) species seemingly related to the Paleozoic genus *Plectogyra* (outer shape, mode of coiling), but possessing a different wall-structure. The wall is reported to be compara-

tively thick, calcareous, two-layered, with rare agglutinated carbonate particles and rather large pores. Such wall-structure was stated to be similar to the one of the genus *Choffatella*, and a new family, *Mesoendothyridae*, was established by Voloshinova (in Bykova & al., 1958), comprising the genera *Mesoendothyra* Dain, *Pseudocyclammina* Yabe & Hanzawa and *Choffatella* Schlumberger. However, as accepted by Loeblich & Tappan (1964), there is no reason to establish a new family for the well-known lituolid genera *Pseudocyclammina* and *Choffatella*, and consequently the genus *Mesoendothyra* was placed in the Lituolidae, the name *Mesoendothyridae* being considered as a synonym of the Lituolidae. Such a classification has been retained here for the present, although the wall-structure of the genus *Mesoendothyra* must not be, in the present author's opinion, identified with the one of the genera *Pseudocyclammina*, *Choffatella* and similar ones. It should be emphasized here that it is quite impossible to discern the real nature of the wall in the genus *Mesoendothyra* after the figures reproduced in Bykova & al. (1958), pl. 4, fig. 8-9, and re-figured in Loeblich & Tappan (1964), fig. 144: 5a, 6a. Besides, in the original description (Dain in Bykova & al., 1958, p. 20) the inner part of the wall is said to consist of rather large pores, perpendicular to the surface of the test. Whether it is identic with »interior coarsely alveolar«, as stated in Loeblich & Tappan (1964, p. C233), is not certain. Therefore a new species displaying a wall-structure quite different from that of *Choffatella*, *Pseudocyclammina* etc. is here included in the genus *Mesoendothyra*.

Mesoendothyra croatica n. sp.

Pl. XI-XII

1963. *Endothyra* sp. - Čanović, pl. 5, fig. 2.

1966. *Endothyra* sp. - Radoičić, pl. 95, fig. 2; pl. 96, fig. 1; pl. 112., fig. 2.

Origin of the name: after the republic of Croatia, where the type-locality and some other finding-places are situated.

Type-locality: The Banska Vrata pass, on the road Jasenak-Novci, in the northern part of the Velika Kapela mountain.

Other finding-places: Čanović (1963) reported findings of the same species from the bore-hole Grahovo-1 (Gr-1) near Osječenica, in the surroundings of Grahovo, Montenegro, from the depth of 2408,30-2410,30 m. Radoičić (1966) figured specimens of that species from southern Hercegovina, and the southern slopes of the Biokovo mountain, Dalmatia. In the investigated material the same species has

also been found on the southern slopes of the Lička Plješevica mountain, in the surroundings of the Plitvice lakes and at Gornje Jelenje on the road Zagreb–Rijeka.

Type stratum: Lower Dogger, sometimes accompanied by »*Dic-tyoconus*« *cayeuxi* Lucas, in pseudoolitic calcarenites or fine-grained limestones.

Holotype: Median section of the specimen figured in pl. XI, fig. 1, thin-section G-181.

Diagnosis: A *Mesoendothyra*-species with an uncoiled stage developed, and deprived of the plectogyroidal initial stage.

Description: Test enrolled in the first 3–4 whorls, mainly involute, planispirally coiled, followed afterwards by an uncoiled rectilinear stage. Proloculus globular, rather large (A-generation). Judging by the available sections, both median and vertical, it can be seen that a plectogyroidal initial stage does not exist. The plane of coiling, however, varies from whorl to whorl, turning through about 10°–30°. In the axial (vertical) sections (pl. XI, fig. 6–8) there can be seen a fairly well-defined, slightly concave umbilical region. The number of chambers in the first and the second whorl amounts to about 6, increasing afterwards (in the third and the fourth whorl) gradually up to 8–10. The rectilinear uncoiled part of the test is not visible in all the specimens available. It is possible, indeed, that in some specimens the uncoiled stage is not developed at all, but certainly in our material we are concerned with incompletely preserved specimens, at least partially. Broken specimens as shown in pl. XI, fig. 4–5 often occur, and the character of sediment – a pseudoolitic calcarenite – agrees with such a presumption. As can be seen in the holotype (pl. XI, fig. 1), the uncoiled part of the test consists of 3–4 chambers. In the beginning (the second to the third whorl) the chambers increase rapidly in size, both in the height and in the diameter, whereas the chambers in the uncoiled part of the test differ from the ones in the last whorl only by a slightly increased diameter, the height remaining almost the same.

The wall is thick, calcareous, microgranular. The specimen figured in pl. XI, fig. 2 shows a wall-structure consisting of two layers, the inner layer being coarsely fibrous in appearance (pl. XII, fig. 1–2). Such a structure, probably, was described by Dain (in Bykova & al., 1958) as consisting of large pores. The fibrous appearance, however, may be caused by radial crystallization, so it may be in fact »pseudofibrous«. The outer layer, on the contrary, is thin and imperforate, appearing dark in the slides. Other specimens, however, show no distinct wall-structure. Their wall seems to consist of a single homogeneous thick dark layer of microgranulated calcite. It is possible that the originally layered structure has been obscured by recrystallization. The presence of agglutinated material could not undoubtedly be ascertained.

The septa are short and thick, single-layered, sometimes scarcely convex towards the aperture, extending from the wall at right angles or slightly more.

The aperture is simple basal in the coiled part. In that stage the diameter of the aperture is approximately equal to the length of the septa. In the uncoiled part the aperture becomes central, shifting to the middle of the septal plate, and remaining rather wide. It is possible, however, that the aperture in the later stages becomes cribrate, judging from the specimens figured in pl. XI, fig. 2, 5. But due to the lack of more available sections the question remains for the present undecided.

Dimensions in mm:

Length (= height) of the test	0,75-1,00
Diameter of the coiled part	0,50
Diameter of the uncoiled part	0,25
Thickness of the test in the umbilical region	0,11-0,22
Thickness of the wall	0,04-0,06
Maximum height of the chambers	0,07-0,10
Diameter of the aperture	0,04-0,05

Similarities and differences: *M. croatica* n. sp. is distinguished from the only species of the genus described till now, *M. izjumiana* Dain, by having quite a well-developed uncoiled uniserial stage and by lacking a plectogyroidal initial stage, resulting in an entirely planispiral mode of coiling. The plane of coiling changes during growth, turning through 10°-30°, whereas Dain (in Bykova & al., 1958) states a value of 45° for *M. izjumiana*.

Family Ataxophragmiidae Schwaeger, 1877

Genus *Lituonella* Schlumberger, 1905

Dougllass (1960) first removed the genera *Coskinolina* and *Lituonella* from the family Orbitolinidae due to their wall-structure. The wall-structure of these two genera was reported by him to be the same, but differing from that of the Orbitolinidae. It consists of a thick homogeneous calcite layer, perforated with closely spaced pores (»keriothecal structure«), in contrast to the thin two-layered wall of the Orbitolinidae.

Afterwards, the genus *Lituonella* was treated separately from the Orbitolinidae by various authors (Loeblich & Tappan, 1964; Mollade, 1965; Neumann, 1967). Mollade (1965) even established a new family, Coskinolinidae, comprising the genera *Coskinolina*, *Lituonella* and *Kilianina*, but this classification has not been adopted here, being regarded as excessively splitting-up, which should be avoided, in our opinion, wherever possible.

In contrast to the above mentioned authors, H o f k e r, jr. (1966), in an excellent and extensive paper, considers the genus *Lituonella* as belonging to the Orbitolinidae, and the species *Coskinolina liburnica* as a junior synonym of *Lituonella liburnica*. He says the wall-structure of this genus need not necessarily be caused by pores; in his opinion it might also be caused by a radial crystallization of the thick wall. Therefore such wall-structure cannot be used, in H o f k e r, jr's (1966) opinion, to exclude such forms from the Orbitolinidae.

Our specimens described as *Lituonella dinarica* n. sp. possess thick walls, some of them also displaying a fairly well-developed »keriothecal structure«. However, a fact that should be emphasized here is the age of our specimens. They derive from the Upper Jurassic deposits, and are, therefore, the oldest representatives of this genus, at the same time older than all the Orbitolinidae hitherto undoubtedly known. This proves that the remarkable thickness of the wall, even regardless of the more or less distinct »keriothecal structure«, cannot be considered as merely thickened orbitolinid-walls, as suggested by H o f k e r, jr. (1966, p. 6-7). Because of this the genus *Lituonella* is here excluded from the Orbitolinidae, although a thorough revision of such forms, apparently similar to the Orbitolinidae but possessing thick walls with more or less distinct »keriothecal structure«, remains exceedingly desirable, particularly in order to clear up the relationship to the type-forms and their original descriptions. Such a work should include both the forms with and without vertical radial partitions in the marginal zone (»*Coskinolina*« and »*Lituonella*«), but this could not be attempted in the present paper, owing to a number of difficulties, the principal ones being the lack of more well-preserved material and the inaccessibility of the original literature.

Lituonella dinarica n. sp.¹

Pl. XIII-XIV

1959. *Coskinolina* sp. (?). - Čanović, pl. 1, fig. 2-3.

1966. »*Lituonella*«. - Radošević, pl. 13, fig. 1-2; pl. 14, fig. 2; pl. 47, fig. 2; pl. 48, fig. 1.

1968. *Lituonella* sp. - Nikler & Sokač, pl. 13, fig. 6.

O r i g i n o f t h e n a m e: The species has been found at a number of localities throughout the Dinarids.

T y p e - l o c a l i t y: At the big curve on the road Zagreb-Rijeka, north of Vrbovsko and south of the point 730.

¹ The species enters into the synonymy of *Parurgonina caelinensis* Cuvillier, Foury & Pignatti Morano 1968 (Geol. Romana 7, pp. 141-156).

Other finding-places: Čanović (1959, p. 24) mentions the same species from the neighbourhood of Trebinje, Hercegovina, between the village Krivi Do and Trebinje, vis-a-vis to the fortress Gluha Smokva. Radoičić (1966) figured some specimens deriving from the northern slopes of the Rumija mountain (Montenegro's Krajina, in the neighbourhood of the village of Murići) and from the northern border of the Zeta plain, and Nikler & Sokač (1968) from the Velebit mountain. In the investigated material the same species has also been found in the neighbourhood of the village of Puškarići, 3-4 km south of the accumulation basin Sabljaki, about 10 km south of Ogulin, as well as in the Upper Malmian deposits at Lipovača near Slunj.

Type stratum: Upper Malm, the *Clypeina jurassica* limestone, or immediately below the first occurrences of *Clypeina*.

Holotype: Axial section of the specimen figured in pl. XIII, fig. 1, slide G-262.

Note: The available material of the species is rather scarce. However, it seems necessary to establish a new species primarily because of its stratigraphic importance, the occurrence of that species throughout the Dinarids being limited to the upper part of the Malm. Naturally, a more extensive description or emendation based on better preserved material is still desirable.

Diagnosis: A *Lituonella*-species of a regular conical shape, with no marginal thickening of the chambers.

Description: Test conical, having the shape of a cone of almost a geometrical regularity (pl. XIV, fig. 1, 3), but this may be a variable characteristic, indeed. The initial trochospirally coiled stage which is usually quite well-developed in the genus *Lituonella* and inclined to one side of the apex of the test, is not preserved in any of the available specimens and consequently the proloculus could not be observed. However, judging from some of the sections available which seem to be more or less axial, it may be presumed that a trochospiral stage did not develop very far. The largest part of the test is composed of wide and low cyclic chambers, with irregularly placed vertical interseptal pillars of a circular shape in the transversal section (pl. XIII, fig. 2, pl. XIV, fig. 2). The chambers, arranged in a conical way, show no considerable marginal thickening at their rims, so that the height of the chambers is approximately the same in the middle of the chambers and at their rim. The wall is thick and homogeneous, consisting of a single thick layer of granulated calcite; fibrous, perforated by narrow and closely spaced pores perpendicular to the surface of the test (Douglas' and Moulle's »keriothecal structure«); pl. XIV, fig. 4. Such wall-structure is, however, not always distinctly discernible in all the specimens available, due to recrystallization. Douglas (1960, p. 255) has already emphasized that the keriothecal structure in the genus *Lituonella*, although otherwise well-developed, may be indistinct in some specimens.

Dimensions in mm:

	holotype	other specimens
Height of the test (H)	1,7	ca 1,00-1,80
Maximum (= basal) diameter (D)	1,3	0,95-1,60
Height of the chambers	0,062	0,06-0,12
Thickness of the wall	0,04	0,03-0,10

Relation H/D amounts to 1-1,3.

As can be seen from the above table with dimensions, our specimens show a great variability in size. The question of whether we are dealing with specimens belonging to the same species but different generations, cannot be answered here due to the lack of better preserved material with the observable proloculus. However, it should be mentioned that all the larger specimens derive from the same locality north of Vrbovsko (= type-locality), whereas all the smaller specimens derive from another finding-place near Sabljaki. Consequently, variations in the size of the test can be regarded as being due to more or less favourable environmental conditions.

