



The Miocene holothurian sclerites from Wawrzyńcowice IG 2 borehole (Opole region)

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Described holothurian sclerites represent two families: Synaptitidae and Caclamnidae. Basing on its mass occurrence *Croneisites polonicus* Górka et Łuszczewska has been considered an index taxon for the Miocene. Holothurian sclerites are accompanied by foraminifers belonging to the following genera: *Elphidium*, *Bulimina*, *Neobulimina* and *Triloculina*. Their presence confirms a conclusion that the sediments were deposited in a warm and shallow-marine environment.

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Key words: Miocene, holothurian sclerites, systematics, palaeoecology.

INVESTIGATED MATERIALS

The described sclerites were found in cores from Wawrzyńcowice IG 2 borehole, which is located in the Opole region (Fig. 1). Their presence in the upper Badenian deposits pierced by above borehole was noted by E. Odrzywolska-Biełkowska (1977). In this paper, the author mentioned that holothurian sclerites also occur in borehole Twardawa IG 1 locating in the same region. Although I have not found them in the samples studied by myself.

The described holothurian sclerites occur at depths of 198.6 and 199.9 m (Fig. 2). They are not so well preserved and their frequency is not so high as in the Gliwice boreholes (see below). They have been assigned to two families: Synaptitidae and Caclamnidae. The most common are specimens belonging to the genus *Croneisites* Frizzel et Exline 1957, represented in particular by *Croneisites polonicus* Górka et Łuszczewska 1969, which may be considered an index taxon for the Miocene. It is abundant in the Miocene (Sarmatian) deposits of Żreca near Chmielnik (H. Górka, L. Łuszczew

ka, 1969), Badenian clays of Korytnica (A. Walkiewicz, 1977) and Miocene deposits from boreholes Gliwice G-19 and Gliwice G-21 (H. Górka, 1997).

Apart from this predominant species, also *Croneisites* sp. 1 and *Croneisites* sp. 2 have been found. The family Caclamnidae is represented by *Caclamnoidea goniaia* Kristan-Tollmann as well as *Eocaudina* sp. 1 and poorly preserved *Eocaudina* sp. 2

Plates and spines of echinoids, ophiuroids, bryozoans and small gastropod shells are also abundant in the studied material.

The literature concerning the Miocene holothurian sclerites is relatively scanty. Apart from Poland, they were also described by J. Duvergier (1924) from the Burdigalian deposits of Saucats and Cestes in the Aquitanian Basin as well as by A. Papp and K. Küpper (1953) and E. Kristan-Tollmann (1964) from the Tortonian of Baden, Eisenstadt and Müllerdorf in the Vienna Basin.

The described collection of sclerites is housed at the Institute of Geology of the Geology Department of Warsaw University, under the acronym IGP UW-HIII.

The photographs were taken using the XL-20 Philips electron microscopy.



Fig. 1. Location map of studied borehole
Szkic sytuacyjny badanego otworu wiertniczego

INTERPRETATION

Environmental conditions are rather difficult to interpret, basing solely upon holothurian sclerites, because most of modern holothurians are characteristic of a wide bathymetric and climatic range. However, the holothurian sclerites assemblage from the Miocene deposits of the borehole Wawrzyńcowice IG 2, with the genus *Croneisites* Frizzel et Exline being predominant, points to a rather warm sea of normal salinity. Taking into account the fact that foraminifers of the genus *Elphidium* de Monfort, considered to have been characteristic of shallow waters, are also abundant in the studied samples, it may be inferred that these sediments were deposited in warm and shallow waters. This is also confirmed by both: the presence of representatives of the genera *Bulimina* d'Orbigny and *Neobulimina* Cushman et Wickenden, which lives at the salinity of 32–36‰ and temperature 30°C, and the occurrence of *Triloculina* d'Orbigny which have similar ecological requirements.

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SYSTEMATIC DESCRIPTIONS

Class Holothuroidea

Family *Synaptitidae* Frizzel et Exline 1955
emend. Frizzel et Exline 1957

Genus *Croneisites* Frizzel et Exline 1957

Type species *Croneisites oligocenicus* (Spandel) = Syn.
Synapta oligocenica Spandel from the Oligocene, Germany
(E. Spandel, 1900, p. 50–51, figs. 3–5)

Croneisites polonicus Górka et Łuszczewska 1969 (Pl. I, Figs. 2, 3, 5–16)

- 1969 *Croneisites polonicus* sp. n.; H. Górka, L. Łuszczewska: p. 366–367, pl. 68, fig. 7, pl. 69, figs. 1–6, 8, 10, pl. 70, fig. 4.
1977 *Croneisites polonicus* Górka et Łuszczewska; A. Walkiewicz: p. 189–190, pl. 4, figs. 1–3.
1997 *Croneisites polonicus* Górka et Łuszczewska; H. Górka: pl. I, figs. 1–12, pl. II, figs. 1–16.

