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THE MIDDLE TOURNAISIAN RUGOSE CORAL *ZAPHRENTIS DELEPINI* VAUGHAN 1915

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Middle Tournaisian faunas of Belgium include Rugose corals of the genera *Cyathaxonia* MICHELIN 1847, *Fasciculophyllum* THOMSON 1883, *Zaphrentites* HUDSON 1941, *Sychnoelasma* LANG, SMITH & THOMAS 1940, *Caninia* MICHELIN in GERVAIS 1840, and *Siphonophyllia* SCOULER in M'COY 1844. A further genus is represented by one of the most common species, "*Zaphrentis*" *delepini* VAUGHAN 1915, which has not been redescribed since its introduction into zoology. This index coral of the Assise de Maredsous (Tn2) is revised and will be assigned to the proposed new zaphrentoidid genus *Saleelasma*.

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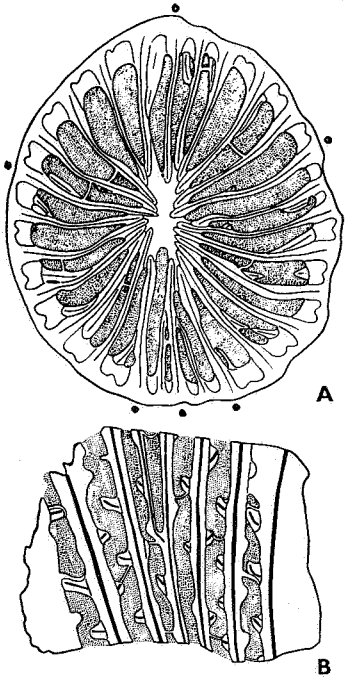
1. *Notes on Rugose corals with metriophylloid carinae*

Species said to be related to "*Zaphrentis*" *delepini* VAUGHAN 1915 are "*Zaphrentis*" *vaughani* DOUGLAS 1909, and "*Zaphrentis*" *junctoseptata* SMYTH 1920. R. G. S. HUDSON (1942, b, pp. 373, 380) has united these three corals as a species-group ("*Zaphrentis vaughani—junctoseptata* group"), characterized by rather long and contratingent minor septa. Later, he has assigned this species-group to the genus *Fasciculophyllum* THOMSON 1883 (R. G. S. HUDSON 1943, a, p. 136). *Fasciculophyllum* has been thought to comprise both species with free and very short minor septa (*omaliusi* group) and species, in which the minor septa are contratingent and slightly longer (R. G. S. HUDSON 1943, a; O. H. SCHINDEWOLF 1952).

From a close inspection of A. VAUGHAN's original figures (1915, pl. 4, figs. 3-5), doubts have arisen concerning the presence of sporadically developed contratingent minor septa, hitherto ascribed to "*Zaphrentis*" *delepini*. Two suitable thin sections then prepared (text-fig. 1) clearly demonstrated, that there are no contratingent minor septa, excepting the two long counter minors. As shown in all the figures of this paper, structures formerly misinterpreted as such minor septa are metriophylloid carinae, the morphological appearance of which has been described at full length by several authors (A. v. SCHOUPPÉ &



Text-fig. 1: *Saleelasma delepini* (VAUGHAN 1915); Landelies limestone (Tn2b); abandoned quarry NNE of Mévergnies (locality Ath 2); specimen No. K. 49.1 (Coll. R. CONIL; Department of Palaeontology, Natural History Museum at HUMBOLDT-University, Berlin).
A) cross section (diameter 5.6 × 6.6 mm), × 7,5. Minor septa of a former calicular stage are visible within the wall. A lot of metriophylloid carinae have no connection to these secondary suppressed minor septa.
B) tangential longitudinal section at side of alar septum, × 10. Dark median lines of septa and of metriophylloid carinae are separated by secondary sclerenchymal thickening of the lateral septal faces.

P. STACUL 1959, b; F. J. HOLWILL 1964). Excepting the two counter minors, true minor septa are free and very short and are restricted to the uppermost part of the calice, just as in most coral species with so-called "cyclic insertion" of minor septa. Middle and basal calicular regions of "*Zaphrentis*" *delepini* have no minor septa; those formerly present are suppressed by secondary sclerenchymal thickening of the wall.

According to current views in systematics (for instance, M. RÓŻKOWSKA 1969), "*Zaphrentis*" *delepini* would have to be regarded as a species of *Metriophyllum* EDWARDS & HAIME 1850 because of the presence of metriophylloid carinae. All the other known genera provided with these special septal carinae display additional features missing in "*Zaphrentis*" *delepini* : columella in *Lophocarinophyllum* GRABAU 1922, aulos in *Metrionaxon* GLINSKI 1963, brevisepta in *Metrioplexus* GLINSKI 1963. *Boolelasma* PEDDER 1967 and *Haptophyllum* PEDDER 1967 are two further genera said to possess metriophylloid carinae, but these Lower Devonian corals are characterized by lateral septal flanges running parallel to the upper septal margins. An important feature of true metriophylloid carinae is their complete independence from septal structure, whereas other types of carinae run either parallel to trabeculae (*Heliophyllum* HALL in DANA 1846, *Billingsastraea* GRABAU 1917, *Haplothecia* FRECH 1885) or parallel to the upper margins of septa (*Duncanella* NICHOLSON 1874, *Enterolasma* SIMPSON 1900, *Spongophylloides* MEYER 1881).[1]

Two opposite opinions have been expressed on corals bearing metriophylloid carinae: the first regarding all these Rugosa to be related genetically (A. GLINSKI 1963), the second assuming a repeated origin of metriophylloid carinae in different and independent groups (A. E. H. PEDDER 1967). The generally accepted systematic arrangement recognizes a family Metriophyllidae HILL 1939 (sometimes lowered to subfamily rank within the "Lindstroemiidae" POČTA 1902), containing the three genera *Metriophyllum* EDWARDS &

(1) On account of certain other characters (e.g. peripherally "split" cardinal and counter septa, as in *Ditoecholasma* SIMPSON 1900), *Boolelasma* PEDDER 1967 and *Haptophyllum* PEDDER 1967 have been removed from "Lindstroemiidae", together with some more genera, to form a new subfamily within the Cyathaxoniidae (D. WEYER 1971, a).

HAIME 1850 (synonyms : *Lopholasma* SIMPSON 1900, *Asserculinia* SCHOUPPÉ & STACUL 1959), *Metrionaxon* GLINSKI 1963 and *Metrioplexus* GLINSKI 1963; whereas *Lophocarinophyllum* GRABAU 1922 is classified as a member of the Timorphyllidae SOSHKINA in SOSHKINA, DOBROLYUBOVA & PORFIRIEV 1941 (= Lophophyllidiidae MOORE & JEFFORDS 1945) on account of its close relationship to *Lophophyllidium* GRABAU 1928. This classification implies an independent double development of metriophylloid carinae, since *Lophophyllidium* — undoubted ancestor of *Lophocarinophyllum* — does not show any relationship to the Devonian Metriophyllidae, but descends from the Carboniferous genus *Claviphyllum* HUDSON 1942 (group of *Claviphyllum hillae* HUDSON & FOX 1943), a member of the Hapsiphyllidae, which are up to now unknown to possess such lateral septal flanges.

In accepting a repeated independent appearance of metriophylloid carinae during Rugose corals history, the commonly recognized Lower Devonian to Upper Permian "genus" *Metriophyllum* EDWARDS & HAIME 1850 (sensu M. RÓŻKOWSKA 1969) can be shown to represent a rather artificial assemblage of quite unrelated corals. At first sight, species included in this "genus" seem to be congeneric and alike in the striking presence of metriophylloid carinae; but otherwise they are very different from each other in features often used to define genera. Such important characters are the presence or absence of a fossula (true cardinal fossula sensu A. v. SCHOUPPÉ & P. STACUL 1959, a), the septal microstructure (trabecular or lamellar), and the configuration of minor septa (long or short, early or late "appearance" in ontogeny, counter minors contratingent and nearly as long as major septa or not differentiated from other minor septa). An investigation of these features presents unusual difficulties and requires intensive serial section techniques because of the obscuring influence, which metriophylloid carinae are exercising on the interpretation of cross sections. There seem to be no doubts that so-called *Metriophyllum* species must be separated into several genera. Almost certainly, *Lopholasma* SIMPSON 1900 and *Asserculinia* SCHOUPPÉ & STACUL 1959 will prove to be valid generic units, not synonymous with *Metriophyllum* EDWARDS & HAIME 1850. But a more definitive decision on the status of these genera would be premature and depends from the reinvestigation of their type species. *Lopholasma* had been proposed by G. B. SIMPSON (1900) on account of the presence of metriophylloid carinae, in that time not fully known from *Metriophyllum*. In erecting *Asserculinia*, the only reason named by A. v. SCHOUPPÉ & P. STACUL (1959, b) had been the time gap between the Devonian genus *Lopholasma* and their new Upper Permian species (these authors have overlooked Lower and Upper Carboniferous species recorded by W. H. EASTON, 1944, and by A. W. GRABAU, 1922).

Metriophyllum EDWARDS & HAIME 1850

A topotype specimen of *Metriophyllum bouchardi* EDWARDS & HAIME 1850, the type species of the genus, has been investigated for comparison purposes (pl. 1, figs. 1-6; pl. 2, figs. 1, 2). According to these serial sections and to those figured by F. J. W. HOLWILL (1964, p. 113, text-fig. 4), *Metriophyllum* comprises species without true fossula, with long cardinal septum not shortened in upper calicular regions, with short minor septa only visible in the upper calice, and without long contratingent counter minor septa. The septal microstructure remains unknown. A record of trabeculae in *Metriophyllum bouchardi* by M. KATO (1963, p. 590, text-fig. 7/D16, 19), based on a misinterpretation of carinae, has been revised by A. v. SCHOUPPÉ & P. STACUL (1966, p. 41). However, the lamellar septal microstructure, ascribed to *Metriophyllum bouchardi* by the latter authors and by H. C. WANG (1950, p. 202), is not proved. The only one available cross thin section suggests that septal microstructure might be trabecular, but at the author's disposal, there are no longitudinal thin sections cutting septa in median radial direction. Undescribed specimens from Frasnian beds of Thuringia show excellently preserved trabeculae; further studies must verify whether these materials are

congeneric with *Metriophyllum bouchardi* or not. The Eifflian species *Metriophyllum gracile* SCHLÜTER 1884 has a clear trabecular microstructure, as seen in two longitudinal sections made by the author. The case of *Petraia* MÜNSTER 1839 (O. H. SCHINDEWOLF 1931, pl. 52, fig. 7) demonstrates, that thin septa as those of *Metriophyllum* may have a trabecular microstructure (that means : a spinose upper septal margin).

