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Rhynchonellid brachiopods from the Upper Tithonian and Lower Berriasian of the Pieniny Klippen Belt

ABSTRACT: An assemblage of rhynchonellid brachiopods from the Upper Tithonian brachiopod bed exposed at the Czorsztyn Castle and from the Lower Berriasian limestones of Rogoźnik, Pieniny Klippen Belt, Poland, is described. The previous identifications are revised and descriptions are supplemented (mostly with internal-structural details) for 2 species of the genus *Monticlarella*, viz. *M. agassizi* (Zeuschner), *M. capillata* (Zittel), and 3 species of the genus *Lacunosella*, viz. *L. atropha* (Zittel), *L. hoheneggeri* (Suess), and *L. zeuschneri* (Zittel).

INTRODUCTION

The present paper gives some results of the investigation of the Jurassic and Cretaceous brachiopod fauna of the Pieniny Klippen Belt of Poland, undertaken in 1970 at the suggestion of Professor K. Birkenmajer. The investigations covered the Upper Tithonian brachiopod limestones with minor amounts of poorly preserved ammonites and aptychi exposed at the Czorsztyn Castle (bed *8* in section *18*; see Birkenmajer 1963, p. 144), the Upper Tithonian to Lower Berriasian limestones at the world-famous locality Rogoźnik, and some other exposures. The investigated strata yielded a rich brachiopod fauna studied already by Zittel (1870) who erected some new species endemic for the Pieniny Klippen Belt. The latter author had, however, based his identifications entirely upon the external shell morphologies and hence, there was a need of a renewed sampling of the classic exposures for brachiopods and their paleontologic study. Thus far, the genera *Pygope*, *Nucleata*, and *Camerothyris* have been revised and provided with supplementary descriptions (Barczyk 1971, 1972a,b).

In the collected material (over 3,000 specimens in total), there are merely 80 rhynchonellid specimens representing only two genera, namely *Monticlarella* Wiśniewska, 1932, and *Lacunosella* Wiśniewska, 1932. In general, they are very poorly preserved. Even those specimens with well

preserved external morphologies are usually filled up with sparry calcite; the internal-structural elements are then destroyed by the recrystallization. Specimens filled up with pelitic limestone occur but

Fig. 1
Location of the exposures yielding the investigated brachiopods at Czorsztyn and Rogoźnik, Pieniny Klippen Belt

sporadically, whereas these are the only ones that permit a study of serial transverse sections.

All the illustrated specimens (*see* Pls 1—2) derived from the exposures at the Czorsztyn Castle and Rogoźnik (*see* Text-fig. 1) are housed at the Museum of the Faculty of Geology, University of Warsaw.

Acknowledgements. The author is deeply grateful to the Management of the Pieniny National Park at Szczawnica-Krościenko for permission to do the fieldwork, and to Professor K. Birkenmajer for indicating the brachiopod-bearing exposures. Dr. A. Wierzbowski is acknowledged for stratigraphic assignment of the limestones exposed at Rogoźnik.

SYSTEMATIC DESCRIPTION

Family **Dimerellidae** Buckman, 1918
Subfamily **Norellinae** Ager, 1959
Genus *MONTICLARELLA* Wiśniewska, 1932
Monticlarella agassizi (Zeuschner, 1846)
(Text-fig. 2, and Pl. 1, Figs 1—2)

1846. *Terebratula Agassizi* Zeuschner; L. Zeuschner, p. 26, Pl. 2, Figs 21—26.
1870. *Rhynchonella Agassizi* Zeuschner; K. A. Zittel, p. 148, Pl. 14, Figs 34—37.

Material: 15 complete (12 from Czorsztyn, 3 from Rogoźnik) and 7 damaged specimens.
Dimensions (in *mm*):

Coll. No.	Length	Width	Thickness
MWGUW 16a	12.3	13.9	7.8
MWGUW 14a	11.5	13.2	7.1
MWGUW 14b	10.3	12.3	5.5
MWGUW 14c	10.0	11.9	5.3
MWGUW 16	9.4	10.3	6.0

Supplementary description. — The biconvex shell is triangular in outline, slightly rounded anteriorily, with the lateral commissures straight and the anterior

commissure straight or (rarely) with a shallow sinus; the brachial valve is more convex than the pedicle one. The suberect beak is massive and very short, with an oval foramen at its apex. The small-sized deltidial plates are triangular in shape. The apical angle approximates 90—95°. There are sparsely distributed growth lines at the shell surface and fine radial striae *(capillae)* close to the anterior margin.