Similarities and differences: *L. dinarica* is the oldest representative of the genus *Lituonella* hitherto known. It is clearly distinguished from most other species of the genus *Lituonella* by lacking the well-known marginal thickening of the chambers, a feature which is usually rather strongly developed in the other species of the genus *Lituonella*.¹ Consequently, the axial sections show more similarity with the genus *Coskinolina* (see Remarks below), but the absence of vertical radial partitions in the marginal zone is considered as a more important feature, accounting for its attribution to the genus *Lituonella*.

L. dinarica n. sp. is also distinguished by its very poorly developed trochospiral asymmetrical stage, resulting in the comparatively high and tapering, almost geometrically regular, conical shape of the test.

Remarks: *Coskinolina* is here provisionally regarded as a valid genus differing from *Lituonella* in having vertical radial partitions in the marginal zone. Owing to that feature such forms are considered synonymous with *Dictyoconus* by Hofker, jr. (1966). However, as already mentioned in the discussion on the genus, the difference in the wall-structures is here regarded as a decisive factor in separating these forms from the Orbitolinidae. It should be mentioned that the forms assignable to the genus *Coskinolina* in such a sense have been observed in a number of slides of the Eocene age. These forms are also endowed with a »keriothecal structure« of the wall, as well as with vertical radial partitions in the marginal zone. As already mentioned, this fact does not exclude the necessity of thoroughly revising such forms.

¹ All Eocene species of the genus *Lituonella* are described in the paper of A. Poignant (1964), which has been used for comparison.

Family Pfenderinidae Smout & Sugden, 1962

Genus *Pfenderina* Henson, 1948; emend. Smout & Sugden, 1962

After Smout & Sugden's (1962) excellent paper on the Pfenderinidae, little can be added to our knowledge of that group of foraminifers. Here it need only be mentioned that the genus *Meyendorffina* Aurouze & Bizon should be removed from that family, its definite systematic position remaining open. In contrast to Smout & Sugden (1962), and, according to them, Loeblich & Tappan (1964) and Redmond (1964a), who assigne *Meyendorffina bathonica* to the Pfenderinidae (= subfam. Pfenderininae in Loeblich & Tappan, 1964), Aurouze & Bizon (1958), Sartoni & Crescenti (1962), Bourrouilh & Moulade (1963) and Moulade (1965) assigne that form to the Orbitolinidae. — However, there exists a striking similarity in the stratigraphic extents of *Meyendorffina bathonica* and the large lituolid species *Orbitamina elliptica* (d'Archiac). These two forms usually occur together, or they are found in deposits corresponding to the same stratigraphic level. May we, therefore, assume that *Meyendorffina bathonica* represents in fact an A-form of *Orbitamina elliptica*? There are no considerable differences in the type of inner structural pattern of both these forms, which can be seen e. g. in Maync (1961, pl. 2) or Delance (1964, pl. 1) or even in Aurouze & Bizon (1958, pl. 3), where both »species« may be directly compared. The same can be also seen in our specimens, figured in pl. IV, fig. 3–4, although in the available material only rare and poorly preserved *Orbitamina* and *Meyendorffina* have been found. *Meyendorffina* has so far been found always as an A-form with a large spherical proloculus, while *Orbitamina elliptica*, admittedly, represents a microspheric form (Maync 1961, p. 10). Furthermore, to support the above mentioned presumption, the reproductive cycle of the related large lituolid species *Orbitopsella praecursor* (Gümbel) may also be remembered, where an analogous alternation of generations exists, and specimens of different generations (*Orbitopsella* and »*Coskinolinopsis*«) show also considerable differences in the size and outer shape of the test (mode of coiling, etc.) (Kochansky-Devidé 1956, 1958; Maync 1960, etc.). Anyway, to prove or to refute definitely the above mentioned presumption, a closer study of the inner structure of both these forms is admittedly needed.

Besides, some specimens figured by Smout & Sugden (1962) and determined as *Pfenderina neocomiensis* (Pfeender), deriving from the Bathonian of Arabia (op. cit., pl. 73, fig. 1–5; pl. 74, fig. 1–2), represented in fact a new species, which must now be assigned to Sartoni & Crescenti's (1962) species *P. salernitana*. The same may be said also for specimens depicted by Redmond (1964a) and assigned to *P. neocomiensis*. Redmond's paper (1964a) contains no reference to Sartoni & Crescenti's (1962) publication.

In the above mentioned paper by R e d m o n d (1964a), the author seems to have taken the same view as in his other paper on lituolid foraminifers (R e d m o n d, 1964b), which has been already subjected to a critical analysis by M a y n c (1965). In the paper dealing with the Pfenderinidae (R e d m o n d, 1964a) the same tendency of splitting-up large populations, resulting in the creation of a number of new taxa on account of differences in size and insignificant external features, can be seen. Besides, many statements lack adequate explanatory illustrative documentation, which concerns particularly generic descriptions, as is also the case in another of his papers, on the Lituolidae (R e d m o n d, 1964b). As to the new proposed genera, especially *Pfenderella* and *Steinekella*, the given photomicrographs – rather blurred pictures of isolated specimens, weathered to different degrees, or polished on one side only – hardly permit most of the features used as generic characteristics, such as the presence or absence of various types of subepidermal structures (which can, admittedly, be clearly seen in thin-sections only), to be discerned. Hence, the criticisms that could be made are essentially the same as those made by M a y n c (1965), although referring to another group of foraminifers.

As to R e d m o n d's (1965) reply to M a y n c's (1965) comments, leaving apart the justification of M a y n c's remarks, it should be pointed out that R e d m o n d's insistence that »... any conclusions as to which characteristics are important in differentiating closely-related species would best be left to a person with firsthand knowledge of the faunal succession in this area, and criticism could more gracefully come from workers in immediately surrounding areas who are working with essentially the same stratigraphic units« (R e d m o n d, 1965, p. 185) is not held to be acceptable. On the contrary, it seems to have completely missed the point, not even being in the habitual terms of discussion. We cannot agree that competence in paleontologic studies can be denied merely because of a lack of acquaintance with the complete biostratigraphy of the region. Besides, as he mentioned in his final remarks (M a y n c, 1966 b), most of M a y n c's remarks are not invalidated by R e d m o n d's (1965) reply.

Concerning the emendation of generic diagnoses for the genera *Pfenderina* and *Kurnubia*, and the newly established subfamilies Pfenderinae and Kurnubiinae respectively, the question remains why such features as the presence or absence of subepidermal partitions are rejected by R e d m o n d (1964 a) as diagnostic criteria. It should be noted that in this case we are concerned with an easily recognizable characteristic, especially suitable for routine determination work dealing with random thin-sections of hard calcareous rocks, when isolated and orientedly sectioned specimens are not obtainable. In our opinion, such reasons should not be neglected, whenever possible, even in »pure« paleontologic studies.

In any case, it is to be highly regretted that Redmond (1964 a) did not figure any section of his abundant material, which might, certainly, have facilitated a better understanding of his explanations.

The presumption that subepidermal structures appear in various stages during phylogenetic development, as stated by Redmond (1964 a), does not invalidate its diagnostic value. Besides, Smout & Sugden (1962) have already anticipated such a possibility, retaining at the same time the diagnostic value of the feature. On the contrary, the secondary infilling of the labyrinthic passages of the columella, taken by Redmond (1964 a) as the basis for distinguishing the newly established subfamilies Kurnubiinae and Pfenderinae, may occur in both *Pfenderina* and *Kurnubia*, although it is usually more developed in *Pfenderina*. Therefore it is here suggested to retain the presence or absence of subepidermal structures as the diagnostic feature for the genera *Kurnubia* and *Pfenderina*, as it has been proposed already by Smout & Sugden (1962).

In the same paper Redmond (1964 a) established two new species of *Pfenderina*. *P. gracilis* is defined as being much smaller than *P. neocomiensis* of Smout & Sugden (= *P. salernitana*) and having fewer chambers per whorl. *P. inflata*, on the other hand, is reported to be intermediate in size between *P. gracilis* and *P. neocomiensis* of Smout & Sugden (= *P. salernitana*), and differing from both of these species in the higher degree of inflation of the individual chambers. However, the validity of setting up a new species based merely on differences in size (*P. gracilis*) appears debatable. Moreover, the alleged inflation of the chambers in *P. inflata* is not satisfactorily brought out in the photographs, apart from the question of whether a slight variation in external shape could serve as a reliable specific characteristic. Accordingly, although the two mentioned Redmond's (1964a) species occur in different levels (*P. gracilis* is reported to derive from the Bathonian or Callovian, and *P. inflata* from the Bajocian), we agree with Maync's (1966a) statement that »the erection of new species on the basis of their different size (*P. gracilis*, *P. inflata*) is not held acceptable . . .« (op. cit., p. 11, foot-note 9). Redmond (1964a) and Maync (1966a) have shown also that the species *Pfenderina butterlini* Brun (1962) from the Middle Lias of Morocco should be removed from the genus *Pfenderina* and thus cannot serve as a valid basis for emendation of *Pfenderina*, as proposed by Brun (1962). Similar forms were observed also in the investigated material, ranging from the Upper Lias to the Lower Malm, from various localities (pl. VII, fig. 2-5), sometimes accompanied by »true« Kurnubias (i. e. species *K. palastiniensis*). In a previous unpublished report (Gušić, 1965) such forms were determined as »Trochamminidae« after Sartoni & Crescenti (1962, pl. 49, fig. 4-7), but it was noted that they display more similarity with the genus *Kurnubia* than with *Pfenderina*,

although the type of subepidermal structure is not identical either to that of the genus *Kurnubia* or similar forms (*Pseudocyclamina*, *Chofatella* etc.; see Brun, 1962, p. 186, and Maync, 1966a, p. 11, foot-note 9).

Finally, Maync (1966a) also performed a short revision of the nomenclature of the genus *Pfenderina*. As already mentioned, he refuted Redmond's (1964a) species based merely on the differences in size, or slightly varying external shape. However, Maync (1966a) considers, furthermore, that there is no reason to differentiate either the species *P. trochoidea* from *P. neocomiensis*. In proof of such a consideration he quotes Smout & Sugden's (1962) statement that »... *P. trochoidea* is identical with *P. neocomiensis* in all characters which do not depend on the shape of spire and its measurements« and »... *P. trochoidea* is so similar to *P. neocomiensis* in all characters not affected by the helicoid component of the coiling, that it is surprising that no intermediate specimens have been found« (Maync, 1966a, p. 11, foot-note 9, after: Smout & Sugden, 1962, p. 588 and 589). Besides, the fact that both species were found together in the same sediments (Bathonian, Callovian and Oxfordian of the Middle East) is considered by Maync (1966a) as »another fact which leads us to doubt the justification to separate *Pf. trochoidea* from the species *Pf. neocomiensis*« (op. cit., p. 11, foot-note 9). However, here Maync does not take into account the fact the specimens determined by Smout & Sugden (1962) as *P. neocomiensis* should be assigned to the species *P. salernitana*, although a few lines before he states: »Elongate types like those figured by Smout & Sugden (1962; Pl. 73, fig. 1-5; Pl. 74, fig. 1-2) and assigned to *P. neocomiensis* hardly fall within the range of variability of the species (= *P. neocomiensis*) as defined by Juliette Pfender.« (Maync, 1966a, p. 11, foot-note 9). And even though Smout & Sugden (1962) in comparing their species (*P. trochoidea*) with *P. neocomiensis* in fact define the differences between *P. trochoidea* and *P. salernitana* (and not *P. neocomiensis*!), which are clearly distinguishable, it is here, nevertheless, considered that the separation of the species *P. trochoidea* and *P. neocomiensis* is sufficiently justified. As proof of this statement it suffices to compare the descriptions given by J. Pfender (1938) of the species *P. neocomiensis* and by Smout & Sugden (1962) of the species *P. trochoidea*, attracting attention particularly to the dimensions - height of the spire (test) and diameter (width) of the test, and to the relation of these values. The differences between all three species (*P. neocomiensis*, *P. trochoidea* and *P. salernitana*) are presented by Sartoni & Crescenzi (1962, p. 281), and here a compiled table is given for easier comparison, showing the relationship between height (H) and diameter (D) for the three species of the genus *Pfenderina*.

Gušić: Jurassic Foraminifers

Species	H/D		after
<i>P. trochoidea</i>	0,60	Smout & Sugden (1962)	p. 586, fig. 1: E-H
	0,65		p. 588, dimensions
	ca 0,60	our specimens	pl. VI, fig. 3
<i>P. neocomiensis</i>	1,80	P f e n d e r (1938)	pl. 16, fig. 1
	2,06		pl. 16, fig. 2
	2,50		our specimens
<i>P. salernitana</i>	3,40	Smout & Sugden (1962)	p. 586, dimensions (for <i>P. neocomiensis</i>)
	4,00		p. 586, fig. 1 D
	4,60	Sart. & Crescenti, (1962), p. 281	
	3,00	our specimens	pl. VI, fig. 2

As is evident, the differences in the shape of the test between the species *P. neocomiensis* and *P. trochoidea*, even when partially affected by the obliqueness of sections, are such that differentiating the species *P. trochoidea* from *P. neocomiensis* appears sufficiently justified, apart from their different stratigraphic extent. On the contrary, some specimens of the species *P. salernitana* come considerably close to the species *P. neocomiensis* in their H/D relationship. However, between the species *P. neocomiensis* and *P. salernitana* some differences in the structure of the central labyrinthic interior part of the test exist. They are described in the description of the species and can also be observed in random thin-sections.