One cross section (pl. 1, fig. 1) presents a sporadically occuring small central aulos. This feature indicates a close relationship of *Metriophyllum* and *Metrionaxon* GLINSKI 1963. *Saucrophyllum arbucklense* SUTHERLAND 1965 and *Petraia squarrosa* SUTHERLAND 1965 are other species with some intraspecific variation concerning the presence or absence of an aulos. The same case has been observed in an undescribed Lower Devonian species of *Duncanella* NICHOLSON 1874. An aulos with periodically secreted tabulae and a "stereocolumella" formed by continuous stereoplasmatic filling of an aulos-like calicular pit have been regarded as homologous skeletal parts (D. WEYER 1971, b). Species groups without aulos may gradually pass into species groups with an aulos. Therefore, by no means, the presence or absence of an aulos seems to be a feature qualified to separate two families (as Laccophyllidae and Metriophyllidae in D. HILL, 1956); in some cases, even a supposed generic rank meaning might be overvalued.

The specimen illustrated in pl. 1, figs. 1-6, and pl. 2, figs. 1, 2, is a straight conical coral (length 15 mm, diameter of upper calicular rim 8 × 10 mm, diameter of broken tip 1 mm). The external surface shows transverse wrinkles and longitudinal interseptal ridges. The observed septal formulae (2) are:

pl. 1, fig. 1			pl. 2, fig. 2		
17 major septa	2	2	18 major septa	2	2
diameter	—	—;	diameter	—	—
5.0 × 5.6 mm	4	3	7.7 × 9.2 mm	4	4

Lopholasma SIMPSON 1900

The type species of *Lopholasma*, *L. carinatum* SIMPSON 1900, has been studied from one specimen from the Kashong shale member, Moscow formation (Hamilton group, Givetian), of Genesee, New York. These sections net yet published here and the figures of G. B. SIMPSON (1900) and F. J. W. HOLWILL (1964) show the following features typical for *Lopholasma* : trabecular septal microstructure, cardinal septum somewhat shortened in middle and upper calicular regions, long contratingent counter minor septa, other minor septa short and free or contratingent. Two of these features may have a greater (supraspecific) importance; then *Lopholasma* would differ from *Metriophyllum* in the long contratingent counter minor septa and in the shortened cardinal septum. *Metriophyllum skalense* FEDOROWSKI 1965 is a typical species of *Lopholasma* as redefined above. In the author's opinion, *Lopholasma* is not related to *Metriophyllum*, but descends from *Stereolasma* SIMPSON 1900.

Asserculinia SCHOUPPÉ & STACUL 1959

In erecting this genus, its authors could not name morphological differences against the Devonian *Metriophyllum* and *Lopholasma* groups. Therefore, M. RÓŻKOWSKA (1969, p. 34) has classified *Asserculinia* as a junior synonym of *Metriophyllum*. Important features of the type species, *Asserculinia prima* SCHOUPPÉ & STACUL 1959, are the rather long and free minor septa, developed in subtabular regions too, and the probable presence of a true cardinal fossula. The two counter minor septa are not prominent. It is not yet possible to judge on this genus, which will prove to be distinct from *Metriophyllum* and *Lopholasma*. In my opinion, *Asserculinia* might be a descendant from *Duplophyllum* KOKER 1924.

Two other Permian species (*Lopholasma gracile* SOSHKINA 1928, *Lopholasma ilitshense* SOSHKINA 1928) and two Carboniferous species (*Lopholasma carbonarium* GRABAU 1922, *Metriophyllum deminutivum* EASTON 1944) are too poorly known to allow comments on their generic positions.

(2) Septal formulae are indicated in the most instructive way used by O. H. SCHINDEWOLF (1942, p. 18; 1952, p. 162), which is based on a similar method of A. KUNTH (1869, p. 653).

2. *Revision of* "Zaphrentis" delepini VAUGHAN 1915

Subordo Streptelasmatina WEDEKIND 1927
Suprafamilia Cyathaxoniaceae EDWARDS & HAIME 1850
Familia Hapsiphyllidae GRABAU 1928

Saleelasma gen. nov.

Name : in honour of abbé ACHILLE SALÉE (1883-1932), who published several thorough studies of Belgian Lower Carboniferous Rugose corals.

Type species : *Zaphrentis delepini* VAUGHAN 1915

Diagnosis : *Fasciculophyllum*-like Hapsiphyllidae with metriophylloid carinae and with two counter minor septa long and contratingent early in ontogenetic development. Other minor septa present only in upper calicular regions. Major septa axially fused at central base of calice. Counter septum situated in a pseudofossula and not longer than other major septa. Cardinal septum on convex side of corallum, shortened in middle and upper calicular regions, long and reaching the axis at calicular base. Tabulae strongly domed, with well developed true cardinal fossula. Septal microstructure lamellar (upper septal margins entire, without spines).

Species assigned : *Saleelasma* comprises the type species and *Rotiphyllum axiferum* HUDSON 1943. An unnamed species may be *Zaphrentis* sp., DOUGLAS 1909 (p. 577, pl. 27, fig. 4).

Occurrence : Lower Carboniferous of Western Europe — Middle Tournaisian (Assise de Maredsous, Tn2) of Belgium and Northern France; Lower Viséan of England; doubtful in high Middle Viséan (top of "zone" S_2) of Ireland. *Saleelasma* may have been distributed much farther. An undescribed new species from the Lower Tournaisian (*Gattendorfia* stage) of the Rhenish Mountains seems to be the earliest representative of the genus, but materials at the author's disposal do not allow to prove the presence of some important features as fossula and shortening of cardinal septum in middle and upper calicular regions. Upper Tournaisian and Lower Viséan corals of Northern Spain, which have been assigned to *Metriophyllum* by J. KULLMANN (1966, p. 446), can not be judged of, as detailed descriptions have not been published up to now.

Comparisons : *Saleelasma* is quite homoeomorphous though not related to some genera of the Devonian "Metriophyllinae". The new genus differs from *Metriophyllum* EDWARDS & HAIME 1850 in the presence of a cardinal fossula and of two long and contratingent counter minor septa; septal microstructure may be distinct too (lamellar in *Saleelasma*, almost probably trabecular in *Metriophyllum*), just as is the length of the cardinal septum (shortened in *Saleelasma*, not differentiated from other major septa in *Metriophyllum*). *Lopholasma* SIMPSON 1900 is similar to *Saleelasma* in the configuration of the shortened cardinal septum and of the two long and contratingent counter minor septa, but its septal microstructure is trabecular, not lamellar. Most minor septa of *Lopholasma* are still present in subtabular regions. It has not been possible to discern, whether there is a true cardinal fossula or a pseudofossula in the type species of *Lopholasma*. *Asserculinia* SCHOUPPÉ & STACUL 1959 (of incertain family affinities) is said to have a true cardinal fossula and lamellar septal microstructure (just as present in *Saleelasma*), but can be distinguished from the new genus here proposed by its minor septa, all of which are of equal length (without differentiation of the two counter minor septa) and are not suppressed in subtabular regions.

Saleelasma is believed to descend from *Fasciculophyllum* THOMSON 1883 and quite certainly from the species-group of *Fasciculophyllum omaliusi* (EDWARDS & HAIME 1851), thus being a member of the Permocarboniferous Hapsiphyllidae.[3] Perhaps excepting

(3) Several authors (A. B. IVANOVSKY 1963, J. KULLMANN 1965, G. ALTEVOGT 1967, M. RÓŻKOWSKA 1969) have assigned Devonian and Silurian species to genera of the Hapsiphyllidae

Asserculinia SCHOUPPÉ & STACUL 1959, there are no other genera provided with metriophylloid carinae within this family. Features common to *Fasciculophyllum* and *Saleelasma* are the position of the cardinal septum at the convex side of the ceratoid corallum, the presence of a counter septum pseudofossula, and the long cardinal septum which is not shortened in subtabular regions; further, major septa have a curvature concave towards the cardinal septum. Evolving from Lower Tournaisian species of *Fasciculophyllum*, *Saleelasma* acquired two new skeletal features (long contratingent counter minor septa, metriophylloid carinae).

The two Irish species "*Zaphrentis*" *junctoseptata* SMYTH 1920 (Upper Tournaisian) and "*Zaphrentis*" *vaughani* DOUGLAS 1909 (? Middle Tournaisian) are not related to *Saleelasma*, though they have been united together with "*Zaphrentis*" *delepini* VAUGHAN 1915 into one species-group by R. G. S. HUDSON (1942, b). In "*Zaphrentis*" *junctoseptata*, all the minor septa are long and contratingent, and there are no metriophylloid carinae; this species belongs to *Hapsiphyllum* SIMPSON 1900 or to a similar new genus (without shortened cardinal septum). Configuration of minor septa is not quite clear in "*Zaphrentis*" *vaughani*; they may be contratingent altogether, just as in *Hapsiphyllum* ? *junctoseptatum* (SMYTH 1920). Contrary to *Saleelasma*, "*Zaphrentis*" *vaughani* has a cardinal septum, situated on the concave side of the corallum, and no metriophylloid carinae.

Remarks: A triad, formed by the counter septum and the two long contratingent counter minor septa, is a common feature of Silurian and Devonian Laccophyllidae. The presence of this character seems to be quite unusual in Hapsiphyllidae (excepting *Hapsiphyllum* SIMPSON 1900 sensu stricto, not sensu O. H. SCHINDEWOLF 1938), but there are some further Permocarboniferous corals provided with this type of counter minor septa, as *Fasciculophyllum tripus* SCHINDEWOLF 1952 or *Duplophyllum mikron* SCHOUPPÉ & STACUL 1959, which have a lamellar septal microstructure and clearly belong to Hapsiphyllidae. Several Polycoeliaceae show a similar specialization of the counter minor septa, which are more prominent than other minor septa in *Plerophyllum* (*Ufimia*) *bradbournense* (WILMORE 1910) (O. H. SCHINDEWOLF 1942, p. 131, text-figs. 50-52) and in *Pentaphyllum* (*Pentaphyllum*) *caryophyllatum* DE KONINCK 1872 (R. G. CARRUTHERS 1919, pl. 11, fig. 4 d — according to species interpretation of R. G. S. HUDSON 1936, p. 98).

