Beitr. Paläont., **19**:181–189, Wien 1994

Nullipora ramosissima REUSS, 1847 — a rediscovery

Nullipora ramosissima REUSS, 1847 — eine Wiederentdeckung

by

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PILLER, W.E., 1994. *Nullipora ramosissima* REUSS, 1847 – a rediscovery. — Beitr. Paläont., **19**:181–189, 2 Figures, 2 Plates, Wien.

Abstract

Seven specimens of coralline algae designated by A. E. REUSS personally as *Nullipora ramosissima* from the locality Neudörfl were rediscovered in the collection of the Geological Survey in Vienna. A critical examination of this material led to the recognition of at least 6 different species. Out of these, a lectotype and syntypes have been designated, described and documented. Applying currently used taxonomy, *Nullipora ramosissima* REUSS must be attributed to the genus *Lithothamnion*.

Zusammenfassung

In der Sammlung der Geologischen Bundesanstalt in Wien wurden 7 Stücke von corallinen Algen entdeckt, die von A. E. REUSS persönlich als *Nullipora ramosissima* vom Fundort Neudörfl bezeichnet wurden. Dünnschliffuntersuchungen zeigten, daß zumindest 6 verschiedene Arten in diesem Material vertreten sind. Daraus wurde ein Lektotypus und Syntypen ausgewählt, beschrieben und dokumentiert. Der derzeitigen Taxonomie bei corallinen Algen folgend ist *Nullipora ramosissima* REUSS zur Gattung *Lithothamnion* zu stellen.

1. Introduction

In 1847 (not 1848, compare Fig. 1), p. 29, August Emil REUSS described frequently occurring fossils from the Leithakalk of the Vienna Basin which he denominated as *Nullipora ramosissima*. He gave only a very short general description of these organisms, without designating a holotype or providing further information based on microscopical studies. He interpreted these fossils as corals (Milleporina), although he mentioned that many people considered them to be plants.

In 1858, the plant nature of these fossils was clearly pointed out by UNGER. He mentioned and figured 2 specimens of what he called the "R e u s s' sche *Nullipora ramosissima*" (UNGER, 1858, p. 23, Taf. V, Fig. 18, 19); these figured algae are, however, not specimens of Reuss's collection because they originate from Lebring, Styria. This locality was not even mentioned by REUSS (1847). Additionally, UNGER (1858, p. 23–24) stated that he was not going to re-classify these algae of the Leithakalk, although he realized that different forms are present in this limestone.

Subsequently, GÜMBEL (1871) presented algae from the Leitha Limestone which he denominated as *Lithothamnium ramosissimum* Reuss spec. Although his descriptions are more detailed, especially as he described conceptacles, a clear classification and identification from his descriptions and figures is not possible. Although a revision of the original material was announced by LEMOINE (1917) and AIROLDI (1936), it was never performed.

CONTI (1946a, b, not 1945; 1945 is the date of the volume: the actual publication date, also mentioned on the front page of the paper, is 1946) gave a new description of REUSS's, UNGER's and GÜMBEL's species without, however, studying the original material. On the basis of his interpretations of UNGER's (1858) descriptions he allied REUSS's *Nullipora ramosissima* with *Lithophyllum ramosissimum* REUSS, whereas for one of the figured specimens of *Nullipora ramosissima* in UNGER (Taf. V, Fig. 20) he created the new species *Lithophyllum pseudoramosissimum* UNGER. The specimens figured by GÜMBEL (1871, Taf. I, Fig. 1a–1d) as *Lithothamnium ramosissimum* Reuss spec. were interpreted by CONTI as *Lithothamnium ramosissimum* GÜMBEL (not REUSS). On the basis of these new (theoretical) interpretations he re-classified all taxa which had been referred to *Lithothamnium ramosissimum* up to this date as one of these 3 species (CONTI, 1946, pp. 8–14: description; pp. 16–17: tabulation). Due to the publication date (just after the Second World War) and the restricted distribution of the journal (Publicazioni dell'Istituto di Geologia dell'Università di Genova, Quaderni 1–2, serie A – Paleontologia), MASTRORILLI (1966) recapitulated CONTI's "revisions" and tabulation within the description of *Lithothamnium ramosissimum* GÜMBEL, 1871, comb. nova

