DEVONIAN CORALS AND BRACHIOPODS FROM
THE BRENDON HILLS, WEST SOMERSET

by B. D. WEBBY

ABSTRACT. The coral and brachiopod faunas of the Middle-Upper Devonian Ilfracombe Beds in the Brendon Hills, west Somerset, have been examined. The corals are restricted to two limestone horizons in the Ilfracombe Beds, the Rodnick Limestone and the Roadwater Limestone: the brachiopods are sparse and more uniformly distributed throughout the succession. The rugose corals, *Heterophronis percevali* sp. nov., *Thamnophyllum concrescentum* (Goldfuss), *Acanthophyllum* (Neostriptophyllum) concrescentum (Walther) and *Mesophyllum* (Aecophyllum) sandalilense sp. nov., a tabulate coral, *Thamnophyllum polyfacer* (Schlotheim); and two brachiopods, *Spinocyrtia ascendens* (Spieretzkaya) and *Thomassia gibbosa* Yonderacke, are described. The coral and brachiopod faunas suggest that the bulk of the Ilfracombe Beds is Givetian; the upper part of the Ilfracombe Beds (the Avril Group) are Lower-Middle Givetian; the Culbone Slate and Rodnick Limestone are Middle-Upper Givetian; and the Roadwater Limestone is Upper Givetian. The Givetian-Frasnian boundary probably lies within the Leighland Beds, towards the top of the Ilfracombe Beds. In the light of the present study, Wedekind's Middle Devonian rugose coral zonal scheme is seen to be in need of considerable modification.

The Devonian corals and brachiopods of the Ilfracombe Beds of west Somerset have received comparatively little attention in the past, possibly owing to the poor state of preservation of the brachiopods, and to the recrystallization of the corals. Perceval (1866, p. 185) listed twelve coral species from a locality near Sandhill Farm, Withycombe, and also mentioned that spiriferids were common, while Etheridge (1867, p. 593) gave a comparable list for the same locality (= his Hill Farm locality) and, in addition, identified corals from Gulsocott (p. 594) and from limestone bands at Wheeldon Cross and Luckwell (p. 586). Lang and Smith (1935), in their redescriptions of *Disphyllophora aequiseptatum* (Milne-Edwards and Haime), figured material collected by Perceval from Sandhill Farm, and indicated that *Disphyllophora* (Phacellophyllum) trigemmum (Quenstedt) occurs abundantly in the Ilfracombe Beds (Upper Givetian-Lower Frasnian) at Withycombe. Another important fauna, including brachiopods, corals, trilobites, and lamellibranchs, was described by Whithborne (in Hicks 1897, p. 441) from the slates at Treborough. Hicks ascribed this slate sequence to the Morte Slates, a mistaken correlation, as already emphasized by Usher (1908). It can be clearly demonstrated that the slates at Treborough occur stratigraphically immediately above and below the Roadwater Limestone, and therefore appertain to part of the Ilfracombe Beds succession rather than to the Morte Slates as Hicks suggested.

Owing to the recrystallization of the corals, only relic structural elements have been retained. As a result, the original structures are readily observable in thin-sections prepared thicker than usual, but further grinding and polishing results in the total loss of the structures. Cellulose peels were also used but failed to give consistent results. The most satisfactory methods for studying the west Somerset material were to use polished sections for those corals differentially stained by percolating solutions from the New Red Sandstone, and thick thin-sections or cellulose peels for the other material.

The detailed stratigraphical succession for the Brendon Hills is shown in text-fig. 1, and has been summarized by Webby (1962b). The lowest unit, the Upper Hangman Grits, has yielded only plant fragments, and lamellibranchs from near the top of the formation. The overlying Hangman–Ilfracombe contact is quite sharp, consisting of a change from the predominant quartzitic sandstones of the Upper Hangman Grits to the alternating slates and thinly bedded siltstones of the Mansley Beds (lowest formation of the Avill Group), a distinctive lithology which seems to be identical with that of the Wild Pear Beds near Combe Martin, north Devon. This lithological correlation is supported by the fact that on the north Devon coast the Wild Pear Beds are underlain by the Hangman Grits and overlain by the Lester Series (Evans 1922), the last being equivalent to the middle and upper parts of the Avill Group (Walland Sandstone, Harwood Beds, and Oaktrow Sandstone) in the Brendon Hills. However, there is an important difference in the respective sequences of north Devon and west Somerset, because near Combe Martin the upper part of the Hangman Grits contains beds with *Stringocephalus cf. bartini* (Defrance), while in west Somerset it appears to be absent. Possibly the lamellibranch horizon in the Upper Hangman Grits is at the equivalent stratigraphical horizon in the Brendon Hills.

No brachiopod faunas have been found in the Mansley Beds and the Walland Sandstone, but the succeeding formations, the Harwood Beds and the Oaktrow Sandstone,
have yielded brachiopods, lamellibranchs, gastropods, and Polyzoa, and the Oaktrow Sandstone has also yielded *Decadocinus oaktrowensis* Webby. The brachiopods from the Oaktrow Sandstone are: *Schuchertella* sp., *Cupularastrum?* sp., *Spinocyrtia ascendens* (Spiestersbach), *Spirifer* sp., *Thomassaria gibbosa* Vandercammen, *Athyrus?* sp., *Cyrtina* sp., *Centrorella* sp., and *Craneana* sp. The occurrence of *Spinocyrtia ascendens* in the Oaktrow Sandstone, and also the Harwood Beds, is of considerable interest, for this species seems to be a useful index-fossil of the Givetian in Germany. It is almost certainly identical with many, if not most, of the forms hitherto referred to *Spirifer medio- textus* Archiac and Verneuil both in Belgium and Germany. *S. medio- textus* is given as the index-fossil for the Gic Zone of the Belgian Givetian type-succession, on the south side of the Dinant Basin (Lecompte and Watrout 1957, p. 241). *Thomassaria gibbosa* has an Upper Givetian to Frasnian range in Belgium (Webby 1962a, p. 538). By considering the overlapping time-ranges of *Spinocyrtia ascendens* and *T. gibbosa*, it might be suggested that the Oaktrow Sandstone was Upper Givetian. However, as will be seen below, the coral evidence from the stratigraphically higher limestones suggests that the limestones are Upper Givetian; hence it seems likely that the Oaktrow Sandstone, and probably also the Harwood Beds, are Middle Givetian.