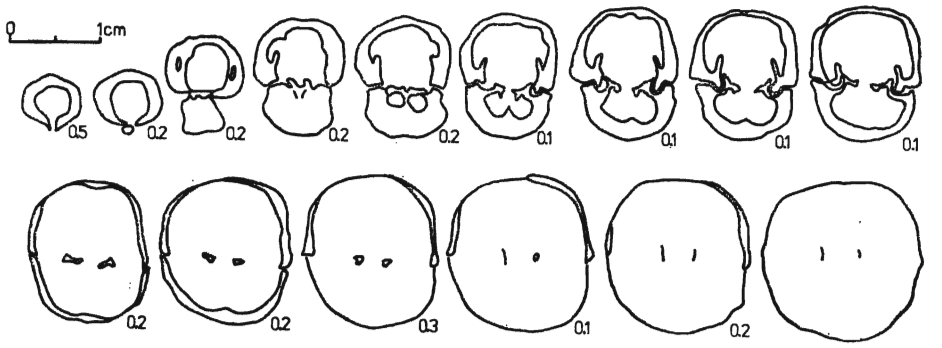

Fig. 2. Serial transverse sections of *Monticlarella agassizi* (Zeuschner) from Czorsztyn, Upper Tithonian

The pedicle valve bears short, clavate hinge teeth and thin but distinct parallel dental plates. There is a indistinct pedicle collar in the beak part of the valve. The hinge plates are well developed, whereas the dental sockets are shallow. The arcuifer crura are massive with their bases slightly turned towards the pedicle valve. There is also an indistinct, low dorsal septum.

Remarks. — The species *M. agassizi* (Zeuschner) resembles most closely *M. capillata* (Zittel) and *M. brentoniaca* (Oppel) but it differs from both the species in its more triangular outline and the anterior sinus poorly developed or lacking at all.

Occurrence. — Tithonian of West Germany (Zittel 1870); Upper Tithonian of Czorsztyn, Biała Woda, and Rogoźnik; Lower Berriasian of Rogoźnik (*cf.* Zeuschner 1846, Zittel 1870).

Monticlarella capillata (Zittel, 1870)
(Text-fig. 3 and Pl. 1, Figs 3—5)

1870. ***Rhynchonella capillata*** Zittel; K. A. Zittel, p. 149, Pl. 14, Figs 38—41.

Material: 30 specimens (23 from Czorsztyn, 7 from Rogoźnik).
Dimensions (in *mm*):

Coll. No.	Length	Width	Thickness
MWGUW 6a	16.3	17.6	11.2
MWGUW 8a	15.4	19.8	10.7
MWGUW 7a	14.5	15.1	9.6
MWGUW 9b	13.7	17.4	8.4
MWGUW 9c	11.3	14.0	6.7

Supplementary description. — The subpentagonal shell is wider than long, with its maximum width attained at the mid-length. It is biconvex, with the brachial valve more convex than the pedicle one. The arcuate lateral commissures

bent dorsally. There is a deep concavity in the pedicle valve, covering up to two third of the shell in length. A large sinus comprises three fourth of the anterior commissure. The suberect beak is short, curved, and pointed, with a small and

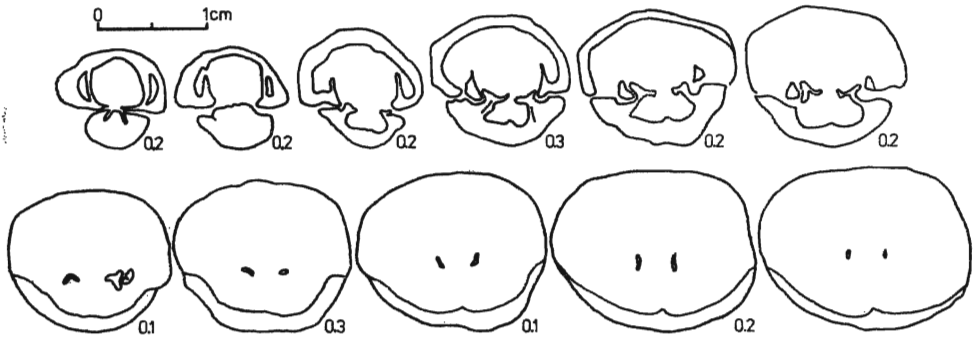

Fig. 3. Serial transverse sections of *Monticlarella capillata* (Zittel) from Czorsztyn, Upper Tithonian

rounded pedicle foramen at its apex. The apical angle ranges from 95° to 115°. The shell surface is covered with distinct growth lines and fine radial striae *(capillae)* increasing in distinctness close to the anterior margin.

