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### TRIASSIC HOLOTHURIAN SCLERITES FROM TATRA MOUNTAINS

*Abstract.* — Holothurian sclerites, extracted from Triassic deposits of the Choč nappe, the Western Tatra Mts., are assigned to nineteen species. The taxonomic position of 16 of the specimens described is uncertain. Three new species are proposed.

#### INTRODUCTION

The holothurian sclerites under discussion have been extracted from plăty, knobby and flinty limestones of the Furkaska unit, which constitutes lower part of the Choč nappe. These deposits have been regarded as

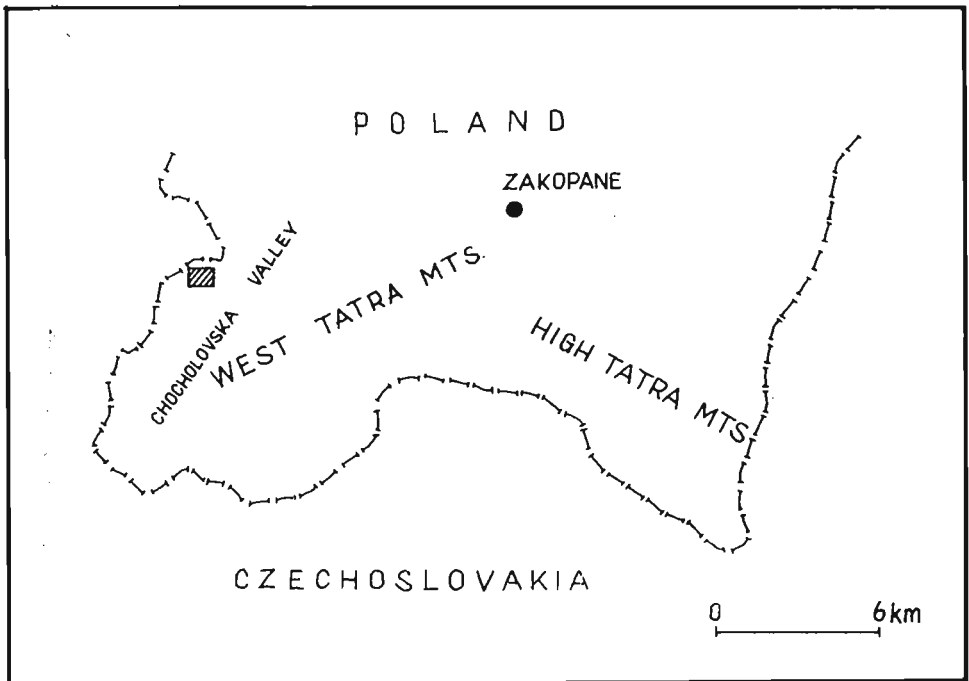


Fig. 1. — Sketch map of the Tatra Mountains with the investigated area hatched.



a probable equivalent of the Reifling limestones from the Eastern Alps (cf. Guzik, 1959; Kotański, 1961, 1965).

Holothurian sclerites were found in 11 samples of compact, micritic or sparry-micritic limestones. Location of investigated region is given on Fig. 1. The only successful method of extraction was dissolution of samples in 15% acetic acid.

Despite the rather small number of specimens of sclerites found in the samples, they display a marked diversity of genera and species.

The stratigraphical ranges of particular genera and species identified, summarized from literature, are given in Table 1. Therefore it may be stated that the sclerites from the Furkaska unit represent an assemblage very similar to those known from the Upper Anisian (Illirian) of other regions.

The Reifling limestones were deposited in deep-neritic or shallow-bathyal environment (Andrusov, 1959), therefore it may be assumed that sclerite-bearing limestones of Mount Furkaska, similarly developed, were deposited at a similar depth.

The material described is housed in the Institute of Geology, Warsaw University.

#### DESCRIPTIONS<sup>1</sup>

##### Family *Stichopitidae* Frizzell & Exline, 1955

##### Genus *Stichopites* Deflandre-Rigaud, 1949

(Type species: *Stichopites mortenseni* Deflandre-Rigaud, 1949)

##### *Stichopites mortenseni* Deflandre-Rigaud, 1949

(Pl. I, Fig. 1)

1955. *Stichopites mortenseni* Deflandre-Rigaud; D. L. Frizzell & H. Exline, Monograph of fossil holothurian..., p. 61, Pl. 1, Figs. 1—3 (earlier synonymy included).  
 1961. *Stichopites mortenseni* Deflandre-Rigaud; M. Rioult, Les Sclérites d'Holothuries..., p. 126, Pl. 1, 26.  
 1964. *Prostichopus jurensis* Frentzen; K. Frentzen, Funde von Holothurien..., p. 40, Pl. 3, Figs. 11—19.  
 1965. *Stichopites mortenseni* Deflandre-Rigaud; E. Kristan-Tollman, Revision..., p. 18.

*Material.* — Approximately 20 specimens.

*Measurements:* Length 0.369 mm, diameter 0.054 mm.

*Description.* — Sclerite rod-shaped, slightly bent, circular in cross section; diameter constant along the whole length; both ends rounded.

*Occurrence.* — Poland, Tatra Mts: Triassic; Germany: Lower Jurassic.

<sup>1</sup> The systematics of Frizzell and Exline (1955) was accepted.

Genus *Rhabdotites* Deflandre-Rigaud 1952(Type species: *Rhabdotites mortenseni* Deflandre-Rigaud, 1952)*Rhabdotites rectus* Frizzell & Exline, 1955

(Pl. I, Fig. 2)

1955. *Rhabdotites rectus* Frizzell & Exline; D. L. Frizzell & H. Exline, Monograph of fossil holothurian..., p. 66, Pl. 1, Figs. 14,15.
1967. *Rhabdotites rectus* Frizzell & Exline; H. Mostler, Conodonten und Holothuriensklerite..., pp. 183—184, Pl. 2, Fig. 18.

*Material.* — One specimen (sample No. 8).

Measurements: Length 0.447 mm, diameter of rod 0.032 mm, width of knob 0.054 mm.

*Description.* — Sclerite rod-shaped, straight, narrow, with small sub-spherical knob on one end; diameter of rod almost constant; cross section circular.

*Occurrence.* — Poland, Tatra Mts: Triassic; Southern Calcareous Alps, St. Cassian Beds: Ladinian; Lower Austria, Hallstätter Limestones: Norian.

Family *Calclamnidae* Frizzell & Exline, 1955Genus *Calclamna* Frizzell & Exline, 1955(Type species: *Calclamna germanica* Frizzell & Exline, 1955)*Calclamna germanica* Frizzell & Exline, 1955

(Pl. II, Fig. 1)

1955. *Calclamna germanica* Frizzell & Exline; M. Rioult, Les Sclérites d'Holothuries..., p. 132, Pl. 1, Figs. 4, 9 (*earlier synonymy included*).
1964. *Cibrum longipontinum* Frentzen; K. Frentzen, Funde von Holothurien..., pp. 37—38, Pl. 3, Figs. 26—28.
1965. *Calclamna germanica* Frizzell & Exline; E. Kristan-Tollman, Revision..., p. 18.
1968. *Calclamna cf. germanica* Frizzell & Exline; P. Speckman, Holothurien-Sklerite..., pp. 199—201, Pl. 1, Fig. 5.

*Material.* — One specimen (sample No. 11).

Measurements: Length 0.169, width 0.146 mm.

*Description.* — Plate-like perforated sclerite, irregular in outline, with smooth margins; perforations similar in size, but variable in shape; central pores form a cross with uneven arms, whereas peripheral pores are elongated, polygonal to ovate, and manifest a certain tendency to radial pattern.

*Occurrence.* — Poland, Tatra Mts: Triassic; Eastern Alps: Anisian; Germany: Lower Jurassic; England: Lower Jurassic.