The presence of two distinct coraliferous limestones has been established, the lower named the Rodhuish Limestone, and the upper the Roadwater Limestone. The Rodhuish Limestone is restricted to the area around Rodhuish, and passes laterally into the Cutcombe Slate. The Roadwater Limestone is more or less persistent from Sandhill Farm, Withcombe, southwards to Roadwater, and thence westwards to Wheddon Cross. The rugose and tabulate corals are restricted to these two limestone formations. The following corals have been collected from the Rodhuish Limestone: *Heliophyllum halli* Milne-Edwards and Haime, *Disphyllum aequiseptatum* (Milne-Edwards and Haime), *Thamnomorpha caespitosa* (Goldfuss), *Cyathophyllum secundum* (Goldfuss), *Thamnomorpha aff. coronaria* (d’Orbigny) and *T. reticulata* (de Blainville). It should be noted that Schlüter (1889) described the type-species *Mesophyllum deflectum* from one of the Goldfuss syntypes of *Cyathophyllum vesiculosum*, and Stumm (1949) designated it as lectotype, thereby making it *Mesophyllum vesiculosum*. Dr. R. Birenheide has indicated (pers. comm.) that the specimen selected by Schlüter is a compound form figured by Goldfuss in plate 17, fig. 5e, and that certain of the other Goldfuss syntypes should be grouped with *C.’ secundum* (Goldfuss). The west Somerset specimens are accordingly assigned to *C.’ secundum*.

The Cutcombe Slate and Rodhuish Limestone have yielded only a few poorly preserved, indeterminate brachiopods. Only *Cyrtospirifer sp.* has been identified from the Rodhuish Limestone. At Treborough the brachiopods and corals described by Whidborne (in Hicks 1897) were collected from the slates below the limestone band (and, therefore, from the topmost beds of the Cutcombe Slate). A revision of their material has demonstrated that much less confident palaeontological assignments than those given by Whidborne are probable. The new assessment does not support a Lower Devonian age as Hicks formerly suggested (1897, p. 444).

An abundant and varied coral fauna has been obtained from the Roadwater Limestone, and a small, comparatively unimportant, brachiopod fauna. The faunal list is as follows: *Syringaxons sp.*, *Heterophrentis percevali* sp. nov., *Heliophyllum halli* Milne-Edwards and Haime, *Disphyllum aequiseptatum* (Milne-Edwards and Haime),
Phillipsastrea sp., Thammoporia caespitosa (Goldfuss), Endophyllum shelleyi Milne-Edwards and Haine, Acanthophyllum (Neostrigophyllum) concavum (Walther), Digonophyllum (Digonophyllum) bilaterale? (Champernowne), Mesophyllum (Arcephyllum) sandullense sp. nov., 'Cystiphyllum' secundum (Goldfuss), Thammopora cervicornis (de Blainville), T. reticulata (de Blainville), T. polyforata (Schlotheim), Alevolites suborbicularis Lamark, Thecosigetea sp., Curtina heteroclitica (Defrance), Schizophoria sp., rhychnonellid and productid species. The commonest corals are Thammoporia caespitosa and Thammopora cervicornis, while Diaphyllum aequetepus, Heliphyllum, and 'Cystiphyllum' secundum are also important. Other species are not abundant.

No determinable faunas have been recovered from the overlying Leighton Beds. In the Leigh Barton Limestone, near the top of the Leighton Beds, Cystostracophyllum sp. and other indeterminate brachiopods have been obtained, but nothing that assists in determining the age of the beds.

The Morte Slates contain few fossils, which are invariably poorly preserved or distorted. Cystostracophyllum sp. has been collected from the Sicklepath Slate, in the lower part of the Morte Slates, and Whibley has identified a trilobite, brachiopods, and lamellibranchs in the Upper Morte Slates from Oakhampton Quarry, near Wiveliscombe, to the south of the Brendon Hills (Hicks 1897, p. 443).

Age of the Rodmell and Roadwater Limestones. In the absence of more precise zonal fossils it has become necessary to rely mainly on the rugose and tabulate corals for determining the age of the Devonian limestones in the Brendon Hills. Perhaps the most certain determination of the age of the limestones is obtained from a study of the whole aspect of the coral fauna within the limestones. The Roadwater Limestone altogether includes 16 different coral species, of which 11 are rugose and 5 tabulate corals. A number of the rugose corals are typical Middle Devonian species, for instance Heliphyllum, Digonophyllum (Digonophyllum), and Mesophyllum (Arcephyllum) are restricted to the Middle Devonian elsewhere in Europe and North America. The presence of Acanthophyllum (Neostrigophyllum) concaveus is interesting since it appears to be restricted to the Upper Givetian of the Bergisches Land, the uppermost Eifelian and Givetian in the Eifel (Birenheide 1961, p. 125) and the Upper Givetian in Moravia (Kettnerová 1932, p. 45). The species of Phillipsastrea collected from the Roadwater Limestone is possibly P. hemiah (Lonsdale), the same form as is found in the limestones of the Ilfracombe Beds at Dodington, on the northern flank of the Quantock Hills. Phillipsastrea is regarded as a typical Frasnian form by Smith (1945, p. 37), whereas both Taylor (1951, p. 192) and Middleton (1959, p. 156) recorded it in the upper Middle Devonian of south Devon, and Middleton from as low as his upper Sp. Zone of the middle Middle Devonian. Presumably, the occurrence of this genus indicates an horizon high in the Middle Devonian, for it is not a characteristic Middle Devonian form in Europe. The association of this typically Frasnian form with the predominant Middle Devonian rugose coral element in the Roadwater Limestone strongly suggests that the horizon is situated not far below the Givetian–Frasnian boundary, viz. in the Upper Givetian.

The tabulate corals of the Roadwater Limestone include three species of Thammopora: T. cervicornis, T. polyforata, and T. reticulata. The time-ranges for numerous species of Thammopora in the Middle and Upper Devonian of the Dinant Basin, given by Lecompte
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(1939, p. 198), shows that *T. cervicornis* ranges through the whole of the Givetian in the Dinant succession, *T. polyforata (= dubia)* ranges from topmost Givetian (Gid) to Frasnian, and *T. reticulata* ranges from Couvinian (C02) to Frasnian. On the basis of the overlapping time-ranges of *T. cervicornis* and *T. polyforata*, the Roadwater Limestone may be tentatively correlated with the Gid Zone, or the Upper Givetian. In addition, the occurrence of *Thecostegites* points to a position close to the Givetian–Frasnian boundary, because the type species *Thecostegites bouchardi* (Michelin), which it resembles, is recorded from the Frasnian at Ferques and in the Dinant Basin (Milner-Edwards and Haine 1851; Lecompte 1939).