The pedicle valve shows slat-like hinge teeth and massive parallel dental plates. The dental sockets are fairly shallow. The arcuifer to radulifer crura are long and thin, with their bases bended towards the pedicle valve. There is also an indistinct, low dorsal septum.

Remarks. — The species *M. capillata* (Zittel) resembles most closely *M. agassizi* (Zeuschner) and *"Rhynchonella" spoliata* (Suess), with the difference consisting mainly in development of the anterior sinus. In fact, the sinus is large and gentle in the investigated species, while it is absent or poorly developed in *M. agassizi*, and pointed in *"Rhynchonella" spoliata.*

Occurrence. — Upper Tithonian of Czorsztyn, Biała Woda, Falsztyn, and Rogoźnik *(cf.* Zittel 1870); Lower Berriasian of Rogoźnik.

Family **Wellerellidae** Likharev, 1965
Subfamily **Lacunosellinae** Smirnova, 1963
Genus *LACUNOSELLA* Wiśniewska, 1932
Lacunosella atropha (Zittel, 1870)
(Text-fig. 4 and Pl. 2, Figs 1—2)

1870. *Rhynchonella atropha* Zittel; K. A. Zittel, p. 145, Pl. 14, Figs 23—25.

Material: 6 complete specimens (all of them from Rogoźnik).
Dimensions (in *mm*):

Coll. No.	Length	Width	Thickness
MWGUW 1a	15.5	15.8	11.7
MWGUW 1	14.2	15.2	10.8
MWGUW 2b	13.6	14.0	9.6
MWGUW 2a	13.0	13.7	10.4
MWGUW 1b	12.1	13.7	9.8

Supplementary description. — The shell is elongate, transversely oval or pentagonal in outline, slightly wider than long, with the maximum width attained

close to the anterior margin. It is biconvex, with the maximum convexity attained in its beak part. The erect beak is massive, short, and straight, with a very small and rounded pedicle foramen. The apical angle approximates 90—95°. The arcuate lateral commissures bent dorsally. There is a well developed, deep sinus located

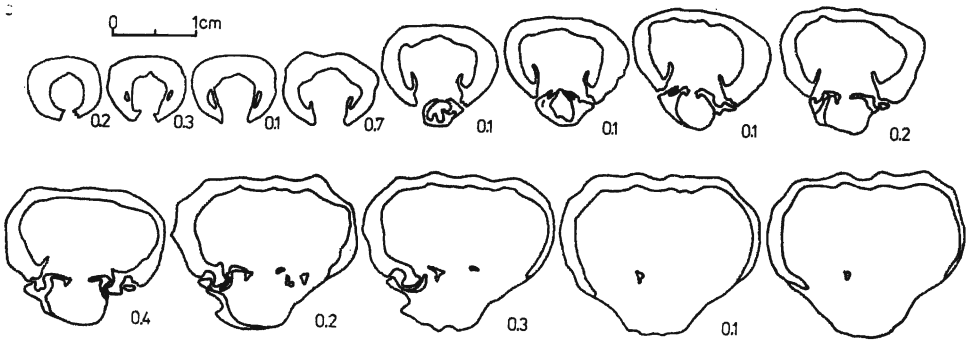

Fig. 4. Serial transverse sections of *Lacunosella atropha* (Zittel) from Czorsztyn, Upper Tithonian

asymmetrically at the anterior commissure. The entire shell is covered with thick radial ribs; there are 6 ribs at the pedicle valve (4 of them within the sinus) and 7 ribs at the brachial valve (3 of them within the sinus).

The thin dental plates are more or less perpendicular to the cardinal margin. The hinge teeth are massive and the respective dental sockets are deep. The falcifer crura are short and wide, while their long and massive bases are turned a little towards the brachial valve.

