

WIESŁAW BARCZYK

Upper Tithonian brachiopods *Camerothyris wahlenbergi* (Zejszner) from the Pieniny Klippen Belt

ABSTRACT: A rich assemblage of brachiopods, in which the species *Camerothyris wahlenbergi* (Zejszner) predominates, occurs in the brachiopod limestone of the Upper Tithonian in the Pieniny Klippen Belt. The taxonomic position of this species has been established, along with the presentation of detailed morphological studies.

INTRODUCTION

The limestone layer composed mostly of brachiopods, with subordinate poorly preserved ammonites and aptychi, occurs near the Czorsztyn Castle in the Pieniny Klippen Belt. On the basis of the aptychi, these limestones have been assigned to the Upper Tithonian (Birkenmajer 1963, p. 144, profile 18, layer 8). A rich assemblage of brachiopods, composed of some 3,000 specimens of which 88% belonged to the species *Camerothyris wahlenbergi* (Zejszner), was collected in this layer. Since the interiors of shells are mostly filled with secondary calcite, which destroyed brachidium or obliterated particulars of its structure, despite the abundance of material few specimens are, however, suitable for the studies on their internal structure. The structure of the brachidium might be traced in only few specimens filled with the pelitic limestone.

Acknowledgements. The writer's thanks are extended to the Management of the Pieniny National Park at Krościenko for permitting him to collect the discussed fossils, and to Professor K. Birkenmajer for indicating the outcrop with brachiopod fauna at Czorsztyn.

DESCRIPTION OF THE MATERIAL

Superfamily **Dallinacea** Beecher, 1893¹Family **Zeilleridae** Rollier, 1915Genus **CAMEROTHYRIS** Bittner, 1890*Type species: Terebratula Ramsaueri* Suess.*Occurrence: Triassic through Jurassic.*

Diagnosis. — Shells small, subtriangular, near anterior commissure bent towards brachial valve. Beak short, massive, strongly incurved, of the permeothyrid type. Pedicle foramen in the apex of beak tiny. Shell surface smooth, with poorly marked growth lines. Beak ridges distinct. Cardinal process lacking, hinge plates fused with septum. Septalium troughlike. Central septum of the brachial valve reaching as far as three-quarters of the length of valve. Loop of the zeilleriform type. Hinge teeth massive. Dental plates divergent, with a short ventral septum situated between them. Dental plates are connected with ventral septum by the callus.

List of species. — The following species, occurring in the Alpine Triassic were assigned by Bittner (1890) to the genus *Camerothyris*: *C. ramsaueri* (Suess), *C. subangusta* (Münster), *C. major* Bittner, *C. dualis* Bittner, *C. commendai* Bittner and *C. sandlingensis* Bittner. As resulted from morphological studies, this genus should also include the Upper Tithonian species *Camerothyris wahlenbergi* (Zejszner). It seems very likely that many Jurassic species, so far assigned to *Aulacothyris* Douvillé, should also be transferred to *Camerothyris* Bittner.

Remarks. — The genus *Camerothyris* Bittner was separated by Bittner (1890) from *Waldheimia* King. It displays many characters in common with *Aulacothyris* Douvillé from which it differs, however, in divergent dental plates and in the presence of septum in the pedicle valve. Species, having parallel dental plates, were separated from *Aulacothyris* Douvillé by Dagys (1963) who erected a new genus *Aulacothyropsis* Dagys. This genus, very closely related to *Camerothyris* Bittner, displays a considerable similarity to the latter in the outer shape of shell and has a similar structure of brachidium, but also conspicuously differs from it in the arrangement of dental plates and the lack of ventral septum. The same characters which occur in *Aulacothyropsis* along with the sculpture of the surface of shells differ *Camerothyris* Bittner from *Pseudorugitela* Dagys.

Camerothyris wahlenbergi (Zejszner, 1846)

(Figs 1—4; Pls 1—2)

1846. *Terebratula wahlenbergi* Zejszner; L. Zejszner, p. 29.1870. *Megerlea wahlenbergi* Zeuschner; K. A. Zittel, p. 141, Pl. 14, Figs 15—19.1920. *Terebratella (Ismenta) wahlenbergi* Zeusch.; L. Rollier, p. 364.

Material. — Twenty four hundred and fifty well-preserved specimens; the interior of thirty-one of them have been studied.

¹ The taxonomic position of the superfamily is given after Dagys (1963).