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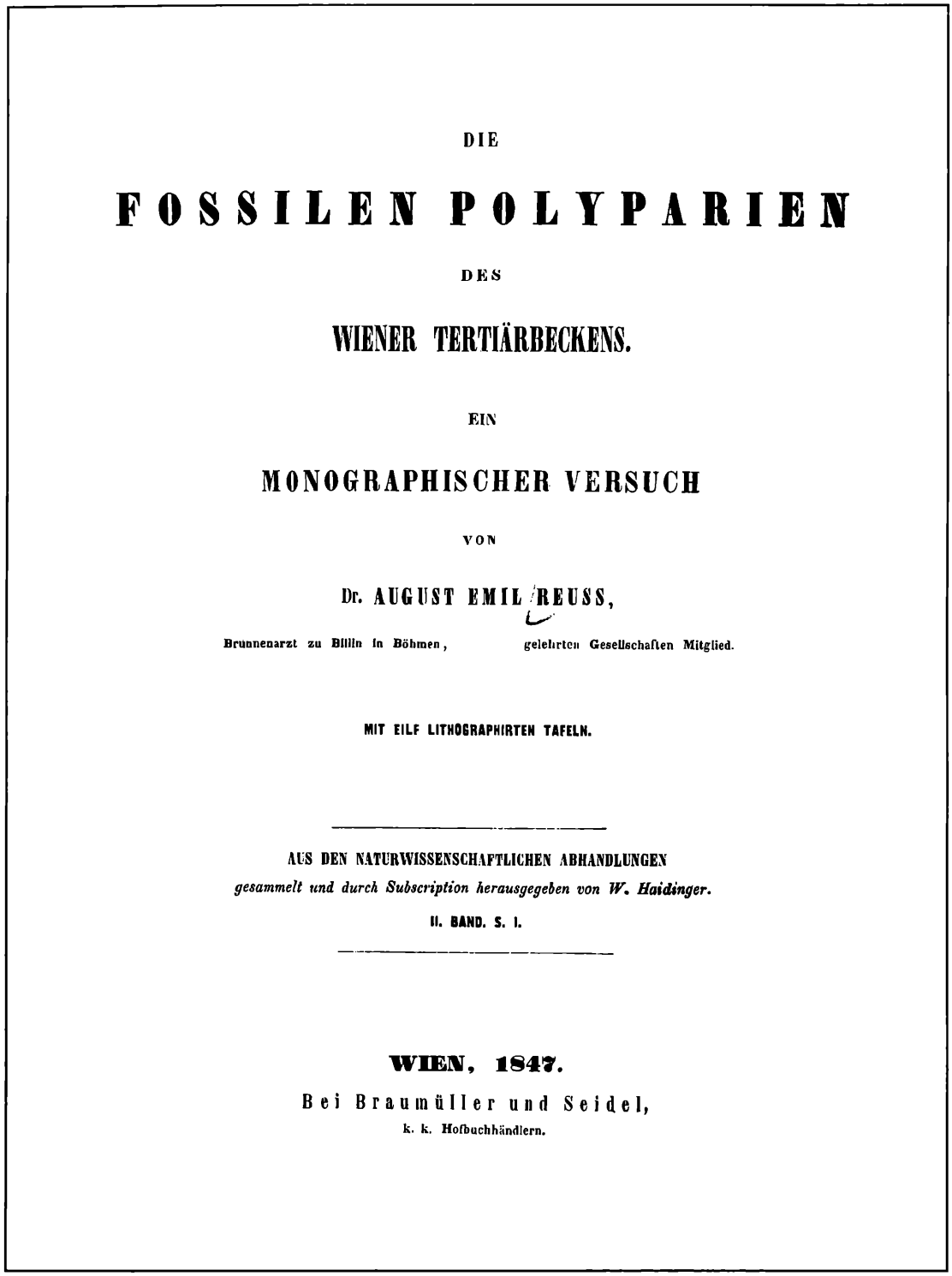

DIE

FOSSILEN POLYPARIEN

DES

WIENER TERTIÄRBECKENS.