Material: 80 well-preserved specimens.

Description. The sclerite has a form of perforated plate, concave-convex, with hexagonal outline and slightly rounded sides, elongated along a plane of symmetry. Six major, oval perforations with small denticulations at fringes, better visible on convex side are observed. Three smaller elliptic perforations, also with small denticulations, are above them (Pl. I, Figs. 3, 5, 8 and 10). Archwise stirrup, occasionally with small denticulations, is located on a concave side of the sclerite (Pl. I, Figs. 6–8, 13 and 15). 3–5 small, oval perforations of different sizes and differently arranged, but devoid of denticulations, are visible in apical part.

Remarks. Shapes of plates vary from hexagonal (Pl. I, Figs. 2, 13 and 15) to more rounded (Pl. I, Figs. 3, 7 and 14), and rarely more or less elongated (Pl. I, Figs. 8 and 12). The sclerite illustrated in Pl. I, Fig. 12 is a transitional form between *Croneisites polonicus* Górka et Łuszczewska and *Croneisites* sp. 1 (Pl. I, Fig. 1) which is more elongated.

The variability refers also to a quantity and arrangement of small perforations in apical part of a plate. Most frequently there are three (Pl. I, Figs. 3, 5, 6, 8, 10, 13 and 15), more rarely five perforations (Pl. I, Figs. 7 and 11), and one of them, located in the middle, is larger.

Moreover, stirrup may be more or less broad, smooth or covered with small denticulations located in the middle and end part of its lower and upper edges.

A similar type of a sclerite is observed in modern holothurians, in which one species can include two morphological types, i.e. plates and flukes.

H. L. Clark (1907, pl. 4, fig. 24), for example, described two morphological types: plates and flukes occurring in coral limestones and sandy abysses, as single species of *Euapta lappa* (Müller) (*fide* H. J. Théel, 1886). W. Erwe (1913, pl. 8, fig. 26) described *Chondroclaea recta* (Semper) from southwest Australia, New Guinea, Philippine Islands, Timor and Ceylon, as *Polyplectana kofersteini* (Selenka) (*fide* R. Semper, 1868, p. 77, fig. 20) from the Red Sea, Moluccas, Samoa, Hawaii Islands and Kosseir. B. Mayer (1937, p. 39, Texte-fig. 35 a, b) named them *Polyplectana innaerens* Müller, whereas G. Charbonnier (1951, p. 54, pl. 27, fig. 6) — *Opheodesoma spectabilis* Fischer (America, Pacific Ocean and Hawaii coasts as well as Tahiti and Dutch India).

Euapta gedeffroi (Semper 1868) (*fide* C. Massin, 1996, p. 167–168, fig. 11) from eastern Iceland should also be mentioned in this context.

Croneisites polonicus Górka et Łuszczewska has been considered an index taxon for the Miocene, due to its mass occurrence in Miocene deposits in Poland.

Occurrence. Miocene, Żrecza 3 borehole (depth 64.8–64.9 m), Gliwice 19 borehole (depths: 45.0, 55.0, 90.0, 100.0, 106.0 and 114.0 m), Gliwice 21 borehole (depths: 19.2, 19.4, 20.8, 31.0, 81.0, 82.9, 84.0 and 92.2 m), Wawrzyńcowice IG 2 borehole (depths: 198.6 and 199.9 m) and Badenian clays from Korytnica.

Croneisites sp. 1
(Pl. I, Fig. 1)

Material: one damaged specimen.

Description. Fenestrate plate, concave-convex, with hexagonal shape and considerably elongated along with its longer axis. Nine oval perforations are arranged in parallel rows, with small denticulations at fringes. A few small perforations in unknown number (due to a poor state of preservation) are located on apical side. One of them (the middle one) is larger. Archwise stirrup is on a concave side.

Remarks. *Croneisites* sp. 1 differs from *C. polonicus* Górka et Łuszczewska in remarkably elongated shape and greater number of perforations.

Occurrence. Wawrzyńcowice IG 2 borehole, depth 199.9 m.

Croneisites sp. 2
(Pl. I, Fig. 4)

Material: One damaged specimen.

Description. The sclerites has a form of perforated plate, with rounded shape and outstandingly truncated base. Three oval perforations are observed at the base with the middle one being larger. Two larger perforations are located in the middle of the plate and three smaller ones, also oval, are above them. These perforations are fit out with small denticulations. Archwise stirrup can be seen on a concave side of the plate, in its apical part. There are also two smaller, rounded perforations devoid of denticulations.

Remarks. *Croneisites* sp. 2 does not resemble any of the so far described species belonging to this genus, neither among ancient nor modern specimens.

