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Article

Revision of *Pleurodictyum lonsdalii* Rh. Richter, 1855, a representative of the genus *Petridictyum* Schindewolf, 1959 (Anthozoa, Tabulata, Lower Devonian, Thuringia)

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With 12 figures and 2 tables

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Abstract: The original material of *Pleurodictyum lonsdalii* Rh. Richter, 1855, preserved in natural cast, has been traced (10 syntypes) and studied in detail as well as an additional 52 specimens from the same area and horizon (topotypes) collected by Volk and Zagora. A lectotype is designated and the species *lonsdalii* definitively assigned to the genus *Petridictyum* Schindewolf, 1959. *Petridictyum lonsdalii*, mainly characterised by wide round tipped interseptal furrows and narrow septal ridges, differs from all other *Petridictyum* and is interpreted as a perhaps endemic taxon of the Early Upper Emsian – *Nowakia cancellata* Zone – of the western Thuringian Slate Mountains (Saxothuringian Terrane, North Gondwana).

Key words: Tabulata, *Petridictyum*, Lower Devonian, Thuringia.

1. Introduction

The ancient coral species *Pleurodictyum lonsdalii* Rh. Richter, 1855 was proposed for an allochthonous shallow water Tabulata found in Emsian basinal deposits of Thuringia in Germany and has never been revised by a modern morphological re-description based on type and topotype collections, which are available. The only earlier attempt by Weissermel (1941) did not follow the International Rules of Zoological Nomenclature prescribing lectotype designation, before proposing an unnecessary replacement name ("*Pleurodictyum problematicum* var. *richteri*"). Schindewolf (1959: 310) has already indicated the correct generic position of the species within his new taxon *Petridictyum*. Here we describe the type material and designate a lectotype for *Petridictyum lonsdalii*.

2. Stratigraphy

The coral species re-described here occurs in the Emsian Tentaculitid Shale at the SE flank of the Schwarzburg Anticline in the Saxothuringian Terrane (Linnemann et al. 1999: 14) of the German Variscan Mountains. This horizon was also called the Tentaculitid Shale and *Nereites* Quartzite Beds; in 1964 it was re-named the Steinach Beds (Volk 1964: 170, fig. 1) which are grouped as a Formation (Fig. 1), overlying the Tentaculitid Nodular Limestone Formation (mainly Pragian, but also including the *Nowakia kabylica* Zone of the upper Lochkovian), and overlain by the anoxic Schwärzschiefer Formation (Eifelian to basal lower Frasnian) in Thuringia. A lithostratigraphical subdivision into four members A-D proposed by Zagora (1962: 360, tab. 1) is now

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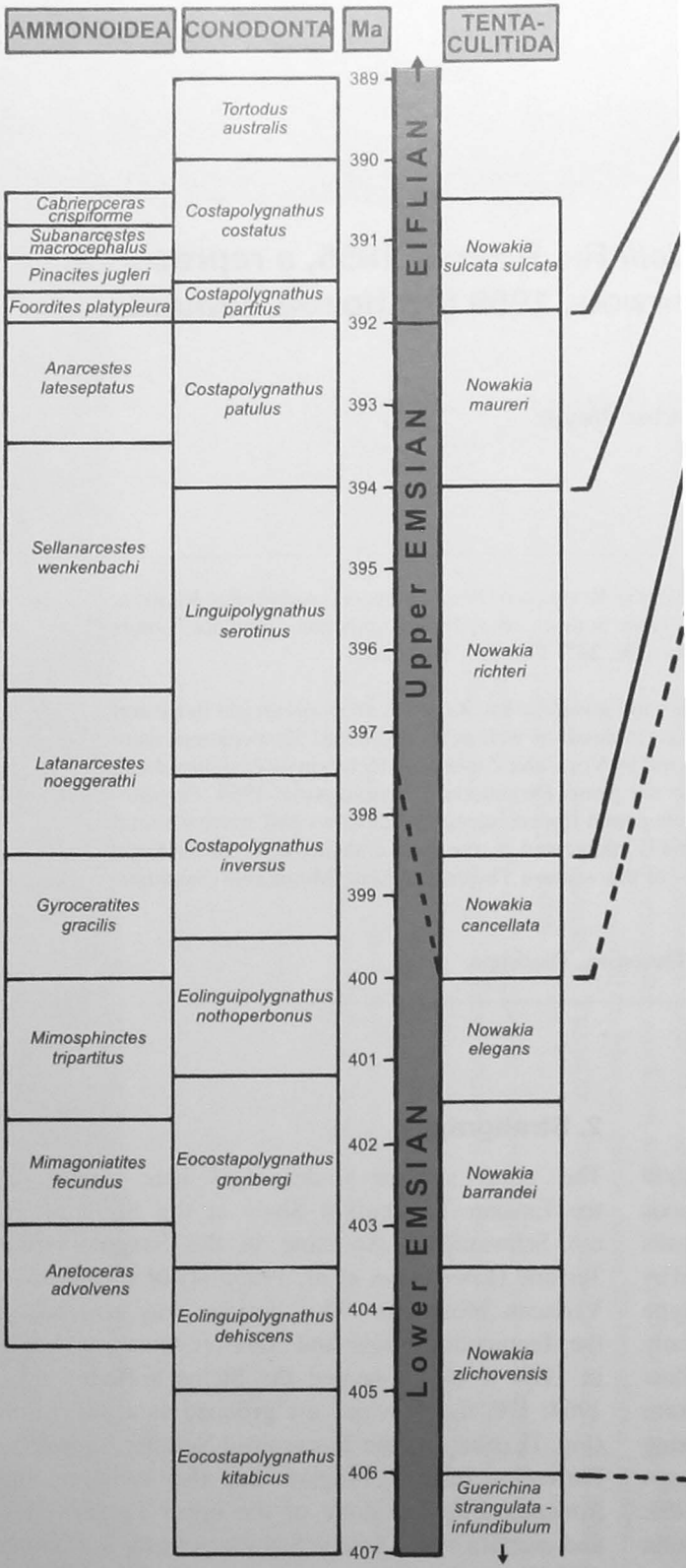
AMMONOIDEA
CONODONTA
Ma
TENTA-CULITIDA
Tortodus australis
Costapolygnathus costatus
Costapolygnathus partitus
Cabrieroceras crispiforme
Subanarcestes macrocephalus
Pinacites jugleri
Foordites platypleura
Anarcestes lateseptatus
Costapolygnathus patulus
Sellanarcestes wenkenbachi
Linguipolygnathus serotinus
Latanarcestes noeggerathi
Costapolygnathus inversus
Gyroceratites gracilis
Eolinguipolygnathus nothoperbonus
Mimosphinctes tripartitus
Eocostapolygnathus gronbergi
Mimagoniatites fecundus
Anetoceras advolvens
Eolinguipolygnathus dehiscens
Eocostapolygnathus kitabicus
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EIFLIAN
Upper EMSIAN
Lower EMSIAN
Nowakia sulcata sulcata
Nowakia maureri
Nowakia richteri
Nowakia cancellata
Nowakia elegans
Nowakia barrandei
Nowakia zlichovensis
Guerichina strangulata - infundibulum

Fig. 1.

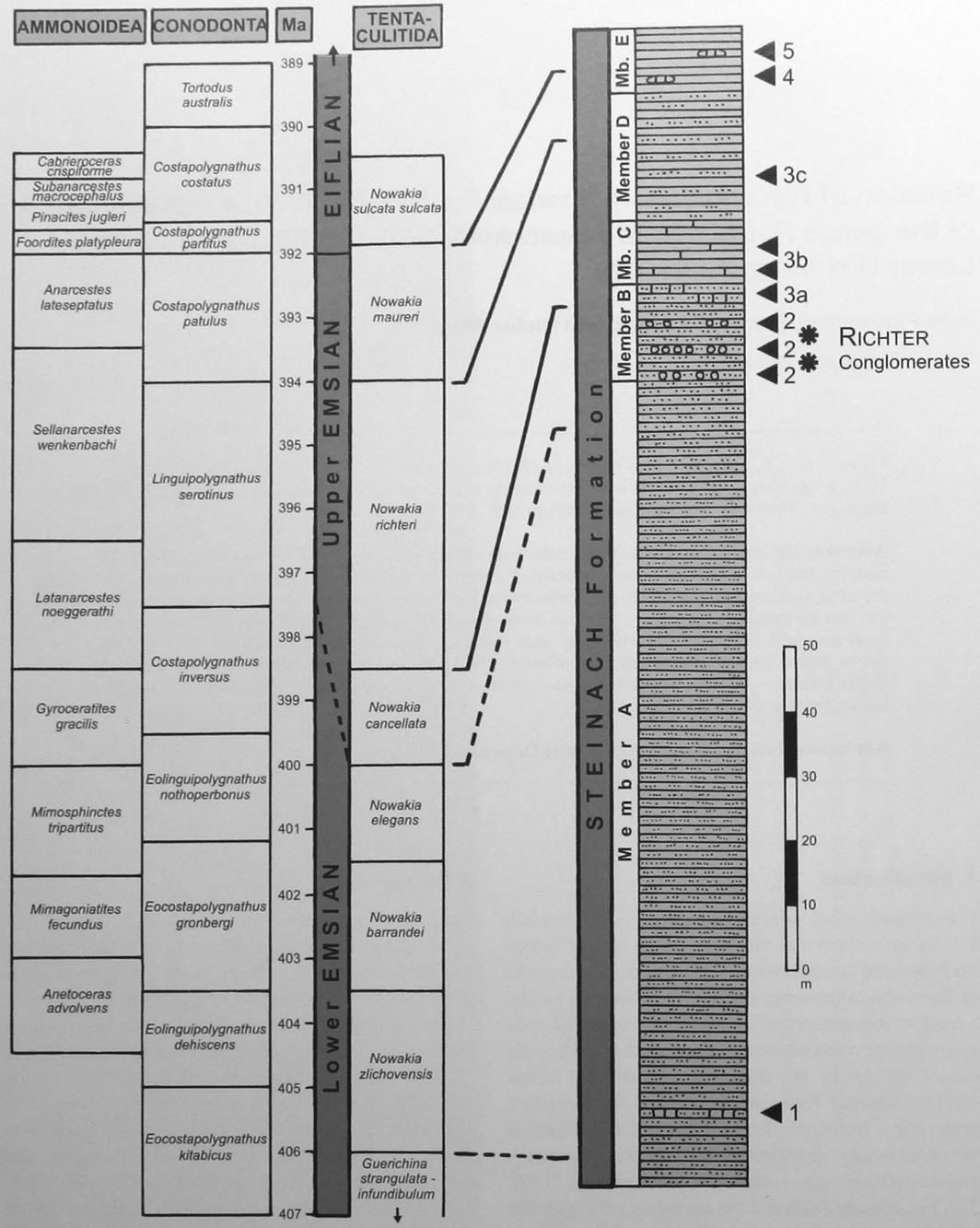


Fig. 1.

generally accepted (Steinbach 1974; Blumenstengel 1995) and enlarged by an additional upper member E formerly included in the Schwärzschiefer Formation (Alberti 1987: 188, fig. 2; Zagora et al. 2008: tab. 1, Blumenstengel et al. 2010: 144, fig. 15).

The precise horizon of "*Pleurodictyum*" *lonsdalii* is the level of the "conglomerates of the *Nereites* beds", now mostly called "Richter Conglomerates" (Volk 1961; Zagora 1962; Alberti et al. 1985, after the faunal descriptions of Richter 1863, 1865), in the lower 10 m of the 15 m thick Member B of the Steinach Formation (Fig. 1, level 2). The intercalated three to four thin, rarely accessible layers (1-5 cm-thick) of local turbiditic conglomerate lenses already surprised the pioneer stratigraphers (Engelhardt 1852; Richter 1851) by their relatively rich fossil content of typical Rhenish facies, elsewhere unknown in the basinal Lower Devonian sediments of Thuringia.

Important biostratigraphic elements of the fauna (rather complete but antiquated lists in Richter 1869: 367-369; Volk 1961: 208-210; for corals also Weyer 1981: 29-30) include Rhenish shallow water Spiriferida (Alberti 1957; Zagora 1978) with *Arduspirifer mosellanus dahmeri* (Solle, 1953) and *Arduspirifer mosellanus steiningeri* (Solle, 1953), both subspecies actually awaiting revision, Bohemian pelagic Dacryoconarida (Zagora 1964, 1977, 1984: 6, pl. 3; Blumenstengel et al. 1976: 1073; Alberti et al. 1985: fig. 4) with *Nowakia cancellata* (Rh. Richter, 1854), and Eifelian ecotype Ostracoda (Zagora 1968, 1977; Zagora & Zagora 1986) with *Zygobeyrichia subcylindrica* (Rh. Richter, 1863). The facies interpretation of Zagora & Zagora (1981) declared nearly all the Rhenish macro- and microfossils of the Richter Conglomerates to be of shallow water origin transported by turbidite currents into a Bohemian/Hercynian bathyal basin (poorly fossiliferous *Nereites* ichnofacies).