EIN

MONOGRAPHISCHER VERSUCH

VON

Dr. AUGUST EMIL REUSS,

Brunnenarzt zu Bilin in Böhmen, gelehrten Gesellschaften Mitglied.

MIT EILF LITHOGRAPHIRTEN TAFELN.

AUS DEN NATURWISSENSCHAFTLICHEN ABHANDLUNGEN

gesammelt und durch Subscription herausgegeben von W. Haidinger.

II. BAND. S. I.

WIEN, 1847.

Bei Braumüller und Seidel,

k. k. Hofbuchhändlern.

Figure 1: Facsimile of the front page of the paper by REUSS, A.E., 1847: I. Die fossilen Polyparien des Wiener Tertiärbeckens. Ein monographischer Versuch. — Naturwiss. Abh., (ed.) HAIDINGER, W., 2:1–109, 11 Taf., Wien.

CONTI, 1945 (MASTRORILLI, 1966, pp. 223–225). In order to study the coralline algae of the Leitha Limestone, a search was initiated for REUSS's original material. Several years ago F. Stojaspal was able to find material at the Geological Survey Vienna (Coll. Geologische Bundesanstalt Wien, Inv. Nr. 1994/8/1 – 1994/8/7) which could be clearly attributed to the REUSS–collection (PILLER, 1991). The aim of the present paper is to document this material, to revise REUSS's description and to reduce the confusion surrounding *Nullipora ramosissima*.

2. Authenticity of material

Although most of the material of REUSS (1847) is housed at the Natural History Museum in Vienna, REUSS mentioned (1847, p. 29) in his list of localities "Neudörfl

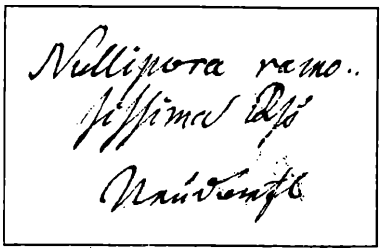

Figure 2: Facsimile of the original label with REUSS's long-hand writing: "Nullipora ramosissima Rss'. Neudoerfl"

in Ungarn" with the addition: "(k.k. montanistisches Museum)". In that listing, this locality is separated from the others by a semicolon, whereas all other localities are separated only by a comma. Research at the Geologische Bundesanstalt (formerly k.k. montanistisches Museum) by Dr. F. Stojaspal brought forth a little box with 7 specimens of coralline algae. The label in this box is written in long-hand and says "Nullipora ramosissima Rss., Neudörfl" (Fig. 2). A comparison with the original labels of the REUSS-collection at the Natural History Museum left no doubt that the handwriting is definitely from REUSS. The specimens figured by REUSS (Tab. III, Figs. 10–11) cannot definitely be recognized, but REUSS's drawings were often inexact. Even if the discovered specimens are not identical with the original figures of REUSS (1847), they represent material designated by REUSS personally as *Nullipora ramosissima.* The fact that there is only one box of REUSS's material and that only the material from the locality Neudörfl is mentioned as being stored in the "k.k. montanistisches Museum", makes it highly probable that this is the original material of the 1847 paper.

3. Description

Before further treatment (breakage and thin sectioning), the 7 specimens were described, measured and photographically documented (Pl. 1, Fig. 1). Afterwards, five of the 7 specimens were broken; one fragment of each sample was embedded in resin and sawed. Thin sections were prepared from all 5 embedded fragments. Examination of the thin sections of the 5 different specimens revealed that nearly each specimen was a species different from most of the other specimens. Considering denominations currently used in the literature (comp. PILLER, 1993a, b), the 5 specimens can be attributed to that taxa listed below:

Specimen 1 (Inv. Nr. 1994/8/1) (Pl. 1, Fig. 1a):
A small elongated rhodolith (2.1 x 1.4 cm) with short protuberances (< 2 mm) of max. 2 mm ∅.
The rhodolith was broken in 2 parts; one part was stored, the other was embedded in resin and thin sectioned (2 thin sections). Some resin-embedded material remained for possible future studies or thin sectioning.
The rhodolith is made up mainly of *Palaeothamnium archaeotypum* CONTI, 1946, with "*Lithophyllum*" *corculumis* (MASLOV, 1962) inhabiting a small portion in the outermost part of the rhodolith, and an intergrown single-layered taxon (*Lithoporella*-type).