Dimensions (in mm):

No.	Length L	Width W	Thickness T	Indexes of	
				width W/L	thickness T/L
MGP-1	16.4	18.9	11.4	115	70
MGP-102	12.5	12.8	8.2	102	65
MGP-59	12.5	12.5	8.2	100	65
MGP-132	11.2	10.8	8.7	96	59
MGP-226	9.6	9.6	6.2	100	65

Description. — Shell biconvex, subtriangular in outline, nearly always wider than long. In most specimens examined, the maximum width occurs in the region of the anterior commissure more or less at a distance of a quarter of the length from the commissure. In all other specimens, it occurs halfway the length of the

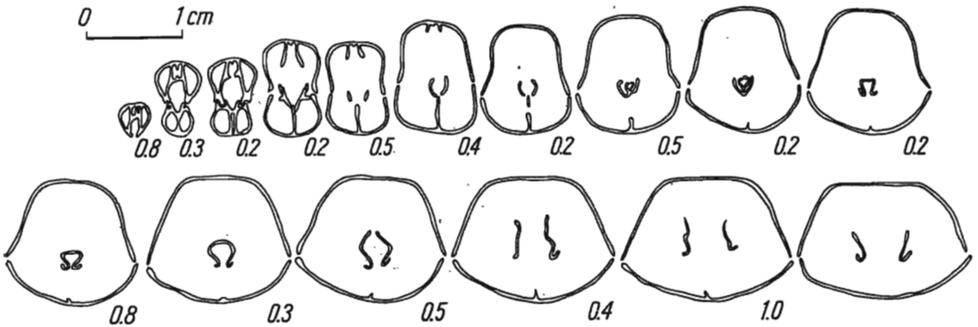


Fig. 1

Camerothyris wahlenbergi (Zejszner); series of transverse sections

shell. An average width-length (W/L) ratio amounts to 102–110. Both valves are strongly convex and nearly identically convex. The maximum thickness of the shell occurs in the region of cardinal margin or halfway the length of shell. An average thickness/length ratio (T/L) fluctuates within limits of 65 and 70. A single fold, very strongly underscored by two ridges (Figs *a* in Pls 1 and 2), which make up an exten-

Fig. 2

Camerothyris wahlenbergi (Zejszner); graphic reconstruction of the brachidium; $\times 3$ *a* ventral view, *b* lateral view

sion of the beak ridge, is situated on the pedicle valve. Near the anterior commissure, this fold occupies about three-quarters of its width. Two, very poorly marked furrows, corresponding to the ridges on pedicle valve, occur on the brachial valve. Anterior commissure truncate with a distinct sinus of the sulcate type (Figs

d in Pls 1 and 2). Lateral commissures strongly incurved towards the brachial valve (Figs c in Pls 1 and 2). Beak short, robust, strongly bent over brachial valve. A small, round foramen is situated in the apex of beak. Cardinal margin invisible, reaching under the beak of brachial valve at an almost right angle. Shell punctate, but punctae do not reach the outer surface of valves.