Rotiphyllum axiferum HUDSON 1943 seems to have well developed metriophylloid carinae. This species can be transfered to *Saleelasma*, though demonstration of cardinal fossula is still missing. The only one figured cross section of "*Zaphrentis*" sp., DOUGLAS 1909 (p. 577, pl. 27, fig. 4) is very similar to *Saleelasma*, a new species of which it might be, if the presence of metriophylloid carinae can be proved (right counter lateral septum). Contrary to *Saleelasma delepini*, the cardinal septum of this coral is situated at the concave side of the corallum.

Saleelasma delepini (VAUGHAN 1915)

(text-fig. 1; pl. 2, figs. 3-7; pl. 3, figs. 1-6; pl. 4, figs. 1-10; pl. 5, figs. 1-9; pl. 6, figs. 1-6; pl. 7, figs. 1-6)

non 1909 *Zaphrentis vaughani* sp. nov. — J. A. DOUGLAS, p. 577, pl. 27, fig. 11.

1911 *Zaphrentis Vaughani* Douglas — G. DELÉPINE, pp. 36, 37, 38, 51, 54, 152, 163, 188, 191, 253, 256, 311, 331, 398.

1913 *Zaphrentis Vaughani* — A. CARPENTIER, pp. 37, 116.

pars* 1915 *Zaphrentis delépini* sp. nov. — A. VAUGHAN, pp. 7, 34; pl. 4, figs. 3, 4 a-b, 5, non fig. 6.

1922 *Zaphrentis Delepini* Vaughan — G. DELÉPINE, p. 50.

non 1937 *Zaphrentis* cf. *délepini* Vaughan — R. G. S. HUDSON & G. H. MITCHELL, p. 13.

1943 *Fasciculophyllum délépini* (Vaughan)

(*Zaphrentoides* STUCKENBERG 1895, *Hapsiphyllum* SIMPSON 1900, *Amplexizaphrentis* VAUGHAN 1906). These corals are very distinct from true Hapsiphyllidae, their septal microstructure being trabecular and not lamellar; they must be assigned to other genera (D. WEYER 1971, c).

— R. G. S. HUDSON, p. 136.

1958 *Zaphrentoides delépini* VAUGHAN — F. DEMANET, pp. 43, 58, 59.

v. 1959 *Zaphrentoides delepini* (VAUGHAN) — R. CONIL, pp. 14, 15, 70, 110, 143, 154.

? 1963 *Zaphrentis delepini* VAUGHAN — M. KATO, pp. 600, 622, text-fig. 13/9.

1967 *Zaphr. delepinei* (VAUGHAN) — R. CONIL, H. PIRLET & M. LYS, p. 14, pl. 1.

Lectotype : specimen figured by A. VAUGHAN (1915, pl. 4, figs. 4a, b), here chosen.

Type locality : "Feluy-Arquennes (near Écaussines)" (A. VAUGHAN 1915, p. 48); restricted type locality — exposures near the rectified course of the river Samme NNE of Feluy (locality No. 931: R. CONIL 1959, pl. 5).

Type horizon : "Horizon β" of A. VAUGHAN (1915), that is Hastière limestone and shales (Tn1b), *peracuta*-shales (Tn2a), and basal part of Landelies limestone (Tn2b); restricted type horizon — lower part of Landelies limestone (Tn2b).

Materials : 39 specimens, from 14 of which have been prepared 41 cross sections (19 peels, 22 thin sections) and 9 longitudinal thin sections. The materials are stored in the Department of Geology at University of Louvain (29 specimens), in the Department of Geology at the Catholic University of Lille (4 specimens), in the Department of Palaeontology, Natural History Museum at HUMBOLDT-University of Berlin (3 specimens), and in the Zentrales Geologisches Institut, Berlin (3 specimens). 23 specimens are topotypes.

Description : Coralla are small, slenderly conical, and regularly cornute. They reach a maximum observed length of 25 mm and a maximum diameter of 9-10 mm. Most specimens are about 15-20 mm long, with upper calicular diameters of 6-8 mm. Their shape is similar to species of *Cyathaxonia* figured by H. M. EDWARDS & J. HAIME (1851, pl. 1, figs. 3, 4). The exterior is marked by prominent septal grooves and interseptal ridges and by faint transverse growth lines (rugae). No attachment scar has been observed, even in corals with rather well preserved tips of about 1 mm in diameter. Most specimens are oval in cross section with the greatest dimension along the cardinal-counter plane. The cardinal septum is situated at the convex side of curvature. In complete coralla, the axial depth of the calice nearly equates to the diameter of the upper calicular margin; peripherally, the calice is some 2-4 mm deeper.

Adult specimens have 22 to 24, rarely 25 major septa, which start as minute ridges at the calicular rim and unite axially at the base of middle calicular regions. An equal number of short minor septa is present in the upper third and becomes secondarily reduced in the middle third of the calice. They are no longer active in the lowest calicular regions below the axial union of major septa; here, minor septa may be seen embedded in the wall, where they are incorporated due to secondary deposition of "stereoplasma" (this structure, common to most Hapsiphyllid corals, is usually termed "cyclic insertion of minor septa", though it is not a matter of septal insertion, but of secondary reducing septa). The two counter minor septa must be excepted; they remain present throughout the calice and gradually increase in the lower calicular third (below level of axial fusion of major septa), reaching half the length of major septa and then being contratingent. The cardinal septum is very short in the upper and middle parts of the calice. It lengthens in the lower calicular region to reach the axis at a level, where other major septa are already strongly fused with each other. In nearly all the specimens, the cardinal septum is somewhat thinner than the remaining major septa just at the peripheral base of the calice. Shortening of the counter septum in the higher calice is similar, though to a much lesser extent. Major septa have a very radial arrangement and usually possess a curvature concave to the cardinal septum. The basic bilateral symmetry is marked by a well developed cardinal fossula and by a prominent counter pseudofossula. The latter is caused by two enlarged interseptal loculi at both sides of the counter septum, which shows but little shortening; the former is due to the remarkable shortness and to the thinness of the car-

dinal septum accompanied by a tabular depression. There are no alar pseudofossulae. The number of major septa in the counter quadrants always exceeds that in the cardinal quadrants. True horizontal metriophylloid carinae, not parallel to the upper septal margins, are developed in the lower third of the calice.

Tabulae are strongly domed. They have a deep fossular depression at both sides of the cardinal septum. The presence of alar fossulae, similar to those of *Fasciculophyllum omaliusi* (EDWARDS & HAIME 1851) (R. G. CARRUTHERS 1908, p. 23, text-fig. 2), can not be proved with certainty, though one cross section (pl. 5, fig. 4) indicates them.

Septal microstructure is lamellar, not trabecular. Upper and internal margins of septa are entire and do not bear spines, as seen from a longitudinal thin section cutting a septum medially, and as observed in a septum cleaned from calicular matrix.

"Ontogeny", as revealed in serial cross sections of subcalicular parts of adult specimens, is nothing but the record of only that skeletal morphology, which is present at the immediate bases of all the successive calices, inhabited by the individual during its life history. Therefore, comparisons of cross sections of immature stages can be made only with cross sections cut in the basal region of the adult calice (e. g. pl. 5, fig. 4), while features typical for somewhat higher calicular cross sections (e. g. pl. 5, fig. 5; pl. 6, fig. 4) never become incorporated into subtabular regions. That being supposed, septal arrangement is quite the same in all the stages observed (zaphrentoidid, with rather radial than pinnate pattern of septa, which show a curvature concave towards the cardinal septum). The two long and contratingent counter minor septa are visible for the first time at diameters of 2.5 to 3.5 mm; but the pseudofossular enlargment of the two interseptal loculi at both sides of the counter septum occurs earlier (pl. 3, fig. 5: diameter 1.8 mm). Stereoplasmatic thickening of septa (and of wall) seems to be stronger in juvenile stages: this is true only relative to size of interseptal loculi, while absolute thickness of juvenile septa does not exceed that of septa in adult stages. An accelerated insertion of metasepta in the counter quadrants is a constant feature during ontogeny. Rejuvenescence has been observed in one specimen (pl. 6, fig. 4). Increase of major septa and changes in septal plans are indicated by the following formulae [4] (n = number of major septa, d = diameter, in mm, perpendicular to cardinal-counter plane):

most juvenile stage observed in cross section (pl. 3, fig. 5)	1 | 1 2 | 2 (n 12) (d 1.8)	adult stage of lectotype specimen (A. VAUGHAN 1915, pl. 4, figs. 4a, b)

3 | 3 5 | 5 (n 22) (d 5-6.5)

developmental stages of specimen figured pl. 4, figs. 1-8

1 | 2 3 | 3 (n 15) (d 2.2)	2 | 2 4 | 4 (n 18) (d 2.5)	2 | 3 5 | 5 (n 21) (d 4.2)	2 | 3 6 | 5 (n 22) (d 4.5-5.3)

developmental stages of specimen figured pl. 3, figs. 1-4

2 | 2 4 | 3 (n 17) (d 2.8)	3 | 3 4 | 4 (n 20) (d 3.9)	3 | 3 5 | 5 (n 22) (d 4.9)	3 | 3 6 | 6 (n 24) (d 5.8)

developmental stages of specimen figured pl. 6, figs. 1-4

2 | 2 2 | 2 (n 14) (d 1.9)	2 | 2 3 | 4 (n 17) (d 2.8)	3 | 3 5 | 4 (n 21]) (d 4.1)	3 | 3 6 | 5 (n 23) (d 6.9)

different adult septal patterns of specimens figured pl. 6, fig. 5; pl. 2, figs. 4-7; pl. 4, figs. 9-10; text-fig. 1; and pl. 5, figs. 4-9

3 | 3 5 | 5 (n 22) (d 4.2)	2 | 2 6 | 6 (n 22) (d 5.4)	3 | 3 6 | 6 (n 24) (d 6.0)	4 | 4 5 | 6 (n 25) (d 5.6)	4 | 3 6 | 6 (n 25) (d 5.6-7.3)

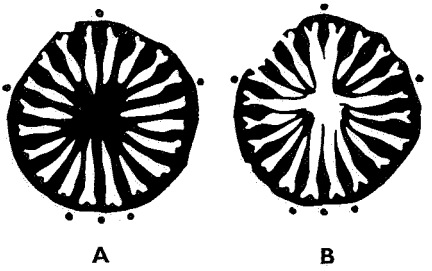
(4) See footnote 2, p. 58.