Family *Caclamnidae* Frizzel et Exline 1955

Genus *Caclamnoidea* Frizzel et Exline 1955

Type species *Priscopedatus collaris* Deflandre-Rigaud
1946 from the Oxfordian, France

Caclamnoidea goniaia Kristan-Tollmann 1964
(Pl. I, Fig. 18)

1964 *Caclamnoidea* sp. n.; E. Kristan-Tollmann: p. 83, pl. 4, figs. 7, 8.

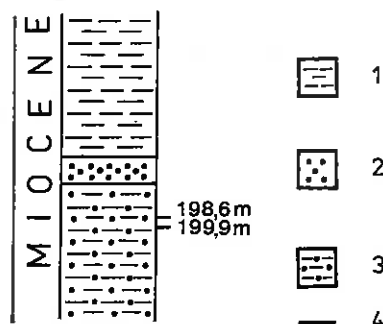


Fig. 2. Sampled Miocene interval in the Wawrzyńcowice IG 2 section
1 — dark grey clay, somewhere green, 2 — yellow-grey sand, 3 — dark grey clay, 4 — location of samples

Opróbowany fragment miocenu z otworu wiertniczego Wawrzyńcowice IG 2
1 — il ciemnoszary, miejscami zielony, 2 — piasek żółtoszary, 3 — il ciemnoszary, 4 — miejsca pobrania próbek

1977 *Caclamnoidea goniaia* Kristan-Tollmann; A. Walkiewicz: p. 185, pl. 4, fig. 7.

Material. One damaged specimen.

Description. Flat plate, of irregular shape and serrated periphery, with 12 perforations arranged in parallel rows. Perforations are of different sizes, round to oval.

Occurrence. Tortonian of Austria, Middle Miocene (Badenian) of Korytnica. Wawrzyńcowice IG 2 borehole, depth 198.6 m.

Genus *Eocaudina* Martin emend. Frizzel et Exline 1955
Type species *Eocaudina septaforaminata* Martin 1952
from the Devonian, Iowa

Eocaudina sp. 1
(Pl. I, Figs. 17, 19)

Material. Two damaged specimens.

Description. Flat, massive, slightly elongated, irregularly perforated plate composed of a single layer. Perforations are of different sizes and relatively large, round to oval in outline. Irregularly serrated periphery maybe damaged.

Remarks. *Eocaudina* sp. 1 does not resemble any of so far described species belonging to this genus.

Eocaudina sp. 2
(Pl. I, Figs. 20, 21)

Material. Two damaged specimens.

Description. Flat, irregular plate composed of a single layer, with abundant irregularly arranged perforations.

Perforations are of different sizes, round to oval in outline, with callosities at edges.

R e m a r k s . *Eocaudina* sp. 2 does not resemble any of the so far described species belonging to this genus.

O c c u r r e n c e . Wawrzyńcowice IG 2, depths 198.6 and 199.9 m.

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SKLERYTY HOLOTURII Z MIOCENU OTWORU WIERTNICZEGO WAWRZYŃCOWICE IG 2 (ŚLĄSK OPOLSKI)

Streszczenie

Opracowano skleryty holoturii z osadów miocenu otworu wiertniczego Wawrzyńcowice IG 2 (region Śląska Opolskiego). Zaklasyfikowano je do dwóch rodzin: Synaptitidae i Caclamnidae.

Na podstawie masowego występowania *Croneisites polonicus* Górka et Łuszczewska, takson ten uznano za wskaźnikowy dla miocenu.

Sklerytom holoturii towarzyszą przedstawiciele otwornic z rodzajów takich jak: *Elphidium*, *Bulimina*, *Neobulimina* i *Triloculina*. Ich obecność potwierdza wniosek, że osady te powstały w warunkach ciepłego i płytkiego morza.

EXPLANATION OF THE PLATE I

Fig. 1. *Croneisites* sp. 1

IGP UW-HIII-30, depth 199.9 m

Figs. 2, 3, 5–16. *Croneisites polonicus* Górka et Łuszczewska

Fig. 2 — IGP UW-HIII-32, Fig. 3 — IGP UW-HIII-6, Fig. 5 — IGP UW-HIII-10, Fig. 6 — IGP UW-HIII-22, Fig. 7 — IGP UW-HIII-16, Fig. 8 — IGP UW-HIII-2, Fig. 9 — IGP UW-HIII-19, Fig. 10 — IGP UW-HIII-1, Fig. 11 — IGP UW-HIII-9, Fig. 12 — IGP UW-HIII-26, Fig. 13 — IGP UW-HIII-12, Fig. 14 — IGP UW-HIII-35, Fig. 15 — IGP UW-HIII-3, Fig. 16 — IGP UW-HIII-4; Figs. 2, 12, 14 — depth 199.9 m, Figs. 3, 5–11, 13, 15, 16 — depth 198.6 m

