

JERZY MAŁECKI

BASES OF UPPER CRETACEOUS OCTOCORALS FROM POLAND

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Bases of octocorals, mostly epifaunal, from Cretaceous deposits of the environs of Cracow, Poland have been classified according to parataxonomic criteria. A form-genus *Octobasis* has been proposed writer for eleven forms-species of octocorals.

Key words: Octocorallia, parataxonomy, Upper Cretaceous, Poland.

Jerzy Małeckí, Akademia Górniczo-Hutnicza, Instytut Geologii i Surowców Mineralnych, Al. Mickiewicza 30, 30-059 Kraków, Poland. Received: September, 1979.

INTRODUCTION

The bases of octocorals have so far been only very rarely described in world literature. The knowledge of these fossils is mostly due to Nielsen (1913, 1917, 1918, 1925, 1937) who described the Octocorallia from the Cretaceous deposits of Denmark. The Cretaceous octocorals were also the subject dealt with by Voigt (1958) who described several Danian-Montian species from the Netherlands, Belgium, Denmark, and German Lowlands.

The bases of the Cretaceous Octocorallia most frequently overgrow various fossils such as pelecypods, belemnites and echinoids (in particular the carapaces of the *Echinocorys* and *Micraster*). Their coralla are lacking. The materials which the present writer had to his disposal come from the Lower Campanian deposits of the environs of Cracow and were collected at the localities Mydlniki, Zabierzów, Korzkiew, Michałowice, Michałowice-Zerwana, Wola Więclawska, Bibice, Witkowice, Raciborowice. The representatives of four octocoral families, the Clavulariidae, Primoidae, Isididae and Virgulariidae, together with a certain number of bases which could not be assigned to any of these families, were found among these materials. Well preserved bases of octocorals of this assemblage probably

represent various species. Due to the fact that the bases of octocorals have not hitherto been studied in detail and that they are mostly found detached from the rest of a skeleton, the determination of their generic assignment causes considerable difficulties. This is why a parataxonomic terminology has been introduced here. It is only in some cases that other parts of the skeleton are preserved together with bases which makes possible assigning them to known taxons. Due to a strongly varying structure of bases, the application of the parataxonomic terminology is by no means an easy task. Describing particular species, Nielsen (1925) and Voigt (1958) did not attach importance to frequently complex root structures. The present writer maintains the already existing names for hitherto described bases of corals and establishes new ones for those never described before.

The following names for designating octocorals are known from Nielsen's and Voigt's works:

- (1) Ribbonlike, procumbent bases assigned to *Epiphaxum auloporoides* Lonsdale.
- (2) Ramified forms resembling longitudinally striate roots which may be related with the genus *Moltkia*.
- (3) Roundish shields covered with fine, radial, slightly undulating striae assigned to the genus *Isis*.

The remaining types of bases of octocorals, presented here on diagrams and photographs, have never been described before. The generic name *Octobasis* is suggested by the present writer for such fossils, while the specific names are coined after their main morphological characters and types of their ornamentation. The writer separates eleven artificial species.

Studying the bases of octocorals attached to echinoid, we distinguish the following fourteen types:

- (1) Roundish, smooth-surface shields (fig. 1): *Octobasis glabra*.
- (2) Roundish shields divided into 6—8 lobes (fig. 2): *O. bullata*.
- (3) Roundish shields with widely spaced, radial striae (fig. 3): *Primnoa costata*.
- (4) Roundish shields with radial, dichotomously ramifying striae (fig. 4): *O. circulata*.
- (5) Roundish shields with fine, radial, closely spaced and slightly undulated striae (fig. 5): *Isis vertebralis* Hen.
- (6) Roundish shields with striae forming labyrinthine coils (fig. 6): *O. ornata*.
- (7) Smooth-surface, amebalike bases (fig. 7): *O. lobata*.
- (8) Bases in the form of a several-point, smooth-surface, star whose branches are rounded at their point (fig. 8): *O. dichotoma* (= *Moltkia*?).
- (9) Bases in the form of a several-point star with pointed branches (figs. 10 and 11): *O. spinosa*.

