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Holothurian sclerites from the Upper Valanginian of Wąwał near Tomaszów Mazowiecki, Central Poland

ABSTRACT: The holothurian sclerites, assignated to 8 species of 4 genera, are described from the Upper Valanginian claystones of Wąwał, north-western margin of the Holy Cross Mountains, Central Poland. Seven species are new: *Priscopedatus aviformis* sp. n., *P. mazoviensis* sp. n., *P. pilicensis* sp. n., *P. valanginensis* sp. n., *P. vonvalensis* sp. n., *Theelia vonvalensis* sp. n., and *Auriculites rarus* sp. n.

INTRODUCTION

The Wąwał clay-pit near Tomaszów Mazowiecki, on the NW Mesozoic margin of the Holy Cross Mts, has been the subject of great interest to many geologists. The clay-pit is known as the best exposure of the Neocomian strata in Central Poland, and it is famous both for its macrofossils (Lewiński 1932, Kokoszyńska 1956, Witkowski 1969, Collins 1969, Pugaczewska 1975) and microfossils (*cf.* Kubiatowicz 1976).

The present paper deals with the holothurian sclerites from Wąwał, found in black claystones with sideritic nodules. The assemblage of ammonites, containing i.a. *Saynoceras verrucosum* d'Orb., points to the Upper Valanginian age of the samples that yielded the holothurian sclerites.

Among many publications applied to the post-Paleozoic holothurian sclerites, the Lower Cretaceous sclerites are mentioned only incidentally. The described sclerites belong almost exclusively to the genus *Priscopedatus* which is represented by 5 new species. Specimens of the genera *Theelia, Achistrum* and *Auriculites* are very subordinate in the material studied.

SYSTEMATIC DESCRIPTION

The systematics and terminology concerning morphological elements of sclerites is accepted after Frizzell & Exline (1966), with some modifications.

All the material figured in this paper is deposited in the collection of the Institute of Geology, University of Warsaw, under the numbers *W. H. 1—25.*

Family **Achistridae** Frizzell & Exline, 1955
Genus *ACHISTRUM* Etheridge, 1881; emend. Frizzell & Exline, 1966
Achistrum (Cancellrum) monochordata Hodson, Harris & Lawson, 1956
(Text-fig. 1a—b)

1905. *Uncinulina polymorpha* Terquem; Hucke, p. 167, Pl. 23, Fig. 6a [*only*].

1955. *Calcligula? huckei* Frizzell & Exline new species; Frizzell & Exline, p. 70, Pl. 1, Fig. 28 [*only*].

1956. *Achistrum monochordata* sp. nov.; Hodson, Harris & Lawson, p. 340, Text-figs 11—12.

1967. *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson; Garbowska & Wierzbowski, pp. 530—531, Fig. 4A—M.

1969. *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson; Górka & Łuszczewska, p. 382, Pl. 79, Figs 2—6.

1971. *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson; Zawidzka, pp. 434—435, Text-fig. 2, Pl. 1, Fig. 7.

Material: Two incomplete specimens (*W.H. 16*).

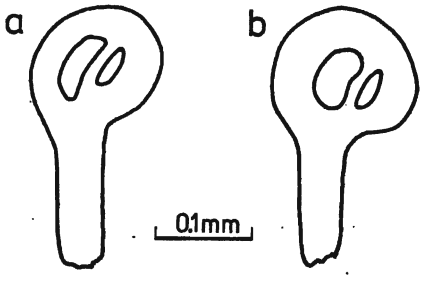

Fig. 1
Specific variability of *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson, 1956

Remarks. — The specimens collected are lacking spears, but their well preserved terminal loop allows the identification as *A. monochordata.* However, the character of shank and spear, as well as the degree of inclination of the terminal loop to the shank are not, according to Garbowska & Wierzbowski (1967, p. 531), of any major taxonomic value in the described species. The specimen figured as *Uncinulina polymorpha* Terquem by Hucke (1905, Pl. 23, Fig. 6a), and considered as the paratype of *Calcligula? huckei* by Frizzell & Exline (1955, Pl. 1, Fig. 28) is closely comparable with the investigated material (*cf.* Text-fig. 1). The present authors include these forms into the synonymy of *A. monochordata.*

Occurrence. — Upper Valanginian (*Saynoceras verrucosum* Zone) of Wąwał; the species is also known from the Upper Jurassic of North America, England, France, and Poland, as well as from the Upper Triassic of Poland (*cf.* references in synonymy).