Taking into account these data and those available on both the underlying and overlying members (see detailed legend of Fig. 1), the Richter Conglomerates are assigned to the *Nowakia cancellata* Zone generally correlated with the early Late Emsian.

3. Localities in Thuringia

Petridictyum lonsdalii (Rh. Richter, 1855) is now recorded from the Richter Conglomerates of 13 localities along the SE flank of the Schwarzburg Anticline in the western Thuringian Slate Mountains (Fig. 2). Fossil collecting profites from the somewhat lower intensity of tectonic deformation and lower metamorphic grade in that region. There are extremely few, almost no natural bedrock outcrops in the type horizon, as the complete Steinach Formation does not yield any useful rocks to be exploited in quarries. Palaeontological collections depend from mostly ephemeral exposures created mainly during road constructions. Usually only some loose pebbles occur.

Three palaeontologists have systematically collected the fauna of the Richter Conglomerates; their collections are available for our coral revision.

The first was Reinhard Richter (1813-1884), whose collections were stored in Berlin (former Prussian Geological Survey). Some parts of those collections (mainly Devonian of Thuringia) were destroyed in 1945 during the war, but nearly all of the type and figured specimens of the Richter publications (Dienst & Gothan 1928, 1932) are still preserved (Daniels et al. 1998: 65, 66; transferred to a security depository in 1944, saved by the Soviet Red Army in 1945, returned from Leningrad in 1957), as well as many of his corals, which had been extracted from the main stratigraphic collection for the studies of Weissermel (1941; after his death in 1943, these Devonian Anthozoa from Thuringia and other regions were kept in a separate

Fig. 1. Litho- and biostratigraphy of the Steinach Formation (Tentaculiten-Schiefer) in Thuringia; the two asterisks in faunal level 2 (= Richter Conglomerates – see stratigraphic text) indicate the occurrence of *Petridictyum lonsdalii*. Faunal level 1: Tentaculitid Zone of *Nowakia zlichovensis* Bouček, 1964. Faunal level 3a: upper third of Member B, in lenticular calcareous sandstones that represent distal turbidites (as a fine-grained and slightly younger facial equivalent of the Richter Conglomerates), with *Nowakia richteri* Bouček & Prantl, 1959 still co-occurring with *Nowakia cancellata* (Rh. Richter, 1854). Faunal level 3b: purely autochthonous, in some cases slightly marly shales of Member C, Tentaculitid Zone of *Nowakia richteri* Bouček & Prantl, 1959. Faunal level 3c: youngest parts of the *Nowakia richteri* Zone. Faunal level 4: Top Late Emsian Tentaculitid Zone of *Nowakia maureri* Zagora, 1962. Faunal level 5: rare limestone lenses 5 m above the base of Member E, with the lowermost Eifelian Tentaculitid Zone of *Nowakia sulcata* (Roemer, 1843).

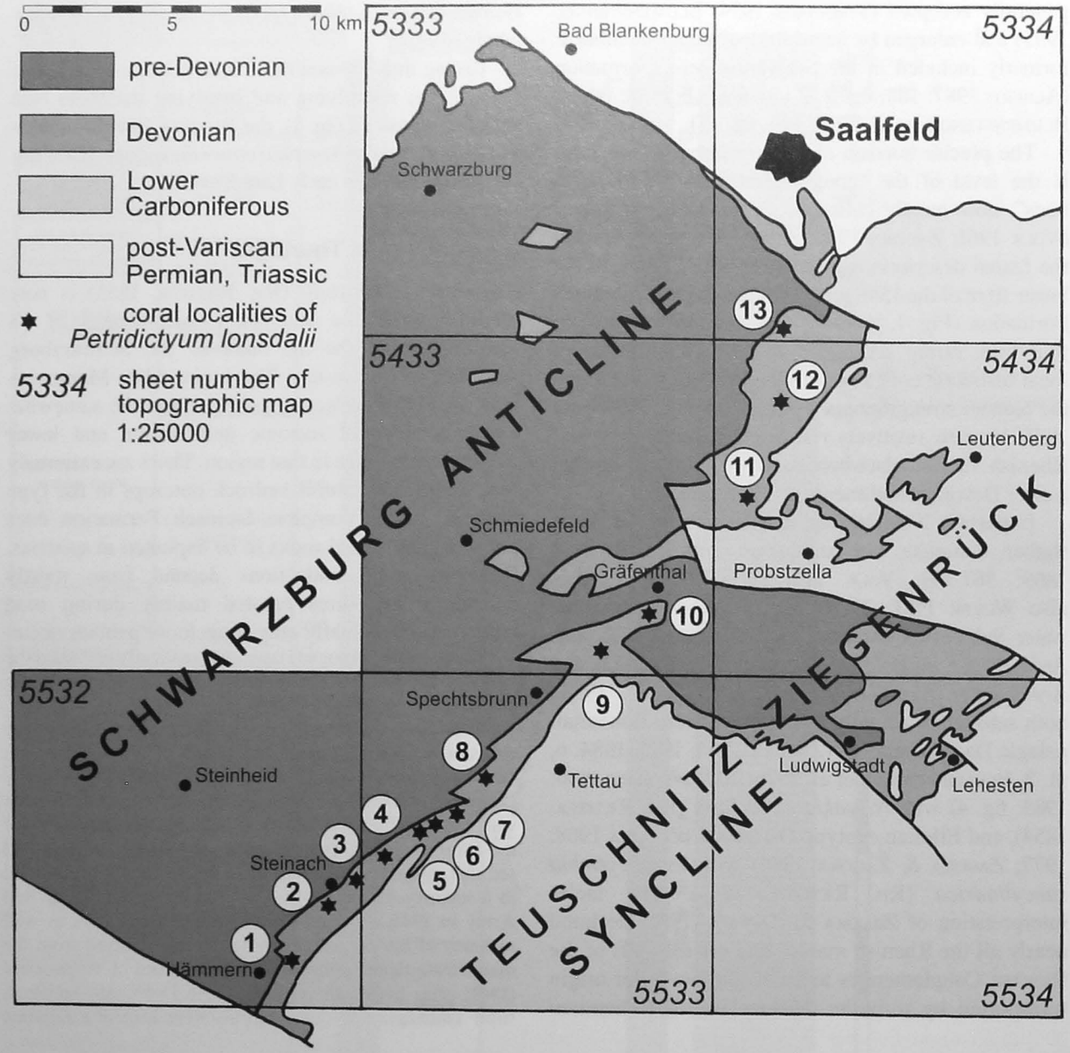


Fig. 2. Map of the Western Thuringian Schiefergebirge, with coral localities 1-13 in the Richter Conglomerates (Member B of Steinach Formation, *Nowakia cancellata* Zone) cropping out on the SE flank of the Schwarzburg Anticline (explanations: chapter localities).

place as an inheritance cupboard, re-arranged in 1965 and used for a revision by Weyer 1981).

The second was Max Volk (1900-1969), who willed his collection to be donated to the University of Halle. It contains the success of nearly 30 years surveying all local outcrops of the Steinach Formation. Volk had planned an extensive publication similar to his Upper Devonian monograph (1939), but apart from some ichnofossil studies, only one faunal list is available (1961).

The third was Karl Zagora (1938-2011), who in 1960 studied all suitable exposures of the Steinach Formation (then Tentaculitid Shales and *Nereites* Quartzites) for his unpublished dissertation of 1964 at the University of Jena. In 1966, his macrofaunal and sedimentological collection

was given to the Zentrales Geologisches Institut (now BGR) and to the Museum of Natural History at Humboldt University, both in Berlin.

Index of localities and collected material: The present official names of the institutions (and their abbreviations used here), where the studied material of *Petridictyum lonsdalii* (Rh. Richter, 1855) is stored, are as follows: 1 – Bundesanstalt für Geowissenschaften und Rohstoffe, Berlin department (formerly Prussian Geological Survey and Zentrales Geologisches Institut) (BGR-…). 2 – Museum für Naturkunde (department of palaeontology) at Humboldt University, Berlin (MB.K…). 3 – Institut für Geologische Wissenschaften – Geiseltalmuseum, Martin Luther University, Halle (PTW2006….. MLU). 4 – British Museum of Natural History, London (BMNH…).

Thirteen localities are indicated on the geological map of the southern Saalfeld area (Fig. 2).

1. Mount Kleiner Mühlberg, east of Hämmern (map sheet 5532 Steinach); original locality of Engelhardt (1852), the discoverer of the strange horizon of the "Rollsteingrauwacke" (= Richter Conglomerates), whose surely rather small collection is missing (according to Volk 1961: 210).
Collection M. Volk: 1 specimen – PTW2006.16.MLU.

2. Mount Pfeiffersberg, western part of Steinach (map sheet 5532 Steinach); the locality yielded a mass occurrence of *Nowakia cancellata* (Rh. Richter, 1854) illustrated by Zagora (1984, pl. 3).
Collection M. Volk: 1 specimen – PTW2006.17.MLU.

3. Mount Bocksberg (identical with Kleiner Tierberg of actual official maps, according to the ancient historical maps of Steinach reillustrated in Blumenstengel & Schultheiss 1994: 18, fig. 5e-f) in northern Steinach (map sheet 5532 Steinach); from the bedrock.
Collection M. Volk: 5 specimens – PTW2006.10.MLU (Fig.4F), PTW2006.11.MLU, PTW2006.12.MLU (Fig. 4G), PTW2006.13.MLU, PTW2006.14.MLU.

4. Treb NE of Steinach (map sheet 5533 Tettau); loose pebbles.
Collection M. Volk: 4 specimens – PTW2006.20.MLU (Fig. 4H), PTW2006.21.MLU, PTW2006.22.MLU, PTW2006.23.MLU.

5. Haselbach, road section near the sharp road curve at eastern slope of mount Dichberg (map sheet 5533 Tettau); from the bedrock. The nowadays nearly forgotten name "Dichberg" is not indicated on actual topographic maps, but according to an old Prussian edition of map sheet Tettau 1:25000 from 1856 it is the mount with height 680.2 m 1 km SW from the church of Haselbach. Zagora (1962: 363, pl. 2) presented the detailed section.
Collection M. Volk: 6 specimens – PTW2006.4.MLU (Fig. 4C), PTW2006.5.MLU, PTW2006.6.MLU, PTW2006.7,8,9.MLU.

6. Haselbach cemetery (30 m off its chapel) (map sheet 5533 Tettau); from the bedrock. Volk (1961: 206) called the place "Hieblein", near the cemetery chapel in Haselbach.
Collection M. Volk: 3 specimens – PTW2006.1.MLU, PTW2006.2.MLU, PTW2006.3.MLU.
Collection K. Zagora 1960: 12 specimens – BRG-BD2507, BGR-BD2599-2605 (specimen no. 2603 contains 2 coralla), MB.K.2346 (Fig. 4E), MB.K.2347, MB.K.2348, MB.K.2349.

7. Path from Eschenbachsheide to the SW to "Marienthal" (former glass-factory) near the village pond in northern Haselbach (map sheet 5533 Tettau); loose pebble.
Collection K. Zagora 1960: 1 specimen – BGR-X12901.

8. Mount Hofberg SSW of Hasenthal (map sheet 5533 Tettau).
Collection M. Volk: 1 specimen – PTW2006.15.MLU (Fig. 9A-B).

9. Slope at the way 1 km WSW of Creunitz, towards Spechtbrunn, just S of mount Gemeindekuppe (map sheet 5333 Gräfenthal); from the bedrock. The locality is named "Creunitz, Vogelherd" in the collection of M. Volk. The section was illustrated by Zagora [1962: 363, pl. 1; 1977, fig. 1; 1978, fig. 3, with *Arduspirifer mosellanus dahmeri* (Solle, 1953)]. Rugosa preserved as casts are *Combophyllum* cf. *ovatum* (Ludwig, 1869), and *Ludwigacia* nov. sp. ind. (Weyer 1975). The locality provided some conodonts of probably *Linguipolygnathus serotinus* Zone from a slightly younger level above the Richter Conglomerates (lower *Nowakia richteri* Zone, upper part of member B of Steinach Formation; Zagora & Zagora 1979).
Collection M. Volk: 1 specimen – PTW2006.19.MLU.
Collection K. Zagora 1960: 12 specimens – MB.K.2340 (Fig. 4A. 10D,G,H), MB.K.2341, MB.K.2342, MB.K.2343 (Fig. 4D,I-L, 10C,F), MB.K.2344, MB.K.2345 (Fig. 10A,B,E), BGR-BD2593-2598.