- (10) Variousy formed bases composed of coarse, tortuous, coiled cylinders (fig. 9): *O. nodosa*.
- (11) Bases composed of variform lobes covered with labyrinthine striae (fig. 14): *O. flabellata*.
- (12) Bases resembling longitudinally striate roots (fig. 12): *O. sulcata* (= *Moltkia?*).
- (13) Bases resembling strongly tortuous, smooth-surface roots (fig. 15): *O. flexuosa*.
- (14) Bases formed like cylinders, uniform in width, with many ramifications and longitudinally striated (fig. 13): *Epiphaxum auloporoides* Lonsdale.

DESCRIPTIONS

Family **Clavulariidae** Hinckson, 1894
 Genus *Epiphaxum* Lonsdale, 1850
Epiphaxum auloporoides Lonsdale, 1850
 (pl. 23: 7; pl. 26: 13)

1850. *Epiphaxum auloporoides* Lonsdale: 261, pl. 18: 35—37.
 1914. *Epiphaxum auloporoides* Lonsdale; Felix: 248.
 1925. *Primnoa gracilis* Nielsen: 5, figs 2, 3.
 1958. *Epiphaxum auloporoides* Lonsdale; Voigt: 9, pl. 1: 1—7; pl. 2: 7; pl. 10: 3 (here **synonymy**).
 1965. *Epiphaxum auloporoides* Lonsdale; Pugaczewska: 81, pl. 5: a—e.

Material. — Eight specimens; No. ZP 0/13.

Dimensions: base width	0.8—1.2 mm
depression diameter	0.6 mm

Description. — Bases ribbonlike, procumbent, variously ramifying and forming polygonal systems. Depressions for some axis insertions are distributed usually at uniform intervals. Surface covered with longitudinal, parallel, sometimes slightly undulating ridges.

Remarks. — This species was described by Lonsdale (1850) and, afterwards, redescribed several times under the specific names of *Epiphaxum auloporoides* and *Primnoa gracilis*. Voigt's (1958) work contains its synonymy and detailed description, together with remarks on this species.

Occurrence. — Poland: Korzkiew, Santonian. Denmark: Danian. FRG: Maastrichtian. The USSR: Turonian.

Family **Primnoidae** Gray, 1857
 Genus *Primnoa* Lamouroux, 1812
Primnoa costata Nielsen, 1913
 (pl. 23: 1 and 2)

1913. *Primnoa costata* Nielsen: 9, pl. 3: 13—26.
 1917. *Primnoa costata* Nielsen; Nielsen: 4, fig. 4.

1918. *Primnoa costata* Nielsen: Nielsen: 462, pl. 8: 1.

1958. *Primnoa ? costata* Nielsen; Voigt: 12, pl. 2: 1—6.

Material. — Eight specimens; No. ZP 0/3.

Description. — Bases roundish with radial, tortuous ribs. A large insertion of axis, the margin of which gives evidence that the axis of this species was covered with longitudinal ridges, is situated in the middle of base. Base 4—8 mm and insertion of axis about 1.2 mm in diameter.

Remarks. — Voigt (1958) expresses certain doubts concerning the generic assignment of this species and justifies them in detail. The specimen included in the present writer's collection corresponds to Nielsen's (1913) description. The fact that it is complete, that is, an axis with a base, is very important. The base is roundish, amebalike and covered with widely-spaced radial striae.

Occurrence. — Poland: Zabierzów, Campanian. Denmark: Danian.

Family *Isidiinae* Lamouroux, 1812

Genus *Isis* Linné, 1758

Isis vertebralis Hennig, 1899

(pl. 24: 6; pl. 26: 5)

1899. *Isis vertebralis* Hennig: 5, pl. 1.