Family **Priscopedatidae** Frizzell & Exline, 1955
Genus *PRISCOPEDATUS* Schlumberger, 1890; emend. Deflandre-Rigaud, 1962
Priscopedatus aviformis sp. n.
(Text-fig. 2a—b and Pl. 1, Fig. 2a—b)

Holotype: The specimen figured in Pl. 1, Fig. 2a—b.
Paratypes: The specimens figured in Text-fig. 2a—b.
Type horizon: Upper Valanginian (*Saynoceras verrucosum* Zone), black claystones.
Type locality: Wąwał near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: Latin *avis* — bird, in reference to the bird-shaped outline of the plate.
Diagnosis: Perforated plate with stirrup and spire; small perforations developed on the extensions of plate.
Material: Four specimens (*W. H. 14—16*).
Dimensions: Plate diameter 0.33—0.37 mm.

Description. — Sclerite in form of a perforated plate with spire and stirrup, medium size for the genus. Plate irregular in outline with smooth periphery. Central perforation surrounded by incomplete ring of small perforations. The small perforations, variable in size and more or less circular in outline, are developed on the extensions of plate. These extensions show a clear tendency to narrowing towards a rounded apex (*cf.* Text-fig. 2a). Stirrup 4-footed, feet sloping

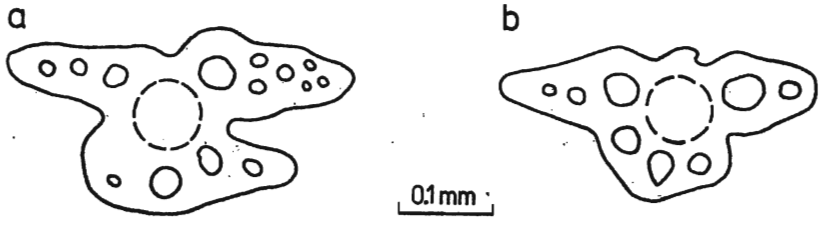

Fig. 2. Specific variability of *Priscopedatus aviformis* sp. n.

from plate to spire. Spire formed of fused feet of the stirrup; place of fusion of the feet marked with perforations (*cf.* Pl. 1, Fig. 2b). Stirrup as well as spire smooth.

Remarks. — The new species does not resemble any hitherto known species of the genus.

Priscopedatus mazoviensis sp. n.
(Text-fig. 3a—f and Pl. 1, Figs 5—6)

Holotype: The specimen figured in Pl. 1, Fig. 5a—b.
Paratypes: The specimens figured in Text-fig. 3a—f and Pl. 1, Fig. 6.
Type horizon: Upper Valanginian (*Saynoceras verrucosum* Zone), black claystones.
Type locality: Wąwał near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: after Mazowsze, province of Central Poland.
Diagnosis: Subrectangular to subcircular perforated plate with stirrup and spire; central perforation surrounded by a ring of small perforations and one or two rows of irregularly placed marginal perforations.
Material: More than twenty specimens (*W. H. 7—13*).
Dimensions: Plate diameter 0.16—0.32 mm.

Description. — Sclerite in form of a perforated plate with spire and stirrup, small to medium size for the genus. Plate subcircular to subrectangular in outline with smooth periphery. Central perforation surounded by a ring of small perforations. The small perforations, elliptical to circular in outline, are variable in size. Frequently small perforations equal in size appear on the opposite sides