Stratigraphic position: The species *P. salernitana* and *P. trochoidea* usually occur together. In the investigated material they occur immediately below the Lower Malmian microfossil association (*Kurnubia* ex gr. *palastiniensis*, abundant *Cladocoropsis mirabilis*, some *Dasycladaceae*), and sometimes also together with the afore mentioned assemblage, so that their stratigraphic position can be defined as the Upper Dogger, eventually the Lowermost Malm.

As to the species *P. neocomiensis*, its occurrence in the investigated material seems to be limited to a restricted horizon immediately below the proved Lower Cretaceous sediments (Korana river, NW of Slunj), which agrees with the previously published data on its stratigraphic position in Europe (P f e n d e r, 1938; D u f a u r e, 1958, etc.).

Pfenderina salernitana Sartoni & Crescenti, 1962

Pl. VI, fig. 2; pl. VII, fig. 1

1962. *Pfenderina neocomiensis*. – Smout & Sugden, p. 585, pl. 73, fig. 1–5, 6?, 7?; pl. 74, fig. 1–2, 3?, 7?; text-fig. 1, A–D.
1962. *Pfenderina neocomiensis*. – De Castro, pl. 14, fig. 1.
1962. *Pfenderina salernitana*. – Sartoni & Crescenti, p. 280, pl. 16; pl. 17, fig. 1–2; pl. 50, fig. 1, 4, 7.
1963. *Pfenderina salernitana*. – De Castro, pl. 3; pl. 4, fig. 2.
- 1964a. *Pfenderina neocomiensis*. – Redmond, p. 255, pl. 1, fig. 11–13.
1966. *Pfenderina salernitana*. – Dondi, Papetti & Tedeschi, pl. 5, fig. 5, 9.
- 1966a. *Pfenderina salernitana*. – Maync, pl. 4, fig. 8, 9.
1966. *Pfenderina salernitana*. – Derin & Reiss, fig. 71, 144, 145.
1966. *Pfenderina salernitana*. – Radoičić, pl. 30, fig. 2; pl. 102, fig. 1–2.
1966. *Pfenderina* sp. – Radoičić, pl. 32, fig. 1.
1968. *Pfenderina salernitana*. – Nikler & Sokač, pl. 8, fig. 3–4, pl. 9, fig. 4.

This species is distinguished from the other species of the genus by the elongate and highly conical shape of the test (see the H/D relationship in the table on p. 75). The differences in that feature from the species *P. trochoidea* are obvious; on the contrary, a greater similarity with the species *P. neocomiensis* can be noted.

However, the whorls in *P. neocomiensis* are more clearly developed and the chamber walls more inflated. Besides, the central column in *P. salernitana* lacks a »spongy« labyrinthic structure as in *P. neocomiensis* and *P. trochoidea*, being entirely homogeneous and appearing dark in thin-sections. Moreover, the infilling of labyrinthic passages in *P. salernitana* has taken place in all whorls, including the last one, as distinct from the species *P. neocomiensis* and *P. trochoidea*.

Pfenderina trochoidea Smout & Sugden, 1962

Pl. VI, fig. 3, 4?

1962. *Pfenderina trochoidea*. – Smout & Sugden, p. 588; text-fig. 1 (E–H); pl. 73, fig. 8–15, 21; pl. 74, fig. 4–6, pl. 75, fig. 1–6.
1962. *Pfenderina trochoidea*. – Sartoni & Crescenti, p. 282; pl. 17, fig. 2; pl. 49, fig. 2, 8.
- 1964a. *Pfenderina trochoidea*. – Redmond, p. 256; pl. 1, fig. 1–3.
- 1966a. *Pfenderina neocomiensis-trochoidea*. – Maync, pl. 4, fig. 5–7.
1966. *Pfenderina* sp. (gr. *neocomiensis-trochoidea*). – Derin & Reiss, fig. 146.
1966. *Pfenderina trochoidea*. – Radoičić, pl. 31, fig. 1.
1968. *Pfenderina trochoidea*. – Nikler & Sokač, pl. 8, fig. 6.

The shape of the test is very low trochospiral, nearly planispiral, so that the axial height of the test usually does not attain the maximum diameter (see the H/D relationship in the table on p. 75). Besides, the central column shows a characteristic »spongy« labyrinthic structure and the infilling of labyrinthic passages does not take place up to the last whorl.

Pfenderina neocomiensis (P f e n d e r), 1938

Pl. VI, fig. 1

1938. *Eorupertia neocomiensis*. - P f e n d e r, p. 236, pl. 16, fig. 1-7.

1958. *Pfenderina neocomiensis*. - D u f a u r e, pl. 2, fig. 4-6.

By the shape of the test this species approaches nearer to the species *P. salernitana* than to *P. trochoidea*. The differences are mentioned in the description of *P. salernitana*, the spongy structure of the central column being a characteristic feature of this species, in contrast to *P. salernitana*.

Genus *Kurnubia* H e n s o n, 1948

Smout & Sugden (1962) removed Henson's (1948b) species *Ualvulinella wellingsi* and *U. jurassica* from the genus *Ualvulinella* and assigned them to the genus *Kurnubia*, but they did not redescribe the species of *Kurnubia*. That means that they accepted, implicitly, the differences between these forms as described by Henson (1948b), reducing these to an intraspecific rank, although recognizing the existence of intermediate forms between the species *K. jurassica* and *K. palastiniensis*, i. e. between the forms lacking a uniserial final stage and those with a rather well-developed uniserial stage.

Sartoni & Crescenti (1962, p. 284) considered the species *K. jurassica* and *K. palastiniensis* synonymous, because of the existence of intermediate forms. Accordingly, Sartoni & Crescenti (1962) distinguish two species within the genus *Kurnubia*; both may have a more or less developed uniserial stage, being distinguished from each other by the fact that *K. palastiniensis* has a lower spire, the whorls increasing in depth less rapidly, and being considerably smaller in size than *K. wellingsi*.

As to the new species of *Kurnubia* proposed by Redmond (1964a), the same remarks can be made as already mentioned in the discussion on the genus *Pfenderina*. Maync also repeatedly refuted such »extreme pulverization of the morphologically greatly varying, but intergrading plexus into different genera and more than fifteen species, as recently proposed by Redmond (1964a)« (Maync, 1965, p. 37; 1966a, p. 12, foot-note 10). In the same papers Maync also states that the he observed

all transitions between *K. palastiniensis* and *K. jurassica* and *K. wellingsi*, as well as the fact that all these varying but intergrading morphotypes may occur jointly at the type-locality Kurnub, Israel, which is highly suggestive of their biological unity. Therefore he prefers to include all these forms in one plexus, comprising also Redmond's (1964a) species *K. bramkampi* and *K. variabilis* (Maync, 1965, p. 37, foot-note 1; 1966a, p. 12, foot-note 10).

In the investigated material, in a large number of variously oriented sections, the same situation can be revealed. Thus, for instance, specimens figured in pl. VIII, fig. 1, 2, 4 may be determined as fairly typical representatives of the »species« *K. wellingsi*, whereas some specimens figured in pl. X, fig. 3-6 seem to be nearer to the »species« *K. jurassica*. Almost all other specimens, particularly those in pl. IX, fig. 1-5 may be inserted, both by virtue of their size and their morphologic features, between the two mentioned species which represent extreme forms within the genus *Kurnubia*. Accordingly, most other specimens should be assigned to the species *K. palastiniensis*. But there are some specimens, in addition, which show transitional characteristics between the »species« *K. jurassica* and *K. palastiniensis* (pl. X, fig. 1-2). On the other hand, the specimen figured in pl. VIII, fig. 3, as well as the specimens in pl. IX, fig. 6, may be placed between the »species« *K. palastiniensis* and *K. wellingsi*, although it is more difficult to discern in transversal sections, such as in pl. IX, fig. 6. Besides the above cited examples, a general impression of the uniformity of the various species of the genus *Kurnubia* can also be obtained by studying a large amount of variously oriented sections, the overall impression gained being quite difficult to define in precise terms. Accordingly, Maync's opinion appears to be justified and has therefore been adopted in the present paper, although a slight modification is proposed. Namely, Maync (1966a) defines his specimens as *Kurnubia* gr. *palastiniensis*, distinguishing 3 »types«: *palastiniensis*, *jurassica* and *wellingsi* (Maync, 1966a, pl. 5, fig. 1-16). Probably Maync employs the term »type« having in mind the possibility that these morphotypes may account for a di- or trimorphism, »which can be clarified only by a detailed study of a large number of oriented thin-sections.« (Maync, 1966a, p. 12, foot-note 10). Such a presumption may prove to be true. However, it is also possible that the morphologic variations should be regarded as separate taxonomic categories of a lower rank. Therefore it is here suggested that the three Henson's species of *Kurnubia* should be considered as »formae«, the lowest infrasubspecific taxon. In cases when we are dealing with fairly typical specimens, we are allowed to denominate the form, as is the case with our specimens mentioned in the foregoing pages. However, in the routine determination work as well as in dealing with inadequately preserved or intergrading specimens such determination may be omitted without affecting the validity and integrality of the species. Accepting the above, the terminology applied conforms with the

International Rules of Zoological Nomenclature, according to which the term »type« denotes quite a different and strictly defined meaning (holotype, type-species, etc.).

Stratigraphic position: Most authors agree in assigning *K. palastiniensis* (in the sense defined above, i. e. including the three Henson's species) to the Malm, while Sartoni & Crescenti (1962) restrict its stratigraphic range to the Lower Malm and the Callovian respectively. In the Dinarids this species is not limited to the Lower Malm only, although its occurrence in the Lower Malm seems to be more common, as is also the case in the area investigated (Gušić, 1969).

Only Maync (1966a) and Derin & Reiss (1966) report findings of *Kurnubia* gr. *palastiniensis* ranging from the Bajocian and the Bathonian. However, some specimens figured by Derin & Reiss (1966, fig. 125, 126, 134, 135, 146 and maybe some others), reported to derive from the Bathonian, represent rather problematically determinable sections, which are undoubtedly related to *Kurnubia*, but which do not permit a definite determination. Perhaps some of them should be assigned to the already mentioned forms determined by Sartoni & Crescenti (1962) as »*Trochamminidae*«.

Kurnubia ex gr. *palastiniensis* Henson, 1948

Pl. VIII-X

As already mentioned in the foregoing discussion on the genus, specimens displaying rather wide morphologic variations and considerable differences in size are included within the range of the species. Therefore a subdivision into three taxa of infrasubspecies rank is proposed. However, such a determination can be carried out only when typical representatives of separate »forms« are available.

Dimensions in mm:

	forma »jurassica«	forma »palastiniensis«	forma »wellingsi«
Length	0,65-1,60	1,20-1,40	1,60-2,86
Diameter	0,26-0,44	0,40-0,62	0,70-1,10

SHORT REMARKS ON SOME OTHER GENERA

Orbitopsella Munier-Chalmas. Kochansky-Devidé (1956, 1958) showed that the genus *Coskinolinopsis* Henson (1948a) represent in fact megalospheric specimens (A-generation) of the well-known Middle Liassic species *O. praecursor* (Gümbel). Later, this was

accepted by almost all authors (Maync, 1960; Sartoni & Crescenti, 1962; Loeblich & Tappan, 1964; Neumann, 1967, etc.).

However, a tendency to »resurrect« the genus *Coskinolinopsis* can be revealed in recent papers by some Italian authors (Pirini, 1956; Dondi, Papetti & Tedeschi, 1966; Canuti & Marcucci, 1966). But the above mentioned authors give neither new information, nor any scientifically established argument supported by newly discovered data; they explain their standpoint only by general expressions, such as: »...le differenze morfologiche con *Orbitopsella* sono notevoli«, »...gli elementi strutturali di *Orbitopsella* differiscono da quelli di *Coskinolinopsis*...« (Pirini, 1965, p. 1172), without specifying what these differences are. Therefore such a consideration is here refuted. As can be seen from the above quotations, there are no well-founded reasons for attempting a reinvestigation at the present time.

Protopenneroplis Weynschenk. After Farinacci's (1964) paper little can be added to our knowledge of this genus. However, a problem of classification of that foraminifer still remains unsolved, though Farinacci (1964) performed a revision of the systematic position of *Protopenneroplis*. Judging by the wall-structure it seems that the most adequate classification would be the one combined from both the classification proposed by Loeblich & Tappan (1964), and that by Farinacci (1964). Thus the genus *Protopenneroplis* should be removed from the family Involutinidae, in which the genera such as *Involutina*, *Auloturitus* (= *Permodiscus*?), *Trocholina* and similar forms, characterized by fibrous single-layered walls, are included, in order to be assigned to the subfamily Loeblichinae (= Nanicellinae in Farinacci, 1964; according to Loeblich & Tappan, 1964, the name Nanicellinae is to be considered as a younger synonym of the Loeblichinae). The subfamily Loeblichinae, however, should be included in the family Endothyridae, and not in the Nodosariidae (= Lagenidae in Farinacci, 1964, according to Rauzer-Černousova & Fursenko, 1959), as has been proposed by Fursenko (in Rauzer-Černousova & Fursenko, 1959) and according to her, by Farinacci (1964).