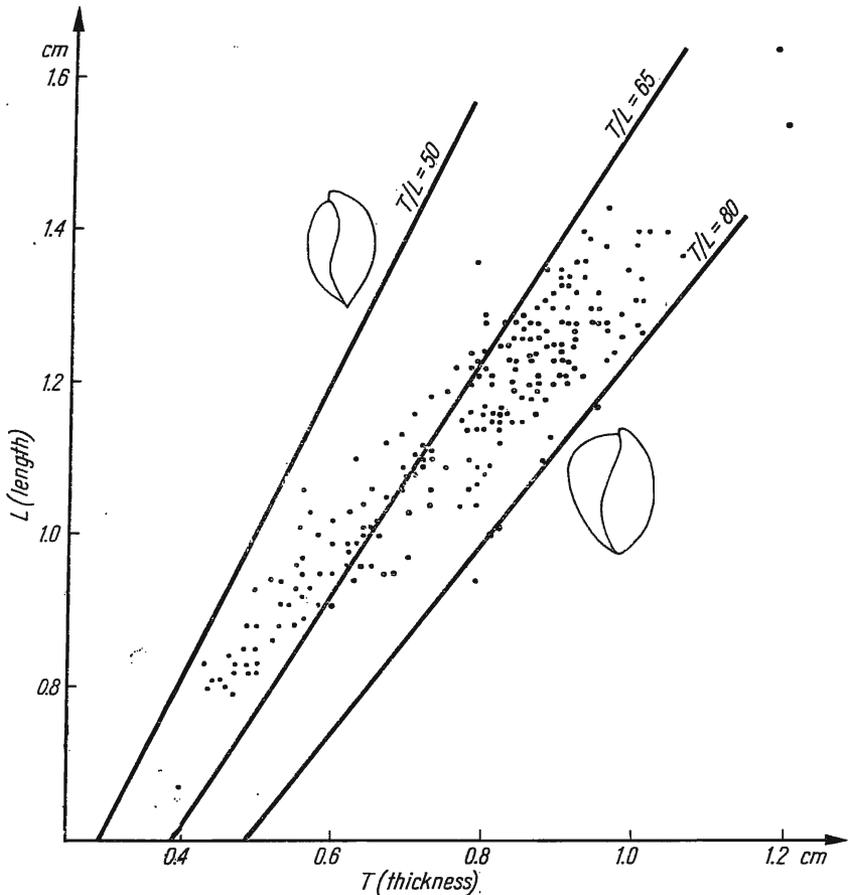
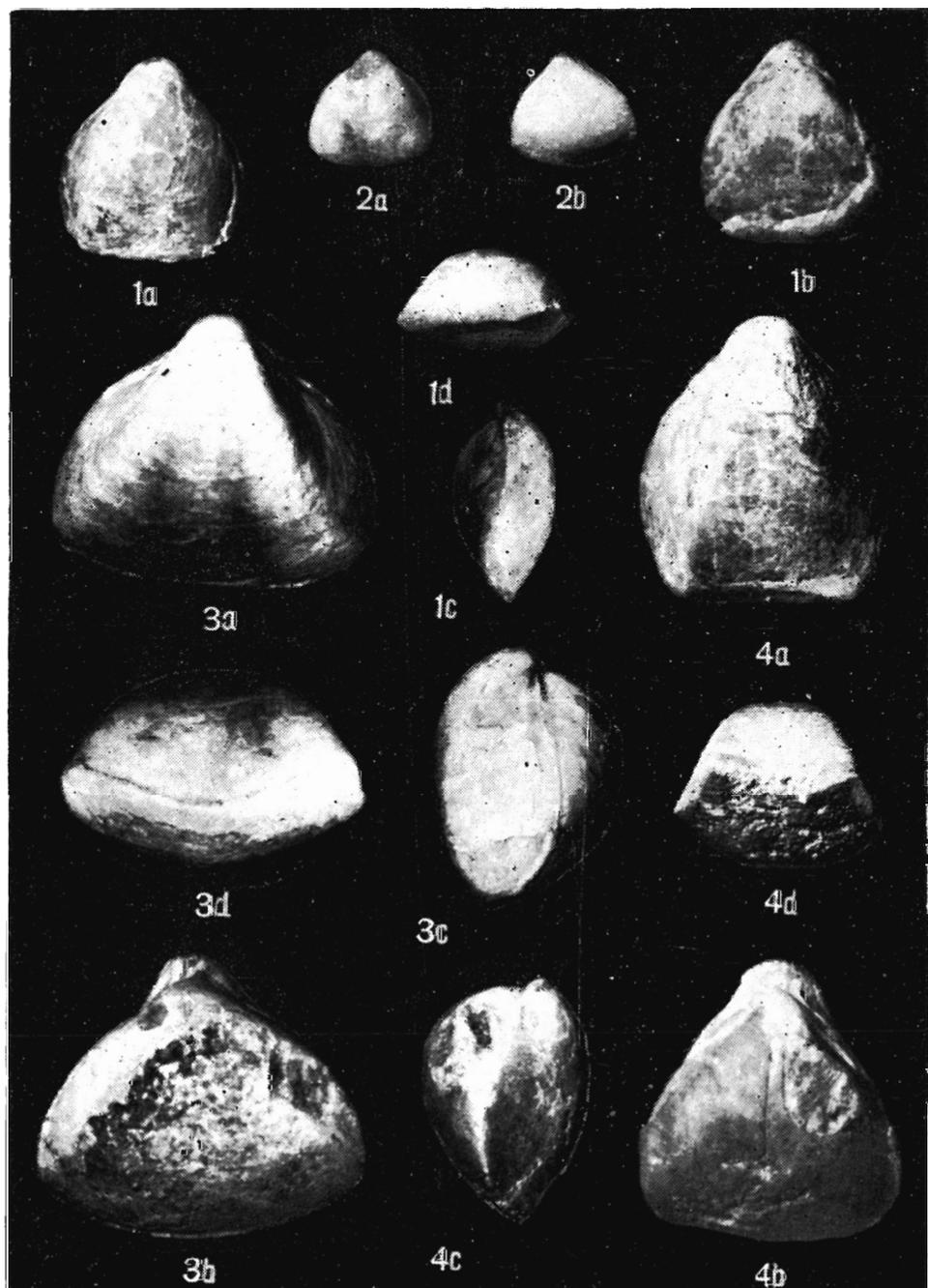