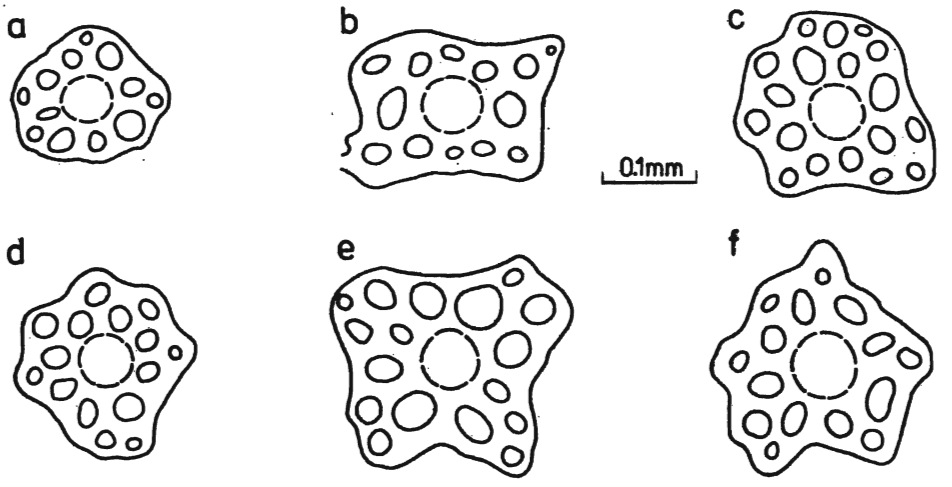

Fig. 3. Specific variability of *Priscopedatus mazoviensis* sp. n.

of the central perforation (*cf.* Text-fig. 3b, e), while small and larger in size perforations tend to be placed alternately (*cf.* Text-fig. 3c, f). Beyond the mentioned ring there are one or two rows of irregularly placed marginal perforations; the latter perforations frequently occur between the perforations of the ring. Stirrup 4-footed, feet sloping from plate to spire. Spire formed of fused feet of the stirrup (*cf.* Pl. 1, Fig. 5b). Stirrup as well as spire smooth.

Remarks. — The new species does not resemble any hitherto known species of the genus.

Priscopedatus pilicensis sp. n.
(Text-fig. 4a—d and Pl. 1, Fig. 1)

Holotype: The specimen figured in Pl. 1, Fig. 1.
Paratypes: The specimens figured in Text-fig. 4a—d.
Type horizon: Upper Valanginian (*Saynoceras verrucosum* Zone), black claystones.
Type locality: Wąwał near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: after Pilica, the river near Wąwał.
Diagnosis: Elongated, perforated plate with stirrup and spire; small perforations concentrated on opposite sides of central perforation.
Material: Eight specimens (*W. H. 17—18*).
Dimensions: Plate diameter 0.23—0.31 mm.

Description. — Sclerite in form of a perforated plate with stirrup and spire, medium size for the genus. Plate irregularly elongated (*cf.* Text-fig. 4) with smooth periphery. Small perforations, more or less circular in outline and almost equal in size, are concentrated on opposite sides of the central perforation. Stirrup 4-footed, feet sloping from plate to spire. Spire rectangular in cross-

-section is formed out of fused feet of the stirrup; feet are empty inside (*cf.* Pl. 1, Fig. 1). Stirrup as well as spire smooth.

Remarks. — The new species does not resemble any hitherto known species of the genus.

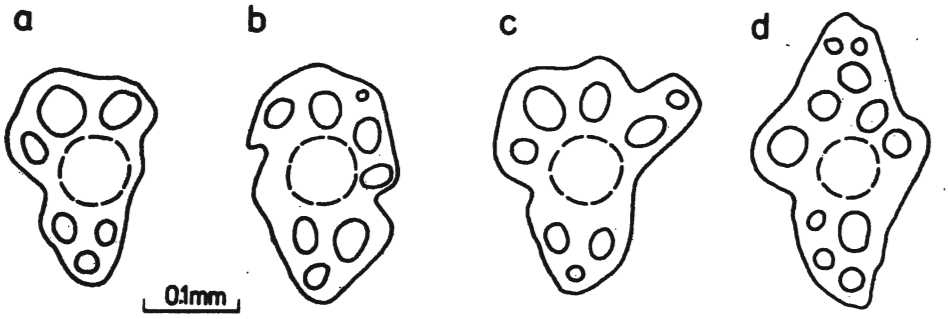

Fig. 4. Specific variability of *Priscopedatus pilicensis* sp. n.