1913. *Isis vertebralis* Hennig; Nielsen: 11, pl. 2: 17—21; pl. 4: 1—12.

1917. *Isis vertebralis* Hennig; Nielsen: 7, fig. 9.

Material. — Four specimens; No. ZP 0/5.

Description. — Bases large, flat, roundish, sometimes in the form of a large ellipse, with one or two insertions of axes on its surface. Surface covered with fine, radial, closely-spaced, slightly undulating striae. Shield between a few and 30 mm and insertions about 1 mm in diameter.

Occurrence. — Poland: Michałowice-Zerwana, Campanian. Denmark: *Crania*-chalk.

Family *Virgulariidae* Verrill, 1868

Genus *Graphularia* Milne-Edwards et Haime, 1850

Graphularia meijeri Voigt, 1958

(pl. 25: 4)

1958. *Graphularia meijeri* Voigt: 45, pl. 13: 1—11; fig. 7.

Material. — Two specimens; No. ZP 0/16.

Description. — Coralla of considerable size, reaching 2 mm in diameter and 10—15 cm in length. Transverse section of a corallum oval or slightly polygonal. A starlike tube, concentric growth rings and radially arranged calcite crystals are visible in transverse section. Outer surface smooth, with fine, longitudinal striae.

Remarks. — *G. meijeri* Voigt, 1958 differs from other species of the genus *Graphularia* in its large dimensions and starlike transverse section of its internal canal.

Occurrence. — Poland: Michałowice-Zerwana, Campanian. Belgium: Maastrichtian.

Genus *Octobasis* gen. n.

This name is applied to basal parts of octocorals found in deposits or, more frequently, overgrowing shells of various marine organisms. These bases usually

cannot be detached from the substrate. Their strongly varying shape and surface ornamentation probably are specific characters and serve to the present writer to determine artificial species.

Diagnosis.—Shield-like or root-like bases, variable in size and shape. Round, craterlike depressions corresponding to the insertion of the axis occur on the surface. Surface smooth or covered with ridges or striae of variable size, density and arrangement.

Octobasis glabra sp. n.

(pl. 26: 1)

Holotype: Specimen No. ZP 0/1; pl. 26: 1.

Type horizon: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *glabra* = smooth.

Material.—Six specimens.

Description.—Flat roundish shields, with a smooth surface displaying a small axial insertion situated in its middle. Dimensions of shield varying between 2 and 5 mm, insertion diameter amounts to 0.06 mm.

Octobasis bullata sp. n.

(pl. 25: 5; pl. 26: 2)

Holotype: Specimen No. ZP 0/2; pl. 25: 5.

Type horizon: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *bullatus* = nodular.

Material.—Three specimens.

Description.—Convex nodular bases composed of 6—8 lobes roundish in outline and with a large axial insertion in the middle. Base diameter 2—3 mm, insertion diameter about 1 mm.

Octobasis circulata sp. n.

(pl. 24: 5; pl. 26: 4)

Holotype: Specimen No. ZP 0/4; pl. 24: 5.

Type horizon: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *circulatus* = circular.

Material.—Thirty specimens.

Description.—Bases subcircular, flat, with a very distinct sculpture in the form of radial, dichotomously ramifying ribs. Nodes, with round axial insertions occur in the middle of bases. Bases 4—13 mm and insertions about 1 mm in diameter.

Octobasis ornata sp. n.

(pl. 24: 2 and 3; pl. 26: 6)

Holotype: Specimen No. ZP 0/6; pl. 24: 3; pl. 26: 6.

Type horizon: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *ornatus* = embellished.

Material.—Forty-three specimens.

Description.—Bases flat, irregular in shape, with small axial insertions in the middle. Coarse, radially diverging and variously bent cylinders forming a characteristic ornament cover the entire surface of the shield. The surface sculpture of this species conspicuously differs from those of other species distinguished in the present paper. Base is 2–12 mm and insertions 0.3–0.4 mm in diameter.