Considerable intraspecific variation commonly occurs in two skeletal features. There are specimens with many metriophylloid carinae (e. g. pl. 3, figs. 1-4) and specimens nearly without them (e. g. pl. 2, figs. 3-7). Septa may be thinner or thicker in corresponding calicular stages (compare pl. 3, fig. 4, and pl. 6, fig. 4).

Remarks : One of the four figured specimens of A. VAUGHAN (1915, pl. 4, fig. 6 : "Densiphylloid variant") must be excluded from *Saleelasma delepini* because of missing metriophylloid carinae and missing long contratingent counter minor septa; this "variant" is a typical member of the genus *Fasciculophyllum* THOMSON 1883 (as redefined by R. G. S. HUDSON 1942, a). Some true variants of *Saleelasma delepini*, characterized by only very few metriophylloid carinae (e. g. pl. 2, figs. 3-7), differ from *Fasciculophyllum* in having long and contratingent counter minor septa, whereas other minor septa are short and restricted to upper calicular regions.

A strong counter pseudofossula with a distinctly shortened counter septum seems to be present in cross sections of middle calicular regions (pl. 2, figs. 5-7; pl. 4, figs. 4-6, 10). To a large extent, this feature is simulated by sliding techniques, which are following the growth lines during preparation of serial sections. In ceratoid Rugose corals, a cross section of this kind will show higher calicular regions at the concave side and deeper calicular regions at the convex side of the corallum (D. WEYER 1971, b). Serial sectioning always parallel to the upper calicular margin (at the same time that means : always parallel to the calicular base) — as usually exercised in straight coralla — would result in quite an other appearance of cross section morphology, with only a weak counter pseudofossula containing a less shortened counter septum (pl. 5, figs. 6-8). This counter pseudofossula of *Saleelasma delepini* will look similar to those of *Zaphrentoides griffithi* (EDWARDS & HAIME 1851) (H. M. EDWARDS & J. HAIME 1852, pl. 34, fig. 3a) or of *Fasciculophyllum* sp. cf. *nodosum* (SMYTH 1915) (text-fig. 2b).

The wavy course of the median dark line in some septa, observed in one calicular cross section (pl. 6, fig. 4), may be interpreted as a gerontic structure similar to that of *Fasciculophyllum* aff. *costatum* (M'COY 1849), described by R. G. S. HUDSON (1943, b, p. 28, text-fig. 3). In both cases, rejuvenescence is an attendant sympton of this feature.

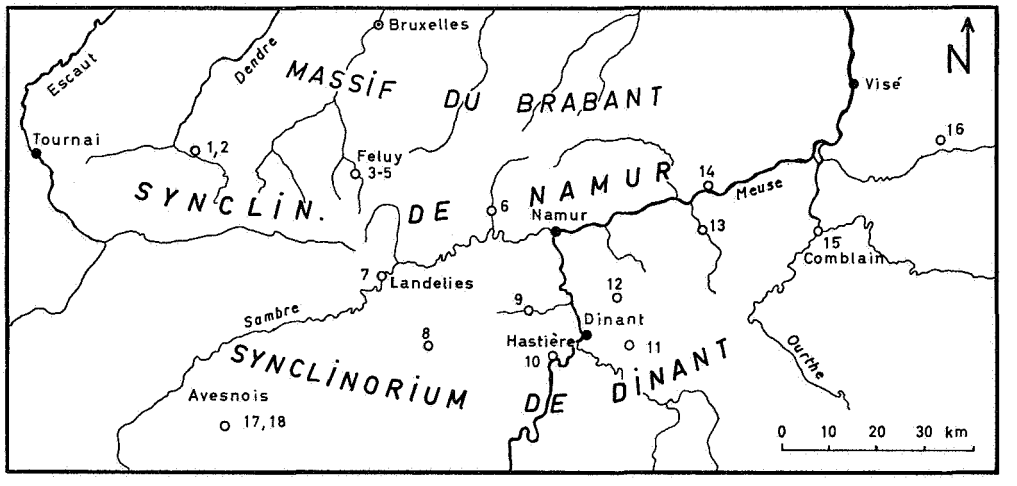


Text-fig. 2: *Fasciculophyllum* sp. cf. *nodosum* (SMYTH 1915); Carboniferous limestone of upper Lower Viséan (V1b) or lower Middle Viséan (V2a) age; Kapfenberg near Göschitz, Zeulenroda district, Eastern Thuringia; specimen No. K.51. (Coll. D. WEYER; Department of Palaeontology, Natural History Museum at HUMBOLDT-University, Berlin).
A) lower calicular cross section, × 3,5
B) middle calicular cross section, × 3,2, demonstrating the counter pseudofossula typical for most species of the genus *Fasciculophyllum* THOMSON 1883.

Saleelasma axiferum (HUDSON 1943) is very near to *Saleelasma delepini* in size, shape, and septal pattern, but clearly differs in the absence of external longitudinal ridges and, above all, in the less prominent cardinal fossula, which does not break radial symmetry.

Distribution : *Saleelasma delepini* is known from Middle Tournaisian beds (Assise de Maredsous, Tn2) of Belgium (basins of Namur and Dinant) and Northern France (Avesnois region). It occurs in the *peracuta*-shales, Tn2a (mainly in upper parts), and in the Landelies limestone, Tn2b (mainly in lower parts). Records from stratigraphically higher beds (Calcschistes de Maredsous, Tn2c; Assise de Celles, Tn3) are unknown. The presence of *Saleelasma delepini* in Lower Tournaisian

beds (Hastière limestone, Tn1b), as stated by A. VAUGHAN (1915, p. 35), can not be verified, though it is not possible to refute in detail this Tn1b-record of the species, since there are no exact corresponding locality references in the VAUGHAN paper. The known localities, where *Saleelasma delepini* has been found, are listed below (text-fig. 3).



Text-fig. 3: Occurrence of *Saleelasma delepini* (VAUGHAN 1915) in Belgium and Northern France. Numbers refer to localities cited in the text.

1. Abandoned quarries NNE of **Mévergnies;** valley of the river Dendre (localities Ath 1 and Ath 2: R. CONIL 1959, p. 10; Landelies limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINE (1922, p. 50), F. DEMANET (1958, p. 59), and R. CONIL (1959, p. 70). 13 specimens from locality Ath 2 have been studied.

2. Abandoned quarry N of **Attre;** valley of the river Dendre (locality 160: R. CONIL 1959, pl. 10); Landelies limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINE (1911, p. 51), and R. CONIL (1959, p. 72).

3. Abandoned quarry "Rousseau", WNW of **Arquennes;** valley of the river Samme (locality 930: R. CONIL 1959, pl. 5); Landelies limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINIE (1911, p. 37), and R. CONIL (1959, p. 15).

4. Exposures near the rectified course of the river Samme, NNE of **Feluy;** (locality 931: R. CONIL 1959, pl. 5); Landelies limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINIE (1911, p. 36), A. VAUGHAN (1915, p. 48), and R. CONIL (1959, p. 14). 23 specimens from this locality (locus typicus restrictus) have been studied.

5. Abandoned quarry near Bourleau, N of **Feluy;** valley of the river Samme (locality 942: R. CONIL 1959, pl. 5); Landelies limestone (Tn2b); *Saleelasma delepini* recorded by R. CONIL (1959, p. 14).

6. Railway cut S of **Mazy;** valley of the river Orneau (locality 1200: R. CONIL 1959, pl. 12); Landelies limestone (Tn2b); *Saleelasma delepini* recorded by R. CONIL (1959, p. 110).

7. Landelies; valley of the river Sambre; *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINE (1911, pp. 152, 163), and F. DEMANET (1958, p. 59).

8. Fairoul; *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by F. DEMANET (1958, p. 58).

9. Lime-kiln of **Maredsous;** *peracuta*-shales (Tn2a) or basal Landelies-limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINE (1911, p. 331), and F. DEMANET (1958, p. 58).

10. Hastière; *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINE (1911, p. 331), and F. DEMANET (1958, p. 58).

11. Gendron; *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by F. DEMANET (1958, p. 58).

12. Spontin; *peracuta*-shales (Tn2a) or baxal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by F. DEMANET (1958, p. 59).

