

L. BEVERLY TARLO

A PRELIMINARY NOTE ON NEW OSTRACODERMS FROM
THE LOWER DEVONIAN (EMSIAN) OF CENTRAL POLAND

Abstract. — The Emsian sediments of the Holy Cross (Święty Krzyż) Mountains in Central Poland include an essentially marine sequence (Łysogóry facies) and a continental placoderm series (Kielce facies). Placoderm facies occur within the marine sequence. A new richly fossiliferous deposit from the continental sequence has yielded abundant remains of acanthodians, arthrodires, the crossopterygian *Porolepis*, and heterostracans in particular psammosteids. These Emsian psammosteids show similarities to the Middle Devonian Baltic forms. They appear more likely to be the forerunners of the Middle Devonian Baltic forms than does the Siegenian and Emsian *Drepanaspis* which is a marine-lagoonal type.

INTRODUCTION

In the summer of 1955 the author, as guest of the Paleontological Institute of Warsaw University, collected a number of specimens of vertebrate-bearing Emsian sandstone from a quarry north of Daleszyce, near Kielce, in Central Poland (see fig. 1). The fauna was recognised by Dr. E. I. White of the British Museum (Natural History) as including acanthodians, arthrodires, the crossopterygian *Porolepis* Woodward, and new heterostracans. The fauna is being investigated by Mr. J. Kulczycki of the Institute of Paleozoology, Polish Academy of Sciences, who has generously agreed to allow the author to describe the Agnatha. A further collection was made in the summer of 1956.

The fossils are preserved as natural moulds in a fine grained sandstone. The grains are well rounded, but the interstices are filled with secondary quartz in optical continuity with the original grains, producing a typical quartzite. There is a high proportion of zircon present as well as some feldspar. As a result of subsequent silicification the most delicate ornamentation of the fossil remains is perfectly preserved. The plates, spines, scales and other skeletal parts have suffered little distortion and can best be examined from casts (for methods of preparation see Rixon & Meade, 1956). Occasionally, small fragments of original bony material are preserved.