Genus *Calclamnoidea* Frizzell & Exline, 1955  
 (Type species: *Priscopedatus collaris* Deflandre-Rigaud, 1952)  
*Calclamnoidea canalifera* Kristan-Tollman, 1963  
 (Pl. I, Fig. 12)

1963. *Calclamnoidea canalifera* Kristan-Tollman; E. Kristan-Tollman, *Holothurien-Sklerite...*, pp. 359—360, Pl. 1, Figs. 1—6; Pl. 2, Figs. 1—2.

*Material.* — One specimen (sample No. 5).

Measurements: Length 0.184 mm, width of pores 0.032 mm.

*Description.* — Plate-like, perforated sclerite, with one row of elliptical pores, equal in size and elongated in one direction; other perforations ovate to subtriangular in shape and randomly distributed or located normally to row of elliptical pores.

*Occurrence.* — Poland, Tatra Mts: Middle Triassic; Dolomites, St. Cassian Beds: Kordevol.

Genus *Eocaudina* Martin, 1952 emend. Frizzell & Exline, 1955  
 (Type species: *Eocaudina septaforaminalis* Martin, 1952)  
*Eocaudina subhexagona* Gutschick, Canis & Brill, 1967  
 (Pl. I, Figs. 8—11)

1967. *Eocaudina subhexagona* Gutschick, Canis & Brill; R. C. Gutschick, W. F. Canis & K. G. Brill, *Kinderhook...*, p. 1469, Pl. 186, Figs. 16—21, Pl. 187, Fig. 18.

1968a. *Eocaudina subhexagona* Gutschick, Canis & Brill; H. Mostler, *Holothurien-Sklerite...*, p. 12, Pl. 2, Fig. 4.

1968b. *Eocaudina subhexagona* Gutschick, Canis & Brill; H. Mostler, *Holothurien-Sklerite...*, p. 55, Pl. 2, Figs. 1—4.

*Material.* — Four well-preserved specimens (samples No. 5, 10, 11).

Measurements: Length 0.130—0.234 mm, diameter of pores 0.013—0.039 mm.

*Remarks.* — Three specimens (Pl. I, Figs. 8—10) correspond almost entirely to forms illustrated by Gutschick (*l.c.*). Elongation of sclerite is marked more strongly, resulting in a bilateral outline. Number of pores constant (30); four central pores are the largest. Specimen from Pl. I, Fig. 11 differs from others in size, and its pores are more numerous and less differentiated in size, but is identical to forms illustrated by Mostler (1968b, Pl. 2, Figs. 1,3).

*Occurrence.* — Poland, Tatra Mts: Triassic; USA: Carboniferous; North Calcareous Alps: Anisian.

Family **Achistridae** Frizzell & Exline, 1955Genus *Achistrum* Etheridge, 1881(Type species: *Achistrum nicholsoni* Etheridge, 1881)*Achistrum ludwigi* (Croneis, 1955)

(Pl. I, Fig. 4)

1955. *Achistrum ludwigi* (Croneis); D. L. Frizzell & H. Exline, Monograph of fossil holothurian..., p. 97, Pl. 4, Figs. 23, 24 (earlier synonymy included).
1958. *Achistrum ludwigi* (Croneis); C. H. Summerson & L. J. Campbell, Holothurian sclerites..., pp. 967—968, Pl. 125, Figs. 1, 2.
1959. *Achistrum ludwigi* (Croneis); R. C. Gutschick, Lower Mississippian..., p. 33, Pl. 25, Figs. 13—19.

*Material.* — One specimen (sample No. 9).

Measurements: Length 0.477 mm, loop width 0.146 mm, hook length 0.061 mm, shank width 0.060 mm, shank thickness 0.031 mm.

*Description.* — Hook-like sclerite with long, slightly arcuate shank, narrow-elliptical in cross section; spear short, perpendicular to large, ovate loop; eye of loop is relatively large, ovate, with smooth margins.

*Remarks.* — The specimen described is slightly smaller than forms described by Croneis, McCormack and Gutschick, but ratios between particular dimensions are very close and ratio of thickness to shank width is almost identical.

*Occurrence.* — Poland, Tatra Mts: Triassic; USA: Carboniferous.

*Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson, 1956

(Text-fig. 2; Pl. I, Fig. 7)

1956. *Achistrum monochordata* Hodson, Harris & Lawson; F. Hodson, B. Harris & L. Lawson, Holothurian spicules..., pp. 340—341, Figs. 10,11.
1962. *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson; B. N. Fletcher, Holothurian spicules..., p. 325, Figs. 6,7.
1967. *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson; J. Garbowska & A. Wierzbowski, Holothurian sclerites..., pp. 530—531, Figs. A-M (earlier synonymy included).
1969. *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson; H. Górka & L. Łuszczewska, Holothurian sclerites..., pp. 382—383, Pl. 79, Figs. 2—6.

*Material.* — One specimen (sample No. 5).

Measurements: Loop height 0.107 mm, loop width 0.123 mm, shank length 0.023 mm, shank width 0.003 mm.

*Description.* — Loop ovate and located eccentrically to shank axis and slightly inclined to it; shank is somewhat flattened in plane perpendicular to loop plane, close to loop base becoming cylindrical downward; loop eye ovate, divided by thin cross-bar, closely adhering to loop margin.

*Remarks.* — Material at hand is not sufficient for conclusions concerning the relation of *Achistrum monochordata* Hodson, Harris & Lawson to *Achistrum bartensteini*. Previous opinions are diverse (cf. Rioult, 1961; Mostler, 1968).



Fig. 2. — *Achistrum (Cancellrum) monochordata* H., H. & L.; Triassic, Tatra Mts.

*Occurrence.* — Poland, Polish Jura Chain: Upper Jurassic, Tatra, Mts: Triassic; France: Upper Jurassic; Germany: Upper Jurassic; USA: Carboniferous.

*Achistrum* sp. 1  
(Pl. I, Figs. 3a, b)

*Material.* — One specimen (sample No. 5).

Measurements: Length 0.346 mm, loop width 0.092 mm, loop length 0.084 mm, eye diameter 0.015 to 0.023 mm, hook length 0.053 mm.

*Description.* — Hook-like sclerite, with shank slightly arcuate, subcircular in cross section and narrowing toward loop; loop ovate, located eccentrically to shank; loop wall variable in thickness; loop plane normal to plane of spear and inclined to it; loop eye almost triangular with weak convexities; spear short, acute, normal to shank.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Achistrum* sp. 2  
(Pl. I, Fig. 6)

*Material.* — One specimen (sample No. 2).

Measurements: Length 0.246 mm, loop length 0.040 mm, loop width 0.038 mm, shank width 0.023 mm.

*Description.* — Hook-like sclerite; shank straight, bent only in junction with spear, located in plane perpendicular to loop; loop somewhat twisted in relation to shank plane; loop eye small, circular.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Achistrum* sp. 3

(Pl. I, Fig. 5)

*Material.* — One specimen (sample No. 10).

Measurements: Length 0.354 mm, loop length 0.146 mm, loop width 0.077 mm.

*Description.* — Hook-like sclerite with straight shank widening toward loop and circular in cross section; loop long, ovate, somewhat flattened from above; eye follows outline of loop.*Occurrence.* — Poland, Tatra Mts: Triassic.Family **Priscopeditidae** Frizzell & Exline, 1955Genus *Staurocumites* Deflandre-Rigaud, 1952(Type species: *Staurocumites bartensteini* Deflandre-Rigaud, 1952)*Staurocumites bartensteini* Deflandre-Rigaud, 1952

(Pl. II, Figs. 2a, b, 3a, b, 4, 5)

1968. *Staurocumites bartensteini* Deflandre-Rigaud; H. Mostler, *Holothurien-Sklerite...*, pp. 21—22, Pl. 3, Figs. 6—9 (earlier synonymy included).1968. *Staurocumites bartensteini* Deflandre-Rigaud; P. Speckman, *Holothurien-Sklerite...*, p. 204, Pl. 1, Fig. 9.*Material.* — Six well-preserved specimens (samples Nos. 1, 3, 5, 7).