10. Meernach SW of Gräfenthal (map sheet 5433 Gräfenthal).
Collection M. Volk: 2 specimens – PTW2006.24.MLU, PTW2006.25.MLU.

11. Road between Marktgölitz and Probstzella (map sheet 5434 Leutenberg).
Collection M. Volk: 1 specimen – PTW2006.18.MLU.

12. "Near Saalfeld" of Richter (1855). The exact locality for the "Conglomerate of the *Nereites* beds" was not indicated (Richter 1863, 1865, 1869); such mysterious conduct obviously happened in fear of competing fossil collectors (Zimmermann in Weissermel 1941: 165). Most probably it was the area around the village Schaderthal (map sheet 5434 Leutenberg), where Richter had also exploited the fauna of Member C (Schaderthal trilobite community), and where Alberti (1957) had recollected the Richter Conglomerates. Labels of fossils from the Steinach Formation in the preserved parts of the Rh. Richter collection bear (in Richter's handwriting) as locality data mostly "near Saalfeld", but in rare cases also "Schaderthal" (Weyer 1981: pl. 1, fig. 1).
Collection Rh. Richter ca. 1850-1870: 1 lectotype BGR-X3665. (Figs. 3E, 5A, 6A-C; syntype of Richter 1855: fig. 4); 3 paralectotypes (figured syntypes of Richter 1855: figs. 1-3) – BMNH-AZ553 (Fig. 3I), BGR-X3663. (Figs. 3B, G, H, 8A-C), BGR-X3664. (Figs. 3C, F, 7A-E);
6 paralectotypes (unfigured syntypes of Richter 1855) – BRG-BD2608-2612, BRG-BD 2430-H.

13. Area around the village Knobelsdorf (map sheet 5334 Saalfeld); obviously loose pebble from agriculture fields.
Collection A. Teetzmann ca. 1918-1930: 1 specimen – BRG-BD2428.

3. Systematic palaeontology

Subclass Tabulata Milne-Edwards & Haime, 1850
Order Favositida Wedekind, 1937
Family Micheliniidae Waagen & Wentzel, 1886
Subfamily Micheliniinae Waagen & Wentzel, 1886

Genus *Petridictyum* Schindewolf, 1959

Petridictyum lonsdalii (Rh. Richter, 1855)
Figs. 3-10

v pars 1855 *Pleurodictyum Lonsdalii*. – Rh. Richter, p. 559-566, figs. 1-4, 6 (non fig. 5 = *Granulidictyum* n. sp.).
1865 *Pleurodictyum Lonsdalei*. – Barrande, p. 205.
1869 *Pleurodictyum Lonsdalei* Richt. – Rh. Richter, p. 367.
1871 *P. Lonsdalei*. – Rh. Richter, p. 622-623.
1878 *Pl. Lonsdalei* Richter. – Kayser, p. 230.
1879 *Pleurodictyum problematicum* Gold. *(P. Lonsdali* Richt.). – Gümbel, p. 470.
1883 *Pleurodictyum Lonsdalei* Richter. – Roemer, p. 428.
1888 *Pl.(eurodictyum)*, wahrscheinlich *problematicum* Gold. = *P. Lonsdalei* Richter. – Liebe & Zimmermann, p. 20.
1896 *Pleurodictyum Lonsdalei* Richter (1855). – Sardeson, p. 294.
1936 *Pleurodictyum Lonsdalii* Reinh. Richter. – Mailleux, p. 16, 20-21, 24, 39-40.
v pars 1941 *Pleurodictyum problematicum* Goldfuss n.var. *richteri*. – Weissermel, p. 184 (non pl. 5, fig. 15).
v ? 1951 *Pleurodictyum lonsdalii* Reinh. Richter. – Richter & Richter, p.148, 158, 161, pl. 12, fig. 8.
1959 *Pl. lonsdalei* Rh. Richter. – Schindewolf, p. 310.
v *1961* *Pleurodictyum petri* Giebel [sic]. – Volk, p. 208.
v non *1961* *Pleurodictyum problematicum* Goldf. var. *richteri* Weissermel – Volk, p. 208.
1981 *Petridictyum lonsdalii* (Rh. Richter, 1855). – Weyer, p. 29.
1984 *Pleurodictyum lonsdalii* Richter 1855. – Weyer, p. 7.
1984 *Petridictyum lonsdalii* (Rh. Richter 1855). – Weyer, p. 14.
v ? 1985 *Petridictyum lonsdalei* (Rh. Richter) – Birenheide, p. 95, pl. 34, fig. 3 (specimen of Richter & Richter 1951, inverted photograph).
1989 *Pleurodictyum lonsdalii* Reinh. Richter 1855. – Birenheide et al., p. 358.
v *2010* *Petridictyum lonsdalii* (Richter 1855). – Blumenstengel et al., p. 146.

Synonymy list: We have used the following abbreviations to specify qualifying comments on the synonymy list (after Matthews 1973, simplified).
1855: year in roman, that work contributes to the knowledge of the species or at least gives short information, description and/or illustration on specimens assigned to the species under discussion.
1855: year in italics, mention of the species but without description or illustration.
v: we have seen the specimen(s).
?: the assignment to the species under discussion is questionable.
pars: the reference applies partly to the species under discussion.

Checking the synonymy list of *P. lonsdalii*, it appears that the main part of the references are merely records in faunal lists and except for the questionable specimen of Richter & Richter (1951), the species has never been clearly identified outside the localities of the Western Thuringian Slate Mountains.

Type locality: According to Rh. Richter (1855: 559): "near Saalfeld", most likely region of Schaderthal village, 7.5 km south of Saalfeld, Thuringia (Germany).

Type horizon: Steinach Formation (formerly Tentaculitenschiefer and Nereitenquarzit), Member B, "Richter Conglomerate", *Nowakia cancellata* Zone, Early Upper Emsian.

Material: We have been able to examine original, topotypic and "stratotypic" material housed in four different places (Universities, Museums and Survey), altogether 62 specimens. The preservation as natural casts is highly variable and many specimens are incomplete.
1. The main part of the original material of Rh. Richter (1855) is preserved in the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) in Berlin (Germany). 3 figured and 6 unfigured specimens.
2. The specimen of Rh. Richter's fig. 1 (1855), presented by him to William Lonsdale, care of Roderick Impey Murchison, after a field trip in Thuringia in 1854, was found in the Murchison Collections (The Natural History Museum, Department of Palaeontology, London) in a drawer of fossils from the Devonian of Germany, without assignment nor registration number (now BMNH-AZ 2553). The comments on the specimen written by Lonsdale in a letter to Murchison/Richter are published in Rh. Richter (1855: 559). A note of Lang & Smith (1927: 448) says that most corals of the Lonsdale collection were part of the Murchison collection later donated to the Geological Society of London, and partly (materials from foreign countries) given to the British Museum of Natural History in London in 1911.
3. A rather large collection made by Max Volk is preserved in the Institut für Geologische Wissenschaften, Martin Luther University in Halle, a posthumous donation to that institution in 1969 – 25 specimens. Volk as geologist and collector numbered his specimens on labels and stones using the private prefixes of his field books; now new museum numbers were given to his collection. All his specimens in our opinion belonging to *lonsdalii* were assigned to *Pleurodictyum petrii* (Maurer, 1874), *P.* cf. *petrii* or *P.* sp. Volk (1961) declared that the corals had been determined by Weissermel, but one of us (D.W.) suggests that this was true only for the first part of the Volk collection gone to Berlin and published by Weissermel (1941: 184) as *Pleurodictyum problematicum* var. *richteri* nov. var. Weissermel (1941: 206) had only used the determination as *Pleurodictyum petrii* Maurer, 1874 for an older specimen from the Pragian Tentaculitenknollenkalk Formation, later reinterpreted as *Granulidictyum* sp. by Weyer (1970). After the death of Weissermel (1943), Volk determined the corals himself, then surely knowing (for his review of 1961) the publication of Schindewolf (1959).
4. A nice collection made in 1960 by Karl Zagora is housed (by donation) in the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR – 16 specimens), and in the Museum für Naturkunde (department of palaeontology) at Humboldt University, both in Berlin (MB – 10 specimens).
5. One specimen collected ca. 1920 by A. Teetzmann (an amateur living in the town of Zeitz) belongs to the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) in Berlin.
Rh. Richter (1855) provided six figures corresponding to six different specimens. Posthumously, his collection (including all the figured specimens of his numerous publications) was acquired in 1884 by the Prussian Geological Survey in Berlin (see the catalogue of identifiable Richter "original" fossils of Dienst in Dienst & Gothan 1928, 1932).

The specimen of fig. 1 corresponds most likely to the specimen found in the Murchison collection, BMNH-AZ 2553 (here Fig. 3I); it is the only piece in this collection; moreover, the size of the specimen is consistent with the

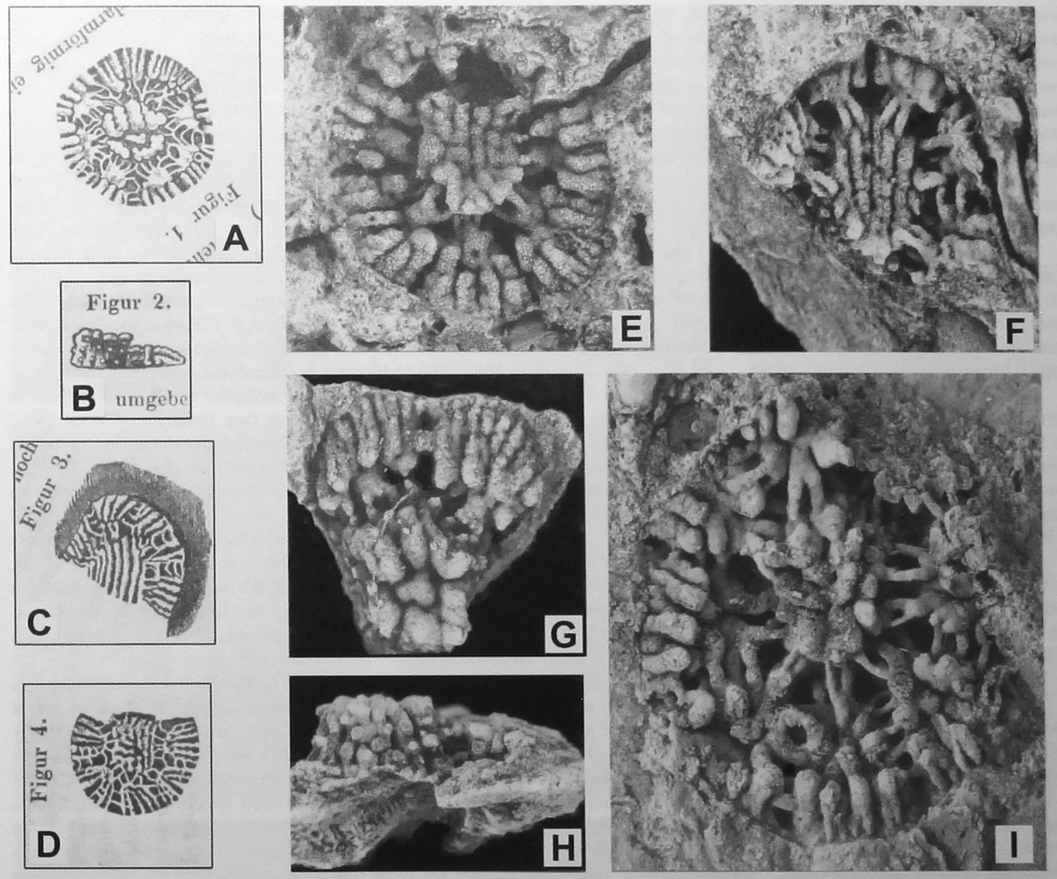


Fig. 3. *Petridictyum lonsdalii* (Rh. Richter, 1855), "Saalfeld" (most likely Schaderthal village), original material, corallum morphology, specimens preserved as natural casts, upper side, all specimens with the same orientation, apex of protocorallite bottom-facing, excepted H. **A-D** – Copied original figures of Rh. Richter (1855), same orientation as figs. E-H, magnification x 2; **E-G** – lectotype BGR-X3665, and paralectotypes BGR-X3664 and BGR-X3663; **H** – lateral view, BGR-X3663; **I** – BMNH-AZ 2553, specimen nearly almost without spines, magnification x 5. Remark: A = I, B = G-H, C = F, and D = E.

one of Rh. Richter fig. 1. In fact, for all the specimens the magnification is variable, in some cases more, other cases less than 2/1 (as indicated 1855: 561) and there are eight peripheral corallites. Nevertheless, the specimen is a bit incomplete and, one can note that the restored area on the drawing shows a false "ordinary" morphology. Finally, the figure of Rh. Richter is rather schematic and idealized.