Specimen 2 (Inv. Nr. 1994/8/2) (Pl. 1, Fig. 1b):
A small rhodolith (1.4 x 1.3 cm) with short, blunt and flaring branches (length up to 4 mm, max. ∅: 2 mm).
The rhodolith was broken in 2 parts; one part was stored, the other was embedded in resin and thin sectioned (2 thin sections).
The rhodolith is dominated by *Spongites albanensis* (LEMOINE, 1924) BRAGA, BOSENCE & STENECK, 1993 (compare BRAGA et al., 1993).

Specimen 3 (Inv. Nr. 1994/8/3) (Pl. 1, Fig. 1c):
Irregular crust fragment (2.0 x 1.7 cm) with widely spaced branches. The crust thickness ranges from 0.5 to 2 mm and its lower surface is irregular, reflecting the shape of the – not preserved – substrate. This shape perhaps points to the umbonal area of a bivalve shell. The branches attain a length of up to 4 mm, are stubby to club-shaped, and have a ∅ of 2 mm sometimes increasing distally to 3 mm.
The crust was broken in 2 parts; one part was stored, the other was used for 2 thin sections. A very small part remained for further studies or thin sectioning.
Specimen 3 consists of *Lithothamnion operculatum* (CONTI, 1943) CONTI, 1950, with thin crusts of "*Lithophyllum*" *anguineum* CONTI, 1946.

Specimen 4 (Inv. Nr. 1994/8/4) (Pl. 1, Fig. 1d):
Branched rhodolith or rhodolith fragment (1.8 x 1.3 cm). Branches up to 7 mm in length and 3 mm ∅, mostly < 2 mm ∅ and < 5 mm in length.
The specimen broke apart into several fragments, of which 5 are stored and 2 thin sections were performed.
The branches are made up of *Palaeothamnium archaeotypum* CONTI, 1946.

Specimen 5 (Inv. Nr. 1994/8/5) (Pl. 1, Fig. 1e):
A small, branched fragment (1.1 x 0.6 cm).
The fragment was completely resin embedded and thin sectioned (2 thin sections).
It represents *Palaeothamnium archaeotypum* CONTI, 1946.

Specimen 6 (Inv. Nr. 1994/8/6) (Pl. 1, Fig. 1f):
A branched fragment (1.1 x 1.1 cm). Individual branch length up to 6 mm and ∅ of 2 mm.
Specimen was stored untreated.

Specimen 7 (Inv. Nr. 1994/8/7) (Pl. 1, Fig. 1g):
Irregular fragment (1.3 x 0.9 cm) with protuberances up to 3.5 mm.
Specimen was stored untreated.

4. Lectotype selection

All the dominant taxa detected in the thin sections of the 5 specimens are generally very abundant in the Leitha Limestone; therefore, no preference for one of the

specimens can be deduced by its frequency in occurrence, and further arguments must be found to designate a lectotype.

Although the description of *Nullipora ramosissima* by REUSS included a great variety of characters, the 2 figured specimens probably represent branching rhodoliths with slightly flaring branches (Pl. 1, Fig. 2). Hence, out of the available material, branching rhodoliths should be preferrably selected. Unlike for most corals and bryozoans in REUSS's figures and figure descriptions, no statement on magnification is given for both specimens of *Nullipora ramosissima*. Basically, REUSS tried to figure specimens in natural size, supplemented by further enlargements. This would suggest that Figs. 10 and 11 in REUSS represent natural sizes. In the material now available, however, no specimen is as large as those documented in Fig. 10; only specimens 1 and 3 come close in size to Fig. 11. Considering morphology, specimen 3 represents a crust fragment with branches, whereas specimen 1 is a rhodolith having only protuberances. Taking only the branching type into account, specimens 2 and 4 are similar to REUSS's Fig. 10, with best match of specimen 4 having distinct branches slightly flaring at their tips. Specimens 5–7 can be excluded primarily as representing only small fragments. Summarizing these statements, no one specimen matches exactly one of the 2 figures of REUSS. Therefore, that specimen will be chosen as lectotype which shows the most anatomic characters, and this is specimen 1 (Pl. 1, Fig. 1a).