Remarks. — The most typical feature of *L. atropha* is the asymmetrically located sinus easily discernible in both the juveniles and the adults. The species *L. atropha* appears the most close to *L. hoheneggeri* (Suess). The latter species displays, however, a symmetrical sinus and long crura resembling those of calcarifer type, whereas there are falcifer crura in *L. atropha.*

Occurrence. — Lower Berriasian of Rogoźnik.

Lacunosella hoheneggeri (Suess, 1858)
(Text-fig. 5 and Pl. 2, Figs 4—5)

1858. *Rhynchonella Hoheneggeri* Suess; E. Suess, pp. 56—57, Pl. 6, Figs 13—19.
1870. *Rhynchonella Hoheneggeri* Suess; K. A. Zittel, p. 147, Pl. 14, Figs 23—31.
1899. *Rhynchonella Hoheneggeri* Suess; M. Remeš, p. 229, Pl. 8, Figs 1—2.
1965a. *Kolhidaella(?) hoheneggeri* (Suess); D. V. Ager, p. 160, Fig. 5A.
1977. *Lacunosella hoheneggeri* (Suess); O. Nekvasilová, pp. 60—62, Pl. 4, Figs 1—9, Pl. 5, Figs 1—5 and 8—11, Pl. 7, Fig. 3.

Material: 4 complete (3 from Czorsztyn, 1 from Rogoźnik) and 8 damaged specimens.
Dimensions (in *mm*):

Coll. No.	Length	Width	Thickness
MWGUW 4	18.0	21.0	11.0
MWGUW 5a	16.5	21.5	13.7
MWGUW 5	13.2	16.8	8.7
MWGUW 5b	12.9	14.6	9.7

Supplementary description. — The biconvex shell is pentagonal or oval in outline, wider than long, with the maximum width attained close to the anterior margin. In lateral view, the pedicle valve is gently convex in its beak part, while steeply sloped anteriorily. The erect beak is massive and straight, with a submezothyrid, small-sized and almost circular pedicle foramen. The apical angle ranges from 87° to 95°. The lateral commissures are straight or slightly bent dorsally. The anterior commissure shows a wide and distinct sinus covering two third of its total length. There is a distinct concavity in the pedicle valve, onset just below the beak and attaining its maximum depth at the anterior margin. The shell is ornamented with 8—9 thick radial ribs (3—4 of them within the concavity). Concentric steplike growth lines are also clearly marked at the shell surface.

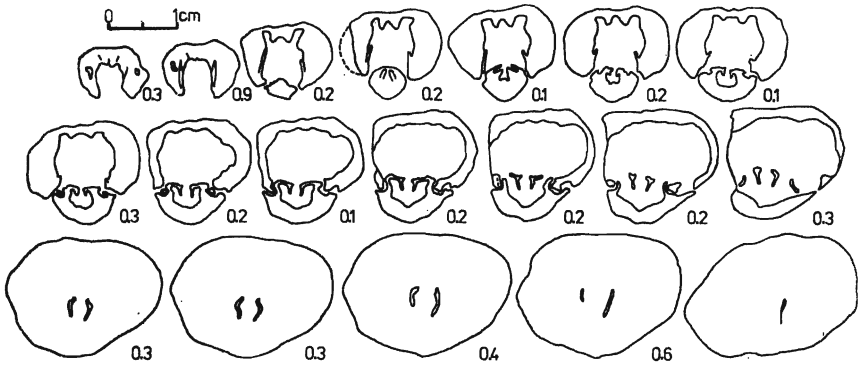

Fig. 5. Serial transverse sections of *Lacunosella hoheneggeri* (Suess) from Rogoźnik, Lower Berriasian

The internal structure is typical of the genus *Lacunosella*. There are thin and short but nevertheless, distinct almost parallel dental plates. The hinge teeth are massive and their respective dental sockets are deep. The crura are long and thin, close to calcarifer-type ones, while their bases are long and nearly straight.

Remarks. — The specimens from Rogoźnik and Biała Woda described and illustrated by Zittel (1870) as well as those investigated by the present author appear entirely consistent with the locotypes described by Nekvasilová (1977) from Kopřivnica, Czechoslovakia.