The specimen of fig. 2 (lateral view) corresponds to the corallum BGR-X3663 (here Fig. 3G-H); its calicinal view was not illustrated.

The specimen of fig. 3 corresponds to the incomplete specimen BGR-X3664 (here Fig. 3F) taking into account the presence of parallel septal ridges in the central corallite and the number of peripheral corallites (5). In this particular case we can see again that Rh. Richter's drawings are only approximate.

The specimen of fig. 4: If we disregard the two broken corallites situated opposite to the central corallite tip in BGR-X3665 (here Fig. 3E), fig. 4 is very likely an incomplete drawing of this specimen. In this hypothesis the rounded or « fat » shape of the interseptal furrow casts is here not well drawn. Nevertheless the identification of BGR-X3665 as fig. 4 is likely.

The specimen of fig. 5 is not traced; it was in the lost private collection of Wolfgang Jakob Engelhardt (1807-1865), surveyor of mines in Steinach, who had discovered the fossiliferous layer of the "Richter Conglomerate" in 1851.

The specimen of fig. 6 (proximal side) is also untraced.

Lectotype designation: The main part of the original material (10 specimens) has been traced but, of course, Rh. Richter did not designate a holotype, a term not yet invented in his time. The species name *Pleurodictyum lonsdalii* was conditionally proposed, but such names published before 1961 are valid according to the International Code of Zoological Nomenclature (art. 11.5.1, 15).

The study of the original and additional material shows that, within the figured specimens of Rh. Richter fig. 1-4, and probably fig. 6 (only known by its proximal side), belong to the genus *Petridictyum* Schindewolf, 1959, and the specimen in his fig. 5 (probably lost) very likely to *Granulidictyum* Schindewolf, 1959. Hence, it appears that the species *lonsdalii* could be either a *Petridictyum* or a *Granulidictyum* depending on the lectotype designation.

An easy decision takes into account the following data and/or historical arguments: 1) the first four figures of Rh. Richter (1855) represent the same species of *Petridictyum*, 2) in view of Kayser's (1878: 230) opinion the specimen of fig. 5 is not a *lonsdalii* but quite probably a *problematicum* (*die von Richter l. c. p. 562, f. 5 abgebildete Form mit breiteren, becherförmigen Zellen gehört wohl keinesfalls zu Lonsdalei, erinnert vielmehr an problematicum*), 3) Richter & Richter (1951) assigned a representative of the genus *Petridictyum* to *lonsdalii*, 4) *Pleurodictyum lonsdalii* is included in his new genus *Petridictyum* by Schindewolf (1959: 310), 5) last but not least, the syntype specimen of Richter (1855: fig. 5) now assigned to *Granulidictyum* is not traced.and obviously lost (see remarks of Volk 1961: 210, about the fate of the Engelhardt collection) and this genus is much rarer in the Richter Conglomerates.

Therefore, the name *lonsdalii* has to be transferred to *Petridictyum*. Hence, within the four originally illustrated *Petridictyum* specimens, we designate as lectotype BGR-X3665 (Rh. Richter 1855, fig.4, here re-illustrated in Figs. 3E, 5A, 6A-C) rather than BMNH-AZ 2553 (Rh. Richter 1855, fig.1), because it is housed in Berlin, its country of origin, and mainly also because its size gives a better idea of the species.

As a result, the specimen of Rh. Richter's (1855) fig. 5 is not a *Petridictyum lonsdalii* and, although not examined, it can be assigned to the same genus and species as the specimen of Weissermel (1941, pl. 5, fig. 15), his so-called "*Pleurodictyum problematicum* Goldfuss var. *richteri*". One of us (Y.P.) has seen the illustrated specimen of Weissermel and has pointed out some similarities with *Pleurodictyum latum* Plusquellec, 1976, but above all some features indicating that its assignment to *Procteria* (*Granulidictyum*) could not be excluded; unfortunately the proximal side was unknown (Plusquellec 1976: 25-26; Birenheide et al. 1989: 358). In the material collected by Volk and Zagora, from the same horizon and localities as *P. lonsdalii,* we have

Fig. 4. *Petridictyum lonsdalii* (Rh. Richter, 1855), corallum morphology. **A-H** – Specimens preserved as natural casts, upper side (excepted E lower side), all specimens with the same orientation, apex of protocorallite bottom-facing. A: MB.K.2340, Creunitz, complete corallum with well exposed minor septal ridges; B: BGR-X12901, Eschenbachsheide, enlarged view of the protocorallite, white triangles indicate two minor septal ridges on both sides of the cardinal ridge; C: PTW2006.4.MLU, Haselbach-road, very nice example of protocorallite with calicinal bottom of the radial type; D: MB.K.2343, Creunitz, see also Fig. 4I; E: MB.K.2346, Haselbach-cemetery, proximal side, the arrow indicates the position of the metacorallite 2^2; F: PTW2006.10.MLU, Bocksberg in Steinach, young specimen; G: PTW2006.12.MLU, Bocksberg in Steinach, note the fork-like pores; H: PTW2006.20.MLU, Treb NE Steinach, protocorallite belonging to the radial type. **I-L** – Specimen MB.K.2343, Creunitz, resin restored skeleton (see the natural cast Fig. 4D). I: upper side of the corallum; J: side view normal to the plane of bilateral symmetry; K: metacorallite 2^1_{Left}, side view showing the contratingent minor septal ridges on both sides of the cardinal ridge and the axial cave-like structure; L: metacorallite 1^2_{Left} showing, above the initial platform, a series of cavities around the axial cave-like structure and some crenulations on the top of the wall of the protocorallite (top right). All specimens x 5 except Fig. 4K-L x 10.

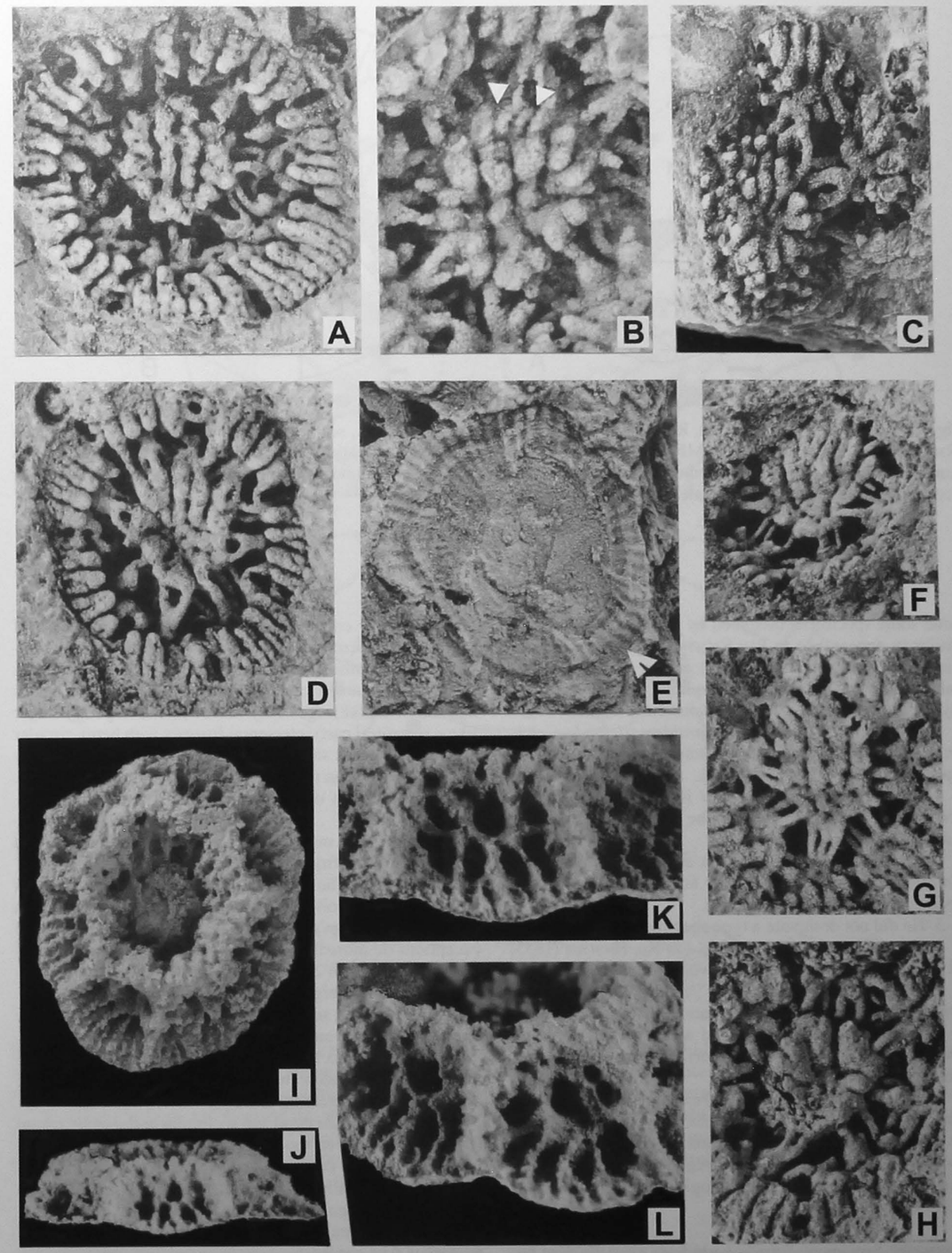


Fig. 4.

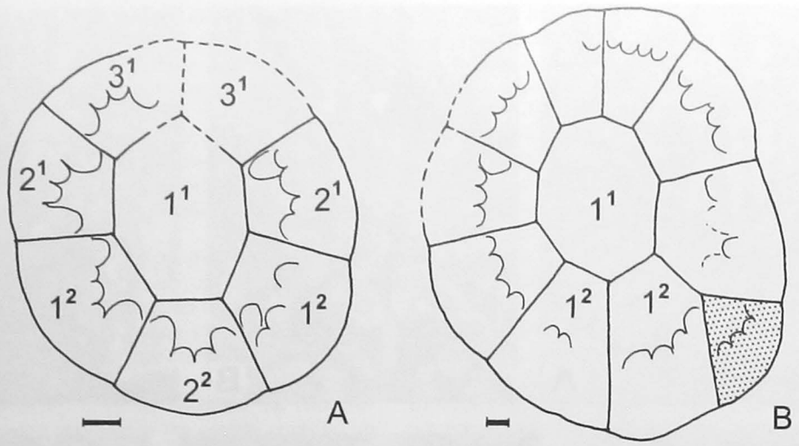


Fig. 5. *Petridictyum lonsdalii* (Rh. Richter, 1855), Lectotype BGR-X3665 (**A**, see Figs. 3D-E and 5A) and *P.* cf. *lonsdalii* (Rh. Richter, 1855), specimen SMF-XXV-262a (**B**, see Fig. 12). Diagrammatic drawing of the upper side with calices numbered in order of their development, conjectural in B. Scalloped line as boundary of the initial platform; dotted area for a corallite of the second series. Scale bar 1 mm.

found some specimens (assigned by Volk to *Pl. petrii* and similar in appearance to Rh. Richter's fig. 5 of 1855 and Weissermel's pl. 5, fig. 15 of 1941), with a preserved proximal side showing the granular morphology of the Granulidictyinae Weyer, 1970, *quod erat demonstrandum*.

At first sight, "*Pleurodictyum problematicum* var. *richteri*" now could be named *Granulidictyum richteri*, but the paper by Weissermel is ambiguous.

1. He suggested that *lonsdalii* is a variety of *Pleurodictyum problematicum* to which he gave the useless name *richteri*.

2. He gave a unique figure that corresponds to a *Granulidictyum* and his measurements are those of the figured specimen, not of the true *lonsdalii*.