Measurements: Complete specimens 0.180—0.270 mm, arm 0.090—0.187 mm long, spire 0.100—0.117 mm high.

*Remarks.* — Polish specimens are similar to forms illustrated previously, although some differences in dimensions are noted.*Occurrence.* — Poland, Tatra Mts: Triassic; Northern Calcareous Alps: Norian; Eastern Alps: Anisian; France: Lower Jurassic; Germany: Lower Jurassic.Genus *Priscopedatus* Schlumberger, 1890 emend. Deflandre-Rigaud, 1961(Type species: *Priscopedatus pyramidalis* Schlumberger, 1890)*Priscopedatus* aff. *anguliferus* Zankl, 1966

(Pl. II, Fig. 9)

1964. *Priscopedatus* sp. B Zankl; H. Zankl, *Zur mikrofaunistischen...*, p. 554, Pl. 5, Fig. 3f.1966. *Priscopedatus anguliferus* Zankl; H. Zankl, *Holothurien-Sklerite...*, p. 75, Pl. 5, Fig. 7.1968. *Priscopedatus anguliferus* Zankl; P. Speckman, *Holothurien-Sklerite...*, p. 202, Pl. 1, Fig. 2.*Material.* — Two specimens (sample No. 6).

Measurements: Length 0.277 mm, width 0.184 mm, spire 0.092 mm high.



*Description.* — Plate-like perforated sclerite, irregular, somewhat elongated in outline; margin smooth; four central pores arranged in the form of a cross; shape of pores variable, from polygonal to ovate; spire relatively long and irregularly angular.

*Remarks.* — *Priscopedatus* aff. *anguliferus* Zankl differs from *P. anguliferus* Zankl in size and form of spire base. Spires of specimens described are long and joint with plate without intermediate stirrups.

*Occurrence.* — Poland, Tatra Mts: Triassic; Eastern Alps: Upper Anisian, Norian, Rhaetian.

*Priscopedatus normani* Schlumberger, 1890

(Pl. II, Fig. 7)

1955. *Priscopedatus normani* Schlumberger; D. L. Frizzell & H. Exline (partim), *Monograph...*, p. 107, Pl. 5, Fig. 21.

*Material.* — One specimen (sample No. 7).

Measurements: Length 0.286 mm, bigger pores are 0.065 to 0.091 mm in diameter.

*Description.* — Sclerite flat, irregular in outline, with cross formed by four main pores elongated and relatively large; between particular arms of cross, four other pores occur: two polygonal and almost equal in size with cross-forming ones, one triangular and the smallest one, circular; lack of spire.

*Occurrence.* — Poland, Tatra Mts: Triassic; France: Eocene.

*Priscopedatus mostleri* n.sp.

(Text-fig. 3; Pl. IV, Fig. 5)

1968. *Priscopedatus* n.sp. A Mostler; H. Mostler, *Holothurien-Sklerite...*, p. 20, Pl. 6, Fig. 16.

1968. *Priscopedatus* sp. 2, Speckman; P. Speckman, *Holothurien-Sklerite...*, p. 202, Pl. 2, Figs. 2a, 2b.

*Holotypus:* Specimen No. THC 6—2; Text-fig. 3; Pl. IV, Fig. 6.

*Stratum typicum:* ?Illir.

*Locus typicus:* Wielkie Koryciska, the Chochołowska Valley, Western Tatra Mts.

*Derivatio nominis:* To honour H. Mostler (Institut für Geologie und Paläontologie der Universität Innsbruck), who for the first time described and illustrated this species.

*Material.* — One, relatively well-preserved specimen (sample No. 9).

Measurements: Diameter 0.551 mm, spire 0.039 mm high, pores 0.001—0.039 mm in diameter.

*Description.* — Plate-like sclerite, almost circular in outline; pores polygonal, occasionally elliptical, very numerous and generally arranged

in radial and arcuate rows; the latter do not pass through center but continue toward margins, gradually disappearing. In slightly convex central part (cf. Fig. 3), five elliptical pores, equal in size, surround short, conical spire. Spire base obscured. Margin curved upward, smooth.

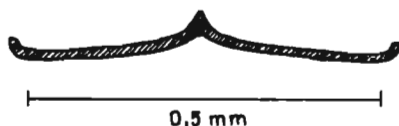


Fig. 3. — *Priscopedatus mostleri* n.sp.: cross section; Triassic, Tatra Mts.; No. THC6-2

*Occurrence.* — Poland, Tatra Mts; Triassic; Eastern Alps: Anisian.

*Priscopedatus* cf. *triassicus* Mostler, 1968

(Pl. III, Fig. 1)

1968. *Priscopedatus triassicus* Mostler; H. Mostler, *Holothurien-Sklerite...*, pp. 18—19, Pl. 6, Figs. 9—13.

1968. *Priscopedatus triassicus* Mostler; P. Speckman, *Holothurien-Sklerite...*, pp. 200—202, Pl. 1, Figs. 4, 7, 8.

*Material.* — One incomplete specimen (sample No. 7).

*Measurements:* Maximal radius 0.149 mm, central pores 0.061 mm in diameter, spire 0.060 mm high.

*Description.* — Plate-like perforated sclerite with undulated outline and smooth margin; pores large, closely spaced, variable in shape — from polygonal to ovate — and in size; spire narrow, conical, its upper part is probably broken off.

*Occurrence.* — Poland, Tatra Mts: Triassic; Eastern Alps: Anisian.

*Priscopedatus elliptiferus* n.sp.

(Pl. II, Figs. 6a, b)

*Holotypus:* Specimen No. THO 3—1; Pl. II, Figs. 6a,6b.

*Stratum typicum:* ?Upper Anisian.

*Locus typicus:* Wielkie Koryciska, the Chochołowska Valley, Western Tatra Mts.

*Derivatio nominis;* after elliptical shape of pores.

*Material.* — One specimen (sample No. 5).

*Measurements:* Specimen 0.299 mm long, 0.195 mm wide, spire 0.143 mm high, 0.045 mm in diameter, pores 0.039 to 0.52 mm in diameter.

*Description.* — Plate-like perforated sclerite, slightly elongated, irregular in outline; pores not numerous, elliptical, approximately equal in size; four central pores form a cross and surround high spire with acute apex and circular cross section; margin smooth.