Such a classification of *Protopenneroplis* seems to be justified by its wall-structure. The wall consists of two distinct layers, the inner layer being dark and microcrystalline, the outer layer light and distinctly radially perforated (fibrous). Such wall-structure is characteristic of the Endothyridae, even of the Endothyracea, but not of Nodosariidae (= Lagenidae in Rauzer-Černousova & Fursenko, 1959). Such a wall-structure of *Protopenneroplis* can be clearly seen in almost all the specimens figured in various publications up to this time, and therefore proves to be a constant characteristic (pl. XV, fig. 4-7).

Nautiloculina Mohler. Specimens assignable to the species *N. oolithica* Mohler (1938) have been observed not only in the Malm., but also in the Lias. That means that the stratigraphic range of the species ought to be considerably enlarged. Besides, in the oolithic limestone of the Lower Malmian age (with *Labyrinthina mirabilis*, *Protopeneroptis striata* and rare *Kurnubia palastiniensis*) in the area of the Korana river, specimens have been found representing probably a new subspecies of the species *N. oolithica* (pl. XV, fig. 1-3). They differ from the type-species *N. oolithica* by having septa almost twice as far removed as in *N. oolithica*, so that the length/diameter (height) relationship of the chambers, particularly in the last whorl, is almost 2 : 1. In *N. oolithica*, on the contrary, the height (diameter) of the chambers equals the length, so that the chambers have approximately a quadratic shape in an equatorial (median) section. However, the available material is too scarce for a more complete diagnosis. Radoičić (1966, pl. 43) figured identical forms under the name of *Nautiloculina* sp.

SUPPLEMENT

When this paper was already in the course of printing, the author was given the opportunity of seeing the recent paper by Hottinger (1967). Unfortunately, it was no longer possible to take into account a number of highly interesting considerations made by Hottinger (1967) which would have, certainly, changed or perhaps even invalidated some of the considerations given in the present paper. However, leaving aside the incomparably greater significance of Hottinger's (1967) paper, it should be mentioned here, that, in spite of obvious discrepancies mainly concerning the treatment of species and other taxa, some general considerations reveal a remarkable similarity between Hottinger's (1967) and the present paper.

Received 10th October 1968.

Department of Geology and Paleontology
Faculty of Science, Zagreb,
Socijalističke revolucije 8

REFERENCES

- Auroze, G. & Bizon, J. J. (1958): Rapports et différences des deux genres de Foraminifères: *Kilianina* (Pfender) et *Meyendorffina* n. gen. Rev. Micropal. 1/2, 67-74, pl. 1-3, fig. 1, Paris.
- Bourrouilh, R. & Moullade, M. (1963): Étude stratigraphique et micropaléontologique d'une série jurassique de l'île de Minorque, Baléares (Espagne). Bull. Soc. géol. France (7), 5, 375-382, pl. 16, fig. 1-2, Paris.
- Brun, L. (1962): Note sur le genre *Pfenderina* Henson 1948. Description d'une nouvelle espèce (*Pfenderina butterlini*) dans le Domérien du Maroc. Rev. Micropal. 5/3, 185-190, pl. 1-2, Paris.

- Bykova, N. K. & al. (1958): Novye rody i vidy foraminifer. Trudy VNIGRI 115, Mikrofauna SSSR 9, 4-81, pl. 1-12. Leningrad.
- Canuti, P. & Marcucci, M. (1966): Microfacies dei calcari grigi liassici di Lavarone (Trento). Atti Soc. Tosc. Nat., Mem., (A), 73, 518-530, pl. 1-5, 1 map. Pisa.
- Cati, F. (1959): Nuovo Lituolide nei calcari grigi liassici del Vicentino. Giorn. Geol. (Ann. Museo Geol. Bologna) (2), 27, 103-112, pl. 1, text-fig. 1-2. Bologna.
- Čanović, M. (1959): Neki mikropaleontološki podaci za izdvajanje sedimenata donje krede na terenu Trebinja (Hercegovina). Geol. glasnik 3, 23-27, pl. 1-2. Titograd.
- Čanović, M. (1963): Stratigrafski profil bušotine Grahovo-1 (Gr-1). Vesnik Zav. geol. geofiz. istr. (A), 21, 41-50, pl. 1-7, 1 annexe. Beograd.
- De Castro, P. (1962): Il Giura-Lias dei Monti Lattari e dei rilievi and ovest della Valle dell'Irno e della Piana di Montoro. Boll. Soc. Nat. Napoli 71, 3-34, pl. 1-19, text-fig. 1-5. Napoli.
- De Castro, P. (1963): Sulla presenza del Giura (Dogger e Malm) nei Monti Aurunci. Boll. Soc. Nat. Napoli 71, 16-19, pl. 1-4. Napoli.
- Delance, J. H. (1964): *Meyendorffina* et *Orbitamina* dans les calcaires de Comblanchien au sud-ouest de Dijon. Rev. Micropal. 7/3, 219-222, pl. 1. Paris.
- Derin, B. & Reiss, Z. (1966): Jurassic Microfacies of Israel. 43 pp., 320 fig. Israel Inst. Petr., Spec. publ. Tel Aviv.
- Dondi, L., Papetti, I. & Tedeschi, D. (1966): Contributo alle conoscenze del Mesozoico del sottosuolo Abruzzese. Geol. Romana 5, 69-98, pl. 1-8, fig. 1-9. Roma.
- Dougllass, R. C. (1960): Revision of the family Orbitolinidae. Micropaleontology 6/3, 249-270, pl. 1-6, text-fig. 1-3, 1 table. New York.
- Dufaure, Ph. (1958): Contribution à l'étude stratigraphique et micropaléontologique du Jurassique et du Neocomien, de l'Aquitaine à la Provence. Rév. Micropal. 1/2, 87-115, pl. 1-6. Paris.
- Farinaci, A. (1964): Sulla posizione sistematica e stratigrafica di *Protopeneroptis striata* Weynschenk, 1950 (Foraminifera). Geol. Romana 3, 41-48, fig. 1-5. Roma.
- Fourcade, E. & Neumann, M. (1966): À propos des genres *Labyrinthina* Weynschenk, 1951 et *Lituosepta* Cati, 1959. Rev. Micropal. 8/4, 233-239, pl. 1-2, text-fig. 1-2. Paris.
- Gušić, I. (1965): Izvještaj o mikropaleontološkoj analizi uzoraka lista Udbina 105. Arch. Inst. geol. research. Unpublished report.
- Gušić, I. (1969): Biostratigrafske i mikropaleontološke karakteristike nekih jurskih profila iz područja centralne Hrvatske. Geol. vjesnik 22, 89-97, 2 annexes. Zagreb.
- Henson, F. R. S. (1948a): Larger imperforate Foraminifera of South-Western Asia. Families: Lituolidae, Orbitolinidae, Meandropsinidae. XI+127, pl. 1-16, text-fig. 1-16. British Museum (Nat. Hist.). London.
- Henson, F. R. S. (1948b): New Trochamminidae and Verneuilinidae from the Middle East. Ann. & Mag. Nat. Hist. (11), 14/117, 605-627, pl. 14-18, text-fig. 1. London.
- Hofker, J., jr. (1966): Studies on the family Orbitolinidae. Palaeontographica (A), 126/1-2, 1-34, pl. 1-10, text-fig. 1-11. Stuttgart.
- Hottinger, L. (1967): Foraminifères imperforés du Mésozoïque marocain. Notes & Mém. Service Géol. Maroc 209, 1-168, pl. 1-20, text-fig. 1-61. Rabat.
- Kochansky-Devidé, V. (1956): Makro- und mikrosphärische Generation der *Orbitopsella praecursor* im Lias von Plitvice (Kroatien). Bull. scient., Cons. Acad. RPF Yougosl. 3/2, 47, Zagreb.
- Kochansky-Devidé, V. (1958): Izmjena generacija vrste *Orbitopsella praecursor* u lijasu Plitvica. Geol. vjesnik 11, 77-86, pl. 1-3. Zagreb.

- Loeblich, A. R. & Tappan, H. (1964): Protista 2; Sarcodina; chiefly »Thecamoebians« and Foraminiferida, 1-2; in: Moore, R. C. (editor): Treatise on Invertebrate Paleontology, C, XXXI+900, fig. 1-653. Geol. Soc. Am. & Univ. Kansas Press.
- Maync, W. (1952): Critical taxonomic study and nomenclatural revision of the Lituolidae based upon the prototype of the family, *Lituola nauiloidea* Lamarck, 1804. Contr. Cushman Found. Foram. Res. 3/2, 35-36.
- Maync, W. (1959): On some larger arenaceous Foraminifera from the Liassic limestone section of Monte Baldo, east of Lago di Garda, Italy. Riv. Ital. Paleont. Strat. 65/4, 367-382, pl. 21-24. Milano.
- Maync, W. (1960): Morphology and occurrence of the foraminiferal genus *Orbitopsella*. Riv. Ital. Paleont. Strat. 66/4, 491-524, pl. 44-49, text-fig. 1-4, Milano.
- Maync, W. (1961): Note sur le genre *Orbitamina* (Foraminifère) et sa repartition stratigraphique. Rev. Micropal. 4/1, 7-16, pl. 1-2, text-fig. 1. Paris.
- Maync, W. (1965): Some comments on D. C. Redmond's new lituolid Foraminifera from Saudi Arabia. Rev. Micropal. 8/1, 37-40. Paris.
- Maync, W. (1966a): Microbiostratigraphy of the Jurassic of Israel. Geol. Survey Bull. 40, 1-56, pl. 1-15. Jerusalem.
- Maync, W. (1966b): Final remarks on D. C. Redmond's new lituolid Foraminifera from Saudi Arabia. Rev. Micropal. 9/1, 56. Paris.
- Mohler, W. (1938): Mikropaläontologische Untersuchungen in der nordschweizerischen Juraformation. Abh. Schweiz. Palaeont. Gesellsch. 60, 1-53, pl. 1-4, text-fig. 1-10. Basel.
- Moullade, M. (1965): Contribution au problème de la classification des Orbitolidae (Foraminiferida, Lituolacea). C. R. Acad. Sc. Paris, t. 260, groupe 9, 4031-4034. Paris.
- Neumann, M. (1967): Manuel de Micropaléontologie des Foraminifères. I, IX+297, pl. 1-60, fig. 1-182, 12 tables. Gauthier-Villars, Paris.
- Nikler, L., Sokač, B. & Ivanović, A. (1964): Die Gesellschaften der Mikrofossilien der Jura und Kreide des südöstlichen Velebit. Bull. Scient., Cons. Acad. RSF Yougosl. (A), 9/3, 67-68. Zagreb.
- Nikler, L. & Sokač, B. (1967): Fosilne Dasycladaceae gornje jure Velebita i sjeverozapadne Velike Kapele. Rad Jugosl. Akad. 345, 101-134, tab. 1-8. Zagreb.
- Nikler, L. & Sokač, B. (1968): Biostratigraphy of the Jurassic of Velebit (Croatia). Geol. vjesnik 21, 161-176, pl. 1-13. Zagreb.
- Pfender, J. (1938): Les Foraminifères du Valanginien provençal. Bull. Soc. géol. France (5), 8/2, 231-242, pl. 13-16. Paris.
- Pirini, C. (1965): Presenza di »*Orbitopsella praecursor*« (Gumbel) nella zona di Monte Marsicano (Abruzzo). Riv. Ital. Paleont. Strat. 71/4, 1169-1178, pl. 100-101. Milano.
- Poignant, A. (1964): Aperçu sur les différentes espèces de Lituonelles et notamment celles d'Aquitaine. Rev. Micropal. 6/4, 211-222, pl. 1-2. Paris.
- Radoičić, R. (1962): O jednoj novoj gornjojurskoj dazikladacci *Pianella grudii* nov. gen., nov. spec. Vesnik Zav. geol. geof. istr. (A), 201-209, pl. 1-3, text-fig. 1-4. Beograd.
- Radoičić, R. (1964): Mikropaleontološke odlike i stratigrafska korelacija nekih jurskih stubova spoljašnjih Dinarida. Nafta 15/10, 294-303, fig. 1-4. Zagreb.
- Radoičić, R. (1965): *Teutloporella gallaeformis* spec. nov. iz jure spoljašnjih Dinarida. Geol. glasnik 4, 219-226, pl. 1-4. Titograd.
- Radoičić, R. (1966): Microfaciès du Jurassique des Dinarides externes de la Yougoslavie. Geologija 9, 5-23, tables 1-13, pl. 1-156. Ljubljana.