The Rodhuish Limestone contains no typical Upper Devonian forms. *Thamnophyllum caespitosum* and *Thamnophyllum reticulatum* may occur in the Frasnian, but they are just as common in the Givetian. All the other species, particularly *Heliophyllum hatti* and *'Cystiphyllum' secundum*, are typically Middle Devonian forms. Although the Rodhuish Limestone does not contain *Thamnophyllum cervicornis*, it does yield a form closely similar to *T. croniger*, which in the Dinant succession ranges through the Middle Givetian (Gib to Gic). From its relationship to the Oaktraw Sandstone below and the Roadwater Limestone above, and from its coral content, the Rodhuish Limestone may be regarded as Middle or Upper Givetian in age.

The total evidence adduced from the coral faunas of the Ilfracombe Beds in the Brendon Hills thus indicates that the Rodhuish Limestone is Middle–Upper Givetian, and the Roadwater Limestone is Upper Givetian. The Givetian–Frasnian boundary lies above the Roadwater Limestone but the precise position remains in doubt. Until a good fauna is obtained from the Leighland Beds, or its equivalent stratigraphical horizon in another area, nothing can be said with certainty on its precise position, which may lie within the Leighland Beds (text-fig. 1), or it might be a little higher, perhaps at the contact between the Ilfracombe Beds and the Morte Slates.

For convenience the Morte Slates may be considered to be Frasnian, though as yet no indubitable Frasnian fossils have been found.

Correlation of the Rodhuish and Roadwater Limestones, and the Wedekind Zonal Scheme. On the north Devon coast, Evans (1922) identified a number of different limestone bands within the Ilfracombe Beds, placing the Givetian–Frasnian boundary between the Red Limestone Series and the David’s Hole Beds. He referred to well-preserved corals—identified by Stanley Smith as *Endophyllum* (*Spongophyllum*) *bowerbanki* Milne-Edwards and Haine, *Cystiphyllum caespitosum* and *Pachyphora cervicornis*—in the Jenny Start Beds, which underlie the Red Limestone Series, and are, therefore, included in the Givetian. Holwill (1961) re-examined the coastal section and concluded that there are only three limestones, which are repeated by folding and faulting; the oldest, the Jenny Start Limestone, is correlated with the Givetian, followed by the Combe Martin Beach Limestone and the David’s Stone Limestone, both of which are thought to be Lower Frasnian.

More recently, Holwill (1963) has indicated that the Combe Martin Beach Limestone contains the corals *Barrandeophyllum*, *Syringax*, *Metriophyllum*, *Alveolites*, and *Thamnophyllum*, while the overlying David’s Stone Limestone includes *Syringax*, *Barrandeophyllum*, and *Thamnophyllum*. He considered the species of *Metriophyllum* to be close to *M. bouchardi* from the Frasnian of the Boulonnais. As yet *Barrandeophyllum* and
Metriophyllum have not been confirmed in the limestones of the Brendon Hills. If they characterize a limestone horizon higher than the Roadwater Limestone, then there must be important facies changes between north Devon and west Somerset.

Correlations with south Devon are even more uncertain. The only recent work on corals is by Taylor (1951) and Middleton (1959), who have adhered closely to Wedekind's zonal scheme as their basis for dating the Middle Devonian limestones. The scheme was established by Wedekind (1923, 1924, 1925, 1937) from his studies of rugose corals in the Eifel, and used subsequently outside Germany with modifications by Soskina (1936) in Russia, and Taylor (1951) and Middleton (1959) in south Devon.

The recent work of Birenheide (1961) placing Grypophyllum as a subgenus of Acanthophyllum is indicative of the close relationship between the acanthophyllids and grypophyllids. Furthermore, Ptenophyllum (Ptenophyllum), Ptenophyllum (Astrophyllum) and Ptenophyllum (Rhapalophyllum), Leptoinophyllum and Stenophyllum (parium) are considered as synonyms of Acanthophyllum, and Neostrangophyllum as a subgenus, like Grypophyllum. According to the Wedekind zonal scheme, acanthophyllids (sensu stricto) are restricted to the lower Middle Devonian (Digonophyllum Zone to Dohrnophyllum Zone inclusive); Leptoinophyllum is abundant in the Leptoinophyllum Zone and the grypophyllids are abundant in the Stenophyllum and Sparganophyllum Zones of the middle Middle Devonian; and Neostrangophyllum occurs in the Dialyophyllum Zone of the upper Middle Devonian. All the cited forms are closely related and are now included in the one genus, Acanthophyllum. Thus, the acanthophyllids (sensu lato) extend from the base of the lower Middle Devonian to the upper Middle Devonian and, accordingly, are not useful zonal indicators, except in a more general sense than that intended by Wedekind.

The digonophyllids, according to the Wedekind scheme, are restricted to the lower part of the lower Middle Devonian, whereas Kettnerová (1932) recorded three species of Digonophyllum (Digonophyllum) from the Givetian limestones of Čelčovice, in Moravia, and Digonophyllum (Digonophyllum) bilaterale is present in the Upper Givetian Roadwater Limestone in the Brendon Hills. Middleton (1959, p. 140) suggested that digonophyllids may be found even as high as the upper Middle Devonian, and the west Somerset occurrence strongly endorses this view.

Another modification of the zonal scheme seems necessary, as the keriophyllids were regarded as restricted to the lower Middle Devonian. There is much difference of opinion on the interpretation of the genera Heliophyllum and Keriophyllum. Wedekind (1923) and Haller (1935) have not recognized Heliophyllum for their German forms; Stumm (1949, p. 21) regarded Keriophyllum as congeneric with Heliophyllum; Hill (in Moore 1956, p. F278) recognized both Heliophyllum and Keriophyllum, the chief difference between them being the yard-arm carinæ of the former, and the zigzag carinæ of the latter; and Middleton (1959, p. 155) regarded Keriophyllum as a subgenus of Heliophyllum. Birenheide (1962) has indicated that most of Wedekind's and Haller's species of Keriophyllum should be assigned to Cyathophyllum (Cyathophyllum) Goldfuss and Cyathophyllum (Peripadium) Ehrenberg, and only 'K' dahlemense Haller should be assigned to the genus Heliophyllum. The validity of the Keriophyllum Zone thus becomes open to question, unless Heliophyllum dahlemense, which characterizes the Dahlemner Keriophyllum Zone, is excluded. The range of Heliophyllum in Europe appears
to be at least from the lower Middle Devonian (as indicated by *H. dahlense* in the Eifel) to upper Middle Devonian (as suggested by *H. halli* in the Brendon Hills).