Octobasis lobata sp. n.

(pl. 23: 4; pl. 25: 3 and 4; pl. 26: 7)

Holotype: Specimen No. ZP 0/7; pl. 23: 4.

Type horizon: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *lobatus* = lobulate.

Material.—Eight specimens.

Description.—Bases large, flat, smooth, amebalike, lobulate, frequently with numerous axial insertions. Bases 4–36 mm, insertions about 1 mm in diameter.

Octobasis dichotoma sp. n.

(pl. 23: 3; pl. 24: 4; pl. 26: 8)

Holotype: Specimen No. ZP 0/8; pl. 24: 4.

Type horizon: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *dichotomus* = dichotomously ramifying.

Material.—Twenty-eight specimens.

Description.—Bases large, inflated, smooth, marked by long, radial, dichotomously ramifying branches having rounded ends. Bases 4–12 mm, insertions about 1 mm in diameter.

Remarks.—Somewhat similar rootlike systems are mentioned by Voigt (1958: 39) who do not assign them, however, to any definite species.

Octobasis spinosa sp. n.

(pl. 23: 5 and 6; pl. 26: 10 and 11)

Holotype: Specimen No. ZP 0/10; pl. 23: 6.

Type horizon: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *spinus* = spiny.

Material.—Sixteen specimens.

Description.—Bases nodular, with radially arranged, sharp spines. Bases attached to flat surfaces are very irregular, while those fused to the sides of echinoids have spines varying in length. Spines usually single, rarely ramifying. Spines pointing downward are long, the rest of them short and rather irregularly developed. Bases from a few to 15 mm, axial insertions 1.2 mm in diameter.

Octobasis nodosa sp. n.

(pl. 25: 1 and 2; pl. 26: 9)

Holotype: Specimen No. ZP 0/9; pl. 25: 1.*Type horizon*: Campanian.*Type locality*: Michałowice-Zerwana.*Derivation of the name*: Lat. *nodosus* = nodular.*Material*. — Twelve specimens.

Description. — Bases very characteristic, composed of thick coils of tortuous roots, covered with fine striae. Depressions occur between coils. In the case when a base of this species is extended over a flat surface, its stretched parts are symmetrically arranged around the axial insertion. When the bases are fused with the lateral walls of echinoids, they extend asymmetrically (pls 3 and 4). The diameter of a base reaches 3 cm and that of axial insertions — about 3 mm.

Octobasis flabellata sp. n.

(pl. 25: 8; pl. 26: 14)

Holotype: Specimen No. ZP 0/14; pl. 25: 8.*Type horizon*: Campanian.*Type locality*: Michałowice-Zerwana.*Derivation of the name*: Lat. *flabellus* = a fan.*Material*. — Twelve specimens.

Description. — Bases small, flat, composed usually of two laterally stretched fanlike lobes. Lobes consist of radial roots, which are tortuous in their initial sectors. Length of base: 8—12 mm, width of base: 2.5—4 mm, diameter of axial insertion: 0.4 mm.

Octobasis sulcata sp. n.

(pl. 25: 6; pl. 26: 12)

Holotype: No. ZP 0/12; pl. 25: 6.*Type horizon*: Campanian.*Type locality*: Michałowice-Zerwana.*Derivation of the name*: lat. *sulcus* = a sulcus.*Material*. — Eighteen specimens.

Description. — Bases rootlike, very variable in shape, with longitudinally running sulci. Sulci relatively deep, with sharp edges occurring between them. One or, sometimes, several axial insertions occur in the middle part. The length of ramified branches varies from a few to 15 mm. Axial insertions are 0.5 mm in diameter.

Remarks. — Somewhat similar rootlike systems were referred by Voigt (1958: 39) to the genus *Moltkia* Steenstr. This author has not, however, determined the specific characters of forms assigned to the genus *Moltkia*.