- Rauzer-Černousova, D. M. & Fursenko, A. V. (1959): Obščaja čast, Prostějšic; in Orlov, Ju. A. (red.): Osnovy palcontologii, 482 p. Akad. nauk SSSR, Moskva.
- Redmond, D. C. (1964a): The foraminiferal family Pfenderinidae in the Jurassic of Saudi Arabia. *Micropaleontology* 10/2, 251-263, pl. 1-2, text-fig. 1-3. New York.
- Redmond, D. C. (1964b): Lituolid foraminifera from the Jurassic and Cretaceous of Saudi Arabia. *Micropaleontology* 10/4, 405-414, pl. 1-2, text-fig. 1-2. New York.
- Redmond, D. C. (1965): A reply to Wolf Maync's »Some comments on C. D. Redmond's new lituolid Foraminifera from Saudi Arabia«. *Rev. Micropal.* 8/3, 185-188. Paris.
- Sartoni, S. & Crescenti, U. (1959): La zona a *Palaeodasycladadus mediterraneus* (Pia) nel Lias dell'Appennino meridionale. *Giorn. Geol. (Ann. Museo Geol. Bologna)* (2), 27, 115-139, pl. 1-3, text-fig. 1-2. Bologna.
- Sartoni, S. & Crescenti, U. (1962): Ricerche biostratigrafiche nel Mesozoico dell'Appennino meridionale. *Giorn. Geol. (Ann. Museo Geol. Bologna)* (2), 29, 162-302, pl. 11-52, 1 table. Bologna.
- Smout, A. H. & Sugden, W. (1962): New information on the foraminiferal genus *Pfenderina*. *Palaeontology* 4/4, 581-591, pl. 73-76, text-fig. 1. London.
- Sokač, B. & Nikler, L. (1967): *Teutloporella elongatula* (Praturlon, 1966) Sokač & Nikler, calcareous alga from the Middle Liassic of Velebit. *Geol. vjesnik* 20, 111-116, pl. 1-6. Zagreb.
- Sokač, B. & Nikler, L. (1969): O vrstama roda *Petrascula* iz donjeg lijasa Velebita. *Acta geol. Jugosl. Akad.* 6, 103-112, pl. 1-7. Zagreb.
- Weynschenk, R. (1951): Two new foraminifera from the Dogger and Upper Triassic of the Sonwend Mountains of Tyrol. *J. Pal.* 25/6, 793-795, text-fig. 1-3, 1 table. Tulsa.
- Weynschenk, R. (1956): Some rare Jurassic index foraminifera. *Micropaleontology* 2/3, 283-286, pl. 1, text-fig. 1-3, 1 table. New York.

I. G U Š I Ć

NEKE NOVE I NEDOVOLJNO POZNATE JURSKE FORAMINIFERE IZ PODRUČJA CENTRALNE HRVATSKE

Pod uvjetnim nazivom centralna Hrvatska obuhvaćeno je područje koje se pruža od Karlovca prema jugozapadu do primorskih padina Velike Kapele, a prema jugoistoku do Ličke Plješevice. U tom području jurske naslage otkrivene su na velikom broju lokaliteta s mnogo izdanaka. Međutim, kako su makrofosili u tim naslagama vezani isključivo za rijetke i stratigrafski strogo ograničene nivoe, a osim toga njihovo prisustvo često je uvjetovano i tipom facijelnog razvoja, glavna pažnja posvećena je proučavanju mikrofosila u izbruscima.

Palcontološkim istraživanjima podvrgnuta je isključivo mikrofauna, tj. foraminifere. Razlog tome leži u činjenici da su vapnenačke alge, osobito Dasycladaceae, koje uz foraminifere predstavljaju osnovni i gotovo jedini mikropaleontološki vrijedan materijal u jurskim naslagama, bile u novije vrijeme objekt izučavanja većeg broja radova (Radoičić 1962, 1965; Nikler & Sokač 1967, Sokač & Nikler 1967, 1969; i dr.). Za razliku od toga, foraminifere se spominju samo u stratigrafskim radovima, i to jedino kao dokumentacija stratigrafske pripadnosti, što se obično svodi na nabranje u listama fosila (Nikler, Sokač & Ivanović 1964; Radoičić

1964, 1966; i u nekima od gore citiranih radova o algama kao popratni fosili). Zato su ovim istraživanjima obrađene sve glavne foraminifere koje su susretane u sakupljenom materijalu, bez obzira što se većim dijelom radi o već poznatim oblicima. Većina tih oblika uglavnom je do sada i u stranjoj literaturi prikazana oskudno i nepotpuno, a o nekima od njih postoje još i danas divergentna mišljenja u pogledu njihove taksionomske pripadnosti, odnosno o validitetu ili ne-validitetu nekih publiciranih rodova. Zato su u ovom radu izneseni svi osnovni rezultati do kojih se došlo paleontološkim istraživanjem pojedinih foraminiferskih vrsta.

Postoji još jedan razlog da je glavna pažnja posvećena foraminiferama, a to je da su u istraživanom području foraminifere obilatije zastupane i ravnomjernije pro storno raspoređene nego vrpčaste alge, pa su i biostratigrafski rezultati istraživanja, koji su prikazani u posebnom radu (Gušić, 1969), dobijeni većinom na osnovu izučavanja foraminifera i njihovog vertikalnog odnosno prostornog rasprostranjenja.

Terenkim radom sakupljeno je oko 3000 uzoraka, od kojih je do sada načinjeno i pregledano preko 1000 preparata. Od tih je oko 200 sadržavalo paleontološki vrijedan materijal, pa je od tih uzoraka onda načinjen po potrebi veći broj preparata za daljnja paleontološka istraživanja.

Svi izbrusci čuvaju se u Geološko-paleontološkom zavodu Prirodoslovno-matematičkog fakulteta, pod oznakom G i brojem.

Obrađene su vrste rodova: *Haurania*, *Orbitopsella*, *Labyrinthina* (= *Litosepta*), *Mesoendothyra*, *Pfenderina*, *Kurnubia*, *Meyendorffina*, *Lituonella*, *Protopeneroplis* i *Nautiloculina*.

Rod *Haurania*: Obrađene su vrste *H. deserta* Henson i *H. amiji* Henson, a na osnovu nekih indicija ukazano je i na mogućnost da se možda radi i o jednoj te istoj vrsti. Zbog nedostatka materijala to pitanje ostavljeno je za sada otvorenim. Redmondov rod *Brankampella* (Redmond, 1964b) smatra se sinonimom roda *Haurania*, a s druge strane odbačeno je stanovište Loeblicha & Tappanove (1964) da bi rod *Haurania* trebalo smatrati sinonimom roda *Rhapydionina*. Naime usprkos znatnoj sličnosti unutrašnje građe između ta dva roda (prisutnost sekundarnih subepidermalnih septa), postoji osnovna razlika u strukturi stijenske, što svjedoči o pripadnosti ne samo različitim rodovima nego i višim taksionomskim kategorijama, od kojih svaka karakterizira, odnosno postiže maksimum razvoja, u drugo doba geološke historije (*Lituolidae* - jura, osobito lijas; *Soritidae* - gornja kreda, tercijar i kasnije).

Rod *Labyrinthina*: Prihvaćeno je stanovište Loeblicha & Tappanove (1964) te Fourcade & Neumann (1966) da Catijevu (1959) lijasku vrstu *Litosepta recoarensis* treba uključiti u rod *Labyrinthina* zbog podudarnosti u osnovnoj građi, premda originalni opis roda *Labyrinthina* (Weynschenk 1951, 1956) ne donosi odgovarajući prikaz građe tog roda. Pritom je upozoreno da oblici koje Fourcade & Neumann (1966) prikazuju kao vrstu *L. mirabilis* očito predstavljaju novu vrstu tog roda, s mnogo bolje izraženim svim osobinama roda, pa je predloženo da se ti oblici označe kao nova vrsta pod imenom *L. neumannae*. Prilikom potpune revizije odnosno emendacije tog roda trebalo bi eventualno takve oblike odrediti kao tipičnu vrstu roda. Ukazano je i na postojanje još jedne nove vrste u lijasu, ali zbog nedostatka materijala ostavljena je otvorena nomenklatura. Ustanovljeno je postojanje stupića u lijetkama razmotanog stadija, što predstavlja novu generičku karakteristiku.

Foraminifera koja se javlja u naslagama donjeg dogera, a koju su neki autori (Čanović 1963, Radičić 1966) označavali kao *Endothyra* sp., uključena je na osnovu građe stijenske u rod *Mesoendothyra*, koji je, prema Loeblichu & Tappanovoj (1964), uvršten u familiju *Lituolidae*. Od tog roda do sada je opisana samo tipična vrsta, *M. izjumiana* Dain, iz malmskih naslaga Krima. Istraženi oblic i opisani su kao nova vrsta *M. croatica*, koja se od tipične vrste razlikuje razvijenim uniseptalnim odmotanim stadijem koji se sastoji od 3-4 klijetke, i odsustvom plektogiridnog početnog stadija. Osim toga ravnine namatanja pojedinih zavoja variraju za 10°-30°, prema 45° kako za vrstu *M. izjumiana* navodi Dain (u Bykova & al., 1958).

Prilikom osvrta na familiju *Pfenderinidae*, u koju autori (Smout & Sugden, 1962) ubrajaju rodove *Pfenderina*, *Kurnubia* i *Meyendorffina*, iznesena je pretpostavka da *Meyendorffina bathonica*, možda, predstavlja u stvari A-generaciju vrste *Orbitam-*

mina elliptica. U prilog toj pretpostavci može se navesti da postoji znatna sličnost unutrašnje građe kod te dvije »vrste«, zatim činjenica da je *Meyendorffina* uvijek poznata kao makrosferični oblik, dok *Orbitamina* očito predstavlja mikrosferičnu generaciju. Konačno, i kod srodne lituolidne vrste *Orbitopsella praecursor* postoji sličan način izmjene generacija, gdje se pripadnici različitih generacija znatno razlikuju po dimenzijama i vanjskom obliku kućice (način prirasta klijetaka, i dr.).

Kod roda *Pfenderina* prikazane su tri postojeće vrste i na osnovu tabelarnog prikaza nekih njihovih odnosa dimenzija (visina/dijametar kućice) zaključeno je da se sve tri vrste, tj. *P. neocomiensis*, *P. trochoidea* i *P. salernitana*, mogu smatrati opravdano odijeljenim. Treba naime napomenuti da prema *Mayncu* (1966a) vrste *P. neocomiensis* i *P. trochoidea* predstavljaju sinonime, usprkos njihovog različitog stratigrafskog rasprostranjenja.

Rod *Kurnubia*: Izvršena je revizija shvaćanja vrsta u okviru roda i uglavnom je prihvaćeno stanovište *Maynca* (1965, 1966a) da sve tri *Hensonove* (1948b) vrste (*K. palastiniensis*, *K. wellingsi* = *Valvulinella wellingsi* i *K. jurassica* = *Valvulinella jurassica*) treba smatrati jednom vrstom. Ujedno je predloženo da se dosadašnje tri spomenute »vrste« svedu na rang infrasubspecifičke kategorije (forma). *Maync* (1966a) je naime bio predložio da se kod vrste *Kurnubia palastiniensis* mogu razlikovati 3 »tipa« u smislu *Hensonovih* vrsta, ali takva terminologija nije formalno u skladu s Međunarodnim pravilima zoološke nomenklature, gdje termin »tip« ima drugačije i sasvim određeno značenje (tipična vrsta, holotip itd.).

U vezi s rodovima *Pfenderina* i *Kurnubia* izvršen je kritički osvrt na rad *Redmonda* (1964a) i odbačeno je njegovo stanovište o ekstremno rasparčanoj klasifikaciji rodova i vrsta unutar jedne populacije oblika, koji doduše po morfološkim obilježjima mogu varirati ali pokazuju sve prelaze. Zamjerke se uglavnom svode na neopravdano umjetno cijepanje bioloških jedinica na osnovu nebitnih razlika u vanjskom izgledu i dimenzijama, što može biti uvjetovano različitim ekološkim prilikama, a što je i inače osobina koja je kod te skupine foraminifera jako podložna variranju, kao i na neodgovarajuću i nedovoljnu ilustrativnu dokumentaciju autorovih tvrdnji (ne osobito jasne fotografije izoliranih, manje ili više natrošenih ili samo jednostrano nabrušenih primjeraka). Karakteristično je da se zamjerke identičnog karaktera mogu staviti i jednom drugom *Redmondovom* radu (1964b), iako se radi o drugoj skupini foraminifera – lituolidama, što je učinio *Maync*, (1965, 1966b).

Postavljena je nova vrsta roda *Lituonella* – *L. dinarica*,¹ iz naslaga gornjeg malma (klipcijski vapnenci). To je do sada najstariji poznati predstavnik tog roda. S time su u skladu i neke karakteristike te vrste, koje se mogu smatrati primitivnima. To je u prvom redu nepostojanje rubnog odebljanja klijetaka, tako da je visina pojedinih klijetaka jednaka u njihovom centralnom dijelu i na rubu, te razmjerno vrlo slabo razvijeni početni asimetrični trohospiralni stadij, čime je uvjetovan relativno šiljati i gotovo geometrijski pravilno konični oblik čitave kućice.