PLATES

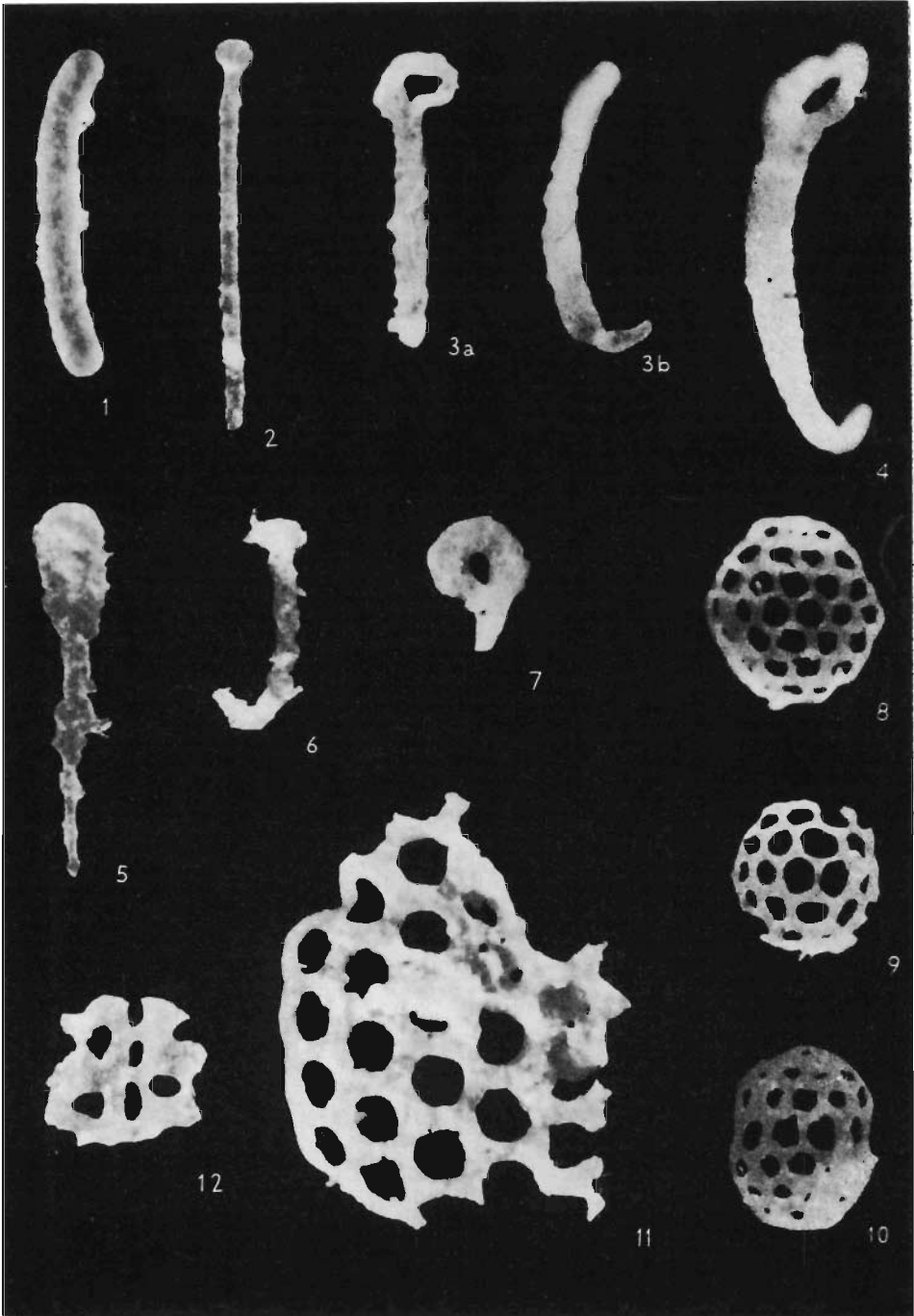
I - IV

Plate I

- Fig. 1. *Stichopites mortenseni* Deflandre-Rigaud; No. THO20-1.  
Fig. 2. *Rhabdotites rectus* Frizzell & Exline; No. THO20-2.  
Fig. 3. *Achistrum* sp. 1; *a* front view, *b* lateral view; No. THP14-1.  
Fig. 4. *Achistrum ludwigi* (Croneis); No. THC6-1.  
Fig. 5. *Achistrum* sp. 3; No. THC2-1.  
Fig. 6. *Achistrum* sp. 2; No. THC3-1.  
Fig. 7. *Achistrum (Cancellrum) monochordata* Hodson, Harris & Lawson; No. THP14-2.  
Figs. 8—11. *Eocaudina subhexagona* Gutschick, Canis & Brill; Nos. THPc-1, THPc-2, THC2-2, THP8.  
Fig. 12. *Calclamnoidea canalifera* Kristan-Tollman; No. THP18.

Triassic, Tatra Mts.

All  $\times$  115



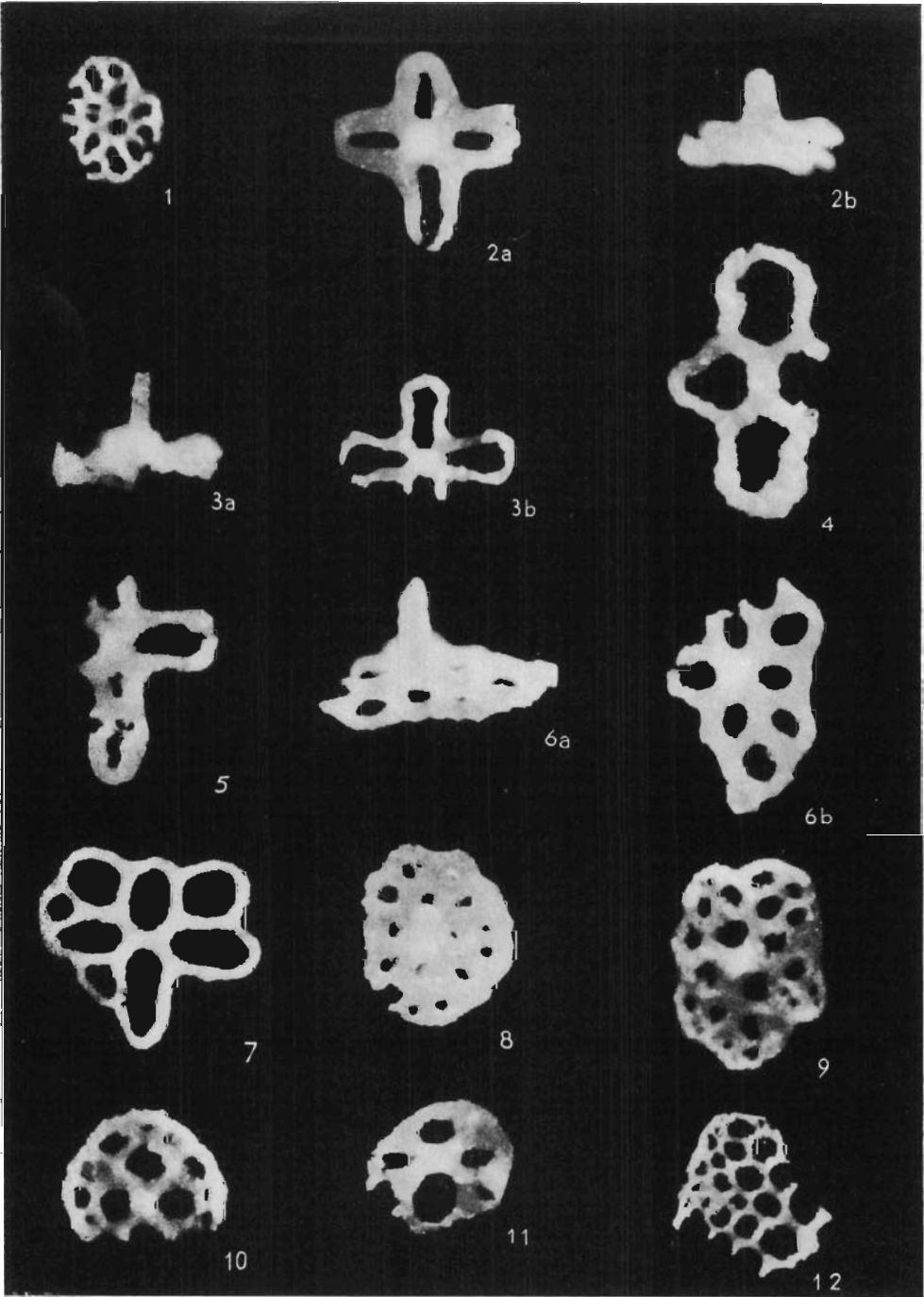


Plate II

Fig. 1. *Calclamna germanica* Frizzell & Exline; No. THPc-3.

Figs. 2—5. *Staurocumites bartensteini* Deflandre-Rigaud: 2a, 3b, 4, 5 top view; No. THO1.