Fig. 4. *Croneisites* sp. 2

IGP UW-HIII-5, depth 198.6 m

Figs. 17, 19. *Eocaudina* sp. 1

Fig. 17 — IGP UW-HIII-31, Fig. 19 — IGP UW-HIII-33; depth 199.9 m

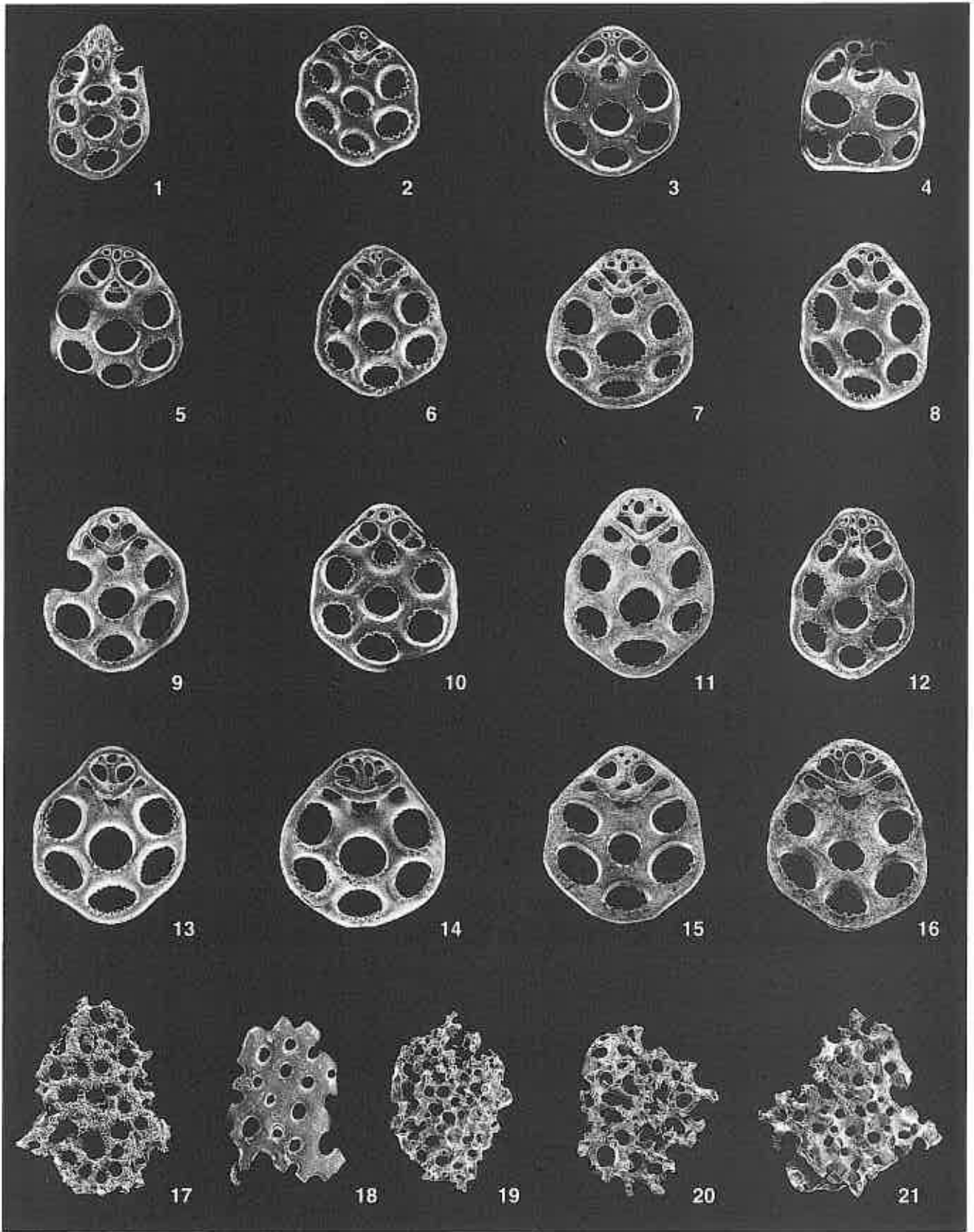
Fig. 18. *Calcamnoidea goniaia* Kristan-Tollmann

IGP UW-HIII-20, depth 198.6 m

Figs. 20, 21. *Eocaudina* sp. 2

Fig. 20 — IGP UW-HIII-28, depth 199.9 m; Fig. 21 — IGP UW-HIII-21, depth 198.6 m

Fig. 1 — x 140; Figs. 2–20 — x 156; Fig. 21 — x 140



Hanna GÓRKA — The Miocene holothurian sclerites from Wawrzyńcowice IG 2 borehole (Opole region)