Priscopedatus valanginensis sp. n.
(Pl. 1, Figs 7—8)

Holotype: The specimen figured in Pl. 1, Fig. 7.
Paratype: The specimen figured in Pl. 1, Fig. 8a—b.
Type horizon: Upper Valanginian (*Saynoceras verrucosum* Zone), black claystones.
Type locality: Wąwał near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: after the Valanginian stage.
Diagnosis: Irregular, perforated plate with solid stirrup and spire; central perforation surrounded by irregularly and widely spaced small perforations.
Material: More than twenty specimens (*W. H. 19—21*).
Dimensions: Plate diameter 0.28—0.33 mm.

Description. — Sclerite in form of a perforated plate with spire and stirrup, medium to large size for the genus. Plate irregular in outline with smooth periphery. Central perforation surrounded by irregularly and widely spaced small perforations. Outline of the small perforations circular to suboval; perforations highly variable in size. Stirrup solid, 4-footed; feet sloping from plate to spire. Stirrup as well as spire smooth (*cf.* Pl. 1, Fig. 8a).

Remarks. — The species is similar to *P. mazoviensis* sp. n., but differs in irregularly and widely spaced small perforations and their smaller size, as well as in its irregular outline of the plate.

Priscopedatus vonvalensis sp. n.
(Pl. 1, Figs 3—4 and Pl. 2)

Holotype: The specimen figured in Pl. 1, Fig. 3a—b.
Paratypes: The specimens figured in Pl. 1, Fig. 4 and Pl. 2, Figs a—r.
Type horizon: Upper Valanginian (*Saynoceras verrucosum* Zone), black claystones.
Type locality: Wąwał near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: after the type locality.
Diagnosis: Perforated plate with stirrup and spire; central perforation surrounded by a ring of 7—8 small perforations.
Material: More than twenty specimens, many fragments (*W. H. 1—6*).
Dimensions: Plate diameter 0.15—0.31 mm.

Description. — Sclerite in form of a perforated plate with spire and stirrup, small to medium size for the genus. Plate subcircular to oval in outline with undulating or smooth periphery. Central perforation surrounded by a ring of 7—8 small perforations, more or less circular in outline and almost equal in size. There are also specimens (*cf.* Pl. 2) with some extra small perforations developed, outside the mentioned ring of perforations, on the extensions of periphery of plates. Stirrup 4-footed, feet sloping from plate to spire. Spire formed out of fused feet of the stirrup; place of fusion of the feet marked with perforations (*cf.* Pl. 1, Figs 3b, 4). Stirrup as well as spire smooth.

Remarks. — The new species bears some similarity to *Priscopedatus pseudaffinis* Deflandre-Rigaud, 1950, known from the Oxfordian of France, and to *P. jaworznicensis* Górka & Łuszczewska, 1969, recorded from the Bathonian of Poland; it differs, however, by its perforated spire which lacks any denticles.

Family **Theeliidae** Frizzell & Exline, 1955
Genus *THEELIA* Schlumberger, 1890
Theelia vonvalensis sp. n.
(Text-fig. 5a—c and Pl. 1, Figs 10—11)

Holotype: The specimen figured in Text-fig. 5b—c and Pl. 1, Fig. 11.
Paratypes: The specimens figured in Text-fig. 5a and Pl. 1, Fig. 10.
Type horizon: Upper Valanginian (*Saynoceras verrucosum* Zone), black claystones.
Type locality: Wąwał near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: after the type locality.
Diagnosis: Sclerite in form of wheel with denticulated rim incurved interiorly, six rarely five-pointed star situated on lower side of hub, and 6 rarely 5 spokes, narrowing towards hub.
Material: Five specimens (*W. H. 22—24*).
Dimensions: External diameter of sclerite *DA* = 0.31—0.40 mm, internal diameter of sclerite *DI* = 0.25—0.33 m, hub diameter *DN* = 0.027—0.038 mm; *U* = *DA/DI* = 1.21—1.24; *DNI* = *DA/DN* = 10.5—11.5