Octobasis flexuosa sp. n.

(pl. 24: 1; pl. 26: 15)

Holotype: Specimen No. ZP 0/15; pl. 24: 1.*Type horizon*: Campanian.

Type locality: Michałowice-Zerwana.

Derivation of the name: Lat. *flexuosus* = tortuous.

Material. — Six specimens.

Description. — Bases rootlike, with pointed ramifications. Surface smooth, with fine, longitudinal sulci. In some cases, even a dozen or so axial insertions may occur on the bases. Dimensions: length of bases: 12—28 mm, width of bases: 1—2.5 mm, diameter of axial insertions: 0.7 mm.

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JERZY MAŁECKI

BAZALNE CZĘŚCI GÓRNOKREDOWYCH OCTOCORALLIA Z POLSKI

Streszczenie

Podstawy koralii ośmiopromiennych opisywane były bardzo rzadko w literaturze światowej. Poznanie tych skamieniałości, pochodzących z kredy, zawdzięczamy głównie Nielsenowi (1913, 1917, 1919, 1925, 1937) i Voigtowi (1958).

Podstawy kredowych Octocorallia znajdujemy na różnych skamieniałościach: małżach, belemnitach, jeżowcach (zwłaszcza na pancerzach *Echinocorys* i *Micraster*); zwykle są one zachowane bez corallum. Materiały, którymi dysponował autor, pochodzą z osadów dolnego kampanu okolic Krakowa. W materiałach tych stwierdzono przedstawicieli czterech rodzin: Clavulariidae, Primnoidae, Isididae i Virgulariidae oraz szereg podstaw, których nie można było zaliczyć do żadnej ze znanych rodzin. Dobrze zachowane podstawy koralu ośmiopromiennych tego zbioru należą zapewne do różnych gatunków. Ze względu na fakt, iż podstawy Octocorallia nie były dotąd szczegółowo badane, a znajdowane są przeważnie jako jedyne części szkieletu, określenie ich przynależności rodzajowej natrafia na duże trudności. Autor wprowadza terminologię parataksonomiczną dla tych skamieniałości. Tylko w niektórych wypadkach wraz z podstawami zachowują się również dalsze części szkieletu, które umożliwiają zaliczenie ich do znanych taksonów. Ze względu na bardzo zmienną budowę podstaw stosowanie klasyfikacji parataksonomicznej nie jest łatwe. W wyżej wymienionych pracach Nielsena i Voigta autorzy opisując poszczególne gatunki nie przywiązywali większej wagi do bardzo nieraz skomplikowanych struktur korzeniowych. Autor opisując te struktury zachowuje dla opisanych podstaw koralu istniejące nazwy, a dla nie opisanych urabia nowe.

Z prac Nielsena i Voigta znane są następujące nazwy na określenie koralu ośmiopromiennych:

1. Płożące się, wstążkowate podstawy zaliczone do *Epiphazum auloporoides* Lonsdale.
2. Rozgałęzione utwory przypominające korzenie podłużnie prążkowane odnoszące się do rodzaju *Moltkia*.
3. Okrągławe tarczki pokryte radialnymi, cieniutkimi, lekko falistymi prążkami zaliczane do rodzaju *Isis*.

Pozostałe przedstawione na schematach (pl. 26) i fotografiach (pls 23—25) typy podstaw koralu ośmiopromiennych nie były dotąd opisywane. Autor proponuje dla takich podstaw koralu ośmiopromiennych nazwę rodzajową *Octobasis*, nazwy zaś gatunkowe będą urabiane od głównych cech morfologicznych i ornamentacji tych skamieniałości. Takich sztucznych gatunków wydziela autor jedenaście.