Wedekind (1925, 1934) indicated that lythyphyllids are abundant in the middle Middle Devonian and absent from the upper Middle Devonian. An exception to this is seen in the presence of *Cystiphyllum secundum* (= *Lythyphyllum septatum* Wedekind and *L. corneohum* Wedekind and Vollbrecht) in the upper Middle Devonian Rodhuish and Roadwater Limestones of west Somerset.

The Wedekind zonal scheme must be modified to accommodate all the exceptions before it can become an effective tool in European Middle Devonian stratigraphical studies, or else its use must be restricted to Germany. The zonal scheme could not be applied to rugose corals in limestones of the Brendon Hills. Instead, age determination of the limestones has been founded on complete faunal analysis of the rugose and tabulate corals.

**SYSTEMATIC DESCRIPTIONS**

Numbers of specimens catalogued in the Geology Department Collection, Bristol University, are prefixed BU; those from the British Museum (Natural History) by BM; and those from the Geological Survey Museum by GSM.

**Phylum COELENTERATA**

**Order RUGOSA**

**Suborder STREPTELASMATINA** Wedekind 1927

**Superfamily ZAPHRENTICAE** Milne-Edwards and Haime 1850

**Family STREPTELASMATIDAE** Nicholson, in Nicholson and Lydekker 1889

**Genus HETEROPHRENTIS** Billings 1875

*Type species.* *H. spatiosa* Billings 1875.

**Diagnosis.** Solitary, large, ceratoïd to trochoïd; cardinal fossula on convex side; septal stereozone narrow; major septa with very sparse axial lobes, slightly withdrawn from the axis; tabulae complete or incomplete, flat-topped to axially depressed domes, depressed at the fossula.

**Heterophrentis percevali** sp. nov.

Text-fig. 2a-f

**Diagnosis.** *Heterophrentis* with major septa extending two-thirds the distance to the axis, minor septa usually short and contratingent; 38–44 major septa in the ephieic stage; cardinal fossula commonly indistinct.

**Description.** Simple trochoïd to ceratoïd coral, slightly curved, attaining a length of 14 cm., and a diameter of 35 mm. Calice moderately deep, more than 10 mm., with fairly steeply inclined sides. Wall less than 1 mm. thick. Major septa long and thin, apart from peripheral dilatation, extending to two-thirds the distance from periphery to axis, or slightly more, in the ephieic stage; number—38 to 44 in sections of between 22 and 28 mm. average diameter. Minor septa short, about one-fifth the length of the major, and often contratingent. Cardinal fossula clearly observed in two specimens (paratypes
BU 18092 and 18224); in others it is indistinct. Tabulae make up a series of complete and incomplete floors, flat or gently sagging in the axial region, arched in the periaxial region, and sloping downwards towards the periphery. A longitudinal section at right angles to the cardinal fossula shows the tabulae bent downwards across it. No dissepiments.

TEXT-FIG. 2. Heterophrentis percevali sp. nov. a, Holotype, BU 18090, longitudinal section. b, c, Paratype, BU 18091, transverse sections at different levels, 17 mm. apart. d, Paratype, BU 18224, transverse section showing cardinal fossula. e, Paratype, BU 18224, longitudinal section. f, Paratype, BU 18092, longitudinal section in the periaxial region showing tabulae bent downwards across the cardinal fossula. All the figured specimens are from the Roadwater Limestone, a-e from Sandhill Farm and f from between Wheeldon Cross and Ladewell Bridge. All enlargements \( \times 45 \).

Remarks. Champernowne (1884) described a number of Devonian corals from south Devon, several of which clearly belong to the Streptelasmatidae. He assigned two specimens to Zaphrentis sp., one of which (plate 23, fig. 1a-b; BM R23461) is similar to Heterophrentis percevali, but differs in having thicker major septa, while the other (plate 21, fig. 7), a specimen which cannot be traced, is smaller and has fewer major septa. Another specimen (GSM 75731) from Woolborough, south Devon, is also similar,
and may be conspecific. It has an average diameter of 30 mm., long major septa, numbering 44, and short minor septa, differing only in the possession of a thicker wall, slightly more than 1 mm. in thickness.

Le Maitre (1934, p. 146) described *Streptelasma armoricanum* from the Lower-Middle Devonian strata of the Ancenis Basin, France, which may be a species of *Heterophrentis*. From her description and figures (plate 5, figs. 1, 2—the latter being orientated upside down), it is apparent that there are a number of similarities to the west Somerset specimens. The simple corals are of large dimensions, with a diameter of 17 to 30 mm., and carry a thick wall of stromatoporite from 1 to 5 mm. in thickness. The major septa are stated to number 44 to 50 in the sections studied, but only 37 major septa are visible in the specimen figured in transverse section. Dissepiments are stated to occur between major septa, although they are lacking in the figured longitudinal section. The traces giving the appearance of dissepiments in the transverse section are probably intercepted portions of the downward turned tabulae in the perialaxial region. No well-defined fossula is apparent. The main differences between *Streptelasma armoricanum* and *H. percevalii*, based on Le Maitre's description, are the thicker wall, the greater number of major septa (44–50), and the presence of dissepiments in the former.

In comparison with North American species of *Heterophrentis*, *H. percevalii* bears the closest resemblance to *H. ferromensis* Stumm (1962, p. 235, pl. 1, figs. 1–7; pl. 2, figs. 1–6). The main differences are that in most specimens of *H. percevalii* the cardinal fossula is indistinct, there are fewer major and minor septa, the walls are uniformly thin and, at least in one specimen (BU 18224), the coral attains a much greater length. Greater differences are exhibited by other North American species, such as those described by Stewart (1938). The range of the North American forms is from Lower to Middle Devonian, being most common in horizons of the lower Middle Devonian.

*Derivation of name*. In honour of S. G. Percival, for his thorough collecting and for his invaluable faunal list (1866, p. 185) from the coralliferous limestone at Sandhill Farm, Withycombe.


*Occurrence*. Present in the Roadwater Limestone north of Rodhuish, and between Wheddon Cross and Luckwell Bridge, west Somerset. It may also occur in south Devon.

**Family PHILLIPASTRAEIDAE** C. F. Roemer 1883

**Genus THAMNOPHYLLUM** Penecke 1894

*Type species*. *T. stachiei* Penecke 1894.