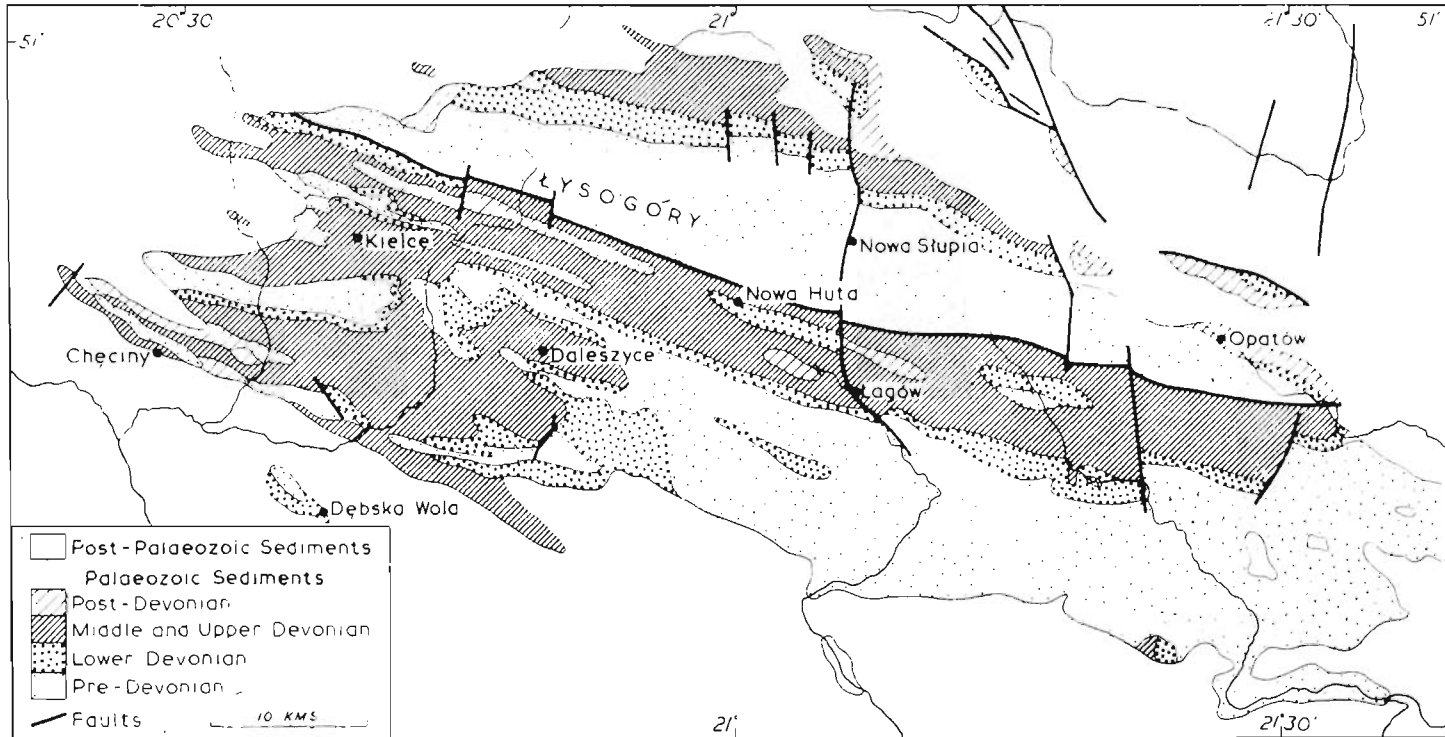


Fig. 1. — Sketch map of the Holy Cross Mountains showing the Devonian sediments (after Samsonowicz, 1952).

GEOLOGY

The Emsian sediments of the Holy Cross (Święty Krzyż) Mountains include an essentially marine sequence — the Łysogóry facies — and a continental placoderm series — the Kielce facies. Placoderm-bearing beds occur within the marine sequence, but the correlation of the two series is uncertain. The Łysogóry facies contain marine invertebrates (Czarnocki, 1937), whilst the placoderm series includes only vertebrate and plant remains.

The succession, according to Czarnocki (1937), in the Łysogóry region is:

Lower Eifelian: Bukowa Góra Beds (*cultrijugatus* horizon)

Upper Emsian: Massive jointed and *Scolithus* Sandstone

Middle Emsian: *Spirifer* Sandstone

Lower Emsian: Barcza Beds

Siegenian hiatus

Upper Gedinnian: Klonów Beds

Lower Gedinnian: Rzepin Beds or Miedziana Góra Conglomerate.

The succession (Czarnocki, 1937) in the Kielce region is:

Lower Eifelian Dolomites

Shales with *Haliserites*

Bieliny Conglomerates (molluscan fauna)

Placoderm Sandstone

Conglomerate

Siegenian and Gedinnian hiatus.

Gürich (1896) considered the Placoderm Sandstone to be equivalent to the *Spirifer* Sandstone i. e. Middle Emsian; whilst Sobolev (1909) believed it to be transgressive and probably including part of the Middle Devonian as well as the upper part of the Lower Devonian. Later Czarnocki (1937) suggested that the presence of *Machaeracanthus polonicus* Gürich and *Ctenacanthus* sp. in both the Placoderm Sandstone and the Barcza Beds, indicates that the former is, at least in part, of Lower Emsian age. Furthermore, as the fauna of the Bieliny Conglomerates is similar to that of the Upper Emsian, the Placoderm Sandstone probably represents the whole of the Emsian.

The vertebrate fauna of the Placoderm Sandstone was described by Gürich (1896) as including the following genera: *Psammosteus*, *Coccosteus*, *Heterostius*, *Bothriolepis*, *Ctenacanthus* and *Machaeracanthus*; no description of this fauna has since been made. Czarnocki

(1937, p. 181) wrote that „it is for the greatest part poorly preserved and has no stratigraphical or paleontological value. It is rather rare and fragmentary”.

The presence of a vast amount of well preserved vertebrate remains at Daleszyce and also at Dębska Wola, 18 km south of Kielce (Czarnocki, 1937, p. 181) enables a detailed study of the fauna of one stratigraphical horizon to be undertaken. On the basis of such a paleontological study it may be possible in the future to establish a vertebrate succession in the Kielce facies; and, more important, to correlate this with the intercalated placoderm beds in the Łysogóry facies.

PALEONTOLOGY¹

Previously the only record of an ostracoderm from the region was of *Psammosteus* sp. (Gürich, 1896, p. 392) from the Placoderm Sandstone at Nowa Huta, 12 km north-east of Daleszyce. The recent collections have yielded at least four forms of psammosteid and two fragments of a pteraspid. Although the latter is specifically indeterminate, it is of interest being the first record of a pteraspid from the Holy Cross Mountains. Furthermore, with the exception of the Middle Devonian forms from Spitsbergen (Dineley, 1955), it is the only record of a pteraspid associated with the later forms of psammosteid.