5. Systematic description

Division Rhodophyta WETTSTEIN, 1901
Class Rhodophycopsida RABENHORST, 1863
Order Corallinales SILVA & JOHANSEN, 1968
Family Corallinaceae LAMOUROUX, 1812
Subfamily Melobesioideae BIZZOZERO, 1885
Genus ***Lithothamnion*** HEYDRICH, 1897

Lithothamnion ramosissimum (REUSS, 1847) PILLER, 1994 (non CONTI, 1946)
(Pl. 1, Figs. 1a, 1d, 2–8; Pl. 2, Figs. 1–8)

* pro parte	1847	*Nullipora ramosissima m.* –	REUSS, p. 29, Tab. III, Figs. 10, 11
?	1858	*Nullipora ramosissima* Reuss –	UNGER, Taf. V, Figs. 18, 19, 21, 22
non	1858	*Nullipora ramosissima* Reuss –	UNGER, Taf. V, Fig. 20
?	1871	*Lithothamnium ramosissimum* Reuss spec. –	GÜMBEL, p. 24 ff., Taf. I, Fig. 1a–1d
?	1946a	*Lithothamnium ramosissimum* GUEMBEL (non REUSS) –	CONTI, p. 18 ff., Tav. I, Fig. 1a–1f; Tav. VII, Fig. 1–3
	1946b	*Palaeothamnium arcaeotypum* n. sp. –	CONTI, p. 42 ff., Tav. III, Fig. 3a–3c, Tav. VIII, Fig. 1a–1c

Lectotype: Out of the 7 specimens designated by REUSS personally, specimen 1 (Pl. 1, Figs. 1a, 3–8; Pl. 2, Figs. 1, 3) was selected as lectotype; 2 thin sections were made.

Syntypes Of the 7 specimens of the REUSS-collection, those designated here as specimens 4 and 5 also belong to this species; 2 thin sections were made of specimen 4 (Pl. 2, Figs. 2, 4–8).

Depository: Collection of the Geologische Bundesanstalt Wien (Geological Survey Vienna), Inv. Nr. 1994/8/1 (lectotype), 1994/8/4, 1994/8/5.

Type locality: "Neudörfl in Ungarn" as designated by REUSS (1847, p. 29), currently Devinska Nová Ves in SW Slovakia. This is the same village mentioned by SCHALEKOVA (1969), although the locality is not identical. No outcrops are currently available at the locality where REUSS's material originates.

Age Middle Miocene (Badenian).

Description of type material

General morphology

Specimen 1 (lectotype) represents a small elongated rhodolith (2.1 x 1.4 cm) with short protuberances (rarely more than 2 mm) of max. 2 mm ∅ (Pl. 1, Fig. 1a; Pl. 2, Fig. 1). The rhodolith is heavily bored, resulting in nearly total loss of the core (Pl. 2, Fig. 1). The main part is made up of *Lithothamnion ramosissimum*, but "*Lithophyllum*" *corculumis* (MASLOV) and a single-layered taxon (*Lithoporella*-type) are also intergrown along with bryozoans (Pl. 2, Fig. 1).

Specimen 4 is a branched rhodolith or rhodolith fragment (1.8 x 1.3 cm) with branches up to 7 mm in length and 3 mm ∅, mostly < 2 mm ∅ and < 5 mm in length (Pl. 1, Fig. 1d; Pl. 2, Fig. 2). Specimen 5 is a small branch fragment (1.1 x 0.6 cm) (Pl. 1, Fig. 1e).

Vegetative anatomy Thallus monomerous with a plumose core (= hypothallium) which reaches a thickness of up to 175 µm. Core filaments curve outwards and also slightly towards the substrate (Pl. 1, Figs. 5, 7, 8; Pl. 2, Figs. 4, 6). The cells are rectangular and measure 8–31 µm (m = 16.0 µm, s.d. = 4.52) in length and 6–14 µm (m = 9.4 µm, s.d. = 1.66) in diameter; ratio length/diameter = 0.8–3.4 (m = 1.74, s.d. = 0.50); n = 75.