Occurrence. — Kimmeridgian, Tithonian, Neocomian, and Berriasian of France and West Germany (Suess 1858, Zittel 1870), and Czechoslovakia (Nekvasilová 1977); Upper Tithonian of Czorsztyn, Rogoźnik, and Biała Woda (*cf.* Zittel 1870).

Lacunosella zeuschneri (Zittel, 1870)
(Text-fig. 6 and Pl. 2, Figs 2 and 6)

1870. ***Rhynchonella Zeuschneri*** Zittel; K. A. Zittel, p. 146, Pl. 14, Figs 26—28.

Material: 4 complete specimens and a single damaged one (all of them from Czorsztyn).
Dimensions (in *mm*):

Coll. No.	Length	Width	Thickness
MWGUW 3a	10.9	13.0	7.4
MWGUW 3b	10.9	11.2	6.8
MWGUW 3	9.6	11.0	5.7
MWGUW 7	9.5	10.7	6.0

Supplementary description. — The bioconvex shell is transverse oval or subpentagonal in outline, with the maximum width attained at the mid-length. The suberect or deject beak is considerably curved and bears a submezothyrid pedicle foramen. The apical angle ranges from 95° to 115°. The lateral commissures are almost straight, whereas the anterior commissure shows a distinct and wide sinus covering some two third of its length. The concavity at the pedicle valve extends up to two third of the valve in length. Both the valves are covered each with 9—11 thick radial ribs (3—4 of them within the concavity). At the pedicle valve, the ribs appear just below the beak and reach the anterior margin. In turn, the beak part of the brachial valve is smooth, as the ribs appear at the mid-length. The whole shell is also covered with concentric steplike growth lines.

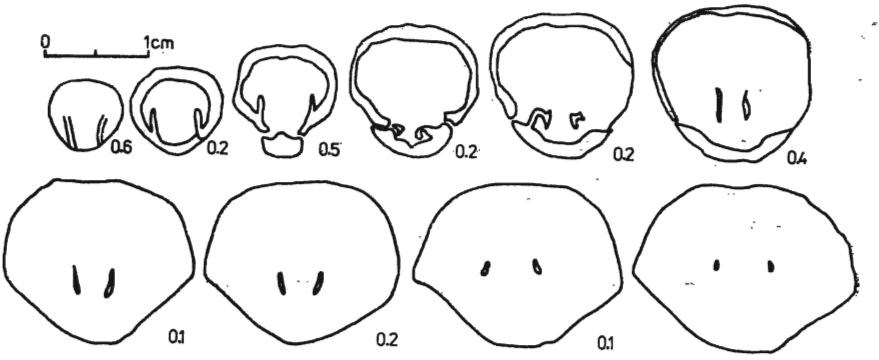

Fig. 6. Serial transverse sections of *Lacunosella zeuschneri* (Zittel) from Czorsztyn, Upper Tithonian

There are very thin and short, parallel dental plates within the pedicle valve. The hinge teeth are indistinct and poorly developed and hence, the dental sockets are very shallow. The falcifer crura are massive, with their bases short and turned towards the brachial valve.

Remarks. — The species *L. zeuschneri* resembles the Oxfordian species *L. kozłowskii* Wiśniewska but it differs from the latter form in its less convex pedicle valve and less curved beak (*cf.* Wiśniewska 1932).

Occurrence. — Upper Tithonian of Czorsztyn and Rogoźnik (*cf.* Zittel 1870).