13. Barse; *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by F. DEMANET (1958, p. 59).

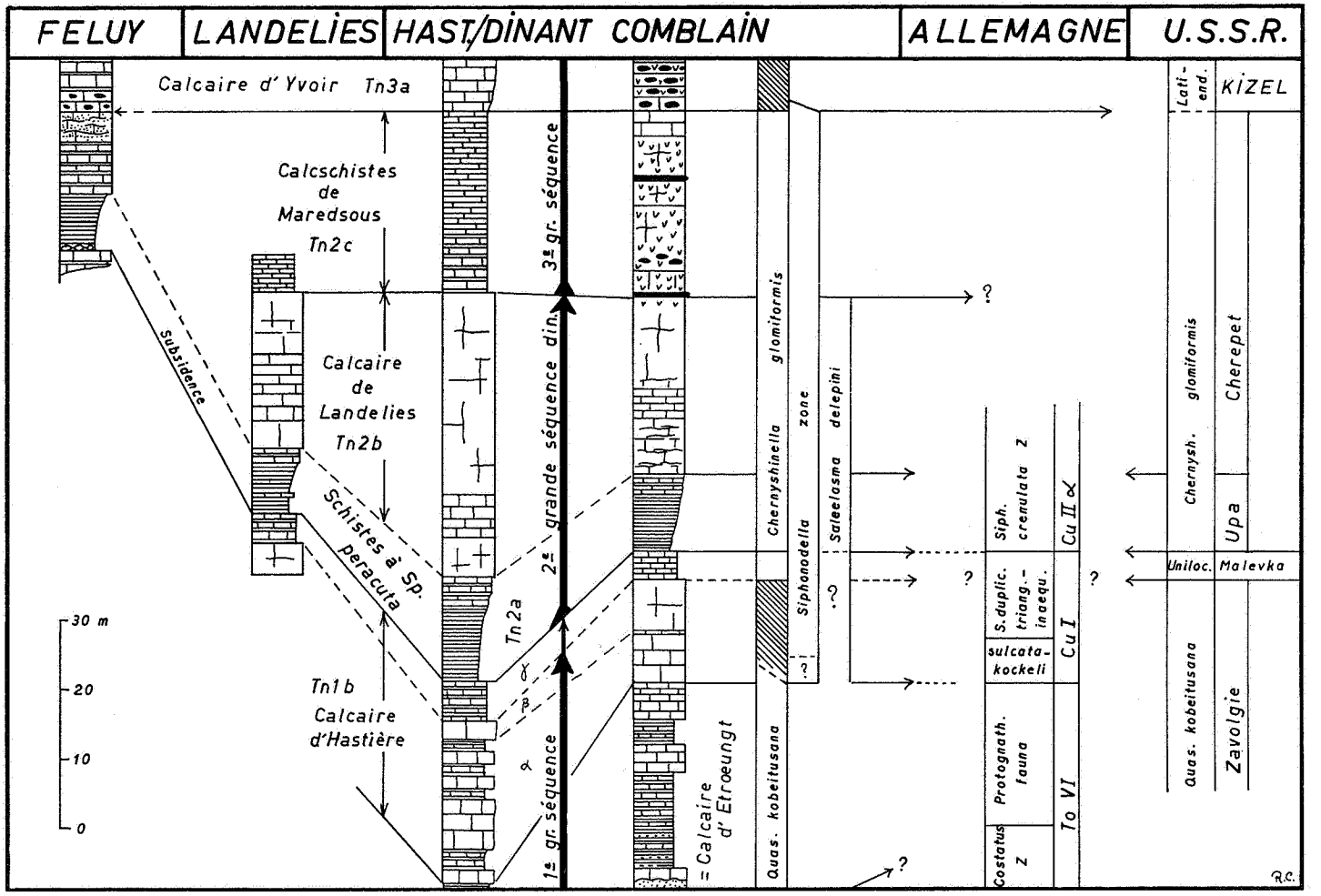

FELUY
LANDELIES
HAST/DINANT COMBLAIN
ALLEMAGNE
U.S.S.R.
Calcaire d'Yvoir Tn3a
Calcschistes de Maredsous Tn2c
Calcaire de Landelies Tn2b
Schistes à Sp. peracuta
Tn1b Calcaire d'Hastière
Tn2a
Subsidence
30 m
20
10
0
3e gr. séquence
2e grande séquence din.
1e gr. séquence
= Calcaire d'Etroeungt
Chernyshinella glomiformis zone
Siphonodella
Saleelasma delepini
Quas. kobeitusana
Siph. crenulata z
S. duplic. triang.-inaequ.
sulcata-kockeli
Protognath. fauna
Costatus z
Cu II α
Cu I
To VI
Lati-end.
KIZEL
Chernysh. glomiformis
Cherepet
Upa
Uniloc.
Malevka
Quas. kobeitusana
Zavolgie
R.C.

PLATE 1

14. Railway cut near **Ampsin;** *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by G. DELÉPINE (1911, pp. 188, 191).

15. Chanxhe; near Comblain-au-Pont; horizon ß of A. VAUGHAN (1915) — most probably *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by A. VAUGHAN (1915, p. 48).

16. Railway cut near **Dolhain;** *peracuta*-shales (Tn2a) or basal Landelies limestone (Tn2b); *Saleelasma delepini* recorded by F. DEMANET (1958, p. 59).

17. Taille-pieds near **Avesnelles;** *peracuta*-shales (Tn2a); *Saleelasma delepini* recorded by A. CARPENTIER (1913, pp. 37, 116).

18. Quarry "Dolomie française", Camp de César near **Avesnelles;** "alternances de bancs calcaires crinoidiques et de schistes ou calcschistes" (A. CARPENTIER 1913, pp. 29-35), corresponding to the basal Landelies limestone (Tn2b; R. CONIL 1968, p. B 722); 3 specimens of *Saleelasma delepini* have been identified from a coral collection, made by O. H. SCHINDEWOLF in 1942, and containing *Siphonophyllia*, *Cyathaxonia*, and two other genera.

STRATIGRAPHIC CONTEXT (R. CONIL)

The formation from which *Saleelasma delepini* has been recorded belong to the second main sedimentary rhythm of the Dinantian (Tn2a-b) and possibly to the phase (Tn1bγ) which heralds its arrival, if the specimens collected by VAUGHAN from the Calcaire d'Hastière came from the shale-limestone alternations at its summit. It is very unlikely that these specimens were found in the thick beds forming the central part of the Calcaire d'Hastière, which are practically devoid od Corals.

In view of its wide extent and the renewal of faunas which occured, this second rhythm of the Dinantian probably accompained an appreciable geographic change. Thus certain characteristic faunas could be diachronous on a continental scale. It seems fairly clear that, during the Lower and Middle Tournaisian, faunal exchange with the Ural geosyncline was easy; in the case of Foraminifera, the similarities are particularly great.

It is interesting to note that *Saleelasma delepini* disappeared as Tn2c began, at the start of the third major dinantian rhythm which braught with it distinctive features all over western Europe (e. g. the almost total disappearance of Foraminifera during Tn3a-b, the birth of waulsortian "reefs" and the massive appearance of cherts).

Text-plate I shows the distribution of *Saleelasma delepini* in its paleontological and stratigraphical context (see p. 65).

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Communication présentée le 19 mai 1970

PLATE 1

Figs. 1-6: *Metriophyllum bouchardi* EDWARDS & HAIME 1850; Frasnian; Boulogne-sur-Mer; probable topotype specimen No. K.50. (Department of Palaeontology, Natural History Museum at HUMBOLDT-University, Berlin).

Serial cross sections (two further cross sections of this specimen are figured in pl. 2, figs. 1,2); magnifications × 10 (figs. 1,2), × 9 (figs. 3-5), × 8 (fig. 6); distances from cross section of fig. 1: fig. 2 — 0.6 mm, fig. 3 — 0.8 mm, fig. 4 — 1.0 mm, fig. 5 — 1.2 mm, fig. 6 — 2.0 mm; diameters 5.0 × 5.6 mm (fig. 1), 5.1 × 5.6 mm (fig. 2), 5.4 × 6.2 mm (fig. 3), 5.7 × 6.3 mm (fig. 4), 5.7 × 6.5 mm (fig. 5), 6.2 × 7.1 mm (fig. 6).

Fig. 1 represents an unusual growth stage with a temporarily developed aulos; an aulos-like pit occurs at the central calicular base in fig. 3; subtabular interseptal loculi are present in fig. 1 (all skeletal lumina), in fig. 2 (central parts of seven interseptal chambers), and in fig. 3 (central part of interseptal chamber on the left side of the cardinal septum); all the other interseptal loculi are supratabular parts of the calice.

In all the cross sections of plates 1-7, six protosepta (cardinal, counter, two alar, and two counterlateral septa) are marked. The cardinal septum is found on the upper side of the figures.

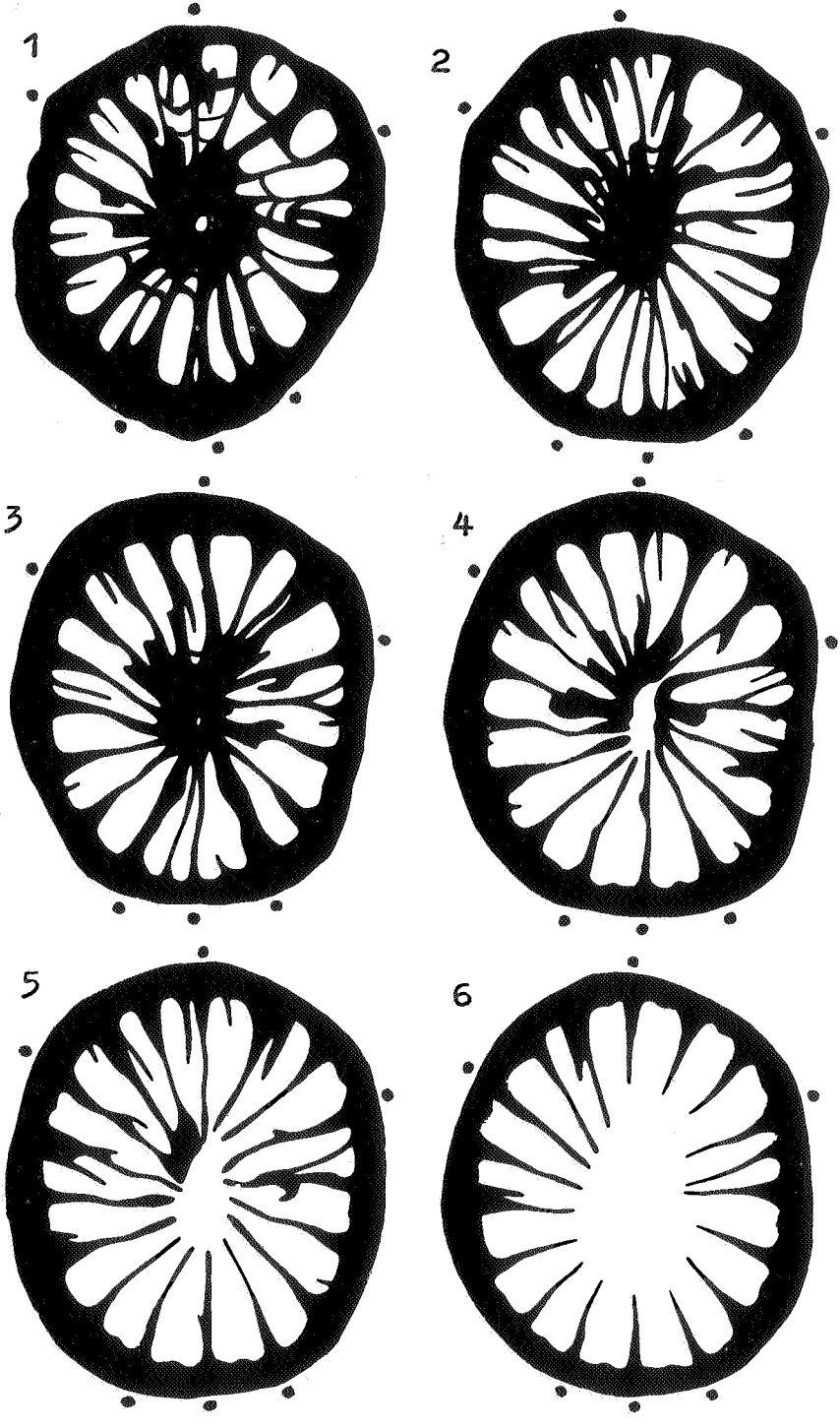

PLATE 1.