The stratigraphical position occupied by the Daleszyce psammosteid fauna is given on p. 229.

From the previously supposed absence of freshwater psammosteids in the Emsian, it has been assumed that the Middle Devonian Baltic freshwater forms must have been derived from the marine-lagoonal *Drepanaspis*. This conception was put forward by Obruchev (1944, 1947) and was based primarily on a consideration of the branchial plates: „Evolution has taken place from *Drepanaspis* through *Psammolepis* to *Psammosteus* by the gradual changing of the branchial plates so that they became shorter and wider. Together with this the posterior parts of the branchials were reduced” (1947, p. 517, translated from the Russian). The differences in branchial plates were correlated with the change from a marine-lagoonal to a fluvatile habitat (1944, p. 145).

However, when the branchials of other Middle Devonian psammosteid genera are examined and additional characters i. e. ventral median plates, are considered, it is evident that there is no simple relationship between *Drepanaspis*, *Psammolepis* and *Psammosteus*.

¹ This note is concerned only with the Agnatha since the Gnathostomata are to be described by J. Kulczycki.

The discovery of a varied psammosteid fauna at the end of Lower Devonian times, living in a freshwater environment and showing similarities with the later Middle Devonian forms, renders unlikely the derivation of the Baltic psammosteids from the marine-lagoonal *Drepanaspis*. It would rather indicate that the Daleszyce psammosteids

MAJOR PSAMMOSTEID FAUNAS

Stages		Continental facies	Marine facies
UPPER DEVONIAN		BALTIC <i>Psammosteus</i> Agassiz <i>Dyptychosteus</i> Preobrajensky <i>Karelosteus</i> Obruchev <i>Aspidosteus</i> Obruchev	
MIDDLE DEVONIAN		BALTIC <i>Psammosteus</i> Agassiz <i>Psammolepis</i> Agassiz <i>Pycnosteus</i> Preobrajensky <i>Ganosteus</i> Rohon <i>Schizosteus</i> Obruchev <i>Yoglinia</i> Obruchev	
LOWER DEVONIAN	EMSIAN	DALESZYCE FAUNA	RHINELAND <i>Drepanaspis</i> Schlüter
	SIEGENIAN		RHINELAND <i>Drepanaspis</i> Schlüter
	GEDINNIAN	PODOLIA <i>Weigeltaspis</i> Brotzen ANGLO-WALES <i>Weigeltaspis</i> Brotzen <i>Tesseraspis</i> Wills	

were the probable forerunners of the later Middle Devonian forms. The existence of both freshwater and marine psammosteid faunas in Emsian times means that a common ancestor must be sought earlier. The psammosteids in fact must have developed along two independent lines — a marine represented by *Drepanaspis* and a freshwater by the Daleszyce and Baltic faunas — from at least pre-Siegenian times.

The Daleszyce psammosteids show very distinctive ornamentation, but there is also considerable variation shown in different parts of the carapace within individuals.

The most common psammosteid, type *A*, bears closely packed, large rounded tubercles, each crenulated at the base, those on the ridge scales being more elongate. A fragment of a median plate (see pl. I, fig. 1) shows concentric growth lines and short radial grooves on the external surface probably representing sensory canals. The branchial plates appear to show some similarities to *Pycnosteus*. As no ventral median plates have yet been identified, it has not been possible to assign this form to a genus.

Type *B* is represented by a fragment of a median plate (see pl. I, fig. 2 for detail) which has tubercles similar to those of type *A*. They are, however, separated from each other by zones of minute tubercles, similar in some respects to those occurring in *Psammolepis undulata* Agassiz and in some specimens of *Pycnosteus tuberculatus* (Rohon).

Type *C* is a branchial plate which has very large, low tubercles well separated from each other as in *Ganosteus stellatus* Rohon. However, in outline the plate approaches *Psammolepis* rather than *Ganosteus*.

The last psammosteid, type *D*, has an ornament of closely packed, small tubercles, but as only a few small fragments have been collected, no suggestion of possible affinities can be made.

It is hoped that further work on the Daleszyce psammosteids will reveal some connection with the Middle Devonian genera, whilst a further examination of the Gedinian genera *Tesseraspis* and *Weigeltaspis* may throw some light on the earlier history of the group. At present it is possible to state that the central position of *Drepanaspis* in this history is no longer as firmly established as it had appeared.