Fig. 3

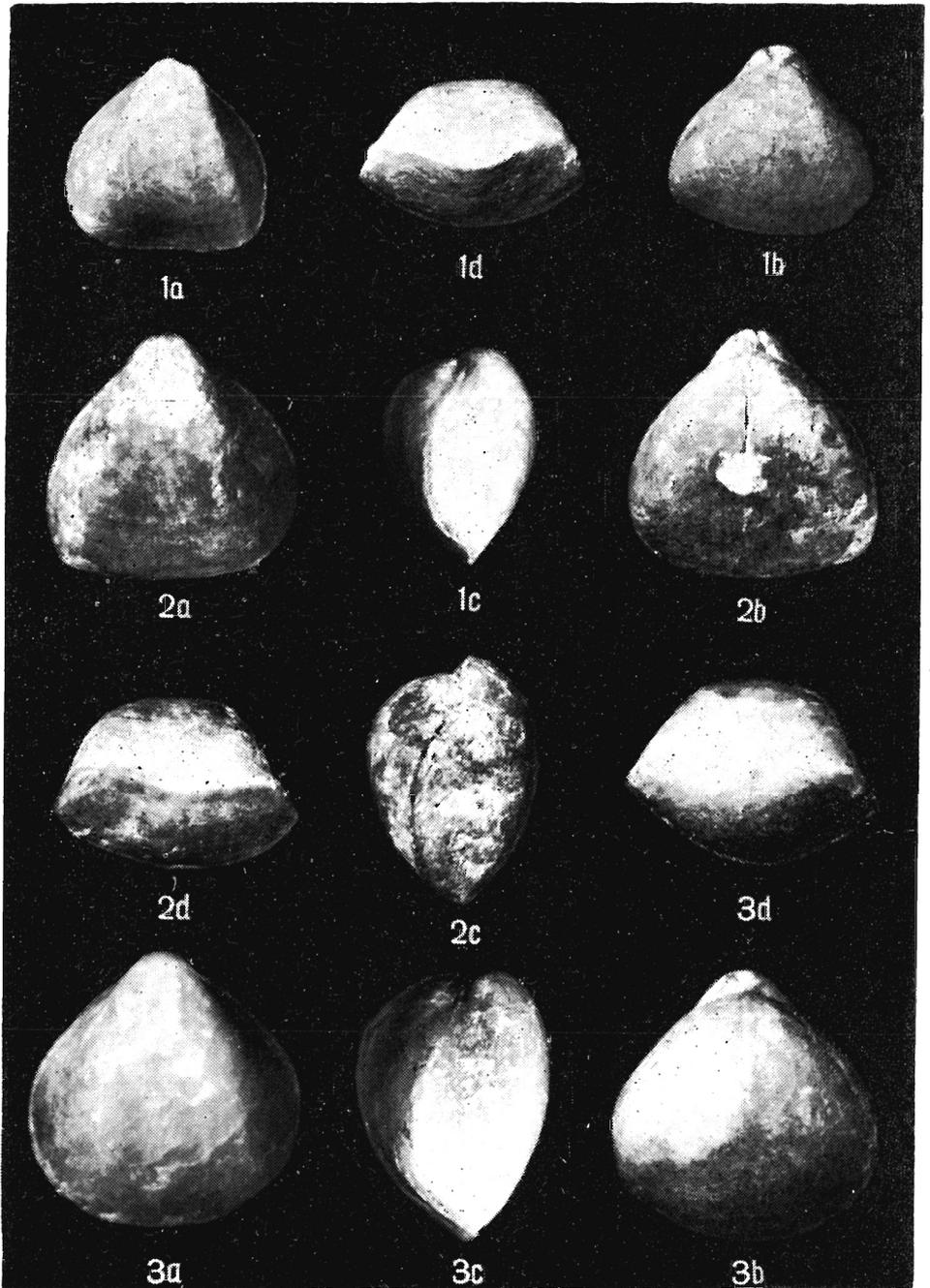
Camerothyris wahlenbergi (Zejszner); graphic relation between length (*L*) and thickness (*T*) of the shell (the ratio taken $\times 100$)