Fig. 6. *Priscopedatus elliptiferus* n.sp. (holotype): a lateral view, b top view; No. THO3-1.

Fig. 7. *Priscopedatus normani* Schlumberger; No. THC5.

Fig. 8. *Priscopedatus* sp. 4; No. THC5.

Fig. 9. *Priscopedatus* aff. *anguliferus* Zankl; No. THOc-1.

Fig. 10. *Priscopedatus* sp. 1; No. THO4-1.

Fig. 11. *Priscopedatus* sp. 2; No. THO5.

Fig. 12. *Priscopedatus* sp. 3; No. THO3-2.

Triassic, Tatra Mts.

All × 115

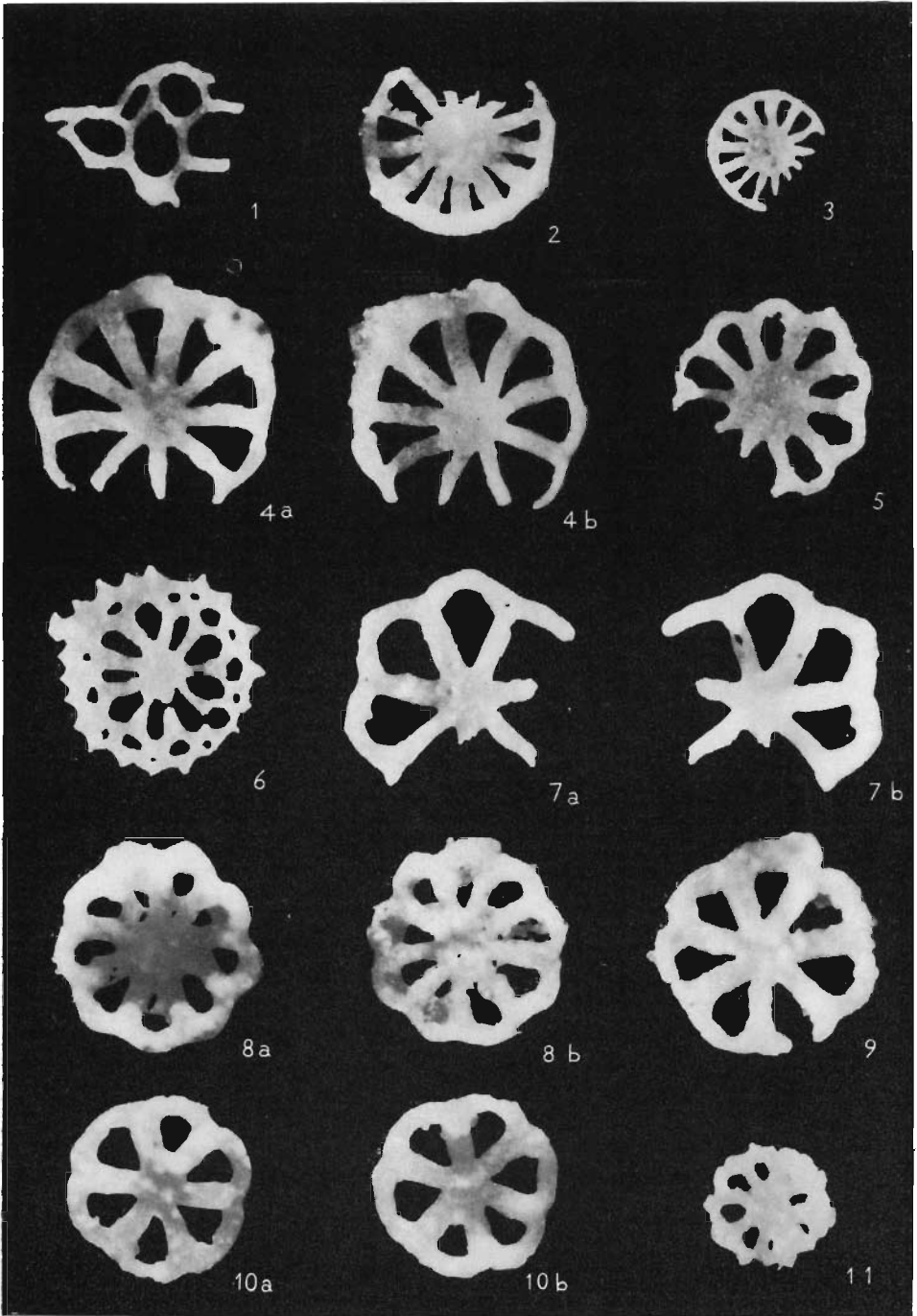
Plate III

- Fig. 1. *Priscopedatus* cf. *triassicus* Mostler; No. THO3-3.  
Fig. 2. *Theelia immissorbicula* Mostler: upper surface; No. THP7/1.  
Fig. 3. *Theelia immissorbicula* Mostler: lower surface; No. THP7/2.  
Fig. 4. *Theelia* aff. *subcirculata* Mostler: *a* lower surface, *b* upper surface; No. THPc-4.  
Fig. 5. *Theelia sarta* Speckman: upper surface; No. THP11.  
Fig. 6. *Acanthotheelia spiniperforata* n.sp. (holotype); No. THPc-5.  
Fig. 7. *Theelia* aff. *undata* Mostler: *a* lower surface, *b* upper surface; No. THP14-3.  
Fig. 8. *Theelia* sp. 3: *a* upper surface, *b* lower surface; No. THC1.  
Figs. 9—10. *Theelia* sp. 4: 9, 10*a* lower surface, 10*b* upper surface; Nos. THPc-6. THP10.  
Fig. 11. *Acanthotheelia* cf. *anisica* Mostler; No. THP7.

Triassic, Tatra Mts.