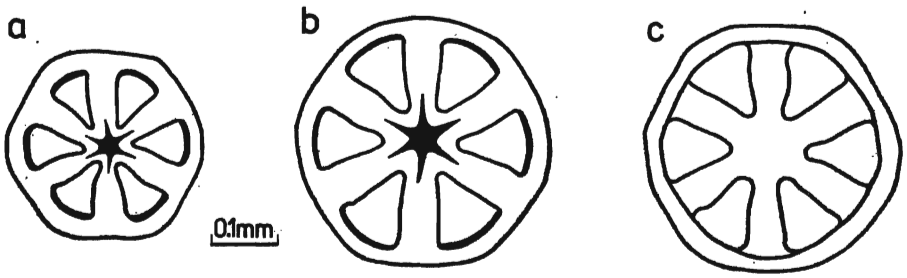

Fig. 5. *Theelia vonvalensis* sp. n.; paratype in lower view (*a*), and holotype in lower (*b*) and upper (*c*) views

Description. — Sclerite in form of wheel; centre occupied by the hub which is connected to external rim by 6 rarely 5 spokes. Rim margin, curved upward and inward, is finely denticulated. Central part of sclerite, *i.e.* the hub is incurved upwardly. A six-pointed (by 6 spokes), rarely five-pointed (by 5 spokes) star, with its arms situated in the extensions of the axes of spokes, is located on lower side of the hub. Spokes are narrowing towards the hub.

Remarks. — The new species differs from *Theelia convexa* (Whidborne, 1883), emend. Lord & Senior 1973, known from the Jurassic of south Dorset,

England, by its spokes narrowing towards the hub; it differs from *T. heptalampra* (Bartenstein, 1936) recorded from the Jurassic of Germany, France, and Poland (*cf.* Matyja 1972, p. 240) by its denticulated rim.

Genus *AURICULITES* Deflandre-Rigaud, 1950

Auriculites rarus sp. n.

(Text-fig. 6a—b and Pl. 1, Fig. 9)

Holotype: The specimen figured in Text-fig. 6a—b and Pl. 1, Fig. 9.
Type horizon: Upper Valanginian (*Saynoceras verrucosum* Zone), black claystones.
Type locality: Wąwał near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: Latin *rarus* — rare; in reference to its rare occurrence.
Diagnosis: Sclerite wheel-shaped with 13 spokes and small hub, rim without denticles.
Material: One, well preserved specimen *(W. H. 25)*.
Dimensions: *DA* = 0.315 mm; *DI* = 0.284 mm; *DN* = 0.042 mm; *U* = 1.1; *DNI* = 7.5.

Description. — Sclerite in form of wheel; centre occupied by the hub which is connected to external rim by 13 spokes. Spokes are narrowing towards the centre of sclerite. Rim, without denticles, is slightly curved upward. The hub is slightly incurved upwardly.

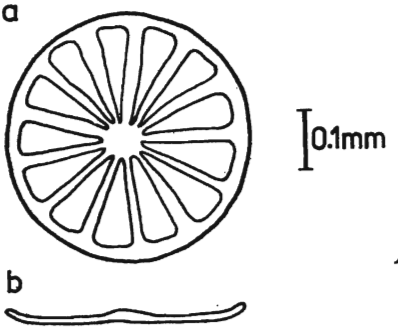

Fig. 6
Auriculites rarus sp. n.; holotype in upper view (*a*), and in cross-section (*b*)

Remarks. — The new species is similar to *Auriculites arcuatus* Deflandre-Rigaud, 1950, recorded from the Oxfordian of France; it differs, however, by its larger diameter of the hub, spokes narrowing towards the centre of the sclerite, as well as by its rim lacking denticles.

In erecting the new species *A. rarus* sp. n., the authors have given up the rule of not labelling a single specimen with a new name. The two hitherto known species of the genus differ however from the presented species in number of so taxonomically important feautres that the possibility for the new species to be conspecific with one of them is out of scope.