The peripheral region (= perithallium) shows a well-developed zonation, especially inside the protuberances and branches (Pl. 1, Figs. 2, 4; Pl. 2, Figs. 2, 7, 8). The zones are composed of 4 to 10 rows of cells (Pl. 1, Fig. 4; Pl. 2, Figs. 3, 7, 8); the filaments are radially arranged. The cells are rectangular and fusions are probable but difficult to observe in the relatively thick thin-sections. The size ranges from 8–23 µm (m = 13.5 µm, s.d. = 3.24) in length and 7–14 µm (m = 10.4 µm, s.d. = 1.54) in diameter; ratio length/diameter = 0.7–2.6 (m = 1.3, s.d. = 0.38); n = 86. A slight decrease of cell height is observable in some zones from bottom to top.

Epithallial cells have not been observed.

Conceptacles: Multiporate, void conceptacles are present in the lectotype (more than 20) (Pl. 1, Figs. 3, 4, 5); one conceptacle in an early stage of development was also found (Pl. 1, Fig. 4). In one syntype (specimen 4), several

conceptacles in an early stage of development composed of elongated cells are present (Pl. 2, Figs. 7, 8). Mature conceptacles are mostly rectangular in sections, sometimes also arcuate due to adjustment to the underlying morphology. Their size ranges from 245–701 µm (m = 420.3 µm, s.d. = 119.2) in diameter and 101–229 µm (m = 136.0 µm, s.d. = 26.9) in height; ratio length/diameter = 2.1 – 5.3 (m = 3.1, s.d. = 0.8); n = 23.

Remarks All morphological characters of the lectotype and syntypes, as there are general morphology, vegetative anatomy as well as size, shape and development of conceptacles, coincide completely with *Palaeothamnium archaeotypum* as described by CONTI (1946 b) from the Leitha Limestone. The species name was spelled by CONTI (1946 b, p. 42) in the formal description as "*arcaeotypum*", but in all his other references he used "*archaeotypum*" (e.g., p. 45, 46, description of Tav. III & VIII). The spelling "*arcaeotypum*" therefore represents a typographic error. Because of the high coincidence, the species *archaeotypum* must be considered a junior synonym of *ramosissimum*. The assignment of the species to the genus *Lithothamnion* is mainly based on the characters of the plumose core and the multiporate conceptacles. The occurrence of conceptacles in an early stage of development, composed of elongated cells, points to an assignment to the genus *Palaeothamnium*. The status of this genus, however, is highly problematic (AGUIRRE & BRAGA, 1993) and a reassessment is in preparation (AGUIRRE et al., in prep.).

The hypothallium is better observable in the syntype (specimen 4) (Pl. 2, Fig. 6), but the few measurable cells (n = 20) of the lectotype show the same size range.

Acknowledgements

The author is greatly indebted to F. Stojaspal (Geological Survey Vienna) for searching and discovering the original material and to F. Rögl (Natural History Museum Vienna) for providing access to the Reuss-collection at the Museum. Photographs were partly printed by W. Reichmann. The author is very grateful to J. C. Braga (Univ. of Granada) and E. Moussavian (Univ. of Munich) for their highly constructive reviews of the manuscript.

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PLATE 1

Fig. 1. All 7 specimens found in the box with the label documented in Figure 2. 1a: specimen 1; 1b: specimen 2; 1c: specimen 3; 1d: specimen 4; 1e: specimen 5; 1f: specimen 6; 1g: specimen 7.

Fig. 2. Facsimile of the original drawings of *Nullipora ramosissima* in REUSS, 1947, Tab. III, Figs. 10, 11.

Fig. 3. Lectotype; part of a protuberance with numerous void conceptacles. Thin section: 1994/8/1/1.

Fig. 4. Lectotype; one void multiporate conceptacle and one conceptacle (only partly preserved) in an early stage of development composed of elongated cells. Thin section: 1994/8/1/1.