All × 115





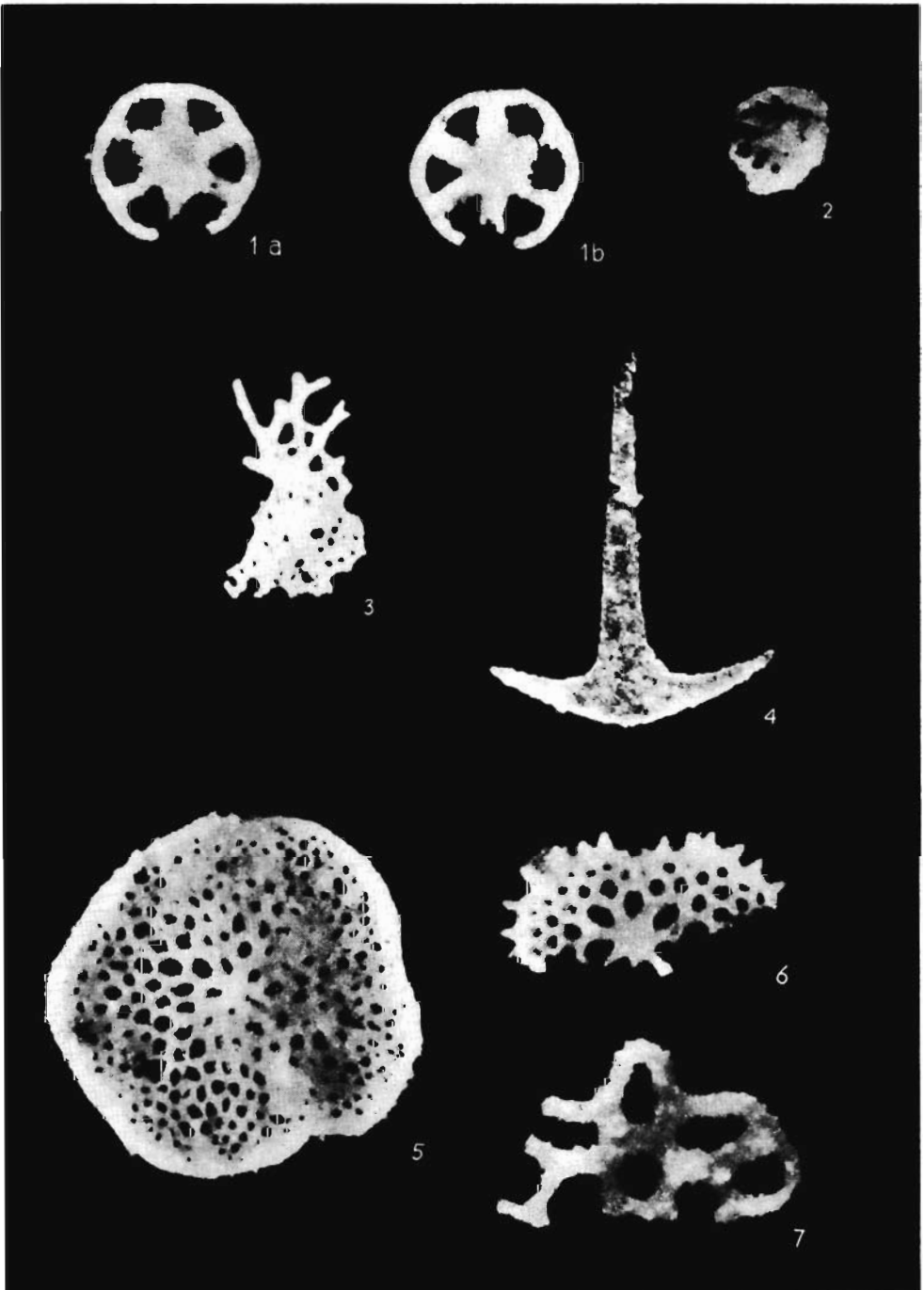


Plate IV

Fig. 1. *Theelia* sp. 1: a upper surface, b lower surface; No. THC3-3.

Fig. 2. *Theelia* sp. 2; No. THP14-4

Fig. 3. ?*Schlumbergerites* sp.; No. THC5.

Fig. 4. ?*Calcancora* sp.; No. THPc-7.

Fig. 5. *Priscopedatus mostleri* n.sp. (holotype); No. THC6-2.

Fig. 6. *Forma 1*; No. THPc-8.

Fig. 7. *Forma 2*; No. THO6-3.

Triassic, Tatra Mts.

All  $\times$  115



*Remarks.* — *Priscopedatus elliptiferus* n.sp. is similar to a form described by Mostler (1969, Pl. 6, Fig. 17) in shape and arrangement of pores, but differs in number and size of pores; moreover, the spire of the former is rather high, therefore it seems improbable that it ever had a forked termination.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Priscopedatus* sp. 1

(Pl. II, Fig. 10)

*Material.* — Two specimens (sample No. 7).

Measurements: Specimen 0.200 mm long, 0.192 mm wide, large pores 0.031 in diameter, smaller pores 0.008 to 0.15 mm in diameter.

*Description.* — Sclerite in the form of flat, ovate, perforated plate with smooth margins; four large izometrical, polygonal pores are surrounded by a single row of smaller pores, almost rectangular in outline and with longer axes parallel to sclerite margin. Pores do not exceed twenty in number. Spire relatively thick and circular in cross section.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Priscopedatus* sp. 2

(Pl. II, Fig. 11)

*Material.* — One specimen (sample No. 7).

Measurements: Specimen 0.192 mm long, 0.162 mm wide, large pore 0.046 mm in diameter.

*Description.* — Sclerite in the form of flat, ovate, perforated plate, slightly elongated, with smooth margins; pores do not exceed 8 in number; among central pores, three are elliptical, almost equal in size, and smaller than fourth pore, ovate in outline and with longer axis normal to axes of former ones; short spire, circular in cross section, occupies eccentric position in connection with bilateral symmetry of sclerite.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Priscopedatus* sp. 3

(Pl. II, Fig. 12)

*Material.* — One specimen (sample No. 5).

Measurements: Maximal radius 0.184 mm, pores 0.005—0.031 mm in diameter, spire 0.018 mm high.

*Description.* — Sclerite in the form of flat, perforated plate, presumably polygonal in outline; margin smooth; pores very numerous, close to

circular, ovate or triangular in outline; pore diameter decreases gradually toward sclerite margin; spire thin, short and irregularly angular.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Priscopedatus* sp. 4

(Pl. II, Fig. 8)

*Material.* — One specimen (sample No. 7).

Measurements: Specimen 0.239 mm long, spire 0.115 mm high, pores 0.015—0.040 mm in diameter.

*Description.* — Plate-like sclerite, relatively thick, slightly elongated, irregular in outline and perforated with small and widely spaced pores; pores uniform in size, polygonal to ovate in outline, and less than 20 in number; central cross formed of four pores; spire central, thick, relatively high, somewhat flattened and irregularly clotty.

*Occurrence.* — Poland, Tatra Mts: Triassic.

Family **Schlumbergeritidae** Deflandre-Rigaud, 1961

Genus *Schlumbergerites* Deflandre-Rigaud, 1961

(Type species: *Schlumbergerites sievertsae* Deflandre-Rigaud, 1961)

?*Schlumbergerites* sp.

(Pl. IV, Fig. 3)

*Material.* — One specimen (sample No. 7).

Measurements: Specimen 0.308 mm long, 0.138 mm wide, pores 0.003—0.031 mm in diameter.

*Description.* — Sclerite elongated, densely perforated, double-layered in places, or only increment in thickness is observed; in the latter case, pores are modified into short tubes; perforation random; shape and size of pores variable; generally size of pores increases narrower end of sclerite.

*Remarks.* — The state of preservation of specimen precludes certainty in determining its generic affinity.

*Occurrence.* — Poland, Tatra Mts: Triassic.

Family **Theelidae** Frizzell & Exline, 1955

Genus *Acanthotheelia* Frizzell & Exline, 1955

(Type species: *Acanthotheelia spinosa* Frizzell & Exline, 1955)

*Acanthotheelia spiniperforata* n.sp.

(Pl. III, Fig. 6)

*Holotypus:* Specimen No. THPc-5; Pl. III, Fig. 6.

*Stratum typicum:* ?Illir.

*Locus typicus:* Wielkie Koryciska, the Chochołowska Valley, Western Tatra Mts.

*Derivatio nominis:* After the presence of spines and increased number of pores.

*Material.* — One relatively well-preserved specimen.

Measurements: Specimen 0.239 mm in diameter, central part 0.065 mm in diameter, spokes 0.015 to 0.025 mm wide, pores 0.001 to 0.026 mm in diameter.

*Description.* — Sclerite in the form of flat, nine-spoked wheel, with uneven outline; triangular spines are situated opposite the particular spoke and in interspoke spaces; short spokes gradually narrow toward center of sclerite; interspoke spaces ovate; centre small, with narrow ring surrounding circular field, distinctly darker than the rest of the sclerite; difference in colour may result from of the hole with secondary material or it may be original depression slightly changed; rim wide and perforated; two rows of pores are observable: inner row of larger, elliptical to ovate pores, with every pore situated opposite to spoke, and external row of smaller pores similar in shape to former, and located in interspoke spaces; both surfaces of sclerite are similar.

*Remarks.* — *Acanthotheelia spiniperforata* n.sp. differs from *A. spinosa* Frizzell & Exline by a number of new morphologic elements, i.e. greater increment of rim/sclerite-diameter ratio, and extra row of pores in comparison with forms described by Kristan-Tollman (1963, Pl. 7, Fig. 7), Mostler (1968, Pl. 4, Fig. 3), Speckman (1968, Pl. 4, Fig. 5; Pl. 5, Figs. 1,4). Moreover, pores are larger and their orientation is slightly different.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Acanthotheelia* cf. *anisica* Mostler, 1968

(Pl. III, Fig. 11)

1968. *Acanthotheelia anisica* Mostler; H. Mostler, *Holothurien-Sklerite...*, pp. 24—25, Pl. 4, Figs. 5, 6; Pl. 6, Figs. 2, 3.