Rod *Lituonella* isključen je iz fam. Orbitolinidae na osnovu građe stijenke. To je u skladu s mišljenjima koja su već ranije iznijeli *Douglass* (1960), *Moullade* (1965) i neki drugi autori. Š obzirom da istraženi primjerci potiču iz malmskih naslaga, te su prema tome stariji od svih do sada poznatih sigurnih pripadnika fam. Orbitolinidae, a neki od njih pokazuju razmjerno dobro razvijenu »keriotekalnu strukturu« stijenke (prema *Douglassu* 1960, i *Moulladeu* 1965), to se ne može prihvatiti mišljenje *Hofkera*, jr. (1966), da izrazito debele stijenke nekih tercijarnih oblika, koji su inače po svemu slični orbitolinidama, predstavljaju samo razvojem odebljale stijenke krednih orbitolinida, a u slučaju kad pokazuju još i »keriotekalnu strukturu« da se radi jedino o prividnoj poroznosti, uvjetovanoj radikalnom kristalizacijom. Zato i nije moglo biti prihvaćeno stanovište *Hofkera*, jr. (1966), da razlika u građi stijenke kod roda *Lituonella* i srodnih oblika prema tipičnim orbitolinidama nije dovoljan razlog za isključivanje takvih oblika iz familije Orbitolinidae.

¹ Ulazi u sinonimiju vrste *Parurgonina caelinensis* *Cuvillier, Foury & Pignatti Morano* 1968 (*Geol. Romana* 7, 141–156).

Kod vrste *Orbitopsella praecursor* (G ü m b e l) odbačeno je stanovište koje se javlja u nekim novijim radovima talijanskih autora (Pirini 1965; Dondi, Papetti & Tedeschi 1966; Canuti & Marcucci 1966), a odnosi se na ponovno »oživljavanje« roda *Coskinolinopsis*.

Predložena je izmijenjena klasifikacija roda *Protopenneroplis*. Prema osnovnom kriteriju - građi stijenke - čini se da bi za rod *Protopenneroplis* trebalo prihvatiti kombinaciju između klasifikacije koju predlaže Farinacci (1964) i one Loeblich & Tappanove (1964), i to u smislu da bi rod *Protopenneroplis* trebalo isključiti iz familije Involutinidae i uvrstiti ga u potfamiliju Loeblichinae odnosno Nanicellinae, a tu potfamiliju uvrstiti u familiju Endothyridae, a ne u familiju Lagenidae (odnosno Nodosariidae) kako to predlaže Fursenko (u Rauzer-Cernousova & Fursenko, 1959) i prema njoj Farinacci (1964).

Kod roda *Nautiloculina* upozoreno je da vrsta *N. oolithica* Mohler dolazi u rasponu od lijasa do malma, a ukazano je na postojanje jedne vjerojatno nove podvrste vrste *N. oolithica* iz naslaga donjeg malma, iz područja donjeg toka Korane. Identične oblike prikazuje Radović (1966, tab. 43) kao *Nautiloculina* sp.

Za sve istražene rodove i vrste diskutira se njihov stratigrafski raspon u usporedbi s drugim oblastima Dinarida i nekim drugim područjima (Apenini, Bliski Istok).

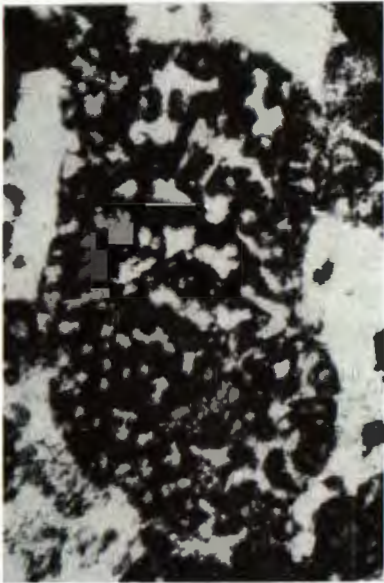
Primljeno 10. 10. 1968.

Geološko-paleontološki zavod,
Prirodoslovno-matematički fakultet,
Zagreb, Socijalističke Revolucije 8.

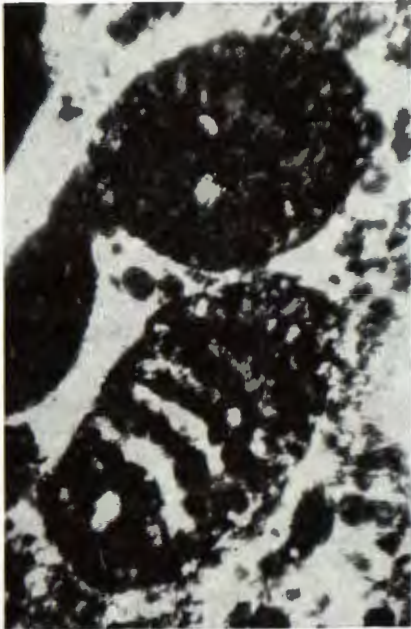
PLATE - TABLA I

- 1-4. *Haurania amiji* Henson. Middle Lias (srednji lijas).
Slides (izbrusci) G-324, G-177, G-176, G-321.
3. *Haurania amiji* Henson and (i) *Labyrinthina recoarensis* (Cati).
5. *Haurania* sp. Middle Lias (srednji lijas). Slide (izbrusak) G-123.

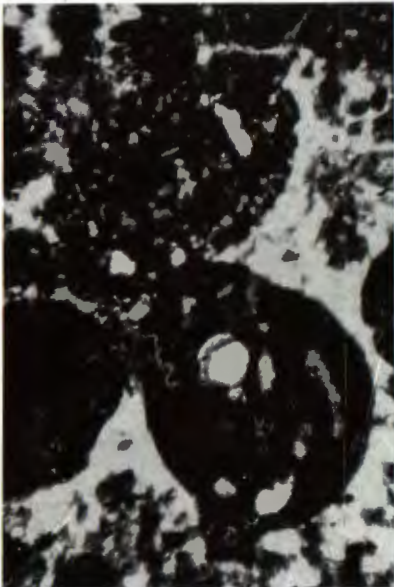
All figures are enlarged (sve slike povećane su) $\times 55$.



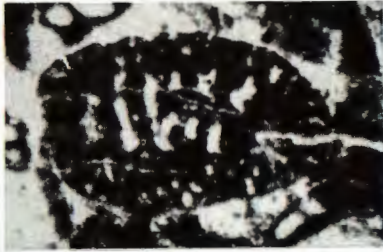
1



2



3



4



5

PLATE: - TABLA II

- 1-2. *Haurania amiji* Henson. Middle Lias (srednji lijas). $\times 55$.
Slides (izbrusci) G-175, G-174.
3. *Haurania deserta* Henson. Middle Lias (srednji lijas). $\times 50$.
Slide (izbrusak) G-322.

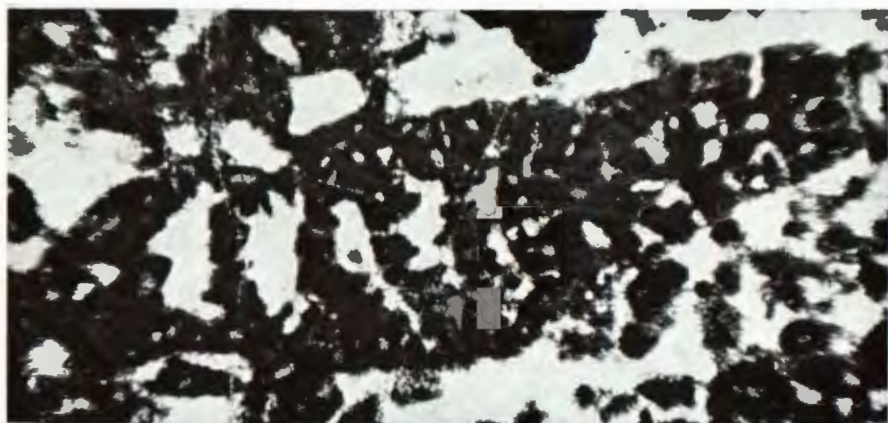
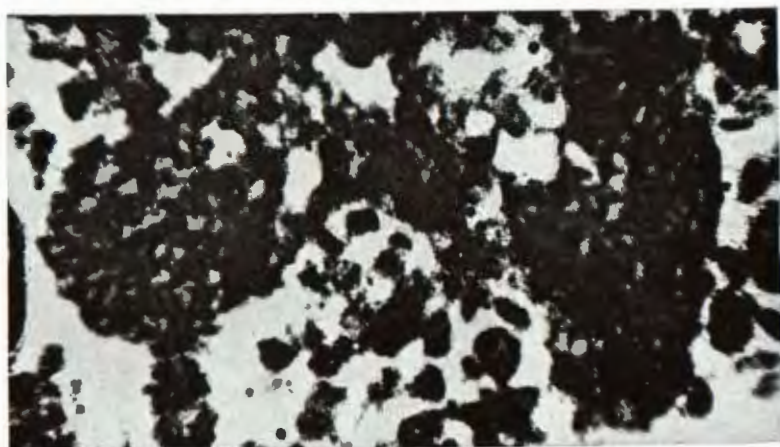
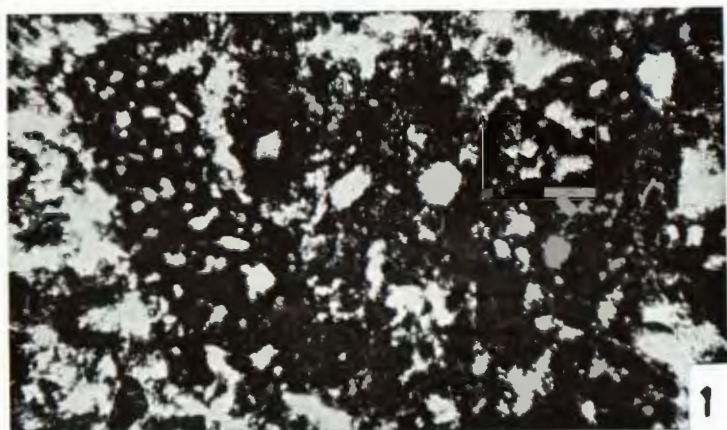


PLATE - TABLA III

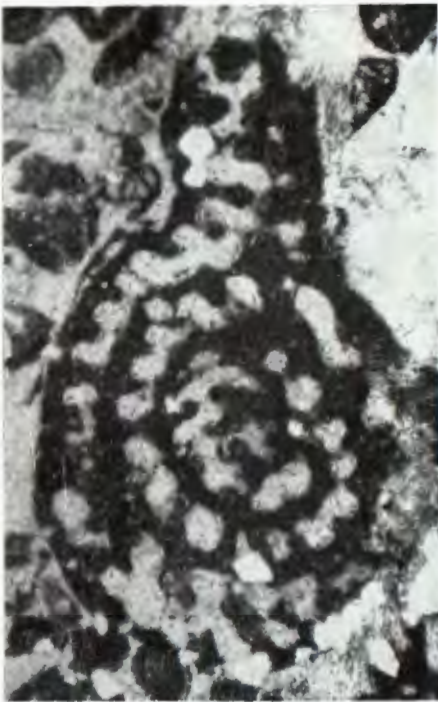
- 1-3. *Labyrinthina mirabilis* Weynschenk. Lower Malm (donji malm). $\times 55$.
Slides (izbrusci) G-254, G-203, G-(Pl-31/2).
4. *Labyrinthina mirabilis?* Weynschenk. Lower Malm (donji malm). $\times 55$.
Slide (izbrusak) G-218.



1



2



3



4

PLATE - TABLA IV

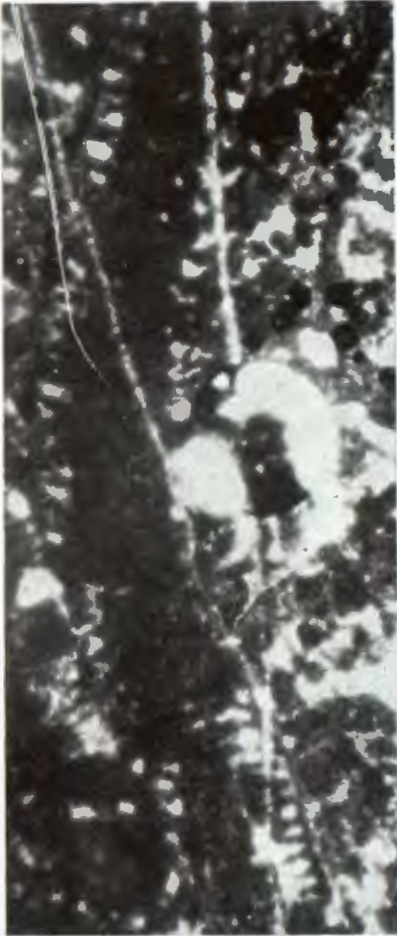
- 1-2. *Labyrinthina recoarensis* (Cati). Middle Lias (srednji lijas). $\times 50$.
Slide (izbrusak) G-126.
3. *Orbitamina elliptica* (d'Archiac). Upper Dogger (gornji doger). $\times 35$.
Slide (izbrusak) G-292.
4. »*Meyendorffina bathonica*« Arouze & Bizon. Upper Dogger (gornji doger).
 $\times 50$.
Slide (izbrusak) G-285.