PLATE 2

Figs. 1, 2: *Metriophyllum bouchardi* EDWARDS & HAIME 1850; Frasnian; Boulogne-sur-Mer; additional serial cross sections from the probable topotype specimen No. K.50., figured in pl. 1, figs. 1-6. Magnifications × 8 (fig. 1), × 7 (fig. 2); distances from cross section of pl. 1, fig. 1: fig. 1 — 2.7 mm, fig. 2 — 5.4 mm; position of cross section of fig. 2 is about 2-4 mm below upper calicular rim; diameters 6.3 × 7.8 mm (fig. 1), 7.7 × 9.2 mm (fig. 2).

Figs. 3-7: *Saleclasma delepini* (VAUGHAN 1915); Landelies limestone (Tn2b); exposures near the rectified course of the river Samme, NNE of Feluy (Locality Feluy 931); (Department of Geology, Catholic University of Lille).

Five serial cross sections; magnifications × 15 (fig. 3), × 8 (fig. 4), × 7 (figs. 5-7); diameters 2.8 × 4.2 mm (fig. 3), 5.3 × 6.2 mm (figs. 4-6), 5.4 × 6.4 mm (fig. 7); metriophylloid carinae are present only in the cross section of fig. 3, just below the peripheral base of the calice (stippled areas on both sides of the cardinal septum); all interseptal loculi of figs. 4-7 are supratabular.

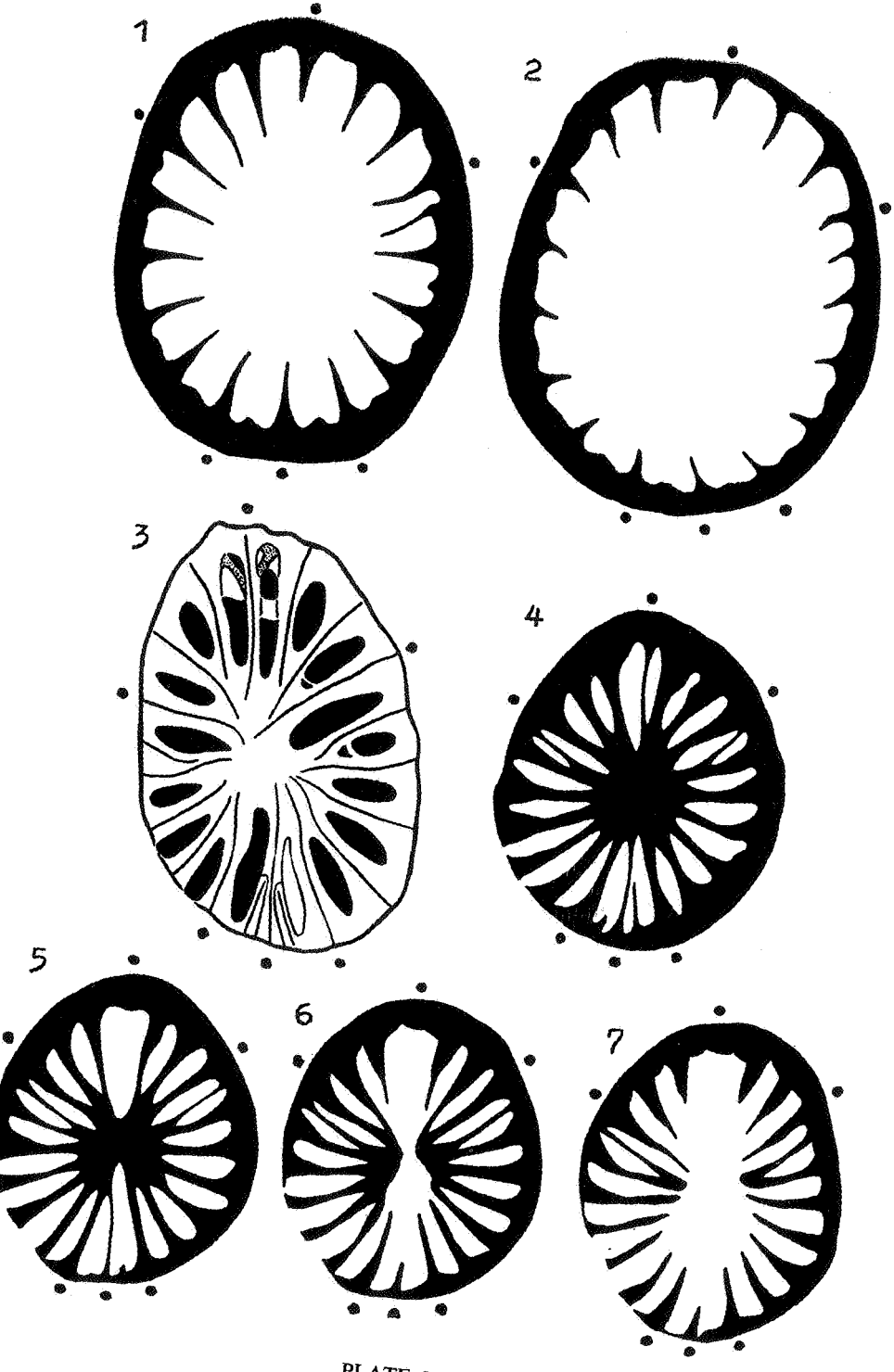

PLATE 2

PLATE 3

Saleelasma delepini (VAUGHAN 1915); Landelies limestone (Tn2b); abandoned quarry NNE of Mévergnies (locality Ath 2).

Figs. 1-4: Four serial cross sections from specimen No. 521 (Coll. R. CONIL, Department of Geology, University of Louvain); magnifications × 15 (fig. 1), × 14 (fig. 2), × 11 (fig. 3), × 10 (fig. 4); diameters 2.8 mm (fig. 1), 3.9 × 4.4 mm (fig. 2), 4.9 × 5.6 mm (fig. 3), 5.8 × 6.4 mm (fig. 4); photographs of cross sections of figs. 2, 3, are given on pl. 7, figs. 4, 5.

Long counter minor septa are not developed in the juvenile cross section of fig. 1 (the corresponding skeletal structure on the right side of the counter septum is a metriophylloid carina); all the interseptal loculi are subtabular in figs. 1-3, and supratabular in fig. 4.

Figs. 5, 6: Two cross sections of juvenile stages from specimen No. 522 (Coll. R. CONIL, Department of Geology, University of Louvain); magnifications × 20 (fig. 5), × 15 (fig. 6); diameters 1.8 × 1.9 mm (fig. 5), 3.0 × 3.4 mm (fig. 6).

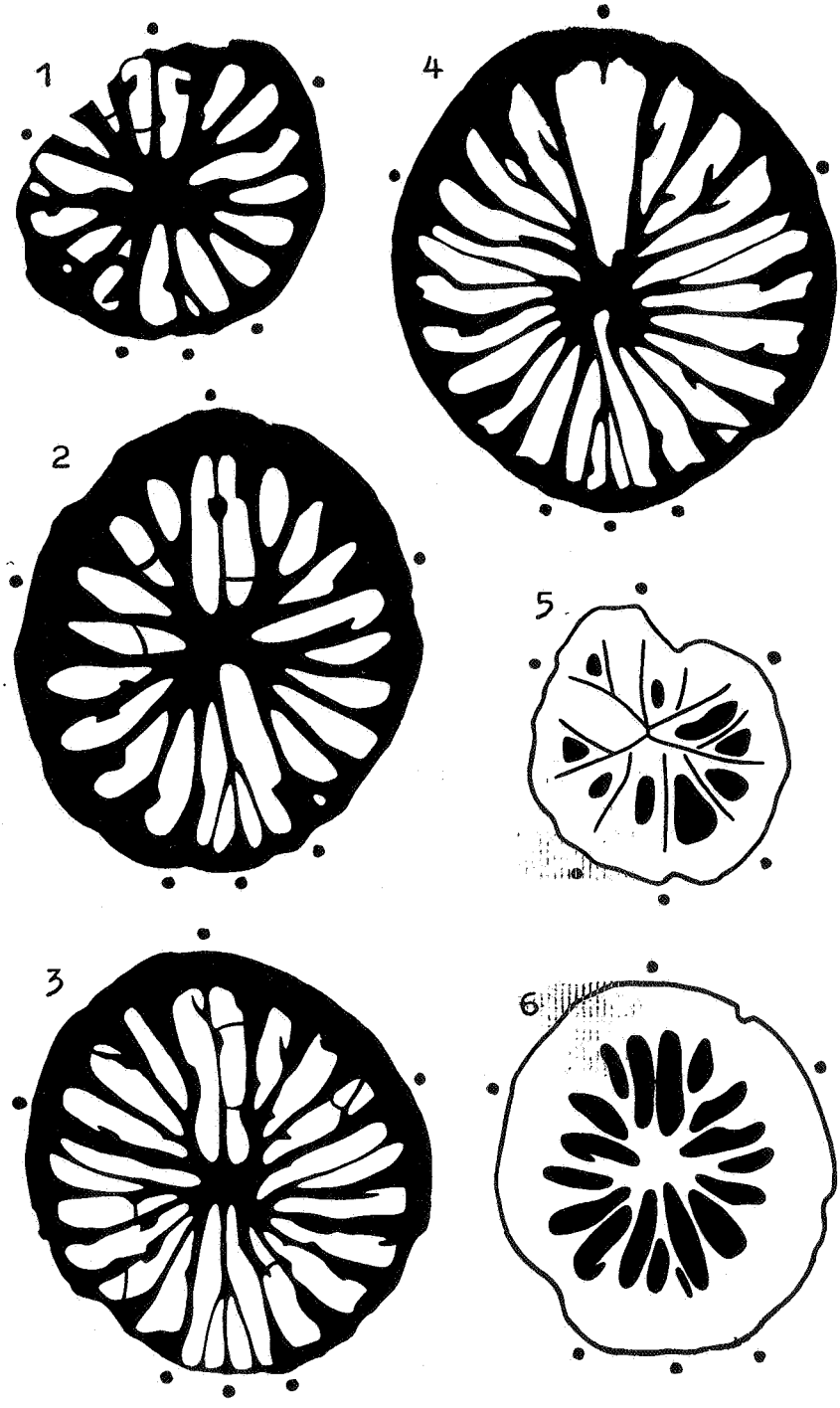

PLATE 3

PLATE 4

Figs. 1-8: *Saleelasma delepini* (VAUGHAN 1915); crinoidal limestone of lower Assise de Marbaix (upper part of Middle Tournaisian, equivalent to basal Landelies limestone, Tn2b); quarry "Dolomie française", Camp de César near Avesnelles; specimen No. X 3631 (Coll. O. H. SCHINDEWOLF, Zentrales Geologisches Institut, Berlin).