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PLATE 1

1 *Priscopedatus pilicensis* sp. n.; holotype in vertical view

2 *Priscopedatus aviformis* sp. n.; holotype in vertical *(a)* and oblique *(b)* views

3—4 *Priscopedatus vonvalensis* sp. n.: **3** holotype in vertical *(a)* and oblique *(b)* views, *4* paratype in oblique view

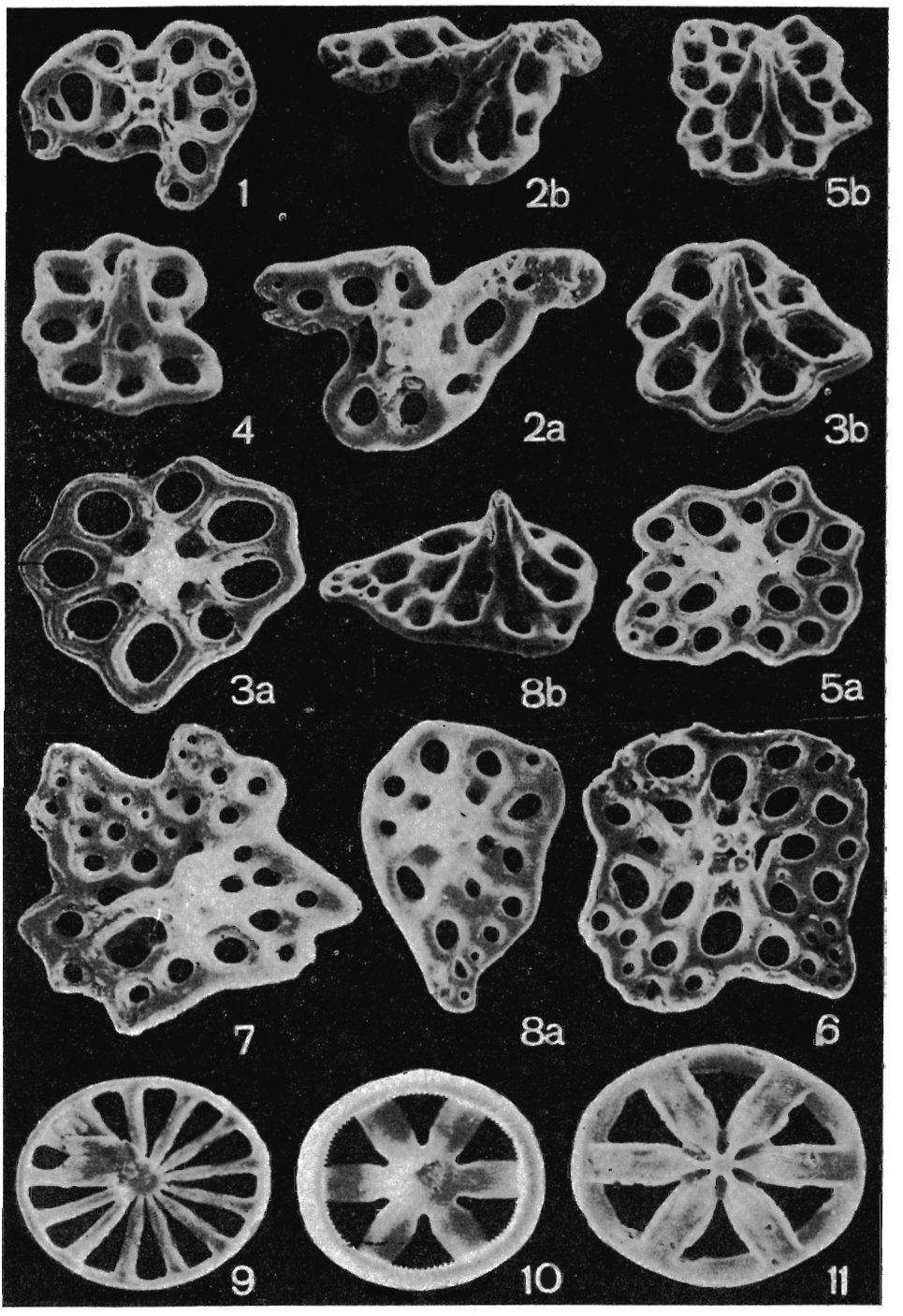
5—6 *Priscopedatus mazoviensis* sp. n.: *5* holotype in vertical *(a)* and oblique *(b)* views, *6* paratype in vertical view

7—8 *Priscopedatus valanginensis* sp. n.: *7* holotype in vertical view, *8* paratype in vertical *(a)* and oblique *(b)* views; × 150