In the interior of the shell, a distinct septalium which massive hinge plates form a trough supported by central septum is visible (Fig. 1). Outer ridges of hinge plates overlap inner ridges of dental sockets. Dental sockets deep, bounded by an inner socket ridge and by a very conspicuous, high and robust outer socket ridge. At first straight, crura become arcuate, reach septum and form, together



Camerothyris wahlenbergi (Zejszner); Upper Tithonian, Czorsztyn; $\times 3$

1, 4 — specimens of triangular outline, elongated; 2, 3 — specimens of triangular outline, widened
 a pedicle valve view, b brachial valve view, c lateral commissure view, d anterior commissure view



Camerothyris wahlenbergi (Zejszner); Upper Tithonian, Czorsztyn; $\times 3$

1, 2 — specimens of triangular outline; 3 — specimen of circular outline
a pedicle valve view, b brachial valve view, c lateral commissure view, d anterior commissure view

with it, a hood consisting of undivided descending and ascending bands of the precampagi- or campagiform type (Fig. 2). Central septum, connected with loop only in the region of cardinal margin, reaches a length equal-three-quarter of that of brachial valve. A short septum and two divergent dental plates detach themselves from the apex of beak of pedicle valve. Halfway their length, dental plates are connected with septum by the callus. Hinge teeth clublike, massive.

Variability. — The individual variability within the species *Camerothyris wahlenbergi* (Zejszner) depends mostly on changes in length/width ratios of shells (Fig. 4). The following four fundamental morphological types have, on the basis of the 250 specimens studied, been distinguished:

1. Triangular shells, including specimens whose width to length (W/L) ratio, more or less identical amounts to 100; their percentage in the assemblage being 48 (Pl. 2, Figs 1 and 2).

2. Triangular, widened shells, including specimens whose W/L ratio fluctuates within limits of 110 and 130; their percentage in the assemblage being 21 (Pl. 1, Figs 2 and 3).

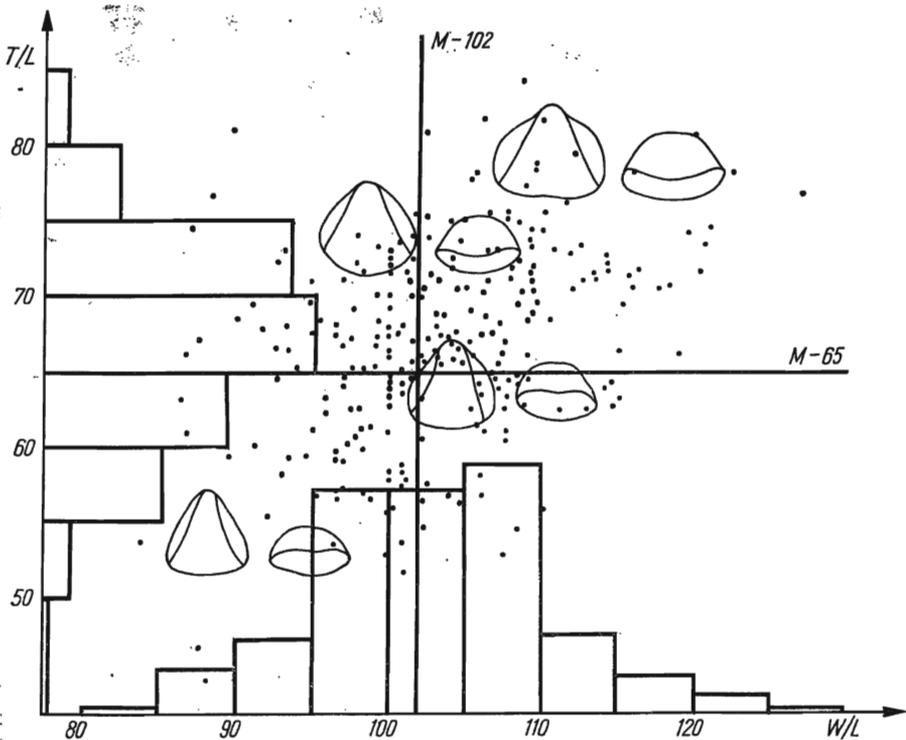


Fig. 4

Camerothyris wahlenbergi (Zejszner); frequency of T/L and W/L ratios illustrating shape variability of the shell (T thickness, L length, W width; M arithmetic mean)

3. Triangular, elongate shells, including specimens whose W/L ratio fluctuates within limits of 85 and 90; their percentage in the assemblage being 15 (Pl. 1, Figs 1 and 4).