*Diagnosis*. Dendroid or phaceloid, coralsites united by dissepimental tissue at axis of branches; septa withdrawn from axis and dilated in dissepimentarium; dissepiments consisting of an outer row of flat plates and an inner row of horse-shoe plates, often replaced by stereoscopic thickening; tabulae complete or incomplete, flat or slightly bowed.

**Thamnophyllum caespitosum** (Goldfuss)

Text-fig. 3a–d

1826 *Lithodendron caespitosum* Goldfuss, p. 44, pl. 13, fig. 4.
1935 *Disphylium* (*Phacelophyllum*) *caespitosum* Lang and Smith, p. 573, pl. 35, figs. 1, 2; text-figs. 28, 29.
Description. Coralum is large, compound, and typically phaceloid. Corallites cylindrical, frequently showing lateral branching, occasionally with two or three branches arising from one level. Diameter of corallites varies from 4 to 13 mm., the average being close to 6 mm. Occasionally the coralum is sub-dendroid, with corallite-diameters greater than the average for the species, and large sediment-filled spaces between the corallites. Lateral buds develop at right angles to the mother corallite, and show little tendency to curve upwards into a similar alignment to that of the mother corallite (text-fig. 3a). Dissepimental tissue between the mother and daughter corallites (plocoid structure of Lang and Smith 1935) is reduced or absent. Most commonly the coralum is phaceloid, with corallite-diameters about the average for the species, and narrow sediment-filled spaces between corallites. Lateral buds curve sharply almost into parallelism with the mother corallite, and at the point of division are united by dissepimental tissue (text-fig. 3b, c). Occasionally the corallites are more tightly packed, and there are only thin sediment-filled spaces between corallites. The corallite-diameters are about, or less than, the average for the species. Lateral buds curve even more sharply into line with the mother corallite, and they are united by dissepimental tissue for upwards of 25 mm. from the point of curvature (text-fig. 3d). The extreme of close packing is seen in a few cerioid to sub-cerioid forms (BU 10088, 18226; BM R16167). It is not yet clear whether these forms are linked throughout growth, or merely represent a level at which a large number of daughter corallites develop. In different specimens the number of major septa varies from 14 to 24, but is usually 18 to 19. Major septa usually extend inwards to 1 mm. from the axis, and they are attenuated within the tabularium. Minor septa are about half the length of the major. Both major and minor septa are dilated in the dissepimentarium, which includes an outer row of flat dissepiments, and an inner row of horseshoe dissepiments. Sometimes the inner and outer rows are not continuous along the length of the corallite, and appear to be replaced by stereoplasmic thickening. Tabularium occupies about half the diameter of the corallite. Two types of tabulae are present, inner flat or slightly domed tabulae, and outer smaller, axially inclined, arched tabulae on the margin of the tabularium.

Remarks. This species was formerly the type species of Phacelophyllum, but it has been assigned to Thamnophyllum by Schouppé (1949) and Różkowska (1956, 1957). They studied the variability of the amount of stereoplasmic thickening in different species of Thamnophyllum, and considered that T. caespitosum fell within this range of variability. The main differences from the type species, T. stachei Penecke (Lang and Smith 1935, p. 581), are the longer major septa, the lesser stereoplasmic thickening, and the different mode of budding, characters which cannot be regarded as diagnostic of a different genus. Therefore, Phacelophyllum should be regarded as a synonym of Thamnophyllum.
Occurrence. Widespread and common in the Middle and lower Upper Devonian of Europe. It is present in the Ilfracombe Beds of north Devon and west Somerset, and in south Devon. In the Brendon Hills it is common in both Rodnuih and Roadwater Limestones.

Suborder COLUMNARINA Rominger 1876
Family Ptenophyllidae Wedekind 1923
Genus Acanthophyllum Dybowski 1873

Type species. Cyathophyllum heterophyllum Milne-Edwards and Haime.

Diagnosis. See Birenheide (1961, p. 81).
Subgenus *Neostringophyllum* Wedekind 1922

*Type species.* *Neostringophyllum ultimum* Wedekind 1922.

*Diagnosis.* See Birenheide (1961, p. 124).

**Text-fig. 4. Acanthophyllum (Neostringophyllum) concavum (Walther),** *a*, BM R16533, transverse section, Roadwater Limestone at Sandhill Farm. *b*, BU 18222, transverse section, limestones of the Ilfracombe Beds at Lower Aisholt, Quantock Hills. *c*, BU 18223, longitudinal section, locality as for *b*. All enlargements × 1-5.

*Acanthophyllum (Neostringophyllum) concavum* (Walther)

Text-fig. 4a–c

1886 *Endophyllum acaelicaeum* Forch. p. 87, pl. 6, fig. 1 only.
1922 *Cystathophyllum heterophyllum* Paechtrmann, p. 68.
1925 *Neostringophyllum* sp. Wedekind, pl. 11, figs. 66–69; non pl. 16, figs. 93, 94.
1928 *Neostringophyllum concavum* Walther, p. 114, text-fig. 8.
1928 *Neostringophyllum simplex* Walther, p. 113, text-fig. 7.
1928 *Neostringophyllum planum* Walther, p. 113, text-fig. 6.
1932 *Sparagmophyllum delicatissimum* Kettnerová, p. 45, text-figs. 28, 29.
1961 *Acanthophyllum (Neostringophyllum) concavum* Birenheide, p. 125, pl. 7, figs. 23, 24.

*Description.* Large solitary coral, subcylindrical. Epithea thin. Greatest length observed is 9 cm., and the average diameter 35 mm., though one specimen (BM R16533) reaches a diameter of 45 mm. Between 68 and 74 septa, consisting of alternate major and minor. Major septa extend to the axis and have slightly twisted and swollen ends; they attenuate near the periphery, dilate across the inner part of the dissepimentarium, become slightly less dilated in the outer part of the tabularium, and then swell at their axial ends. Minor
septa are thinner and extend to about two-thirds of the length of the major. Tabularium occupies one-third of the diameter of the coral. In longitudinal section the dissepsimentarium and tabularium are quite distinct. Herringbone and lateral dissepsiments occur in the outer part of the dissepsimentarium, but mostly the former type, while dissepsiments of normal type occupy the inner part of the dissepsimentarium. Dissepsiments small, globose, inclined at a moderate angle to the periphery, though becoming steeply inclined towards the tabularium, and also slightly more elongated. Floor of tabularium gently concave with numerous closely spaced, flat, gently concave or gently convex tabellae; an average of about three tabellae to the millimetre.