Badając podstawy Octocorallia przyrośnięte do jeżowców stwierdzamy wśród nich 14 następujących typów (pl. 26):

1. okrągławe tarczki o gładkiej powierzchni (fig. 1): *Octobasis glabra*;
2. okrągławe tarczki podzielone na 6—8 płatów (fig. 2): *O. bullata*;
3. okrągławe tarczki z rzadkimi radialnymi prążkami (fig. 3): *Primnoa costata*;
4. okrągławe tarczki z radialnymi, dychotomicznie rozdzielającymi się prążkami (fig. 4): *O. circulata*;
5. okrągławe tarczki z radialnymi, cieniutkimi, gęstymi, lekko pofałdowanymi prążkami (fig. 5): *Isis vertebralis* Hen.;
6. okrągławe tarczki z prążkami tworzącymi labiryntowe sploty (fig. 6): *O. ornata*;
7. podstawy amebokształtne o gładkiej powierzchni (fig. 7): *O. lobata*;
8. podstawy w formie wieloramiennej gwiazdy o gładkiej powierzchni, których ramiona mają zaokrąglone zakończenia (fig. 8): *O. dichotoma* (= *Moltkia*);

9. podstawy w formie wieloramiennej gwiazdy z ostrymi zakończeniami ramion (figs 10, 11): *O. spinosa*;
10. podstawy różnorodnie wykształcone, zbudowane z grubych powyginanych wałków, tworzących sploty (fig. 9): *O. nodosa*;
11. Podstawy złożone z różnokształtnych płatów pokrytych labiryntowymi prążkami (fig. 14): *O. flabellata*;
12. podstawy przypominające korzenie z podłużnymi prążkami (fig. 12): *O. sulcata* (= *Moltkia*?);
13. podstawy przypominające korzenie, bardzo powykręcane, o gładkiej powierzchni (fig. 15): *O. flexuosa*;
14. podstawy zbudowane w formie wałków, jednakowej szerokości, z licznymi odgałęzzeniami, pokryte równoległymi prążkami (fig. 13): *Epiphaxum auloporoides* Lonsdale.

EXPLANATIONS TO PLATES 23—26

Plate 23

1. *Primnoa costata* Nielsen, Michałowice-Zerwana, ZP 0/3, $\times 4$.
2. *Primnoa costata* Nielsen, Michałowice-Zerwana, ZP 0/3, $\times 8$.
3. *Octobasis dichotoma* sp. n., Michałowice-Zerwana, ZP 0/8, $\times 5$.
4. *Octobasis lobata* sp. n., Michałowice-Zerwana, ZP 0/7, $\times 5$.
5. *Octobasis spinosa* sp. n., Michałowice-Zerwana, ZP 0/10, $\times 5$.
6. *Octobasis spinosa* sp. n., Michałowice-Zerwana, ZP 0/10, $\times 5$.
7. *Epiphaxum auloporoides* Lonsdale, ZP 0/13, $\times 5$.

Plate 24

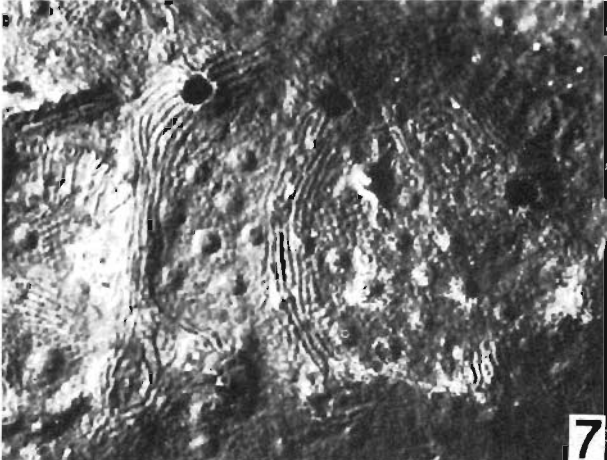
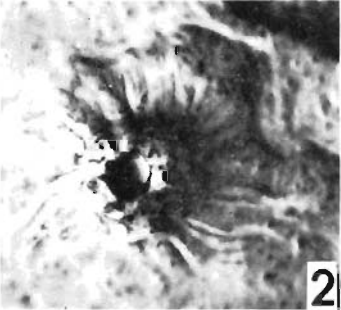
1. *Octobasis flexuosa* sp. n., Michałowice-Zerwana, ZP 0/15, $\times 5$.
2. *Octobasis ornata* sp. n., Michałowice-Zerwana, ZP 0/6, $\times 7$.
3. *Octobasis ornata* sp. n., Michałowice-Zerwana, ZP 0/6b, $\times 7$.
4. *Octobasis dichotoma* sp. n., Michałowice-Zerwana, ZP 0/8, $\times 5$.
5. *Octobasis circulata* sp. n., Michałowice-Zerwana, ZP 0/4, $\times 7$.
6. *Isis vertebralis* Hennig, Michałowice-Zerwana, ZP 0/5, $\times 2$.