Eight serial cross sections; magnifications × 17 (fig. 1), × 15 (fig. 2), × 9 (fig. 3), × 8 (fg. 4), × 7 (figs. 5-8); diameters 2.2 mm (fig. 1), 2.5 × 2.7 mm (fig. 2), 4.2 × 4.7 mm (fig. 3), 4.5 × 5.0 mm (fig. 4), 5.2 × 5.7 mm (fig. 5), 5.0 × 5.4 mm (fig. 6), 5.1 × 5.7 mm (fig. 7), 5.3 × 6.2 mm (fig. 8).

Figs. 9, 10: *Saleelasma delepini* (VAUGHAN 1915); Landelies limestone (Tn2b); abandoned quarry NNE of Mévergnies (locality Ath 2); specimen No. 523 (Coll. R. CONIL, Department of Geology, University of Louvain).

Two serial cross sections of central calicular base region; magnifications × 9 (figs. 9, 10); diameter 5.9 mm (fig. 9), 6.0 mm (fig. 10); interseptal loculi are supratabular.

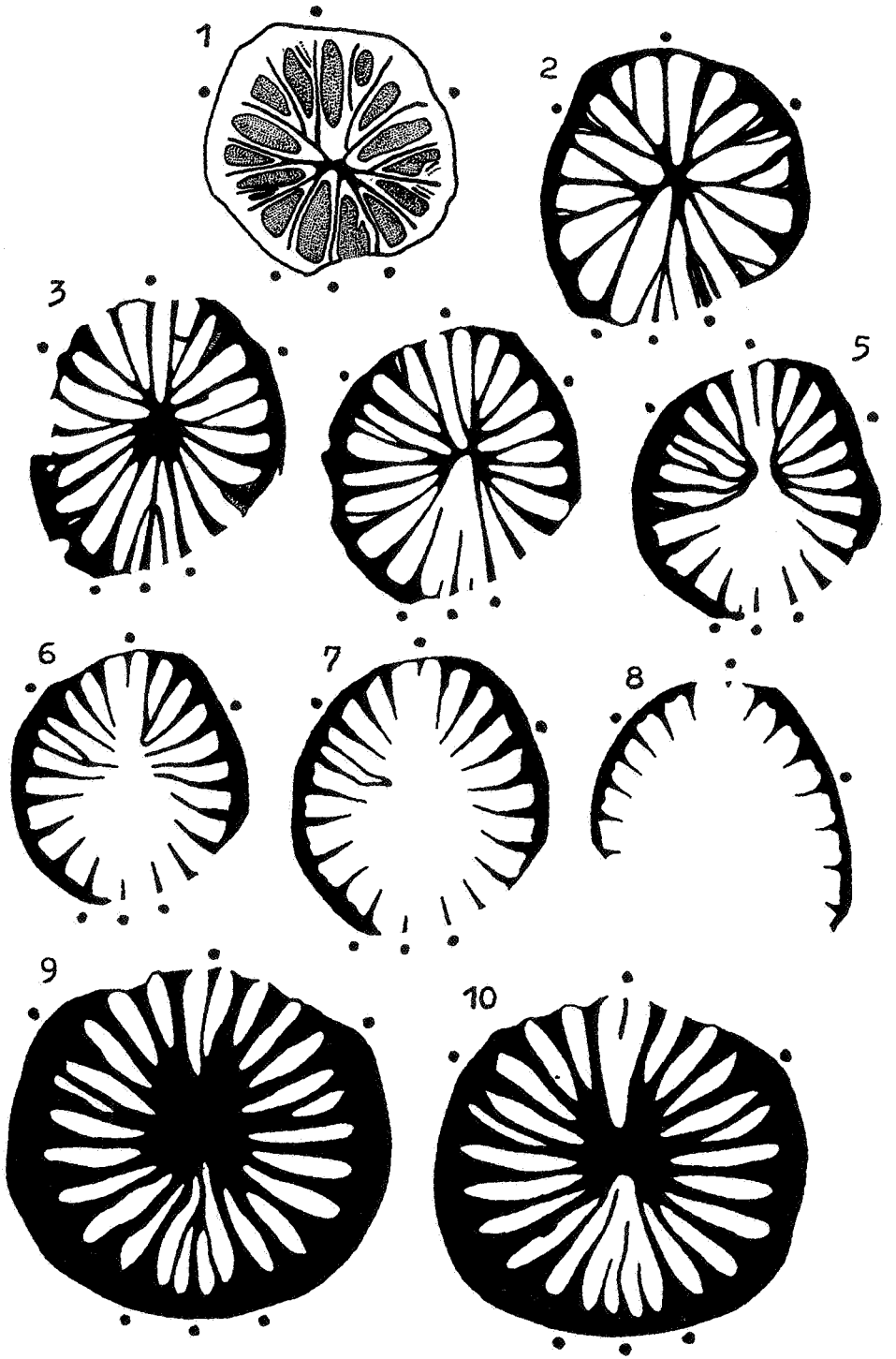

PLATE 4

PLATE 5

Saleelasma delepini (VAUGHAN 1915); Landelies limestone (Tn2b); exposures near the rectified course of the river Samme, NNE of Feluy (locality Feluy 931) — fig. 3 — and abandoned quarry NNE of Mévergnies (locality Ath 2) — figs. 1, 2, 4-9; Coll. R. CONIL (Department of Geology, University of Louvain).

Fig. 1: Tangential longitudinal section at counter septum side of specimen No. 524; magnification × 10; photograph of this section is given on pl. 7, fig. 2.

Fig. 2: Median longitudinal section, perpendicular to cardinal-counter septum plane, from specimen No. 525; magnification × 10; photograph of this section is given on pl. 7, fig. 1; subtabular areas blank, supratabular areas stippled.

Fig. 3: Median longitudinal section, with traces of four horizontal metriophylloid carinae, from specimen No. 526; magnification × 10; cross sections of this specimen are figured on pl. 6, figs. 1-4.

Figs. 4-9: Six calicular serial cross sections from specimen No. 527; magnification × 7 (fig. 4), × 6 (figs. 5, 6), × 5.5 (fig. 7), × 5 (figs. 8, 9); diameter 5.6 × 6.5 mm (fig. 4), 6.2 × 6.8 mm (fig. 5), 6.5 × 6.8 mm (fig. 6), 6.8 × 7.2 mm (fig. 7), 7.0 × 7.6 mm (fig. 8), 7.3 × 8.1 mm (fig. 9); a photograph of the cross section of fig. 4 is given on pl. 7, fig. 6.

Interseptal loculi are in part supratabular (stippled areas) and in part subtabular (blank areas) in fig. 4; the position of tabular intersections demonstrates the presence of a true cardinal fossula (and probably of two alar fossula); an aulos-like pit is developed in the central calicular base (fig. 5); interseptal loculi of figs. 5-9 are supratabular.

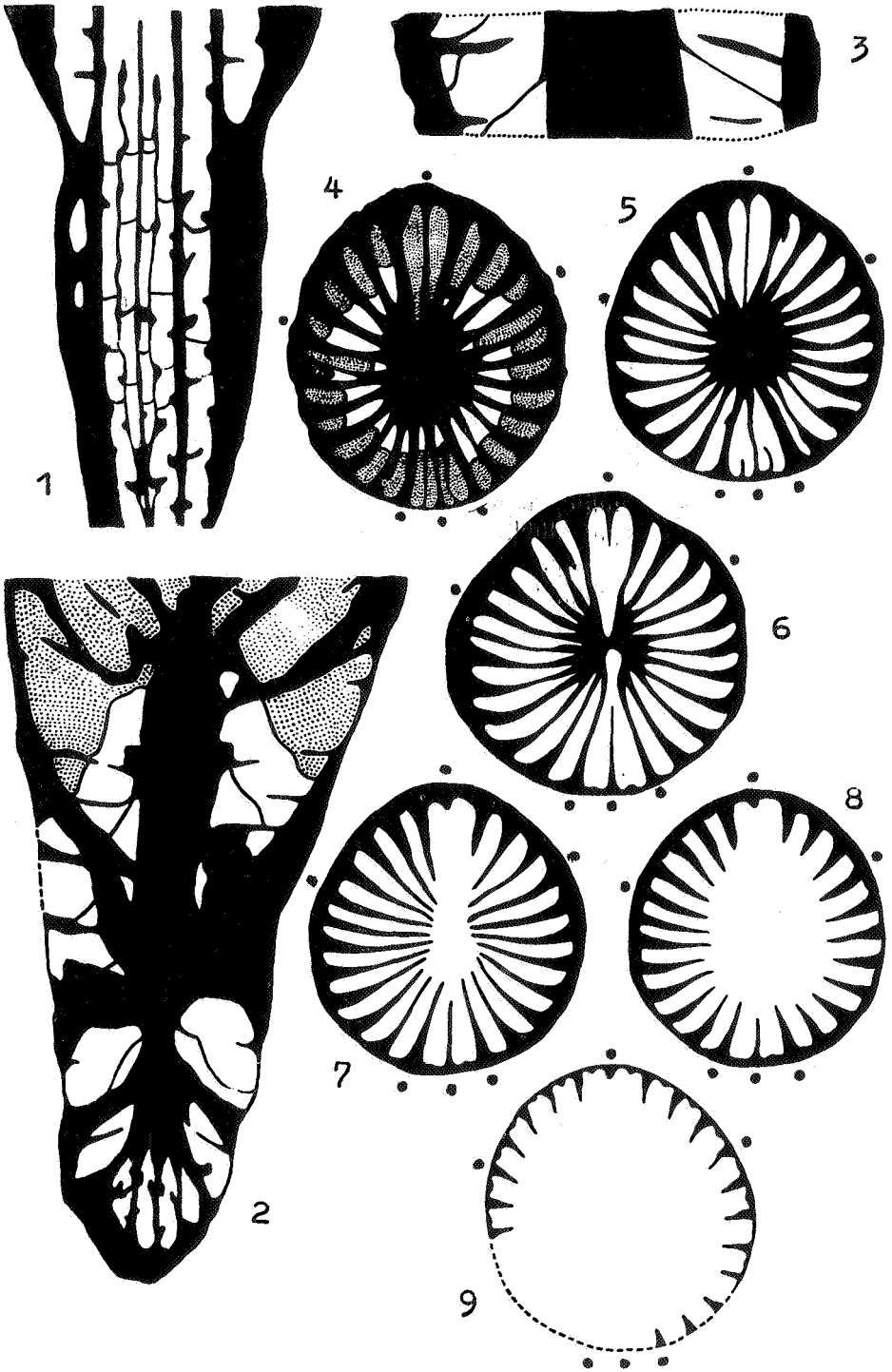

PLATE 5

PLATE 6

Saleelasma delepini (VAUGHAN 1915); Landelies limestone (Tn2b); exposures near the rectified course of the river Samme, NNE of Feluy (locality Feluy 931) — figs. 1-4 — and abandoned quarry NNE of Mévergnies (locality Ath 2) — figs. 5, 6; Coll. R. CONIL (Department of Geology, University of Louvain).