Remarks. The specimens from Sandhill Farm, Withycombe, and Lower Aisholt, Quantock Hills, agree closely with the description of Acanthophyllum (Neostringophyllum) concavum given by Birenheide (1961, p. 125). Neostringophyllum planum Walther (1928, p. 113) is also considered synonymous with A. (X.) concavum, only differing in a smaller diameter (20–22 mm.) from the west Somerset specimens.

Occurrence. Acanthophyllum (Neostringophyllum) concavum has its type-locality in the Upper Givetian Schwelmer Kalk of the Bergisches Land, and it also occurs in the Junkerberg Schichten, Flieringer Schichten, and Dreimühlen Schichten of the Upper Eifelian and Lower Givetian in the Eifel (Birenheide 1961). It is also found in the Upper Givetian Čelchovice limestones of Moravia (Ketternova 1932, p. 45). In west Somerset four specimens have been collected from Sandhill Farm, Withycombe, from the Roadwater Limestone (BM R16533, R16196, R16218; GSM 75710), and two specimens from limestones at Lower Aisholt, Quantock Hills (BU 18222–3).

Suborder CYSTHYLLINA Nicholson, in Nicholson and Lydekker 1889
Family DIGONOPHYLLIDAE Wedekind 1923
Genus MESOPHYLLUM Schlüter 1889

Type species, Cystophyllum vesiculosum Goldfuss 1826.


Subgenus ARCOPHYLLUM Markov 1926

Type species, A. typus Markov 1926.


Mesophyllum (Arcophyllum) sandillense sp. nov.

Text-fig. 5a, b

Diagnosis. Large Mesophyllum (Arcophyllum) with a bell-shaped calice; tabularium occupies one-third, or slightly more, of the diameter. Septa withdrawn from the axis and periphery, and mainly restricted to the inner part of the dissepsimentarium; minor septa short or absent; approximately fifty major septa. Tabellae large. Carinae developed but not obvious in transverse section.

Description. Coralium is large, single, and subcylindrical; paratype 7 cm. long, and
expands in this length from 36 to 45 mm. Calice is bell-shaped, 15 to 18 mm. deep. Holotype is oval in transverse section, 45 mm. minimum diameter, 70 mm. maximum diameter (an average of 57 mm.). The outer surface is seen in a small part of the paratype where there are vague annulations. Major septa estimated at about fifty, variable in length; some extend almost across the dissepimentarium, others short and restricted to the middle or inner part of the dissepimentarium. Minor septa irregular in distribution; they may alternate between major septa or may be absent. There is a narrow peripheral zone of lonsdaleoid dissepiments. Tabularium occupies one-third, or slightly more, of

![Text-fig. 5, Mesophyllum (Arcophyllum) sandhillense sp. nov. a, Holotype, BM R.16085, transverse section. b, Paratype, BM R.16087, longitudinal section of the upper part of the corallum. The type specimens are from the Roadwater Limestone at Sandhill Farm. Both enlargements ×1:25.](image)

the diameter. In longitudinal section of the paratype, the dissepimentarium is seen to vary in width; in the lower part the tabularium is markedly asymmetrical, being situated to one side, and the dissepimentarium is broad on one side and virtually absent from the other; towards the middle of the corallum there is still a pronounced asymmetry, but a narrow band of dissepimental tissue has appeared opposite the broad zone; and in the upper part this dissepimental band broadens until it is approximately the same width on both sides of the tabularium (text-fig. 5b). The tabularium remains about the same width throughout the length of the corallum, 15 to 18 mm. diameter. Dissepiments, as seen in longitudinal section, are variable in size, somewhat globose, steeply inclined near the inner margin, gradually flattening out towards the periphery. Carinae prominent, steeply inclined to the periphery, more or less straight, sometimes bifurcating. Tabellae large, mostly gently convex, forming a series of concave floors.
Remarks. The type species of Arcophyllum, *A. typus* Markov, from the Middle Devonian of the Urals, resembles *Metophyllum* (*Arcophyllum*) sandhillense, differing mainly in being much smaller, in having a narrower tabularium and fewer septa (Markov 1926, p. 54, pl. 3, figs. 3, 5, 7; Soshkina 1949, p. 60, pl. 16, fig. 2; pl. 18-21; pl. 23, fig. 3). *A. septatum* Bulvankter is also similar, but differs in having longer major septa, extending from the middle of the dissepimentarium to well within the tabularium (Bulvanker 1958, p. 63, pl. 25, fig. 2; pl. 26, fig. 1; pl. 27, fig. 1), and *A. markovi* Bulvankter differs in having a broad, flaring form and a funnel-shaped calice (Jakovlev 1947, p. 54, pl. 5, fig. 2). The German species *A. dachsbergi* (Vollbrecht) differs in having a much greater development of peripheral carinae, more complete septa, and smaller tabellae (Wedekind and Vollbrecht 1931, pl. 41, figs. 1, 4; pl. 42, figs. 1-6; pl. 44, fig. 9a), and *Hemicosmophyllum limbatum* Wedekind and Vollbrecht is similar, but the septa are fewer, the major septa are slightly longer, extending closer towards the axis, and the minor septa are absent or represented by a few septal crests (Wedekind and Vollbrecht 1931, pl. 45, figs. 6-12; 1932, pl. 12, figs. 1-8). The differences between *Arcophyllum* and *Hemicosmophyllum* are slight, and the only distinction is the somewhat greater continuity of minor septa in *Arcophyllum*. Hill (in Moore 1956) regarded *Hemicosmophyllum* as a subgenus of *Metophyllum*, but it is desirable to regard it as a synonym of *Arcophyllum*, as there does not appear to be any fundamental difference between the two forms.

Holotype. BM R16085-6. Paratype. BM R16087.

Occurrence. Two specimens from the Roadwater Limestone at Sandhill Farm, Withymcombe.

**Order Tabulata**

**Family Favositidae Dana 1846**

**Subfamily Pachyposinae Gérard 1921**

**Genus Thamnopora Steininger 1831**

Type species. *T. madreporensis* Steininger 1831.

Diagnosis. See Lecompte (1939, p. 102).