4. Subcircular shells, their W/L ratio — like in type 1 — amounting to 100, but they are the widest in another place. In types 1—3, the largest width occurs in the region of the anterior commissure, while in type 4 it is situated halfway the length of the specimen. Percentage in the assemblage is 16 (Pl. 2, Fig. 3).

The growth variability within the species *Camerothyris wahlenbergi* (Zejszner) is manifested mostly in the shape of the shell. Specimens which represent young individuals are characterized by a triangular, strongly elongate shell and small thickness. Their T/L ratio is within 50 to 65 (Fig. 3). They have an almost completely rectimarginate anterior commissure. The outline of the shell changes with the growth of specimens. Shells strongly extend at their anterior part turning into a morphological type in which shell is shaped like an extended triangle and a fold on the pedicle valve is distinctly developed and emphasized by two lateral ridges. Considerable increase is also recorded in the thickness, the T/L ratio attaining 65—80 (Fig. 3) and an extension of the sinus is observed on the anterior commissure. Due to a poor state of preservation, not all of the development stages of the loop can be observed. It is only possible to recognize that small (young) specimens up to 9 mm long and like an elongate triangle in outline, have a loop of the precampagiform-hoodlike type, while those widened-triangular in outline and longer than 12 mm have a brachidium similar to the campagiform stage (Fig. 2).

Remarks. — According to Zittel (1870), *Camerothyris wahlenbergi* (Zejszner) displays a considerable relationship to *Megerlea strigillata* Suess, in which, however, beak is more strongly developed and straighter and which has a straighter line of the anterior commissure and a more distinct sculpture in the form of concentric lines on the surface of the shell. The impossibility of examining specimens of *Megerlea strigillata* Suess prevents the writer from a definite opinion, but he supposes that this relationship is only seeming and that it resulted from Zittel's (1870) application of the generic name *Megerlea* King to both these species. As follows from the writer's studies, the species *strigillata* should probably be placed in the genus *Pseudorugitela* Dagys.

Due to their so far poorly recognized internal structure, the discussed species *wahlenbergi* posed certain taxonomic problems in assigning to an appropriate genus. Zejszner (1846), the author of the species, assigned it to the broadly understood genus *Terebratula*. Then, on the basis of „vertical” dental plates, occurring in the pedicle valve, and of the shape of the loop, Zittel (1870) assigned it to the genus *Megerlea* King. Following Zittel's (1870) description, Rollier (1920) transferred this species to *Ismenia* King. After detailed studies based mostly on serial sections, and finding divergent dental plates, short septum in the pedicle valve and brachidium of the precampagiform and campagiform hoodlike, type, the writer assigns this species to the genus *Camerothyris* Bittner.

Occurrence. — The Tithonian of the French Alps (Rollier 1920) and the Polish Carpathians. In the latter, the species occurs in the Pieniny Klippen Belt in brachiopod limestones of the Middle and Upper Tithonian at Czorsztyn, Biała Woda, Maruszyna and Rogoźnik (Zejszner 1846, Zittel 1870).

*Museum of the Faculty of Geology
of the Warsaw University
Warszawa 22, Al. Żwirki i Wigury 93
Warsaw, March 1971*

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W. BARCZYK

**BRACHIOPODY CAMEROTHYRIS WAHLENBERGI (ZEJSZNER)
Z GÓRNEGO TYTONU PIENIŃSKIEGO PASA SKAŁKOWEGO**

(Streszczenie)

W odsłonięciu pod zamkiem w Czorsztyńnię autor zebrał bogatą kolekcję brachiopodów (liczącą ok. 3000 okazów) z wapieni brachiopodowych górnego tytonu serii czorsztyńskiej (por. Birkenmajer 1963, s. 144, profil 18, warstwa 8). W kolekcji tej dominuje gatunek *Camerothyris wahlenbergi* (Zejszner). Na podstawie budowy płytek zębowych oraz aparatu ramieniowego (fig. 1—2) ustalono pozycję taksonomiczną opisywanego gatunku i rozpatrzono jego zmienność (fig. 3—4 oraz pl. 1—2).

*Muzeum Wydziału Geologii
Uniwersytetu Warszawskiego
Warszawa 22, Al. Żwirki i Wigury 93
Warszawa, w marcu 1971 r.*