9 *Auriculites rarus* sp. n.; holotype in upper oblique view

10—11 *Theelia vonvalensis* sp. n.: *10* paratype in upper view, × 100; *11* holotype in lower oblique view, × 90

All figures × 130, unless otherwise stated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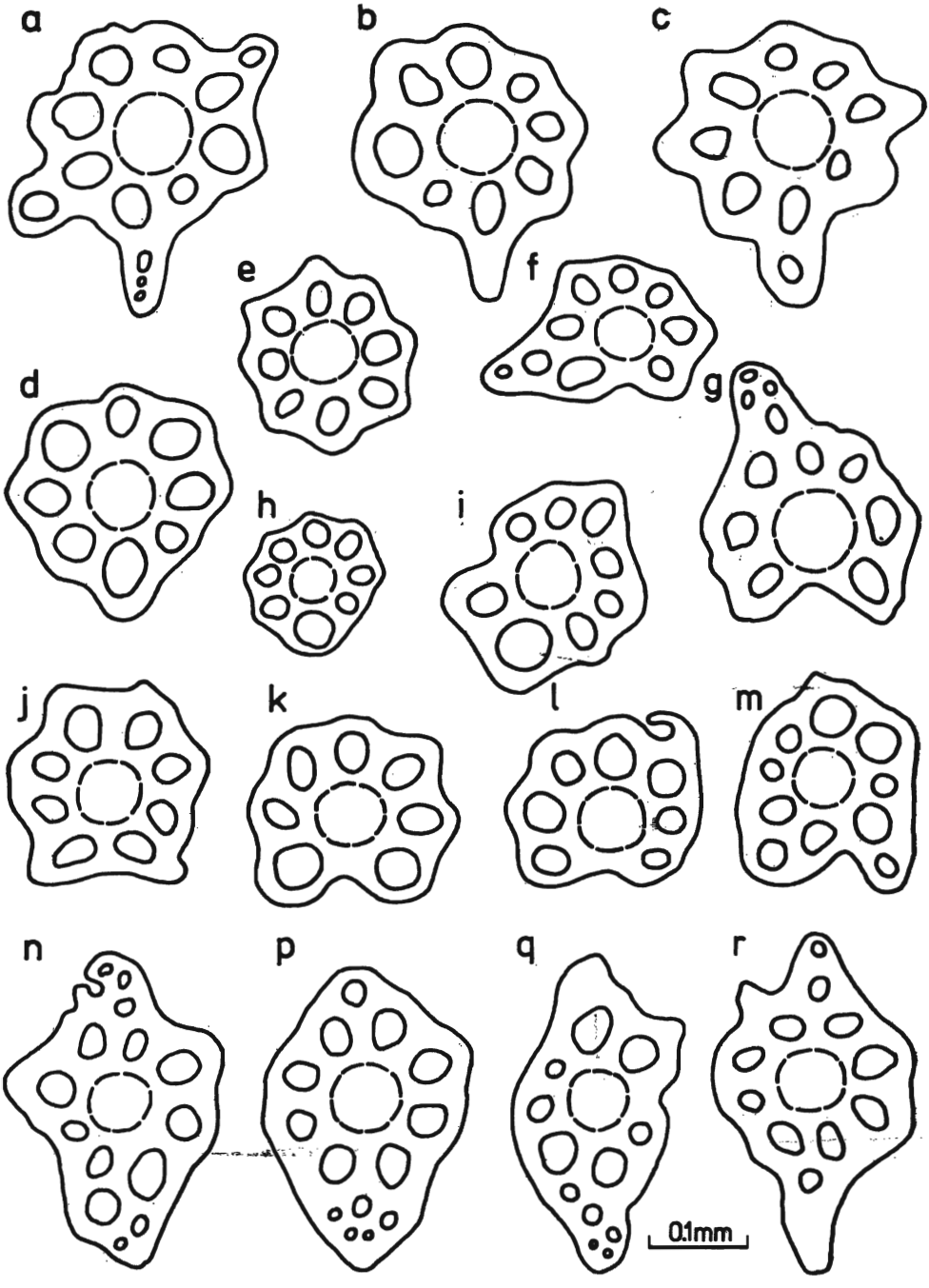

Specific variability of *Priscopedatus vonvalensis* sp. n.