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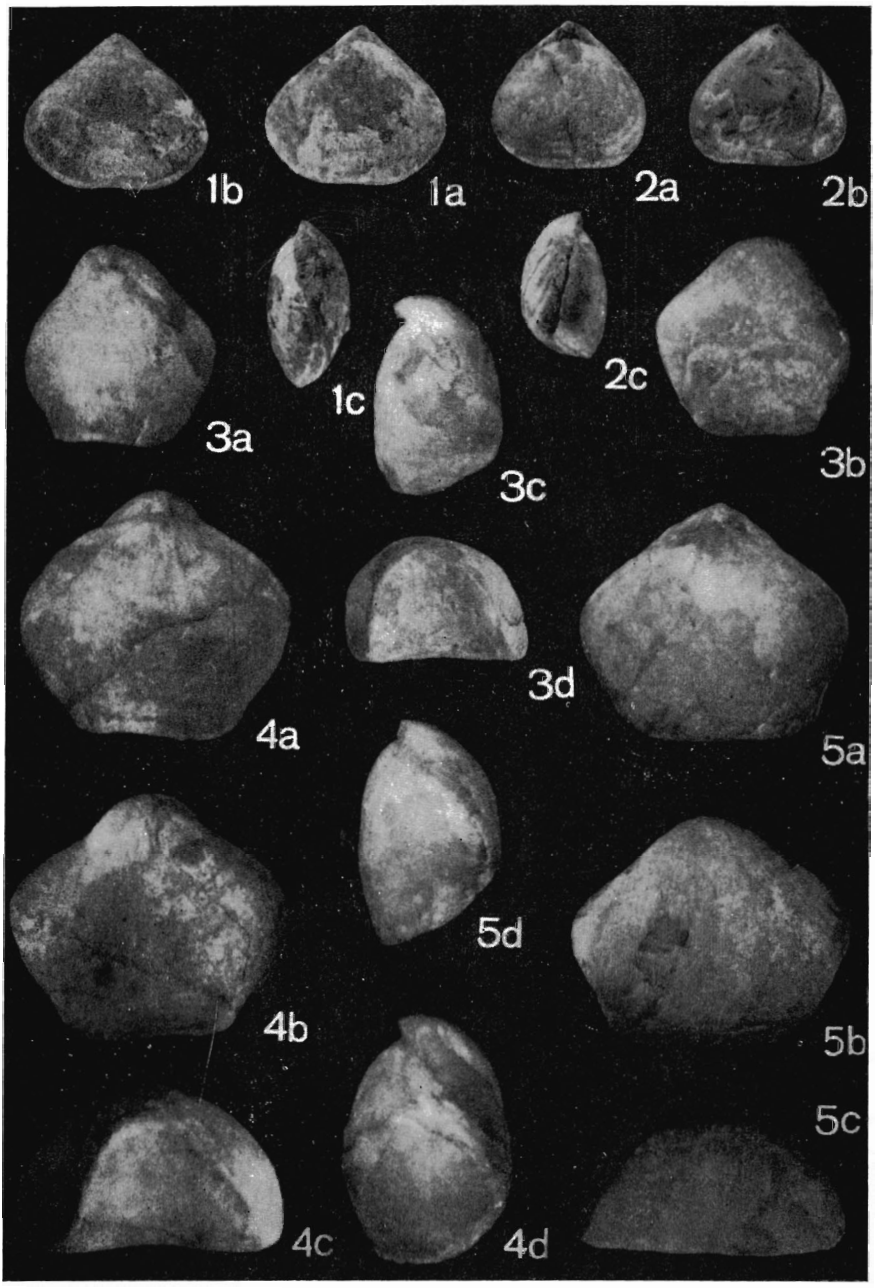
RYNCHONELLIDY GÓRNEGO TYTONU I DOLNEGO BERIASU PIENIŃSKIEGO PASA SKAŁKOWEGO