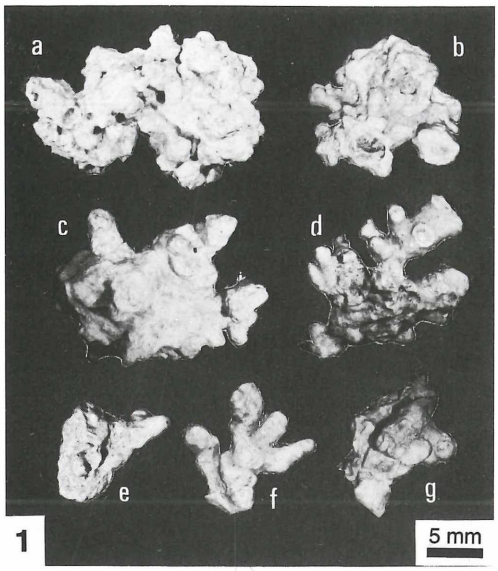
Fig. 5. Lectotype; oblique section through the plumose core and part of the perithallium with one void multiporate conceptacle. Thin section: 1994/8/1/1.

Fig. 6. Lectotype; curved filaments of the peripheral region (= perithallium), showing the relatively regular rectangular cells. Thin section: 1994/8/1/1.

Fig. 7. Lectotype; portion of the plumose core (= hypothallium) showing cell filaments which curve slightly outwards as well as towards the substrate. Thin section: 1994/8/1/1.

Fig. 8. Lectotype; portion of the plumose core (= hypothallium) showing cell filaments which curve slightly outwards as well as towards the substrate. Thin section: 1994/8/1/2.

PLATE 1



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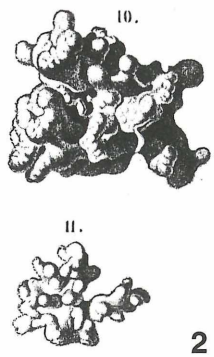

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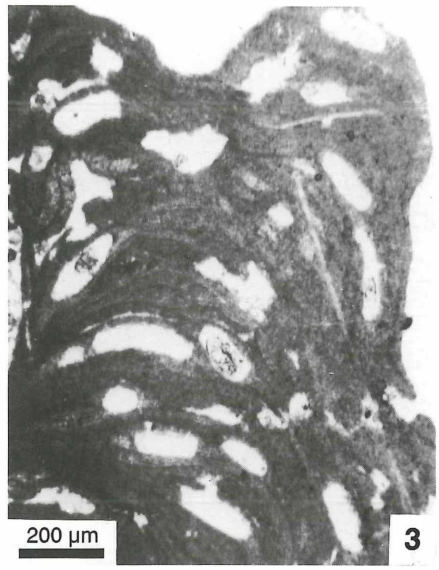

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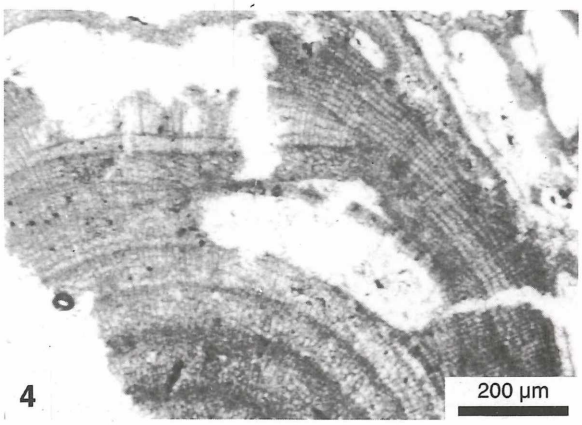

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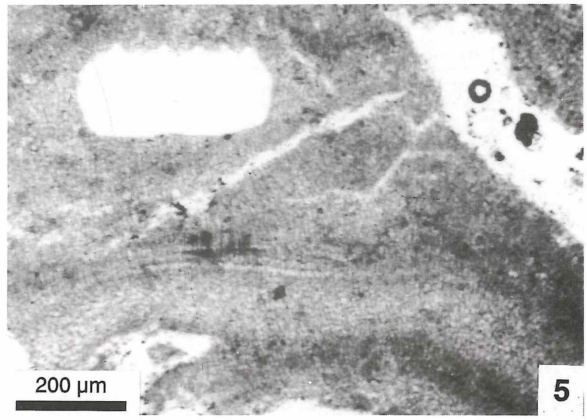