**Thamnopora polyforata** (Schlotheim)

Text-fig. 6a, b

1820 Milieusites polyforatus Schlotheim, p. 365, partim.
1829 Calamopora polymorpha var. gracilis, runulis gracilibus, elongatis Goldfuss, p. 79, pl. 27, fig. 5.
1936 Favositites dubius Lecompte, p. 54, pl. 10, fig. 1 (cwm syn.).
1939 Thamnopora dubia Lecompte, p. 120, pl. 18, figs. 7-12.
1945 Thamnopora polyforata Smith, p. 63, pl. 28, figs. 1, 2 (cwm syn.).
1953 Thamnopora didata Kroppfisch and Schouppé, p. 95, pl. figs. 2, 3 (cwm syn.).
? 1954 Thamnopora cf. polyforata Hill, p. 31, pl. 1, figs. 7-9.

Description. Small ramous corallum with branches 5 to 7 mm. diameter. Corallites usually subcircular in transverse section, expanding markedly and curving outwards.
from the axis to reach the surface obliquely. The walls only slightly thickened towards the axis, but distally the thickening increases considerably. Calices are alveolitoid with projecting lip, usually 1 to 1.5 mm. diameter. Tabulae few and irregularly spaced. Mural pores indistinct in the specimens studied. Septal spines not seen.

Remarks. The specimens differ from Lecompte’s diagnosis of the species (1939, p. 121) in only one respect, viz., in the absence of septal spines. They may be absent owing to the recrystallization and destruction of the elements, or they may not have developed in the specimens examined. Septal spines have not been recognized in the species by Smith (1945, p. 64), who noted that *T. polyforata*, while resembling species of *Striatopora*, is distinguished from these by the absence of septal spines.

Kropfitsch and Schouppé (1953, p. 95) excluded *Thamnopora dubia* (de Blainville) from *T. polyforata* (Schlotheim) as described by Smith (1945), because of differences in the fibrous structure of the corallite walls, and the branch diameters. Smith stated that

under ‘magnification the walls show fibrous structure, and fibres running at right angles to the wall, and also, although much less distinctly, a laminar structure parallel to the walls’ (p. 64). Because of this laminar structure parallel to the walls, Kropfitsch and Schouppé (1953, p. 96) considered that Smith’s *T. polyforata* should be included in the genus or subgenus *Pachypora* Lindstrom. This proposal is unsatisfactory for, while the type species of *Pachypora* has laminae parallel to the walls, it has no prominent fibrous structure at right angles to the wall as described in *T. polyforata* by Smith (see Lecompte 1936, p. 27, pls. 4, 5, for excellent figures of the type-species *P. lanelllicornis* Lindstrom). Furthermore, Smith indicated that ‘Schlotheim’s type... which consists of a single branch is in a somewhat better state of preservation than Goldfuss’s, which comprises several branches’. Differences in the state of preservation may, indeed, account for the presence of the faint laminar structure parallel to the wall in Schlotheim’s material and the absence of the same structure in Goldfuss’s specimen. Lecompte (1936, p. 57), in his study of the Goldfuss material, indicated a branch diameter not exceeding 6 mm., and later (1939, p. 121), in his diagnosis of *T. dubia*, ‘Polypier branchu à rameaux délicats de 6 à 8 mm. de diamètre’. Kropfitsch and Schouppé have preferred the earlier interpretation of Lecompte, considering that the branch diameter is 6 mm., whereas Smith has indicated that the branches are typically about 7.5 mm. in diameter, in agreement with Lecompte’s later viewpoint. Smith’s inclusion of ‘Favosites dubia’ Edwards and Haime 1851 in his synonymy of *T. polyforata*, a species which was made a synonym of *T. bolomensi* by Lecompte (1939), is rightly questioned by Kropfitsch and Schouppé for separating *T. polyforata* and *T. dubia*, and they should be regarded as synonyms.
Occurrence. T. polyforata has been recorded from many localities in Europe, chiefly in Belgium and Germany, and a closely comparable form is reported from Australia. The species occurs in the Upper Givetian and Frasnian of the Dinant Basin (Lecompte 1939), in the Middle Devonian of Germany and Austria (Kropfiisch and Schouppé 1953), and the Givetian or Frasnian of Western Australia (Hill 1954).

**Phylum BRACHIOPODA (ARTICULATA)**
**Superfamily SPIRIFERACEA Waagen 1883**
**Family SPIRIFERIDAE King 1846**
**Subfamily SPIRIFERINAE Schuchert 1913**
**Genus SPINOCYRTIA Fredericks 1916**

Type species. _Delthyris grandiosa_ Conrad 1839.

Diagnosis. See Cooper (in Shimer and Shrock 1944, p. 323).

**Spinocyrtia ascendens** (Spiestersbach)

Plate 1, figs. 1–7

1842 _Spirifer medioteutsch_ Archiac and Verneuil, p. 370, pl. 35, figs. 9, 9a–c.
1871 _Spirifer medioteutsch_ var. Kayser, p. 573, pl. 11, fig. 1.
1900 _Spirifer medioteutsch_ Scupin, p. 21, pl. 2, figs. 4–6.
1935 _Spirifer ascendens_ Spiestersbach, p. 498, pl. 45, figs. 1, 2.
1942 _Spirifer (Spinocyrtia) ascendens_ Paeckelmann, p. 16, text-fig. 14; pl. 1, fig. 4.
1950 _Hysterolites medioteutsch_ Termier and Termier, p. 77, pl. 107, figs. 21–23; pl. 108, fig. 4; pl. 109, figs. 1, 2.
1959 _Spinocyrtia ascendens_ Vandercammen, p. 29.

Description. Shell medium to large, unequally biconvex, spiriferoid, apsacine; cardinal extremities rounded; hinge-line straight, greatest width a little anterior to the hinge-line. Surface of shell lateral to fold and sinus with 13 to 18 costae (observations from 10 specimens); each costa high and rounded in the umbonal region, gradually becoming low, gently convex, and wider towards the anterior margin; furrows between costae rounded, deep and narrow in the umbonal region, becoming gently concave and wider near the anterior margin. Growth-lines of two types; prominent widely spaced, and numerous fine, closely spaced types, which are crossed by fine radiating microfila; tear-granules appear to be situated at the intersections of microfila and growth-lines.

Pedicle valve convex. Sinus broad, shallow, subangular; median depression marked near beak. Lateral slopes curved. Beak prominent and incurved. Area high, slightly concave, with fine transverse and longitudinal striations. Delthyrium open, a little higher than wide. Internal features unknown, except for the long divergent dental plates.