3. He did not designate a type specimen.

4. He was not aware of dealing – as Rh. Richter (1855) did – with material belonging to two different genera.

5. He did not accept the "only" conditionally proposed name *lonsdalii* (against the International Rules of Zoological Nomenclature) and introduced a new name, normally a *nomen vanum* becoming a priori a junior synonym of *Petridictyum lonsdalii*.

Thus, the name "*richteri*" is rejected, as it cannot be applied to the species of *Granulidictyum* figured both by Rh. Richter (1855) and Weissermel (1941). A new name has to be published and a type designated, together with a diagnosis and a modern morphological analysis based on additional collections.

Diagnosis: Species of *Petridictyum* with a corallum of ca. 11 mm in diameter, a proximal side with both radial and concentric ridges, a distal side with a protocoralite bearing a rather flat or concave (in natural cast) calicinal base of ca. 4.3 mm, surrounded by a corona of 6 to 8 metacorallites with a diameter measured along the corallum radius of ca. 2.8 mm and a generally short initial platform; major and minor septal ridges very narrow, wide (« podgy finger like » in natural cast) interseptal furrows with hemi-circular and in some cases slightly widened proximal tip. Typically 8-9 septal ridges on the marginal side of the metacorallites. Corallites with few or scarce spines. No synapticuloids.

Description: The material is preserved as natural cast and will be described from this angle.

Proximal side. – The proximal or lower side of the corallum is generally not collected, either in the Richter's than in Volk's and Zagora's collections; only three unintentional exceptions on more than 60 specimens are known!

Specimen PTW2006.16.MLU (Volk collection, locality Kleiner Mühlberg near Hämmern) is a poor example (a not well preserved sector of about 50°) only showing some irregular wrinkles and a concave outline, but the two specimens of the Zagora collection (BGR-BD2600, MB.K.2346 = Fig. 4E, Haselbach cemetery) are more or less complete and both show interesting features.

The outline of the corallum is circular and slightly lobate (but this can be seen too on the distal side) and its section is concave. In the central part of the proximal side (BGR-BD2600) or laterally (Fig. 4E) lies a flat area that could be the cast of a foreign body on which the corallum was fixed. The rest of the area is occupied by some large wrinkles and numerous fine concentric growth ridges intersected by numerous rather broad radial ridges and narrow grooves.

The number of grooves in Fig. 4E is as follows: 43 conspicuous grooves, total number appraised to be 57. This is close to the number of septal ridges of a corallum of 7 metacorallites (7x8=56). In addition the natural cast of the proximal side exhibits 7 radial undulations corresponding to the walls of the 7 metacorallites seen on the distal side

According to this description, the specimen figured by

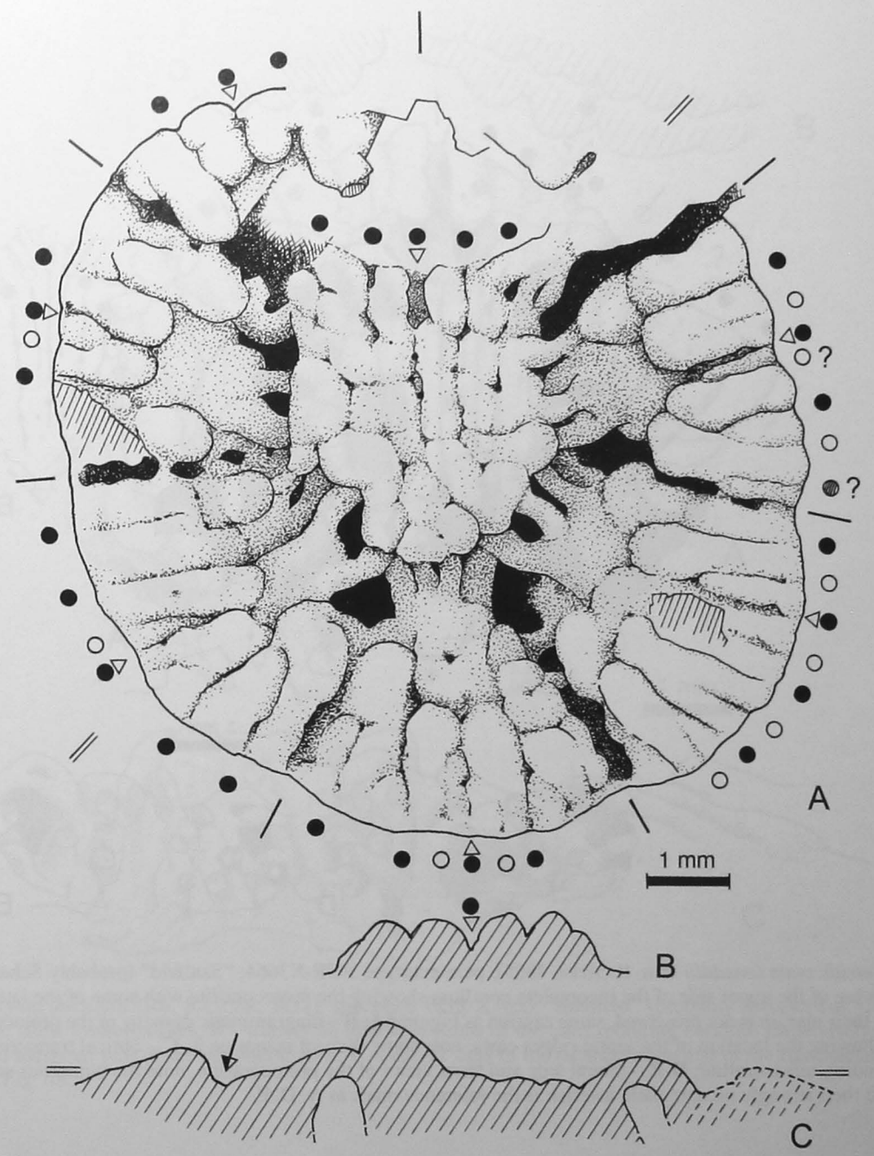


Fig. 6. *Petridictyum lonsdalii* (Rh. Richter, 1855), Lectotype, BGR-X3665, "Saalfeld" (probably Schaderthal village). **A** – Camera lucida drawing of the upper side of the corallum showing the protocorallite with its corona of metacorallites, natural cast (see Fig. 3E); **B** – optical transverse section of the calicinal bottom of metacorallite 2^2 (see Fig. 5A) taken at 2.5 mm from the apex and showing the morphology of the ridges and interseptal ridges; **C** – optical section of the corallum (for position see the opposite double lines). Caption for A-C: solid circle as cast of the major septal ridges, open triangle as cardinal ridge, open circle as cast of minor septal ridges, black and white arrow as boundary of the initial platform.

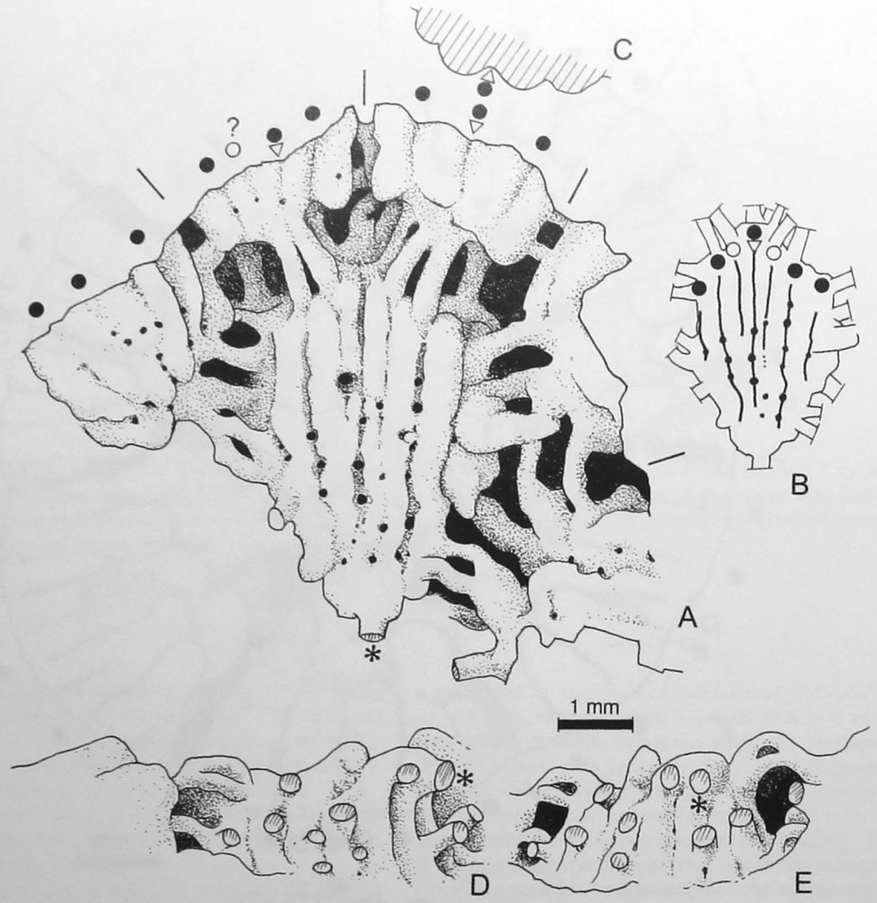


Fig. 7. *Petridictyum lonsdalii* (Rh. Richter, 1855), paralectotype BGR-X3664, "Saalfeld" (probably Schaderthal village). **A** – Drawing of the upper side of the incomplete corallum showing the protocorallite with some of the late metacorallites; note that their margin is not preserved, same caption as Figure 6A; **B** – diagrammatic drawing of the protocorallite calicinal bottom showing the location of the septal ridges casts, note some casts of spines on it; **C** – optical transverse section of the corresponding metacorallite; **D-E** – lateral side and front views of the protocorallite, note the numerous sections of mural pores and their strongly arcuate path, asterisk is the reference mark in A, D, E.

Rh. Richter (1855, fig.6) is very likely a representative of *P. lonsdalii*.

Distal side. – In natural cast, the upper side, at calicinal base level, is generally gently convex; in some cases this shape is marked by the steeply sloping metacorallites in the peripheral zone. This feature confirms that the proximal side is more or less cup shaped. Nevertheless, in some specimens, the outline of the upper side could be concave (PTW2006.22.MLU and young specimen of Fig. 4F), convex along the transverse (right-left) "section" and concavo-convex (or concavo-flat convex) along the axial "section" (plane of bilateral symmetry) in the same specimen (Fig. 4G), concave with a narrow convex peripheral rim (PTW2006.1.MLU) or concave with a flat side (Fig. 4H).

In adult stages, the protocorallite 1^1 (central corallite or initial cell of Beecher 1891) is surrounded by a corona of seven (Lectotype, Fig. 5A) or eight metacorallites (Figs. 3I, 4B).