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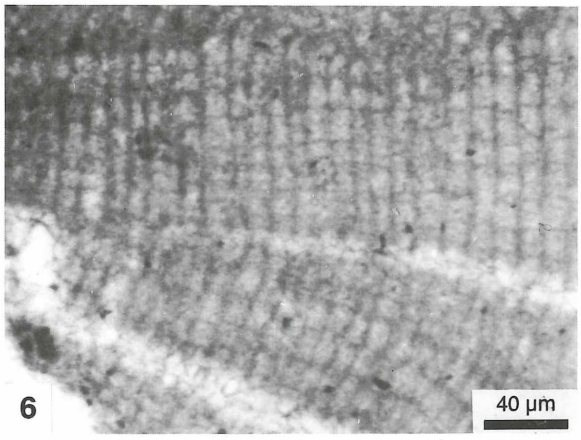

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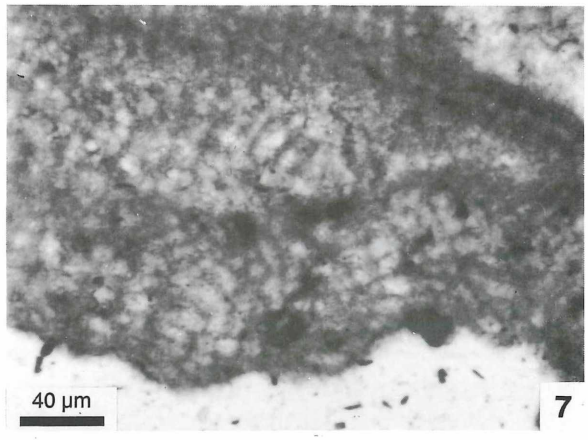

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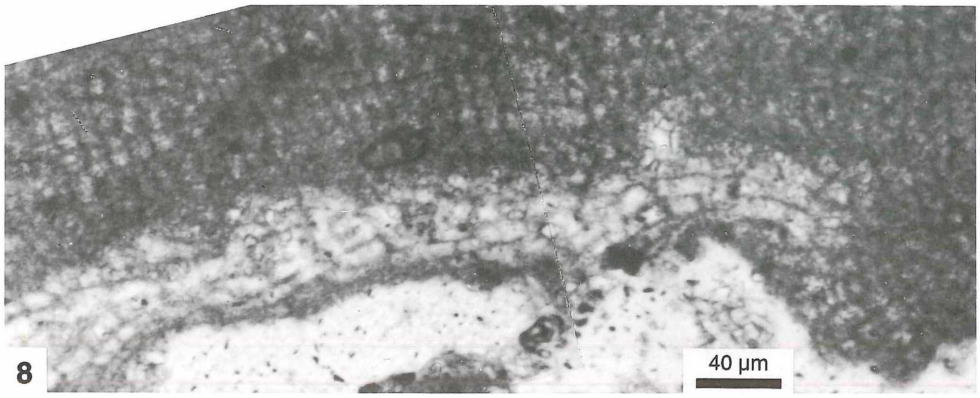

8

PLATE 2

Fig. 1. Lectotype; overview of the heavily bored rhodolith with intergrown bryozoans. Thin section: 1994/8/1/2.

Fig. 2. Syntype; branched fragment with well-developed zonation. Thin section: 1994/8/4/2.

Fig. 3. Lectotype; part of zoned perithallium. Thin section: 1994/8/1/2.

Fig. 4. Syntype; enlargement of Fig. 2 showing plumose core (= hypothallium) made of filaments curving up- and downwards as well as zoned perithallium. Thin section: 1994/8/4/2.

Fig. 5. Syntype; enlargment of Fig. 2 showing zoned, perithallial cells in the central part of a branch. Thin section: 1994/8/4/2.

Fig. 6. Syntype; enlargment of Fig. 2 with plumose core (= hypothallium) made of filaments curving up- and downwards. Thin section: 1994/8/4/2.

Fig. 7. Syntype; portion of well-zoned perithallium showing decreasing cell length inside zones from bottom to top. One conceptacle in an early stage of development composed of elongated cells ("*Palaeothamnium*-type"). Thin section: 1994/8/4/1.

Fig. 8. Syntype; small part of core filaments (lower left), zoned perithallium and a conceptacle in an early stage of development composed of elongated cells ("*Palaeothamnium*-type"). Thin section: 1994/8/4/1.

PLATE 2