Brachial valve less convex than pedicle. Fold prominent, broad, low, not greatly elevated above level of the costa; faint median groove towards the beak. Lateral slopes gently convex. Umbonal region elevated only slightly above hinge-line. Beak inconspicuous. Area narrow; notothyrium wide; cardinal process low; dental sockets widely divergent, groove-like, as seen in one specimen.
Dimensions. Measurements were made from 19 reasonably complete specimens, 11 of the brachial valve, 8 of the pedicle valve. The following are the average measurements in mm. (the number of measurements made is given in brackets with each average value):

- Length around margin of pedicle valve: 290 (5)
- Height of brachial valve: 218 (10)
- Height of area in pedicle valve: 125 (7)
- Thickness of pedicle valve: 110 (3)
- Thickness of brachial valve: 59 (10)
- Maximum width: 317 (13)
- Hinge width: 295 (16)
- Angle of sinus: 29 (3)
- Angle of fold: 26 (9)

Remarks. A comprehensive description of the type species Spinocyrtia granulosa (Conrad) and related species from North America by Ehlers and Wright (1955) allows a much closer comparison between American and European forms than was hitherto possible. One of the diagnostic features of the genus is the presence of tiny tear-shaped granules, which many of the European forms ascribed to this genus seem to lack, or they have not been observed. Perhaps the poor state of preservation in many of the European forms explains the frequent absence of the micro-ornament. Late impressions of an empty mould of Spinocyrtia ascendens from west Somerset produced indubitable tear-shaped granules.

In a redescription of Spinocyrtia mediotexta (Archiac and Verneuil), Vandercammen (1959) considered the differences between the related forms, S. subcerepitoidea (Schnur) from the Upper Emsian, S. eevelensis (R. E. Richter) from the Cretaceous, S. ascendens (Spiettesberg), S. ascendens var. plicatula Paeckelmann, and S. mediotexta from the Givetian. According to Vandercammen, the differences between these forms are slight: S. mediotexta can be distinguished in having a slightly concave fold, and 21 to 29 costae per flank, although the specimens of mediotexta from Gerolstein have only 15 to 18 per flank; S. ascendens can be separated from its variety plicatula, which has a marked

EXPLANATION OF PLATE I

All figured specimens are from the Oaktree Sandstone at Oaktree quarries (National Grid Ref. 881939402).

Figs. 1-7. Spinocyrtia ascendens (Spiettesberg). 1, BU 18126, ×1.5, ventral view of internal mould of pedicle valve showing sinus, costae on the lateral slopes, and long divergent dental plates. 2, BU 18126, ×1.5, lateral view of internal mould of pedicle valve showing strong convexity of valve and the high, slightly concave area. 3, BU 18126, ×1.5, posterior view showing internal mould of area in the pedicle valve. 4, BU 18128, ×1.5, internal mould of brachial valve exhibiting fold and costae on the lateral slopes. 5, BU 18130, ×1.5, internal mould of the brachial valve of a small specimen. 6, BU 18127, ×1.7, detail of latex impression of external mould of the brachial valve showing a portion of the fold with micro-ornament of tear-granules which appear at the intersection between fine radiating microtubules and growth-lines. 7, BU 18129, ×2, latex impression of external mould of the are of pedicle valve showing fine transverse and longitudinal striations.

Figs. 8-13. Thomasia gibbosa Vandercammen. 8, BU 18133, ×3, ventral view of internal mould of pedicle valve showing weakly developed sinus and short divergent dental plates. 9, BU 18132, ×3, dorsal view of internal mould of brachial valve. 10, BU 18132, ×3, latex impression of external mould of brachial valve showing faint concentric growth-lines. 11, BU 18132, ×3, lateral view of internal mould of both valves. 12, BU 18134, ×3, ventral view of internal mould of pedicle valve. 13, BU 18133, ×3, ventral view of internal mould of pedicle valve of a large specimen showing projecting tongue-like anterior margin.
median depression from the beak to the anterior margin on the fold; and only small
differences separate *S. subcuspida*, *S. geesensis*, and *S. ascendens*—12 to 14 costae per
flank in *S. subcuspida*, ± 13 in *S. geesensis*, and 13 to 18 in *S. ascendens*.

Occurrence. This species is present in the Givetian of both the Eifel and the Bergisches
Land, Germany. In west Somerset it is fairly common in the Harwood Beds and the
Oaktown Sandstone of the Avill Group. Some of the Belgian specimens formerly identi-
fied as *Spirifer mediotestus* probably belong to this species. A similar form is reported
from Morocco.

Subfamily AMBOCOELINAE George 1931
Genus THOMASARIA Stainbrook 1945

Type species. *T. altunbasa* Stainbrook 1945.

Diagnosis. See Vandercammen (1956, p. 19).

*Thomasaria gibbosa* VanderCammen

Plate 1, figs. 8–13

1956 *Thomasaria gibbosa* VanderCammen, p. 19, text-figs. 12–19; pl. 1, figs. 28–44.

Description. Shell small, unequally biconvex, subcircular to pentagonal in outline;
cardinal extremities rounded; wider than long, with the greatest width anterior to the
hinge-line; area small, elevated and curved; costae. Some specimens exhibit a weak
fold and sinus towards the anterior margin; anterior commissure uniplicate. Fine con-
centric growth-lines present at widely spaced intervals.

Pedicle valve strongly convex; sinus weak, commencing as a shallow depression away
from the beak, and widening to the anterior margin where it projects slightly as a rounded,
tongue-like projection. Area small, concave, twice as wide as high. As the specimens are
moulds, details of internal structures are lacking, except for the divergent dental plates.

Brachial valve less convex than pedicle valve. No fold observed. Umbonal region
slightly elevated; internal mould of beak short, pointed, and slightly incurved; a shallow,
narrow median groove extends across the incurved beak region. Two small, slit-like
teeth sockets seen in one specimen.

Dimensions. Measurements in mm.

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Remarks. The Oaktown specimens are moulds, and while they do not show all the
features given in the type description (VanderCammen 1956), they do exhibit all the
diagnostic characters. VanderCammen noted that *Thomasaria gibbosa* differs from *T.
paralhela* VanderCammen in having strongly divergent dental plates.
Occurrence. In Belgium, T. gibbosa occurs as a rare species in a number of localities, ranging in age from Upper Givetian throughout the Frasnian. In the Brendon Hills, it is moderately abundant in the Oaktrow Sandstone.

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REFERENCES


GOLDMESS, G. A. 1826–33. Petrofusia Germaniae I: 1–76, pl. 1–25 (1826); 77–164, pl. 26–50 (1829); 165–240, pl. 51–71 (1831); 241–52 (1833), Düsseldorf.


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