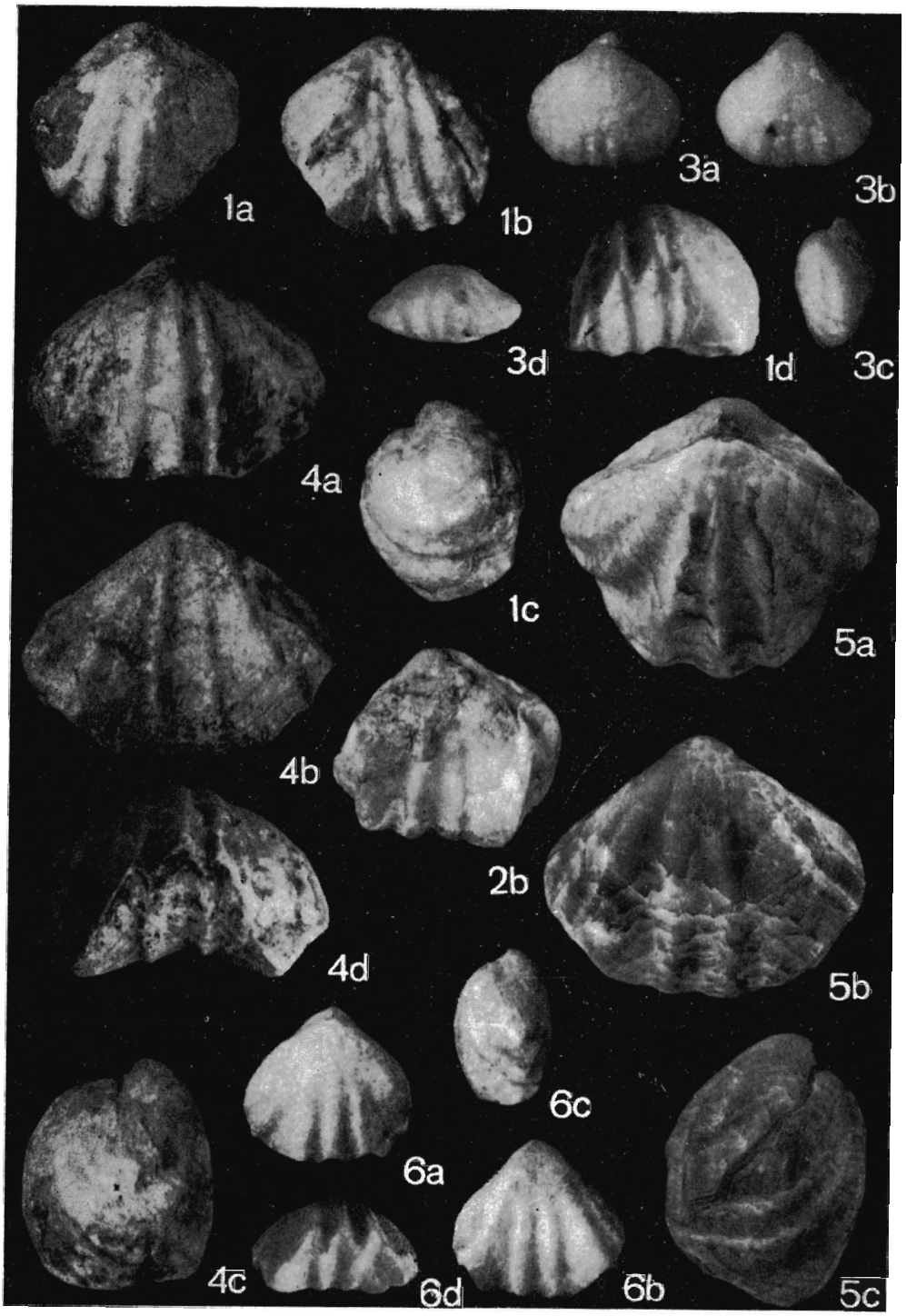
(Streszczenie)

Przedmiotem pracy jest rewizja rynchonellidów zebranych w klasycznych odsłonięciach wapieni górnego tytonu i dolnego beriasu w Czorsztynie i Rogoźniku na terenie Pienińskiego Pasa Skałkowego (patrz fig. 1). W obrębie zebranej kolekcji brachiopodów, liczącej ponad 3000 okazów (*por.* Barczyk 1971, 1972a,b), rynchonellidy stanowią element bardzo podrzędny, obejmujący około 80 okazów. Na podstawie morfologii muszli oraz jej budowy wewnętrznej (*patrz* fig. 2—6 oraz pl. 1—2), wyróżniono pięć gatunków reprezentujących dwa rodzaje: *Monticlarella* Wiśniewska oraz *Lacunosella* Wiśniewska.



1—2 *Monticlarella agassizi* (Zeuschner); Upper Tithonian, Czorsztyn
3—5 *Monticlarella capillata* (Zittel); *3—4* from Upper Tithonian, Czorsztyn, *5* from Lower Berriasian, Rogoźnik

In all the figures: *a* brachial valve view, *b* pedicle valve view, *c* lateral view, *d* anterior view; taken *c* × 2



1—2 *Lacunosella atropha* (Zittel); Upper Tithonian, Czorsztyn
4—5 *Lacunosella hoheneggeri* (Suess); *4* from Upper Tithonian, Czorsztyn, *5* from Lower Berriasian, Rogoźnik
3 and **6** *Lacunosella zeuschneri* (Zittel); Upper Tithonian, Czorsztyn
In all the figures: *a* brachial valve view, *b* pedicle valve view, *c* lateral view, *d* anterior view; taken *c* × 2