The lectotype shows that the two first metacorallites (pair 1^2) start out from the lateral edge of the protocorallite. They are separated by a metacorallite 2 (probably 2^2) hence the prototriade 1^2-1^1-1^2 belongs to the open type (see Plusquellec in Le Menn et al. 2002 and Plusquellec 2007: 27-28, fig. 14). In other words, in the open type (Fig. 5A), the

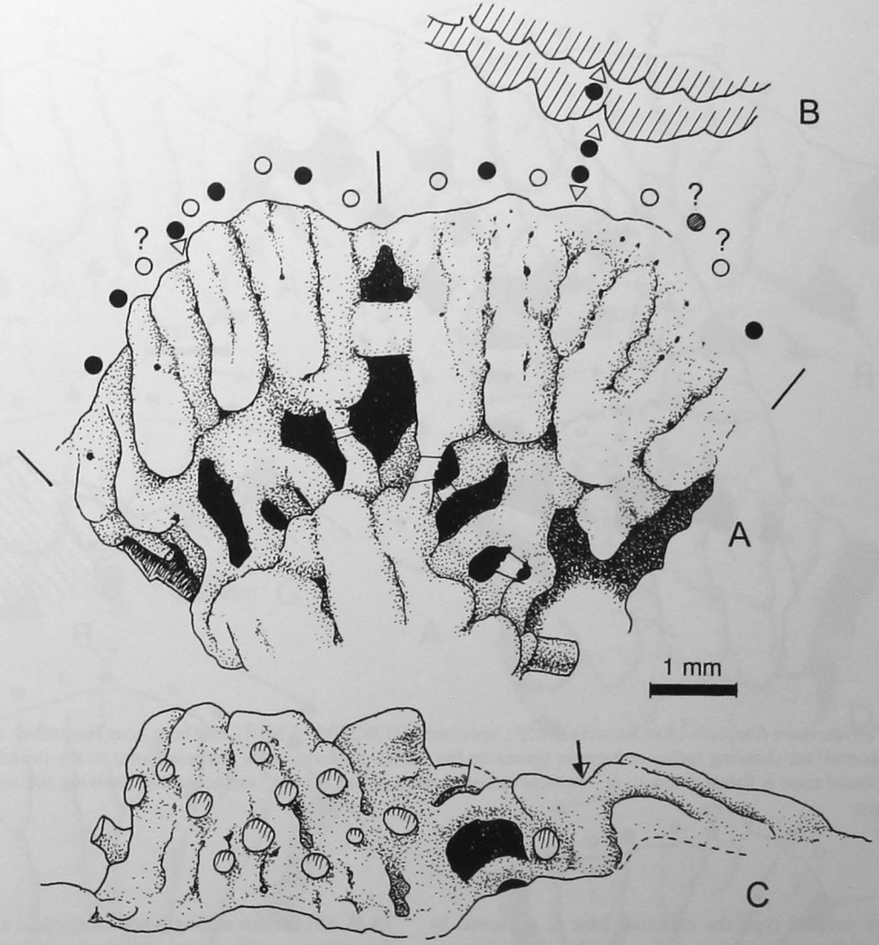


Fig. 8. *Petridictyum lonsdalii* (Rh. Richter, 1855), specimen BGR-X3663, "Saalfeld" (probably Schaderthal village). **A** – Drawing of the latest metacorallites; **B** – transverse optical sections of the corresponding corallite respectively taken in the proximal and marginal part of the peripheral zone; **C** – lateral view of the protocorallite and of the right metacorallite; same caption as Fig. 6A.

plane of bilateral symmetry of the protocorallite (= cardinal ridge) is also the plane of symmetry of the metacorallite 2^2 while in the contiguous type (Fig. 5B) this plane separates the two corallites 1^2. The process of increase continues until the corona was completed by addition of the two corallites 2^1 and the pair of corallites 3^1. In the rather complete specimen of Lonsdale (Richter 1855, fig. 1 and Fig. 3I herein) the prototriade belongs to the open type as well.

Some other specimens show examples of the open type (Fig. 4A, D, F-G; PTW2006.3.MLU) but none of the contiguous type, except perhaps PTW2006.21.MLU, though it is conjectural for this incomplete (not illustrated) corallum. On the other hand, the contiguous type is well known in *P. petrii* from the Erbslochgrauwacke (Schindewolf 1959, pls. 12-14 and Plusquellec, work in progress).

Protocorallite. – The protocorallite is rarely hexagonal, more frequently heptagonal or octogonal, more or less regular (lectotype), or elongated in the plane of septal ridges (Figs. 3F, 4G). The calicinal base, with regards to the septal ridges pattern, shows two kinds of morphology that, in a simplified manner, we assign to the parallel (the more frequent one) and to the radial type. It is not more than an intraspecific variation; some rare specimens half-way between parallel and radial (or intermediate/radial) are known (Fig. 4B).

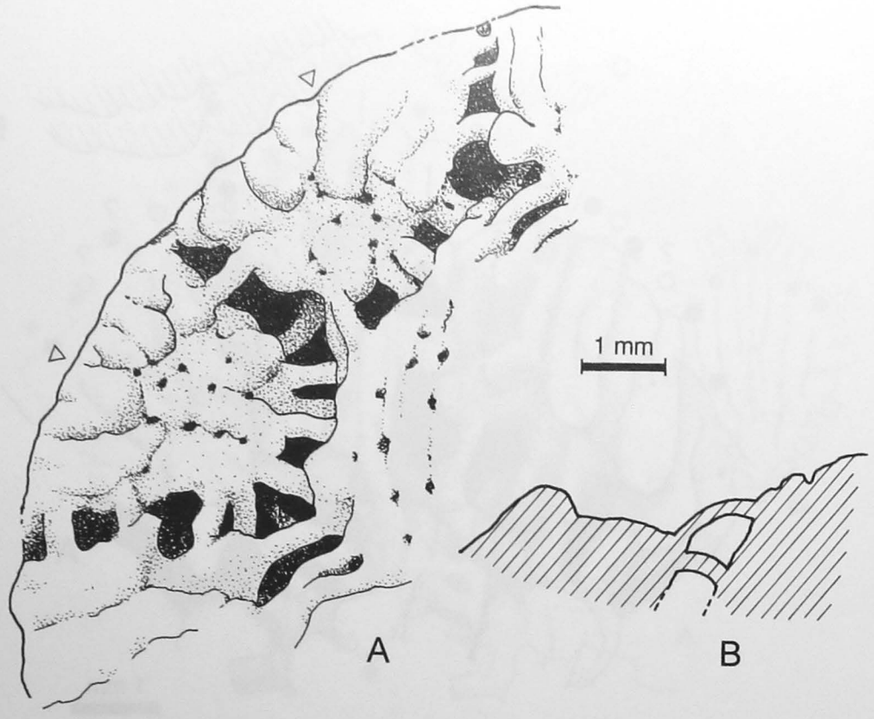


Fig. 9. *Petridictyum lonsdalii* (Rh. Richter, 1855), specimen PTW2006.15.MLU, Hofberg near Hesenthal. **A** – Drawing of two metacorallites showing rather numerous spines on the initial platform, view perpendicular to the initial platform, thus the peripheral zone is foreshortened; **B** – optical radial section of the "upper" metacorallite showing the strong dipping of the margin.

In the parallel type the calicinal base is occupied by as many as five very narrow and somewhat discontinuous casts of major septal ridges (lectotype Figs. 3E-F, 4F, PTW2006.15.MLU, MB.K.2341). The cardinal septal ridge in some specimens is a little bit stronger than the others (lectotype, PTW2006.21.MLU, PTW2006.13.MLU) and is situated in the plane of bilateral symmetry. In the area opposite the apex, two casts of not contratingent minor septal ridges appear on both sides of the cardinal one (Fig. 7A-B, 4B) but this setting is not constant. In some specimens the minor septal ridges are more or less contratingent (PTW2006.23.MLU), hardly visible (PTW2006.12.MLU, Fig. 4G), difficult to identify (Fig. 4F), or not developed (PTW2006.21.MLU). In natural cast, the axial area of the protocorallite is roughly flat with its initial apex slightly raised. In the radial type, the cardinal ridge is not well differentiated and the other ridges are radially arranged (Fig. 4C, H). Moreover, the minor septal ridges are not

Fig. 10. *Petridictyum lonsdalii* (Rh. Richter, 1855), Creunitz. Drawing of the peripheral zone of some metacorallites showing the layout of the septal ridges. Solid circle as cast of the major septal ridges, open triangle as cardinal ridge, open circle as cast of minor septal ridges, open arrow towards the metacorallite 3^1, black arrow showing an expansion of the initial platform in front of a minor septal ridge reaching it (A,D,G), sometimes with development of a "step" (B, E, H). **A** – MB.K.2345, metacorallite 2^1_{Left}; **B** – MB.K.2345, metacorallite 1^2_{Right}; **C** – MB.K.2343, metacorallite 1^2_{Left}; **D** – MB.K.2340, metacorallite 1^2_{Right}; **E** – MB.K.2345, metacorallite 1^2_{Left}; **F** – MB.K.2343, metacorallite 2^1_{Right}; **G** – MB.K.2340, metacorallite 1^2_{Left}; **H** – MB.K.2340, metacorallite 2^2. See photographs of specimen MB.K.2343 (Fig. 4D) and MB.K.2340 (Fig. 4A).

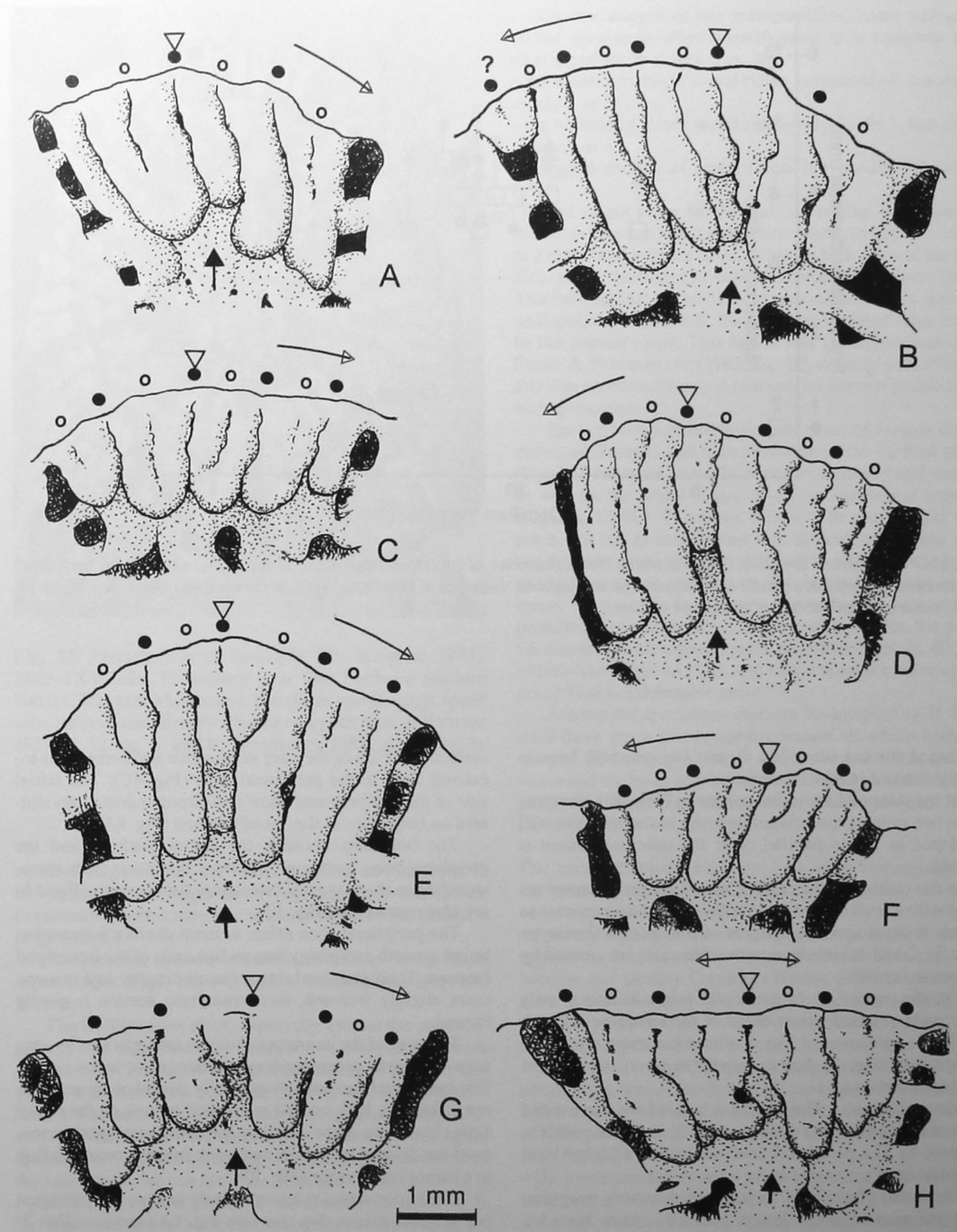
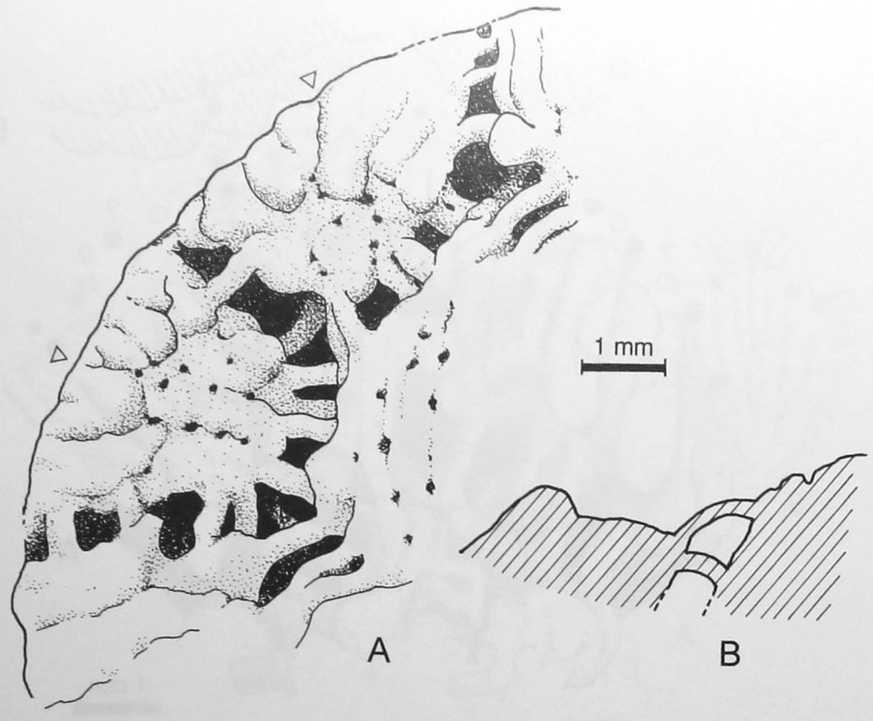


Fig. 10.