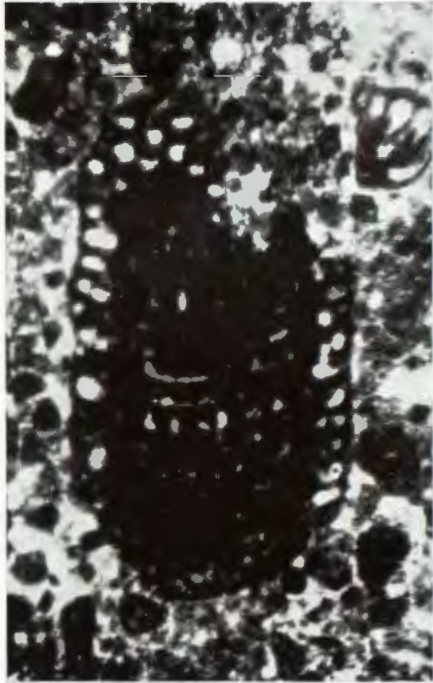
1



2



3



4

PLATEŃ – TABLA V

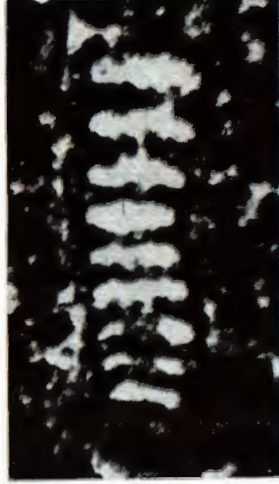
- 1-4. *Labyrinthina* n. sp. A. – Middle Lias (srednji lijas).
Slides (izbrusci) G-126, G-328 (fig. 2, 4), G-327.
Fig. 1-3: $\times 50$; fig. 4: $\times 55$.
- 5-6. *Labyrinthina recoarensis* (C a t i). Middle Lias (srednji lijas). $\times 50$.
Slides (izbrusci) G-133, G-321.



1



2



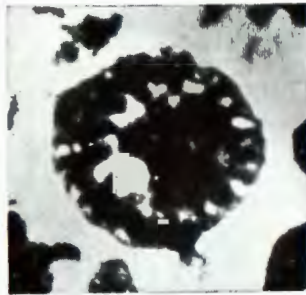
3



4



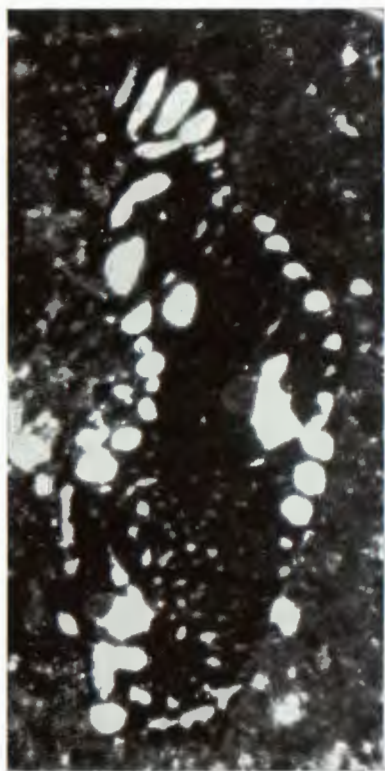
5



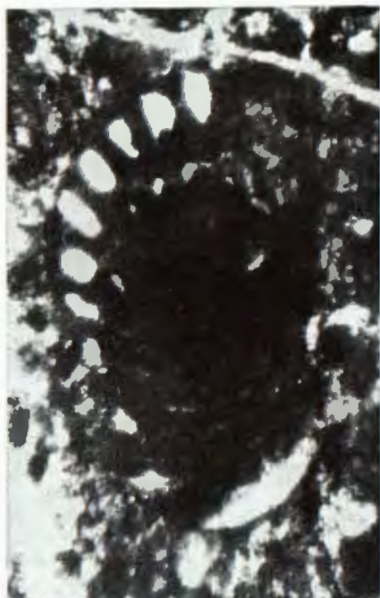
6

PLATE - TABLA VI

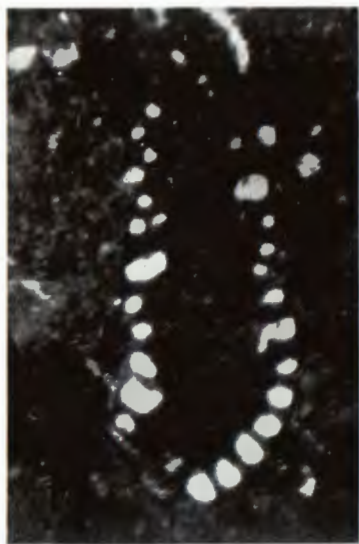
1. *Pfenderina neocomiensis* (P f e n d e r). Uppermost Malm-Lowermost Cretaceous?
(najgornji malm-najdonja kreda?). $\times 35$.
Slide (izbrusak) G-222.
2. *Pfenderina salernitana* S a r t o n i & C r e s c e n t i. Upper Dogger (gornji doger).
 $\times 50$.
Slide (izbrusak) G-247.
3. *Pfenderina trochoidea* S m o u t & S u g d e n. Upper Dogger (gornji doger). $\times 55$.
Slide (izbrusak) G-289.
4. *Pfenderina* sp. (cf. *trochoidea?*). Lower Malm (donji malm) with (sa) *Kurnubia palastiniensis*. $\times 50$.
Slide (izbrusak) G-277.



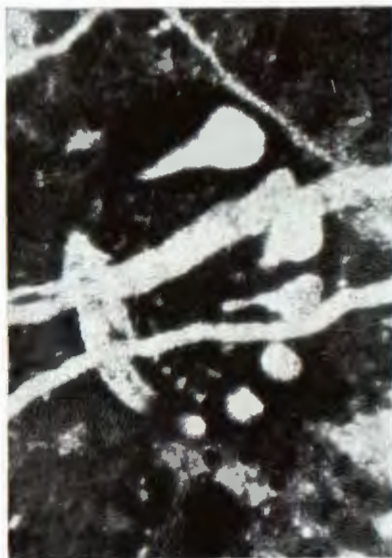
1



3



2



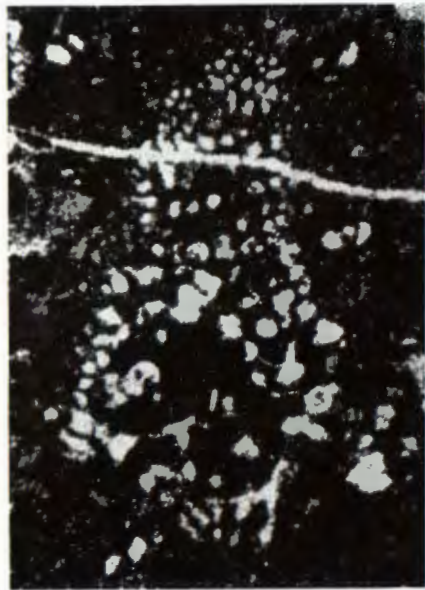
4

PLATA - TABLA VII

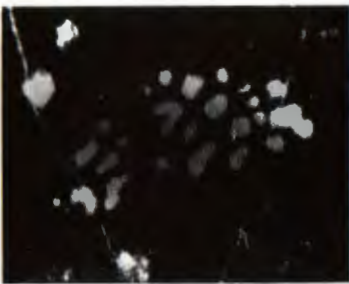
1. *Pfenderina salernitana* Sartoni & Crescenti. Upper Dogger (gornji doger)
× 35.
Slide (izbrusak) G-185.
- 2-5 Genus aff. *Kurnubia* (= »Trochamminidae«: Sartoni & Crescenti, 1962).
Malm. × 55.
Slides (izbrusci) G-219, G-218, G-158, G-254.



1



2



3



4



5

PLATE - TABLA VIII

Kurnubia palastiniensis H e n s o n. Malm.

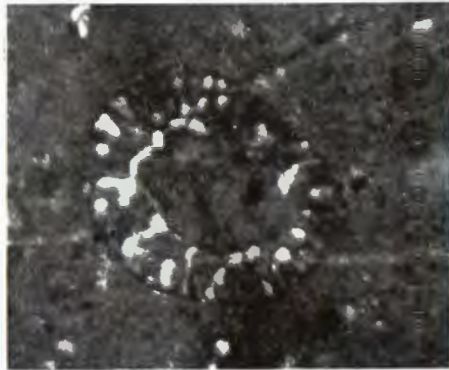
1, 2, 4: forma *wellingsi*. Slides (izbrusci) G-218, G-205, G-162.

3: forma *palastiniensis-wellingsi*. Slide (izbrusak) G-292.

Fig. 1-3: $\times 50$; **fig. 4:** $\times 35$.



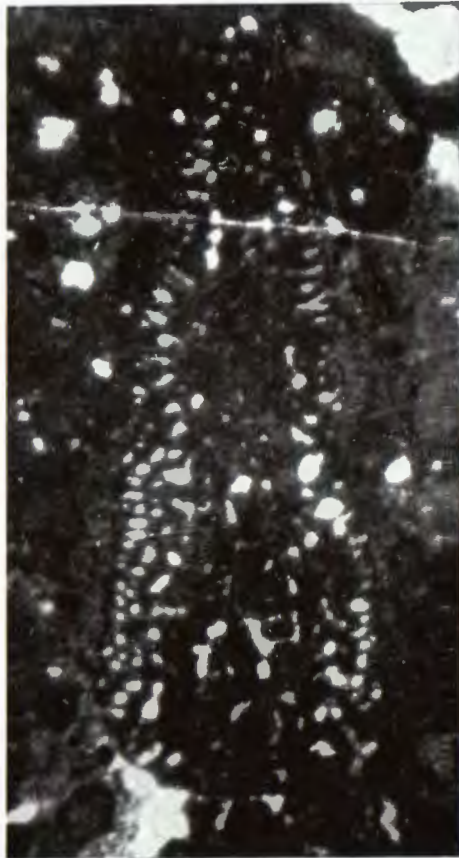
1



2



3



4

PLATE - TABLA IX

Kurnubia palastiniensis Henson. Malm.

- 1-5. forma *palastiniensis*. Slides (izbrusci) G-284, G-205 (fig. 2, 5) G-166, G-197.
6. forma *palastiniensis-wellingsi*. Slide (izbrusak) G-277.

Fig. 1, 3, 4, 5: $\times 55$. fig. 2 6: $\times 50$.



1



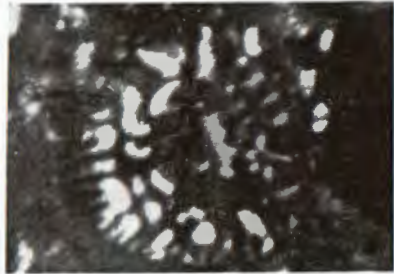
2



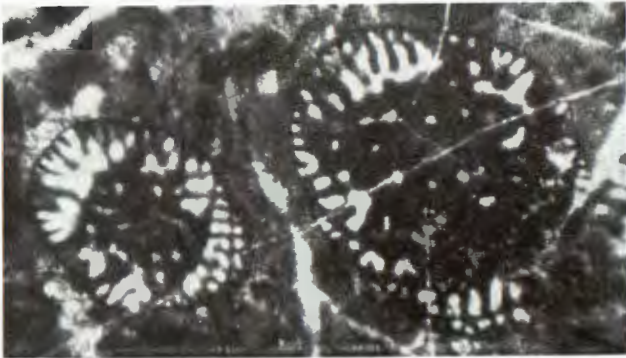
3



4



5



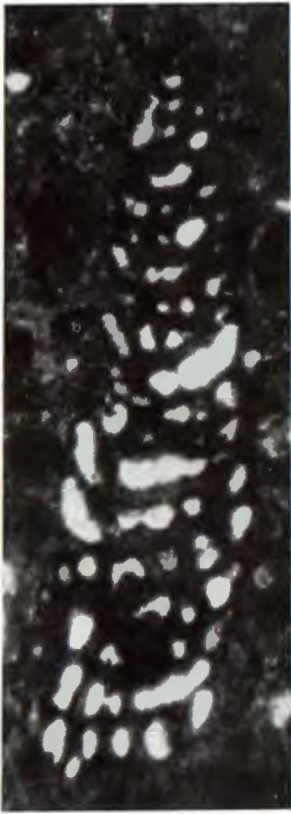
6

PLATE - TABLA X

Kurnubia palastiniensis Henson. Malm $\times 50$.

1-2. forma *jurassica-palastiniensis*. Slides (izbrusci) G-217, G-196.

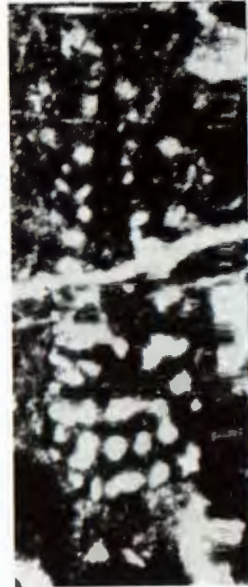
3-6. forma *jurassica*. Slides (izbrusci) G-249, G-219, G-202, G-199.