*Material.* — One specimen (sample No. 5).

Measurements: Specimen 0.138 mm in diameter, central part 0.046 mm in diameter.

*Description.* — Sclerite in the form of eight-spoked wheel, with both surfaces similar; spokes short, slightly widening toward sclerite margin; interspoke spaces ovate; rim ornamented with short spines and tubercles, randomly spaced.

*Occurrence.* — Poland, Tatra Mts: Triassic; Northern Calcareous Alps: Upper Anisian.

Genus *Theelia* Schlumberger, 1890  
 (Type species: *Chiridota undulata* Schlumberger, 1888)  
*Theelia sarta* Speckman, 1968  
 (Pl. III, Fig. 5)

1968. *Theelia sarta* Speckman; P. Speckman, *Holothurien-Sklerite...*, pp. 209—210, Pl. 3, Figs. 3, 5.

*Material.* — One specimen (sample No. 1).

Measurements: Specimen 0.234 mm in diameter, central part 0.090 mm in diameter, spokes 0.016 to 0.019 mm wide.

*Description.* — Sclerite in the form of ten-spoked wheel with strongly and regularly scalloped outline; scallops correspond to interspoke spaces; spokes narrow, slightly widening toward sclerite margin; interspoke spaces long, ovate; rim narrow, curved upward and inward, and with inner outline strongly undulated; on the upper surface, triangular projections of rim, occasionally extending up to one-third of spoke, are developed; central part large, flat and smooth.

*Occurrence.* — Poland, Tatra Mts: Triassic; Dolomites, St. Cassian Beds: Upper Ladinian.

*Theelia* aff. *subcirculata* Mostler, 1968  
 (Text-fig. 4; Pl. III, Figs. 4a, b)

1968. *Theelia subcirculata* Mostler; H. Mostler, *Holothurien-Sklerite...*, pp. 28—29, Pl. 5, Fig. 4.

*Material.* — One specimen (sample No. 5).

Measurements: Specimen 0.300 mm in diameter, central part 0.061 mm in diameter, spokes 0.023 to 0.031 mm wide.

*Description.* — Sclerite in the form of nine-spoked wheel with sub-angulated scalloped outline; scallops correspond to interspoke spaces; spokes triangular in cross section, narrow, slightly widening toward margin, strongly arcuate, bent in half of their length, reaching rim at a right angle (Fig. 4); central part small, slightly raised above upper surface of sclerite; upper surface irregularly tuberculated; lower surface ornamented with irregular convexities, located around depressed central

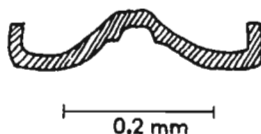


Fig. 4. — *Theelia* aff. *subcirculata* Mostler: cross section; Triassic, Tatra Mts.



part and extending on spokes; rim high, normal to wheel plane, with upper part curved inward; external margin probably smooth.

*Occurrence.* — Poland, Tatra Mts: Triassic; Eastern Alps: Anisian.

*Theelia* aff. *undata* Mostler, 1968

(Text-fig. 5; Pl. III, Fig. 7a, b)

1968. *Theelia undata* Mostler; H. Mostler, *Holothurien-Sklerite...*, p. 30, Pl. 5, Fig. 5.

1968. *Theelia undata* Mostler; P. Speckman, *Holothurien-Sklerite...*, pp. 206–208, Pl. 3, Fig. 2.

*Material.* — Three specimens (sample No. 5).

*Measurements:* Specimen 0.299 mm in diameter, central part 0.070 mm in diameter, spokes 0.031 mm wide.

*Description.* — Sclerite in a form of seven-spoked wheel with strongly undulated outline; spokes slightly arcuate, relatively narrow, with width constant along the whole length; lower surfaces of spokes flat, whereas upper ornamented with ribs continuing along toward margin and increasing in height, becoming a support of triangular projections, protruded above every spoke; interspoke spaces delta-shaped; central part smooth.

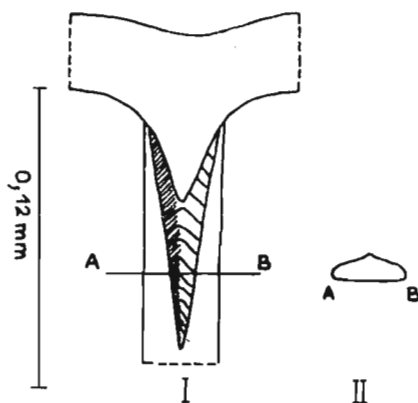


Fig. 5. — *Theelia* aff. *undata* Mostler: *I* top view of the spoke and rim, *II* cross section of the spoke; Triassic, Tatra Mts.

*Remarks.* — Specimen described is similar to *T. undulata* in size, overall outline, shape of interspoke spaces and for junction between rim and spokes, and to *T. undata* by absence of denticles on inner rim margin and presence of long projections protruding over every spoke. The presence of more or less regular, commonly triangular ribs on upper surfaces of spokes is the common feature for most of the species of the

genus *Theelia* (e.g. *Theelia* aff. *subcirculata*, *Theelia* aff. *undata*, *Theelia* sp. 1, *Theelia* sp. 3), described in the present paper.

*Occurrence.* — Poland, Tatra Mts: Triassic; Eastern Alps: Middle and Upper Anisian.

*Theelia immissorbicula* Mostler, 1968

(Pl. III, Figs. 2, 3)

1968a. *Theelia immissorbicula* Mostler; H. Mostler, *Holothurien-Sklerite...*, pp. 26—27, Pl. 5, Fig. 1.

1968b. *Theelia immissorbicula* Mostler; H. Mostler, *Holothurien-Sklerite...*, pp. 57—58, Pl. 2, Fig. 20.

1968. *Theelia immissorbicula* Mostler; P. Speckman, *Holothurien-Sklerite...*, pp. 204—206, Pl. 3, Fig. 4.

*Material.* — Two specimens (sample No. 5).

*Measurements:* Specimens 0.156 to 0.240 mm in diameter, central part 0.052 to 0.089 mm in diameter, spokes 0.010 to 0.019 mm wide.

*Description.* — Sclerite almost perfectly circular in outline; spokes, 13 in number, strongly arched downward, narrow and thin; central part, equalling one-third of sclerite diameter, in a form of cap, convex upward, however, not extending above the rim; rim narrow, curved upward and inward, with smooth inner margin.

*Remarks.* — Forms described by Mostler and Speckman exhibit large variability in outline: some of them are characterized by smooth margin (Mostler, 1968, Pl. 5, Fig. 1), whereas others — by undulated margin (Mostler, 1968, Pl. 2, Fig. 20; Speckman, 1968, Pl. 3, Fig. 4). Specimens described are almost perfectly circular in outline, their margin is smooth and cap-like central part does not rise over plane of rim; however, according to Mostler (1968) and Speckman (1968), this elevation of central part is greatly variable.

The specimens are very similar to forms assigned by Deflandre-Rigaud to *Auricularites arcuatus* (Deflandre-Rigaud, 1952, Fig. 108; 1961, Pl. 5, Fig. 12), but differ in size and by absence of denticles on inner margin of rim.

*Occurrence.* — Poland, Tatra Mts: Triassic; Eastern Alps: Anisian.

*Theelia* sp. 1

(Pl. IV, Figs. 1a, b)

*Material.* — One specimen (sample No. 2).

*Measurements:* Specimen 0.184 mm in diameter, central part 0.077 mm in diameter, spokes 0.016 mm wide.