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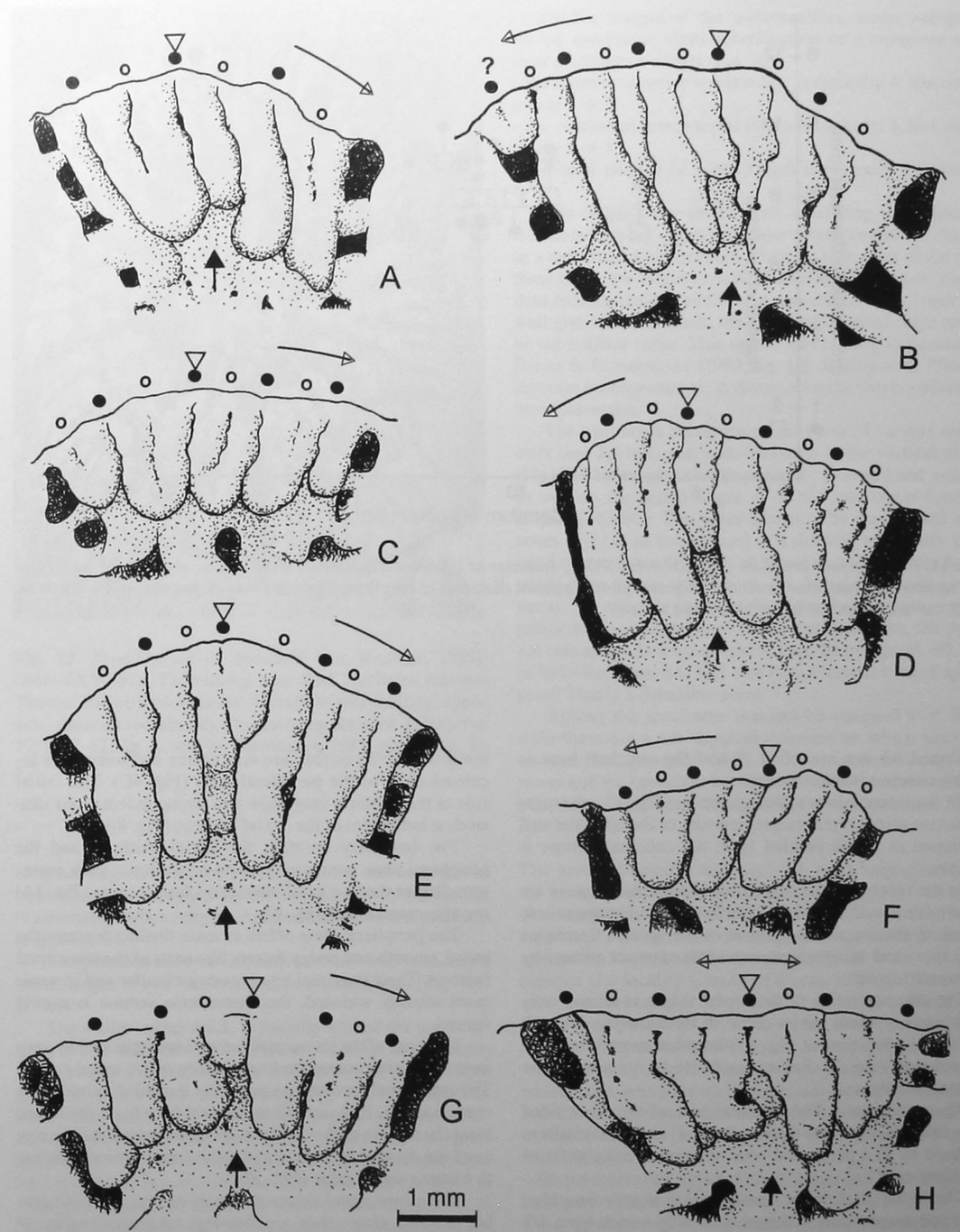

Fig. 10.

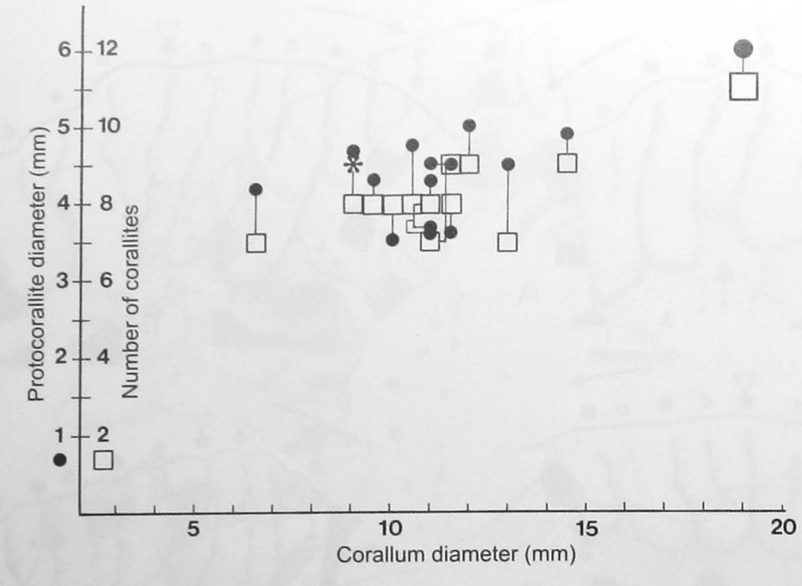

Fig. 11. *Petridictyum lonsdalii* (Rh. Richter, 1855), diameter of protocorallite (small black circle, asterisk for lectotype) and number of corallites (small open square) plotted against diameter of corallum; *Petridictyum* cf. *lonsdalii* (Rh. Richter, 1855, same caption but larger circle and square.

developed (or not identified ?) and the calicinal base is clearly concave in natural cast.

In the intermediate/radial specimen (Fig. 4B), the casts of the two minor septal ridges opposite to the apex are well developed as in the parallel type; the calicinal bottom is concave.

In the two types, the casts of the interseptal furrows are broad with a well curved transverse section that appears to be one of the diagnostic features of the species (lectotype Figs. 3E, G and 4G where moreover the casts are crossed by transverse furrows).

The ornamentation of the septal ridges is scarce: only a few casts of small spines occur in the lectotype (Fig. 6), and in the specimen of Fig. 8 somewhat more numerous and stronger (Fig. 7). Spines appear to be missing in the interseptal furrows.

Metacorallites. – The calicinal base of the three sided metacorallites show two distinct areas: 1) an initial platform bordered by 2) a peripheral zone situated at a higher level in natural cast.

The initial platform of metacorallites is very irregular, short and narrow and its length generally varies from 1/3 to 1/4 of the radial length of the corallite (Figs. 7-8). Nevertheless, in some specimens (Fig. 3I) or in some corallites (lectotype Fig. 6) it reaches one-half the length. Numerous pores open at its tip. The initial platform is ornamented with spines (Figs. 4A, 9) or not (lectotype, except one spine on metacorallite 2^2) or they are very scarce and sometimes localised close to the peripheral zone (Fig. 4C). The initial side of the platform may show two strong indentations situated on both sides of the "axial" pore(s) (Fig. 8A).

The boundary between the initial platform and the peripheral zone commonly shows a re-entrant path corresponding to the two axial interseptal furrow casts (Fig. 5A; see also comment of Fig. 10).

The peripheral zone offers as main distinct features the broad, smooth and podgy fingers like casts of the interseptal furrows. Their proximal tips are semi-circular and in some cases slightly widened, their transverse section is evenly curved.

The casts of the interseptal furrows are separated by very narrow furrows corresponding to sharp major septal ridges. The interseptal furrows are generally devoid of spines (rare exception Fig. 10D, second interseptal furrow on the right). Near the margin of the corallum the main interseptal furrow casts are divided by a short and weak furrow corresponding to a minor septal ridge (Fig. 10).

The minor septal ridges generally are not contratingent but in some places they are (see Fig. 6A, metacorallite 2^2 and $2^1{}_{\text{Left}}$ and $_{\text{Right}}$, and Fig. 10E).The distinction between major and minor septal ridges is not obvious in all cases (see Fig. 6-8) and very commonly the area of the cardinal septal ridge is somewhat confuse and asymmetrical (Fig. 6). Very commonly a minor septal ridge on one side of the cardinal ridge reaches the initial platform and must not to be confused with a major septal ridge. Moreover this feature is associated with a narrow expansion of the initial platform (Fig. 10D, G).

The presence of some imprints of small spines on major septal ridges (Figs. 7A, 8A) and on minor ridges (Fig. 8A) is clear.

The wall is rather thick, especially around the protocorallite. From side view, this latter shows casts of numerous septal ridges. The septal ridges cross the top of the wall thus giving it a crenulated morphology (Fig. 4C, PTW2006.13. MLU). The number of septal ridges is generally very difficult to count. In the very incomplete – hence interesting for the purpose – specimen of Fig. 4C, with a protocorallite of the radial type, we can estimate their number at ca. 10-12 at calicinal bottom level and 22-23 at calicinal margin level. In the specimen of Fig. 4B (intermediate/radial type) there are 16 casts of septal ridges of which two are the minor ridges opposite the apex. In our opinion these data indicate that the protocorallite basically bears 12 major septal ridges – such as numerous tabulate corals (Mistiaen 1989) – and 12 minor ones.

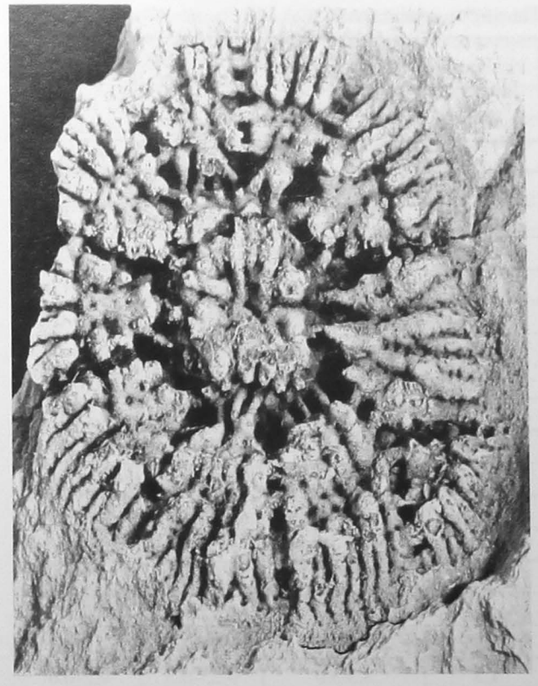

Fig. 12. *Petridictyum* cf. *lonsdalii* (Rh. Richter, 1855), SMF-XXV-262a, Eichenberg near Bad Nauheim (eastern Taunus, Rhenish Mountains). Corallum morphology, upper side, natural cast (already illustrated by Richter & Richter 1951, pl. 12, fig. 8, and by Birenheide 1985, pl. 34, fig. 3). x 5.

On the margin of the metacorallites, some well-preserved specimens allow identification of a complete and clear set of septal ridges (Fig. 10):
– the number of major septal ridges is typically 4, less commonly 5 or 3.
– the number of minor septal ridges is typically 4, less commonly 5 or 3.
– the total number of septal ridges is typically 8-9, rarely 6-7.

The ridges close to the wall separating two adjacent metacorallites are either two major ridges, two minor ridges or a major and a minor ridge, while on both sides of the cardinal ridge, the ridges invariably appear to be minor. These data indicate that the addition of new ridges occurs near the wall and, that as a result, the so called cardinal ridge could be the counter ridge...This option was already indicated by Fuchs & Plusquellec (1982, fig. 10) dealing with *Pleurodictyum problematicum*; in that species the two possibilities were presented.