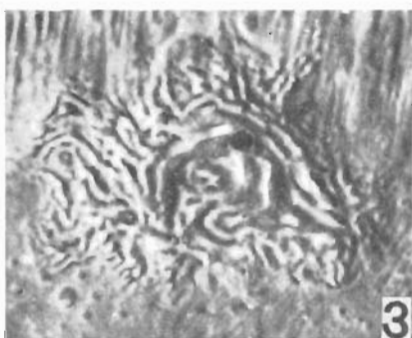
Plate 25

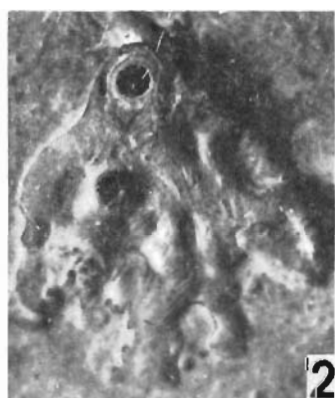
1. *Octobasis nodosa* sp. n., Michałowice-Zerwana, ZP 0/9, $\times 4$.
2. *Octobasis nodosa* sp. n., Michałowice-Zerwana, ZP 0/9b, $\times 2$.
3. *Octobasis lobata* sp. n., Michałowice-Zerwana, ZP 0/7, $\times 5$.
4. *Graphularia meijeri* Voigt, Michałowice-Zerwana, ZP 0/16, $\times 2$.
5. *Octobasis bullata* sp. n., Michałowice-Zerwana, ZP 0/2, $\times 5$.
6. *Octobasis sulcata* sp. n., Michałowice-Zerwana, ZP 0/12, $\times 5$.
7. *Octobasis lobata* sp. n., Michałowice-Zerwana, ZP 0/7, $\times 5$.
8. *Octobasis flabellata* sp. n., Michałowice-Zerwana, ZP 0/14, $\times 5$.

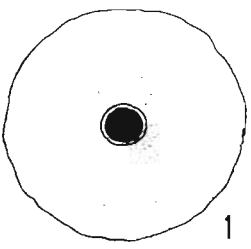
Plate 26

1. *Octobasis glabra* sp. n.
 2. *Octobasis bullata* sp. n.
 3. *Primnoa costata* Nielsen
 4. *Octobasis circulata* sp. n.
 5. *Isis vertebralis* Hennig
 6. *Octobasis ornata* sp. n.
 7. *Octobasis lobata* sp. n.
 8. *Octobasis dichotoma* sp. n.
 9. *Octobasis nodosa* sp. n.
 10. and 11. *Octobasis spinosa* sp. n.
 12. *Octobasis sulcata* sp. n.
 13. *Epiphaxum auloporoides* Lonsdale
 14. *Octobasis flabellata* sp. n.
 15. *Octobasis flexuosa* sp. n.
-