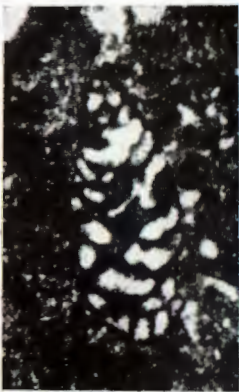
1



2



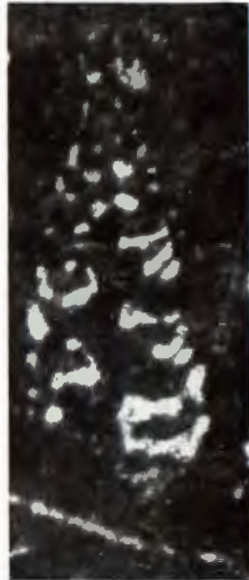
3



4



5



6

PLATE - TABLA XI

Mesoendothyra croatica n. sp. Lower Dogger (donji doger). $\times 55$.

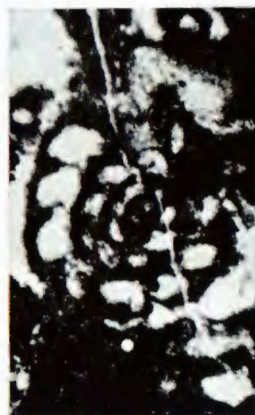
1. Holotype (holotip). Slide (izbrusak) G-181.
- 1-5 Approximately vertical (median) sections - približno vertikalni (medijalni) presjeci.
- 6-7 Axial sections - aksijalni presjeci.
8. Oblique section near to axial - kosi presjek blizak aksijalnom.
Fig. 2: slide (izbrusak) G-237, all other figures (sve ostale slike): G-180 - G-184.



1



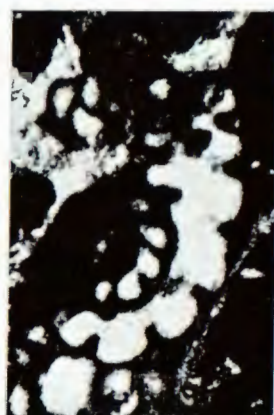
2



3



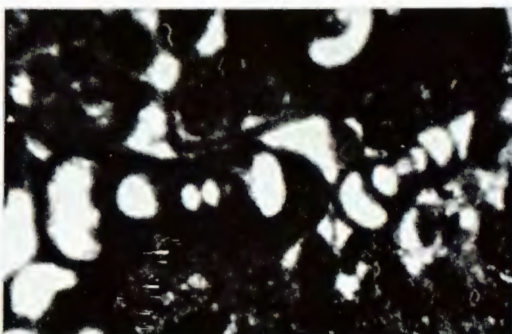
4



5



6



7



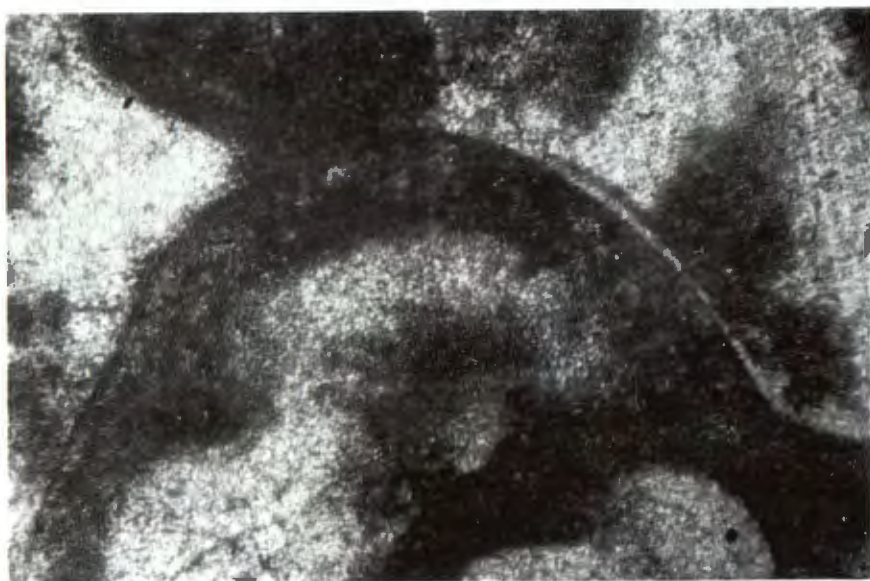
8

PLATE - TABLA XII

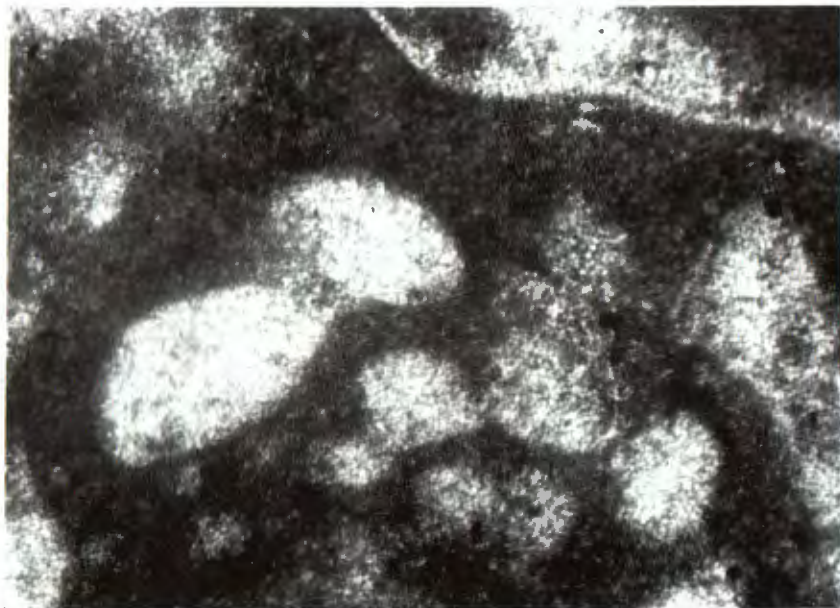
Mesoendothyra croatica n. sp. Lower Dogger (doriđi doger). $\times 210$.

Details of wall-structure - detalji stijenke.

Slide (izbrusak) G-237.



1



2

PLATE - TABLA XIII

Lituonella dinarica n. sp. Upper Malm (gornji malm). $\times 50$.

1. Holotype (holotip). Slide (izbrusak) G-262.
Approximately vertical (median) section - približno vertikalni (medijalni) presjek.
2. Transversal section near to the basis - poprečni presjek blizu baze. Slide (izbrusak) G-261.

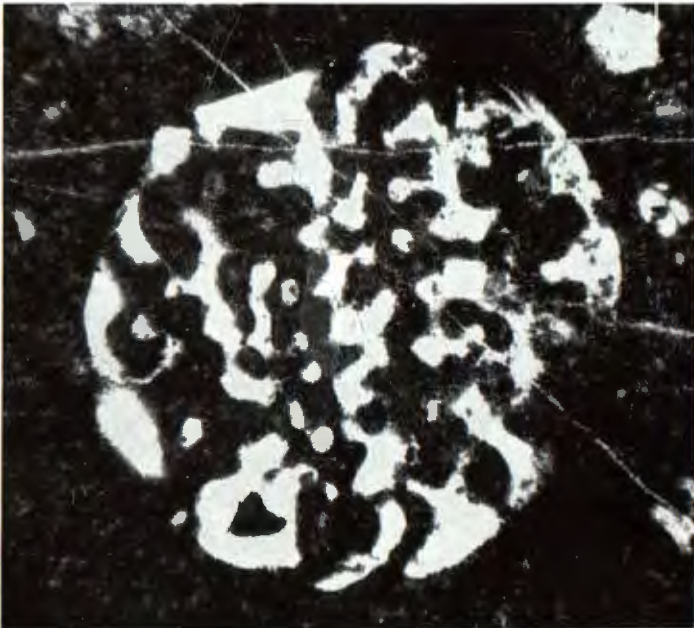
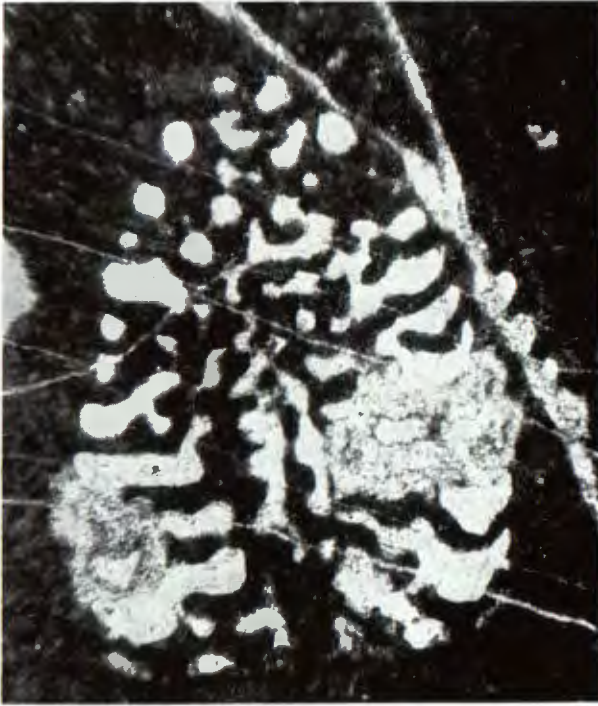
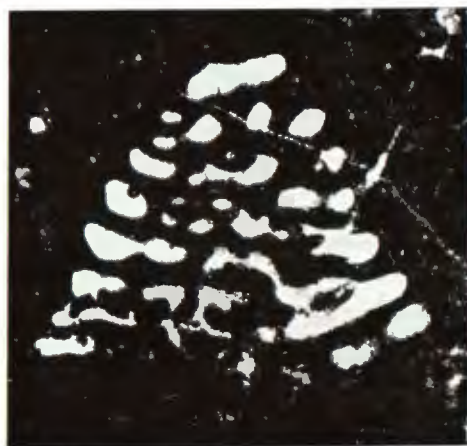


PLATE -- TABLA XIV

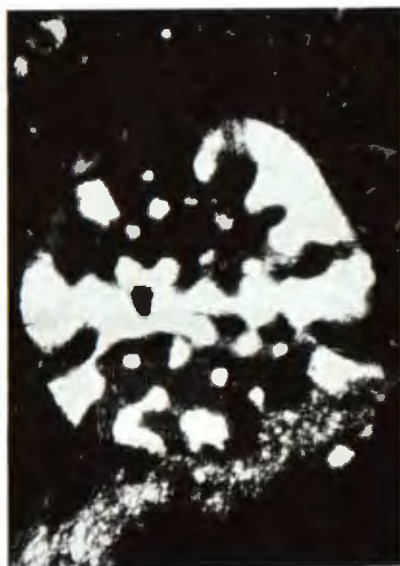
Lituonella dinarica n. sp. Upper Malm (gornji malm).

- 1, 3 Approximately vertical (median) sections – približno vertikalni (medijalni) presjeci. Slide (izbrusak) G-262.
2. Transversal section – poprečni presjek. Slide (izbrusak) G-296.
4. Detail of wall-structure – detalj stijenke. Slide (izbrusak) G-261.

Fig. 1-3: $\times 50$; fig. 4: $\times 80$.



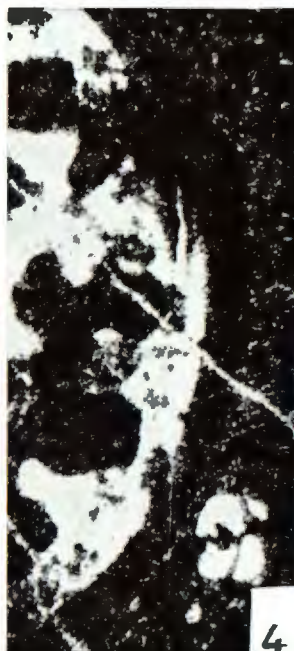
1



2



3



4

PLATE - TABLA XV

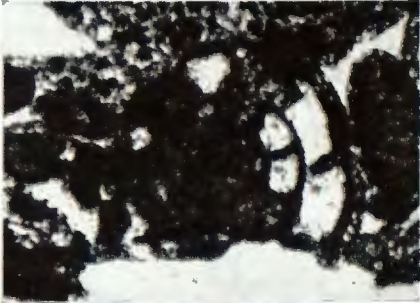
- 1-3. *Nautiloculina oolithica* Mohler, n. subsp? Malm. $\times 55$.
1. Nearly axial section - skoro aksijalni presjek.
2-3. Fragments of equatorial sections - fragmenti ekvatorijalnih presjeka. 1-3 slide (izbrusak) G-202.
4-7. *Protopeneroplis striata* Weynschenk. Lower Malm (donji malm). Slides (izbrusci) G-301, G-228, G-201.



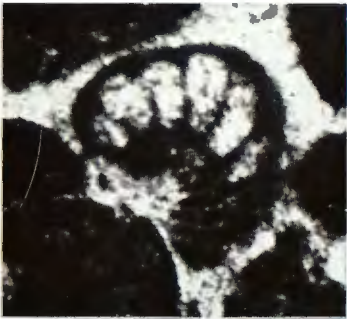
1



2



3



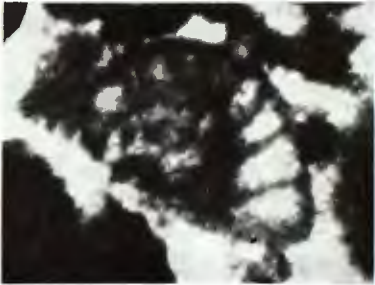
4



5



6



7