ACKNOWLEDGEMENTS

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Professor W. Gross of Berlin University provided facilities for examining the psammosteids in his care; Professor D. Obruchev of the Academy of Sciences, Moscow, sent photographs of the psammosteids in his collections, and Dr. Elga Mark of Tallinn — photographs of *Pycnosteus*. To all the above persons the author tenders his sincere thanks.

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L. BEVERLY TARLO

WIADOMOŚCI WSTĘPNE O NOWYCH OSTRAKODERMACH Z DOLNEGO DEWONU(EMSU) POLSKI ŚRODKOWEJ

Streszczenie

Autor miał sposobność latem 1955 i 1956 r. wyekspluatować wraz z mgr J. Kulczyckim obfite szczątki ryb i ostrakodermów z piaskowca dolno-dewońskiego w Daleszycach, zachowane w postaci odcisków. Badaniem ryb zajął się J. Kulczycki, a opracowanie ostrakodermów zostało powierzone autorowi.

Na wstępie podana jest krótka charakterystyka złoża oraz stanu zachowania skamieniałości. Następnie przytoczono zasadnicze dane dotyczące stratygrafii dolnego dewonu Gór Świętokrzyskich, głównie na podstawie pracy J. Czarnockiego (1937). Reprodukowana jest szkicowa mapka geologiczna Gór Świętokrzyskich według J. Samsonowicza (1952).

W wyniku następnych badań zebranego materiału, autor umieszcza faunę daleszycką, zgodnie z Czarnockim, w piętrze emskim. Cechą charakterystyczną tej fauny ostrakodermów jest dominacja w niej psammosteidów, które tutaj żyły w środowisku słodkowodnym. Fakt ten jest o tyle ciekawy, że dotychczas przypuszczano (D. Obruczew, 1944 i 1947), że słodkowodne środkowo-dewońskie psammosteidy wywodzą się z morsko-lagunowych drepanaspidów. Autor skłania się raczej ku koncepcji, że psammosteidy reprezentują linię rozwojową nie zależną od linii drepanaspidów, już od epoki przed zigenem. Pierwsza z tych linii była słodkowodna, a druga — morska.

Pewne uwagi poświęcone zostały charakterystycznym cechom ornamentacyjnym płytek pancerza. Należy przypuszczać, że szczegółowe badania zebranego ma-

teriału, będące w toku, mogą rzucić nowe światło na stosunek psammosteidów dalezych do rodzajów środkowo-dewońskich. Już obecnie jednak można powiedzieć, że przypuszczenie o centralnej pozycji rodzaju *Drepanaspis* w historii tych bezszczękowców zostaje zachwiane.

OBJASNIENIA DO PLANSZY

Fig. 1. Fragment płytki medialnej typu A, z widoczną ornamentacją, liniami przyrostowymi oraz kanałami czuciowymi, $\times 2$.

Fig. 2. Szczegóły ornamentacji typu B, $\times 10$.

Oba okazy zachowane w postaci naturalnych odcisków

Л. БЕВЕРЛИ ТАРЛО

ПРЕДВАРИТЕЛЬНЫЕ СВЕДЕНИЯ О НОВЫХ ОСТРАКОДЕРМАХ ИЗ НИЖНЕГО ДЕВОНА (ЭМСА) ЦЕНТРАЛЬНОЙ ПОЛЬШИ

Резюме

Летом 1955 и 1956 г. автор имел возможность вести эксплуатацию, вместе с мгр. Ю. Кульчицким, богатых остатков рыб и остракодерм из нижне-девоновского песчаника в Далешицах, сохранившихся в виде отпечатков. Изучением рыб занялся Ю. Кульчицкий, исследование же остракодерм поручено автору.

Во вступительной части статьи приведена краткая характеристика заложки и сохранности окаменелостей. Приведены также основные данные о стратиграфии нижнего девона Свентокжиских гор, главным образом на основании публикации Я. Чарнощного с 1937 г. Воопроизведена схематическая геологическая карта Свентокжисских Гор Я. Самсоновича (1952).