The wall bears numerous mural pores of various diameters (see Table 1) and with curvature in the vertical plane (Fig. 7E). In lateral view, the pores are scattered and located as well on the septal ridges as on the interseptal furrows (Figs. 7D-E, 8C). The pores appear to be mainly mid wall pores (P_2) but in natural cast it is difficult to identify possible corner pores (P_1); it is difficult to recognise the basal mural pore too (= apical pore, P_0), but it does exist in the genus, for example in *P. petrii*. Nevertheless, between the protocorallite and the apex of the metacorallites, the pores are commonly arranged in pairs, twin-like (Figs. 3I, 4D, 7A) or fork-like (Figs. 6A, 8A). Are they a special kind of apical pore? That is a debatable point.

Among the specimens that can be assigned to *P. lonsdalii* there are a few atypical colonies on which both the casts of the interseptal ridges of the metacorallites are narrower and the boundary between the initial platform and the peripheral zone is less distinct than usual (specimen BGR-BD 2430-H).

The restored calcitic skeleton. – A resin impregnation of the natural cast was made using a complete (Fig. 4D) and a very incomplete (MB.K.2342) specimen. By acid (HF) dissolution a replica of the coral appears – a method already applied to Rugosa of the Combophyllidae from the same horizon and locality Creunitz (Weyer 1975), to *Pleurodictyum problematicum* (Fuchs & Plusquellec 1982), and *Petridictyum petrii* (= *P. erbslochense* nomen nudum) from the Erbslochgrauwacke (Plusquellec, unpublished).

There are strong differences in appearance between the natural cast, which shows the calicinal base of the corallites, and the restored skeleton which shows the true upper side of the coral. Some features can be noted (compare Fig. 4D with Fig. 4I):
– the protocorallite appears much larger and hides the proximal part of the metacorallites.
– the top of its wall is wide, rather flat and shows transverse crenulations resulting in some places from mural pores in the process of formation.
– on the metacorallites, the appearance of the overhanging initial platform and of the area that surmounts it, is astonishing and difficult to imagine from the natural cast (Fig.

Table 1. *Petridictyum lonsdalii*, biometrical data of selected Thuringian specimens.

	Corallum diameter (mm)	Number of corallites	Protocorallite diameter (mm)	Protocoral-lite depth (mm)	Metacorallite diameter (mm)	Mural pores diameter (mm) min-max	Thickness of wall (mm) min-max
BRG-X3665 Lectotype	9	1+7	4.5		2.5 2.5 2.5 3.0 2.8	0.25-0.35	0.2-0.4
BRG-X3663			4.5	2.5	2.5 3.2	0.2-0.35	0.5-0.9
BRG-X3664			4.6	1.8	1.8	0.2-0.35	0.4-0.9
BMNH- AZ 2553	14.5	1+ 8	4.9		4.3 4.8 4.8 3.5	0.2-0.6	0.3-0.9
PTW2006.1.MLU	11	1+ 6	4.5		2.2 2.0 3.0	0.2-0.4	0.3-1.0
PTW2006.3.MLU	13	1+ 6	4.5		2.5 2.5 2.2	0.2-0.35	0.25-0.6
PTW2006.4.MLU			3.7	2.8	3.0 2.5	0.2-0.45	0.45-1.1
PTW2006.6.MLU			5	3.5		0.2-0.35	0.5-0.8
PTW2006.12.MLU	9	1+ 7	4.7		2.8 2.0 2.7	0.2-0.5	0.25-1.0
					2.8 2.0		
PTW2006.13.MLU			4	2.4	1.8	0.2-0.3	0.3-0.6
PTW2006.14.MLU			4.5	1.5	2.2	0.2-0.35	0.4-0.6
PTW2006.15.MLU	12	1+ 8	5		3.7 3.4 3.0	0.2-0.35	0.3-0.9
					2.5		
PTW2006.16.MLU			3.7	2	2	0.15-0.3	0.3-1.0
PTW2006.21.MLU	11	1+ 7?	3.6	1.8	2.8 2.7 2.6	0.25-0.5	0.3-0.7
PTW2006.22.MLU			4	1.5	3.5 3.0	0.25-0.5	0.2-0.6
PTW2006.20.MLU	11	1+ 7	4.3		2.5 3.0	0.25-0.5	0.35-0.9
PTW2006.23.MLU			4.5	2	1.5 2.0	0.25-0.45	0.2-0.7
PTW2006.17.MLU			4.6		1.8 2.5	0.3-0.4	0.3-0.7
PTW2006.10.MLU	6.5	1+ 6?	4.2	1.2	1.8 1.0 1.2	0.2-0.4	0.2-0.7
BGR-BD2603	11	1+7	3.6		3.0 2.8 2.7	0.2-0.4	0.3-0.7
					2.7	0.2-0.4	0.3-0.6
BGR-X12901	11.5	1+8	4.5		2.4 3.0 3.3		
					3.1		
MB.K.2340	11	1+7	4.5		4.0 3.4 2.8	0.25-0.4	0.25-0.8
					3.0 3.2 3.2		
					3		
MB.K.2341			5	3.2			
MB.K.2342	9.5	1+7?	4.3	2.3	2.2 2.4	0.2-0.45	0.2-0.8
MB.K.2343	10.5	1+7	4.7		2.6 2.8 2.8	0.25-0.45	0.25-0.8
					2.5 2.2		
MB.K.2345	11.5	1+7	3.6		3.7 4.3 3.3	0.25-0.50	0.25-0.9
					3.7 4.3		
MB.K.2346	10	1+7	3.5				
	N 16	N 16	N 27	N 13	N 73	N 25	N 25
	S 172	S 121	S 116.5	S 28.5	S 203.3	S 45.45-10.5	S 7.10-19.6
	X 10.75	X 7.56	X 4.31	X 2.19	X 2.78	X 0.22-0.42	X 0.28-0.78

Table 2. *Petridictyum* cf. *lonsdalii* (Rh. Richter, 1855), biometrical data of the only specimen from the Rhenish Massiv (Schiefergebirge). The measurement of metacorallite diameter between ( ) concerns an incomplete corallite, the one between [ ] the corallite of the second series.

	Corallum diameter (mm)	Number of corallites (mm)	Protocorallite diameter (mm)	Metacorallite diameter (mm)	Mural pores diameter (mm) min-max	Thickness of wall (mm) min-max
SMF XXV 262a	19	1+10	6.0	5.0 5.0 5.0 7.0 6.0 5.5 (4.0) 5.5 4.5 [4.0]	0.25-0.5	0.5-0.75

4K-L). Above the platform there is a large and rounded axial cave-like structure; on both sides of it lies a smallest cavity with about the same morphology. Generally, at the very base of the axial cave two mural pores can only just be seen. These features are in fact the positive image of the "two strong indentations situated on both sides of the axial pore(s)" (see p. 208) and of the "twin-like" pores (see p.209) of the description of the natural casts. Accessory small cavities develop above and laterally to the main cave, commonly associated with a pore opening into the protocorallite. The peripheral zone of the metacorallites exhibits the narrow major and minor septal ridges easily inferred from the cast.
– in side view the outline of the upper side of the corallum is trapezoidal (Fig. 4J).

Biometric data: The measurements are given in Table 1 and Fig. 11. Corallum diameter is taken along the plane of bilateral symmetry of the corallum; the so-called proto- and metacorallite diameter are in fact diameters of the calicinal bottom from apex to margin. The true height of the corallum is unknown, it exceeds the protocorallite depth.

The case of specimen SMF XXV 262a. – This specimen (Figs. 5B, 12) was assigned to *Pleurodictyum lonsdalii* by Richter & Richter (1951, pl. 12, fig. 8) and later re-illustrated by Birenheide (1985: 95, pl. 34, fig. 3) as *Petridictyum lonsdalei* (sic). It is held in the Natur-Museum Senckenberg in Frankfurt/Main and was collected by S.G.W. Schmidt in 1941 in the "Wissenbacher Schiefer" (Upper Emsian – Lower Eifelian) near Bad Nauheim in the eastern Taunus. At present, it is the only record of the species in the Rhenish Mountains, outside of Thuringia. This specimen exhibits some significant differences from typical specimens of *P. lonsdalii*:
– the casts of the major septal ridges are broader and deeper than in *P. lonsdalii* even if they are rather narrow,
– the specimen is much more spinose, especially on the initial platform.
Some other differences cannot be taken into account in the discussion:
– the prototriade seems to be of the contiguous type,
– the initial platform is well developed and extends to about one-half the radial diameter of the corallite on each of the metacorallites, while in *P. lonsdalii* it is generally very short
– the protocorallite is surrounded by a primary circlet of nine peripheral corallites, and a two sided additional corallite forms the first cell of a second series. In the genus *Petridictyum* that is the way a specimen's advanced age is expressed,
– the size of the specimen (cf. point 3); its measurements are given in Table 2.
In fact, it seems that Richter & Richter followed by Birenheide assigned this specimen to *P. lonsdalii* on the basis of three criteria:
– the unusual shape of the interseptal furrows casts (smooth and rounded with a semi-circular proximal tip),
– the rather narrow septal ridges casts, and
– the initial platform that looks like that in Richter's fig. 1.

The specimen SMF-XXV-262a is not a typical form of *P. lonsdalii*; it could be an evolved form, much larger, more spinose and with a well developed initial platform. The diagram shown in Fig. 11 is consistent with this opinion. Hence, its assignation to *P.* cf. *lonsdalii* is preferred. Moreover the age of the true *P. lonsdalii* is early Late Emsian, while the specimen under discussion probably could be distinctly younger, but precise modern stratigraphic data within its possible time span Late Emsian – Early Eifelian are not available.

4. Discussion

The global morphology and structure of the species *P. lonsdalii* are entirely consistent with those of the genus *Petridictyum* Schindewolf, 1959, and this author had already assigned the species to his new genus (Schindewolf 1959: 310). *P. lonsdalii* differs from the type species of the genus *P. petrii* and e.g. *petrii* in a number of points such as the width of the major and minor septal ridges (see Birenheide et al. 1989, fig. 3c, and Schindewolf 1959, pl. 14, fig. 1), the poor development of the minor septal ridges, the shape of the proximal tip of the interseptal furrows (or their casts), which are rather slightly widened whereas in *P. petrii* or e.g. *petrii* the interseptal furrows become narrower (Birenheide et al., fig. 3c; Plusquellec & Jahnke 1999, pl. 1, fig. 8), the rather common lack of an axial knob on the protocorallite calicinal base, usual if not constant in e.g. *petrii*, the lack of synapticuloids, common *in* e.g. *petrii* (see Plusquellec in Le Menn et al. 2002, fig. 5). The number of septal ridges in the margin side

of the metacorallites is 8-9 in *lonsdalii*, 12-13 in the holotype of *P. petrii* and in e.g. *petrii* from the Erbslochgrauwacke (= *P. erbslochense* Plusquellec & Jahnke nom. nud.) while in the lectotype of *P. lenticulare* (Hall, 1874) (NYSM 297, figured by Hall 1883, pl. 3, fig. 5, cleaned out by Y.P. and re-illustrated by this author, 2007, pl. 2, fig. 1) it reaches 12-14. Moreover the protocorallite of this species is conical (lectotype and specimen of Beecher 1891, pl. 12, fig. 2).

5. Conclusions

The species erected by Rh. Richter is valid and differs from all others within *Petridictyum*.

Petridictyum lonsdalii belongs to the North Gondwana Province (Ibarmaghian Domain, Giessen-Harz Nappes, Thuringia, Bohemia, Carnic Alps, Montagne Noire, Catalonia, Baleares, Turquey and Arabic Peninsula; see Plusquellec et al. 1997) where – for the moment – the species appears to have been endemic to Thuringia during early Late Emsian time.

The genus *Petridictyum* seems to be unknown in southeast Laurussia (Rhenish Mountains, except Giessen-Harz nappes) until Late Emsian – Early Eifelian (Plusquellec & Jahnke 1999, fig. 6). One of its representatives in this area is *P.* cf. *lonsdalii*. Nevertheless, in Laurussia, an early occurrence of the genus is known in the Appalachian Basin with *P. lenticulare* (Hall, 1874) from the New Scotland Formation, Upper Lochkovian – Lower Pragian (see correlation chart by Oliver et al. 1967), not to mention the so called *Pleurodictyum tennesseensis* (Amsden, 1949) of Silurian age, the holotype of which is provisionally assigned to the genus *Petridictyum*, mainly on the basis of the convex outline of the proximal side and the rather large protocorallite (Plusquellec 2007).

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