Figs. 1-4: Four serial cross sections from specimen No. 526; magnification × 20 (fig. 1), × 15 (fig. 2), × 12 (fig. 3), × 8 (fig. 4); diameter 1.9 × 2.3 mm (fig. 1), 2.8 × 3.8 mm (fig. 2), 4.1 × 5.2 mm (fig. 3), 6.9 × 7.9 mm (fig. 4); a longitudinal section of this specimen is figured on pl. 5, fig. 3; rejuvenescence is visible in three interseptal chambers at the periphery of the corallum (fig. 4).

Fig. 5: Cross section from specimen No. 528; magnification × 12; diameter 4.2 × 5.0 mm; interseptal loculi are subtabular; true cardinal fossula is indicated by more numerous tabular intersections on both sides of the cardinal septum.

Fig. 6: Tangential longitudinal section at cardinal septum side of specimen No. 529; magnification × 10; supratabular calicular regions stippled, subtabular areas blank; the right one of the four intersected major septa is the cardinal septum, on both sides of which calicular matrix reaches farther downward, thus indicating the true cardinal fossula.

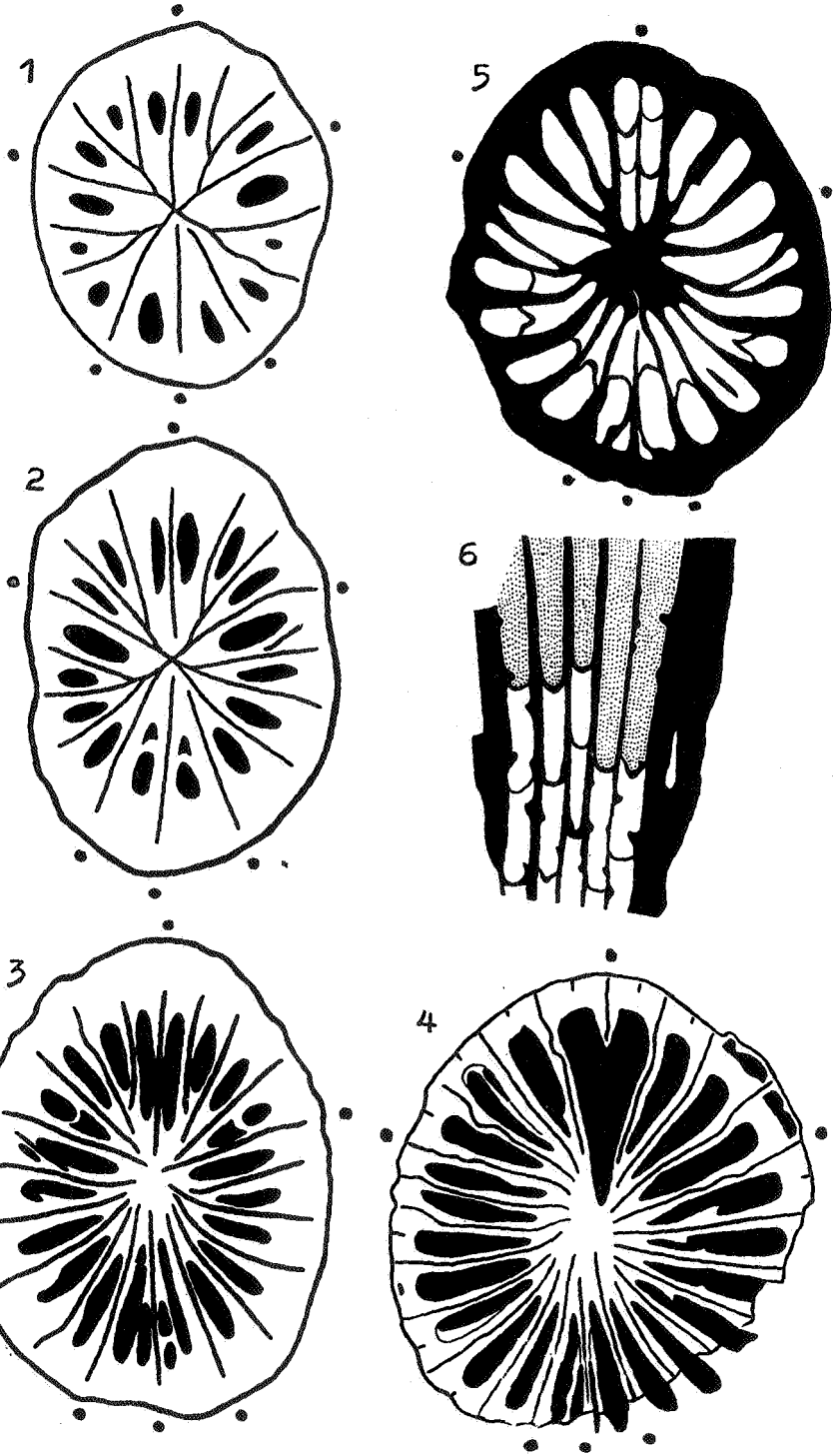

PLATE 6

PLATE 7

Saleelasma delepini (VAUGHAN 1915); Landelies limestone (Tn2b); abandoned quarry NNE of Mévergnies (locality Ath 2); Coll. R. CONIL (Department of Geology, University of Louvain — figs. 1, 2, 4-6; Department of Palaeontology, Natural History Museum at HUMBOLDT-University, Berlin — fig. 3).

Fig. 1: Median longitudinal section, perpendicular to cardinal-counter septum plane, from specimen No. 525; magnification × 10; drawing of section is given on pl. 5, fig. 2.

Fig. 2: Tangential longitudinal section at counter septum side of specimen No. 524; magnification × 10; drawing of section is given on pl. 5, fig. 1.

Fig 3: Tangential longitudinal section at alar septum side of specimen No. K.49.1.; magnification × 10; drawing of section is given in text-fig. 1 B.

Figs. 4, 5: Cross sections of specimen No. 521; magnification × 10; drawings of sections are given on pl. 3, figs. 2, 3.

Fig. 6: Cross section just above calicular base of specimen No. 527; magnification × 10; drawing of section is given on pl. 5, fig. 4.

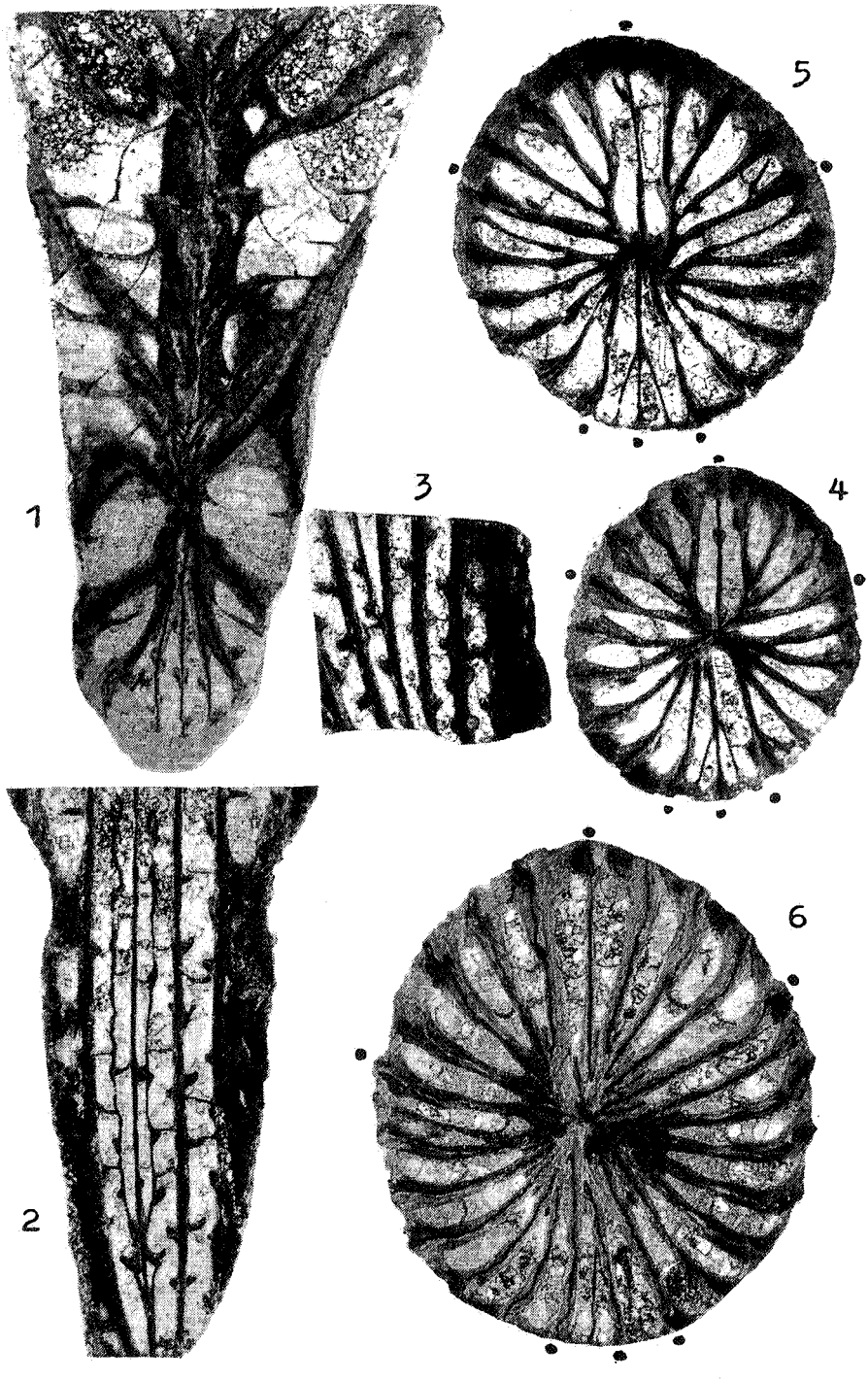

PLATE 7