В результате камерального изучения собранного материала автор помещает фауну из Далешиц, согласно с Чарнощным, в эмском ярусе. Характерной чертой этой фауны остракодерм является преобладание в ней псаммостейд, которые жили здесь в пресноводной среде. Факт этот постольку интересен, что до сих пор велось родословную пресноводных средне-девоновых псаммостейд от лагунно-морских дрепанаспид (Д. Обручев, 1944 и 1947). Автор склоняется охотнее к концепции, принимающей эволюционную линию псаммостейд, не зависящую от линии дрепанаспид уже с доизменского времени. Первая из этих линий была пресноводной, другая — морской.

Некоторые замечания посвящены характерным чертам ornamentации щитков панциря. Следует полагать, что более подробное исследование собранного материала, находящегося в изучении автора, может пролить новое освещение на проблему отношения далешицких псаммостейд к средне-девоновым родам. Однако уже сейчас можно утверждать, что предположение о центральной позиции рода *Drepanaspis* в истории этих бесчелюстных будет сохранено.

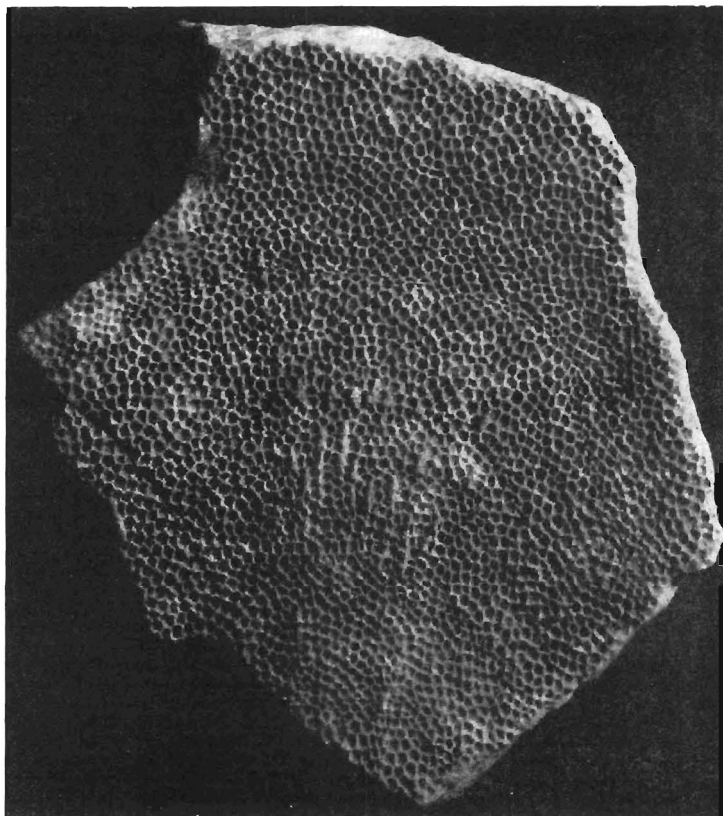
PL. I

Fig. 1. Fragment of psammosteid median plate, type A, showing ornamentation, growth lines and sensory canals; $\times 2$.

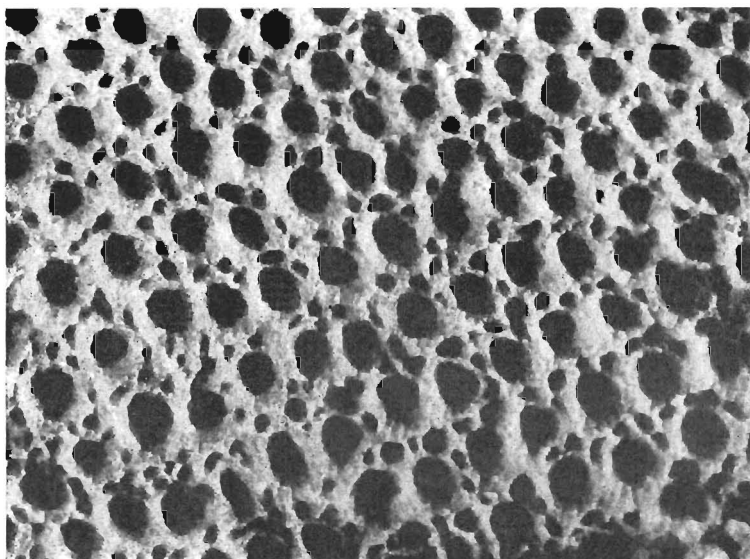
Fig. 2. Detail of ornamentation of type B, $\times 10$.

Both specimens preserved as natural moulds.

(Photos W. Brackenbury)



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