*Description.* — Sclerite in the form of six-spoked wheel, undulated in outline, with tendency to hexagonal shape; spokes arcuate, with

margins parallel; interspoke spaces in a form of triangle with somewhat convex base; lower surface of central part is depressed; rim relatively narrow, curved upward and inward; small triangular projection protruded above every spoke.

*Remarks.* — Central part infilled from below and above with secondary mineral material, thus ornamentation is intractable.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Theelia* sp. 2  
(Pl. IV, Fig. 2)

*Material.* — One specimen (sample No. 5).

Measurements: Specimen 0.138 mm in diameter, central part 0.038 mm in diameter.

*Description.* — Sclerite in the form of seven-spoked wheel almost regular in outline; spokes short, flat, hour-glass-shaped, rapidly widening toward sclerite margin; circular perforation observable in terminal part of every spoke; central part and margin smooth.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Theelia* sp. 3  
(Pl. III, Fig. 8 a, b)

*Material.* — One specimen (sample No. 4).

Measurements: Specimen 0.255 mm in diameter, spokes 0.023—0.031 mm wide.

*Description.* — Sclerite in the form of nine-spoked wheel, undulated in outline; convexities correspond to interspoke spaces; spokes slightly arcuate, relatively narrow, moderately widening toward sclerite margin, rounded below, with triangular rib on upper surface; rib increases in height toward sclerite margin, and consequently, the height of spoke exceeds width; interspoke spaces ovate; central part small, somewhat depressed from below, flat from above.

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Theelia* sp. 4  
(Pl. III, Figs. 9, 10a, b)

*Material.* — Two specimens (samples No. 5, 8).

Measurements: Diameter from 0.231 to 0.261 mm.

*Description.* — Sclerite in the form of six- or seven-spoked wheel, slightly undulated in outline; spokes moderately arcuate, rounded from below and almost triangular from above, widening toward rim; rim curved upward and inward, protruding in the form of triangular pro-

jection above every spoke; central part small, with upper surface somewhat convex and lower flat.

*Occurrence.* — Poland, Tatra Mts: Triassic.

Family **Calcancoridae** Frizzell & Exline, 1955

Genus *Calcancora* Frizzell & Exline, 1955

(Type species: *Calcancora mississippiensis* Frizzell & Exline, 1955)

?*Calcancora* sp.

(Pl. IV, Fig. 4)

*Material.* — Two specimens (sample No. 8).

Measurements: Specimen 0.447 mm long, shank 0.046—0.092 mm wide, fluke-span 0.338 mm.

*Description.* — Sclerite in the form of very flat, anchor with long and slender flukes; from the half of fluke length to the extreme, small, ledges continue; angle between fluke and shank axes attains 80°; shank is narrowing upward and terminates in the way, making it impossible to determine whether the stock existed and was broken off or whether it never existed.

*Occurrence.* — Poland, Tatra Mts: Triassic; Brazil: Palaeocene; France: Eocene; USA: Oligocene; Austria: Tortonian; Germany: Upper Jurassic.

Incertae Familiae

*Forma 1*

(Pl. IV, Fig. 7)

*Material.* — One specimen (sample No. 5).

Measurements: Specimen 0.335 mm long, central part 0.046 mm in diameter, pores 0.005 to 0.015 mm in diameter.

*Description.* — Sclerite in the form of flat, slightly elongated perforated plate with a certain tendency to bilateral symmetry, irregular in outline; numerous triangular spines; spokes, seven in number, subradially arranged, short, flat, narrowest at the middle of their length; interspoke spaces ovate, short; rim wide, perforated, with three concentric rows of pores; circular to ovate towards exterior, pores decrease in size and increase in number.

*Remarks.* — Form of the central part generally correspond to pattern typical for Theelidae, whereas appearance of such features as external spines and flatness points to affinity with the genus *Acanthotheelia*, but, in turn, very wide rim with numerous pores and tendency to bilateral symmetry confirm the connection with the genus *Eocaudina* (*Eocaudina spinosa* Mostler, 1968).

*Occurrence.* — Poland, Tatra Mts: Triassic.

*Forma 2*

(Pl. IV, Fig. 8)

*Material.* — One specimen (sample No. 7).

*Measurements:* Specimen 0.354 mm long, 0.214 mm wide.

*Description.* — Sclerite in the form of elongated perforated plate, irregular in outline; pores large, closely spaced, generally elongated, polygonal or ovate, occasionally circular, almost equal in size.

*Occurrence.* — Poland, Tatra Mts: Triassic.

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*December, 1969*

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KRYSZYNA ZAWIDZKA

SKLERYTY HOLOTHUROIDEA Z TRIASU PŁASZCZOWINY CHOCHAŃSKIEJ  
TATR ZACHODNICH

*Streszczenie*

Opracowane skleryty Holothuroidea pochodzą z kompleksu wapieni z rogowcami oraz wapieni płytowych zachodniej części płaszczowiny chochańskiej (Fig. 1), należących do facji wapieni z „Gr. Reifling” obejmującej anizyk górny i częściowo ladin (Guzik, 1958, 1959; Kotański, 1961, 1965).

Opisano 19 gatunków, należących do 10 rodzajów, w tym 3 nowe gatunki i 16 okazów, których przynależność gatunkowa i rodzajowa jest wątpliwa, a ponadto 2 formy o niepewnej pozycji systematycznej na szczeblu rodziny. Najliczniej reprezentowana jest rodzina Priscopedatidae, do której należą dwa z trzech nowych gatunków i Theelidae.

Skleryty występują sporadycznie, co nie pozwala na szczegółowszą charakterystykę stratygraficzną zespołu skalnego, który je zawiera. Materiał cechuje niezmiernie mała ilość osobników przy stosunkowo znacznej liczbie gatunków. Opierając się na tabeli przedstawionej na Fig. 2, można stwierdzić, że większość opisanych sklerytów była dotychczas znana z górnego anizyku, co zdaje się potwierdzać ten właśnie wiek badanej serii skalnej. Wapienie z „Gr. Reiflingu” w Alpach oraz podobne wapienie płaszczowiny chochańskiej poza granicami Polski są określane jako głębokonytryczne lub płytkobatialne (Andrusov, 1959), co pozwala wskazać na dość znaczne głębokości, na których nagromadziły się izolowane skleryty.

КРЫСТИНА ЗАВИДЗКА

СКЛЕРИТЫ ГОЛОТУРИЙ ИЗ ТРИАСА ХОЧАНСКОГО НАДВИГА  
В ЗАПАДНЫХ ТАТРАХ*Резюме*

Изученные склериты голотурий добыты из комплекса известняков с кремнями и плитняковых известняков западной части Хочанского надвига (фиг. 1), относящихся к фации известняков, которая охватывает верхнеанизийский и частично ладинский ярусы (Гузик, 1958, 1959; Котаньски, 1961, 1965).

Описано 19 видов, принадлежащих к 10 родам, в том числе 16 склеритов, видовая и родовая принадлежность которых достоверно не определена, а также две формы, систематическую позицию которых трудно определить. Наиболее обильно представлены склериты семейства Priscopedatidae, к которым относятся два из трех новых видов.

Склериты распространены изолированно, что не позволяет составить детальную стратиграфическую характеристику вмещающих их пород. Изученный материал характеризуется небольшим количеством особей при сравнительно богатом количестве видов. Согласно данным, приведенным в таблице 2, можно заключить, что большинство исследованных склеритов было известно до сих пор из верхнеанизийского подъяруса. Отсюда следует, что и изученные породы характеризуются верхнеанизийским возрастом.

Известняки эквивалентной фации в Альпах, а также в Хочанском надвиге за пределами Польши считаются глубоконеритовыми и мелкobatiальными породами (Андрусов, 1959), что свидетельствует о значительной глубине, на которой накопились изолированные склериты.

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