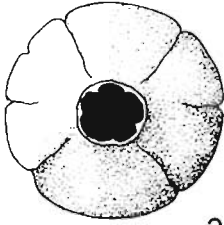




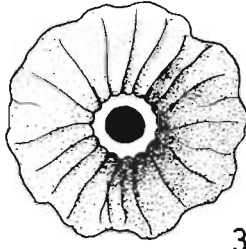




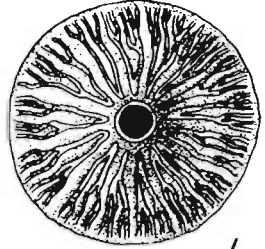
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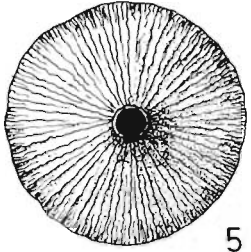
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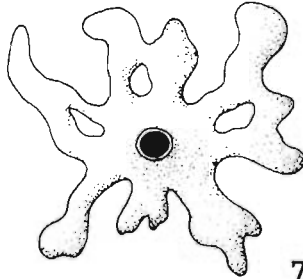
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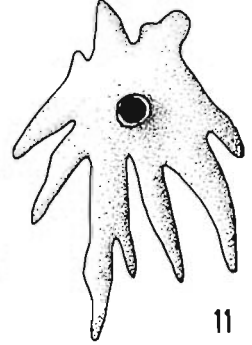
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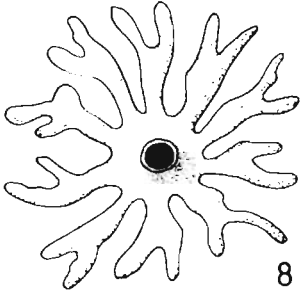
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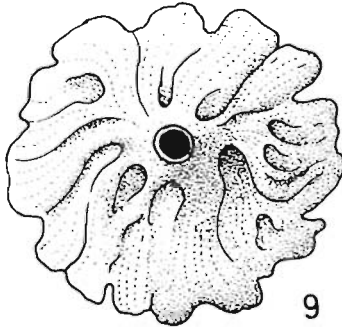
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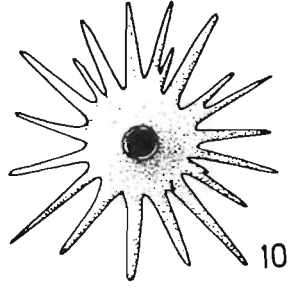
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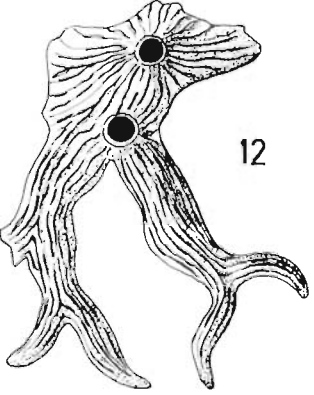
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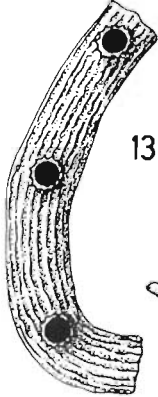
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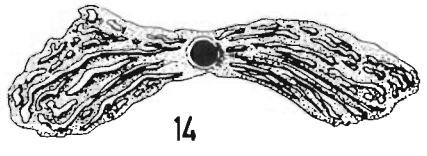
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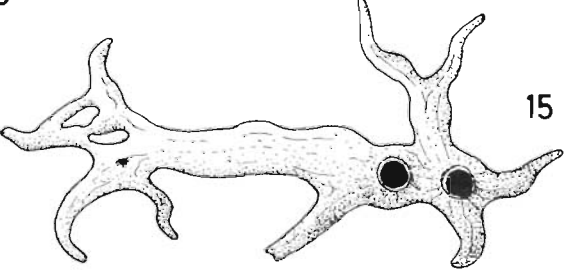
12



13



14



15