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BEYRICHIACEA FROM THE GIVETIAN  
OF THE HOLY CROSS MTS, POLAND

*Abstract.*— Four new species of the ostracods of the family Beyrichiaceae from the marly limestones of the Upper Givetian (= Stringocephalus burtini Beds) of the SE part of the Holy Cross Mts have been described and assigned to the genera *Kozłowskiella* (Příbyl), *Reversoscapha* Rozhdestvenskaja, *Welleria* Ulrich & Bassler and *Welleriella* Abushik. The ostracods, trilobites, Conchostraca and Charophyta are found in the marly limestone intercalations in the stromatoporoid-coral limestone series.

## INTRODUCTION

The ostracods, described in the present paper, come from the Stringocephalus burtini Beds from the Middle Devonian of the Kielce Region in the Holy Cross Mts. The ostracods occur in marly limestones of the Budy quarry about 2 km south of Jurkowice and 60 km ESE of Kielce. This is the first find of the ostracods in this area. The forms described have been assigned to the following four species: *Kozłowskiella jurkowicensis* sp. n., *Reversoscapha? sandomiriensis* sp. n., *Welleria aequiconvexa* sp. n. and *Welleriella rakoviensis* sp. n. The specimens described come from the collection of A. Baliński M. Sc. from the Polish Academy of Sciences' Palaeozoological Institute in Warsaw. They vary in the state of preservation, rarely occurring in the form of single valves. Carapaces are on the whole recrystallized inside, single valves strongly decalcified. The material studied is part of the collection of the Polish Academy of Sciences' Palaeozoological Institute in Warsaw (ZPAL).

The present writer's thanks are extended to A. Baliński, M. Sc. for turning over his collection of the ostracods for elaboration and to Professor A. Martinsson from the University of Uppsala, Sweden for a discussion and valuable remarks.

The photographs of ostracods were taken by M. Wąsák, charts were drawn by E. Sławik, both from the Palaeozoological Institute of the Polish Academy of Sciences, Warsaw.

## STRATIGRAPHIC AND PALEOECOLOGICAL REMARKS

The stromatoporoid-coral limestones from Jurkowiec-Budy, assigned to the Givetian by Samsonowicz (1930), were also studied by Pajchłowa & Stasińska (1965). These deposits have recently been assigned, on the basis of an assemblage of stromatoporoids (Kaźmierczak, 1971) and that of brachiopods (Baliński, 1973), to the lower part of the Upper Givetian. In addition to beds containing a rich and variable marine fauna (stromatoporoids, tabulates, tetracorals, gastropods, brachiopods and ostracods), intercalations of marly limestones with a strongly impoverished faunal assemblage were found by Baliński (1973) in the limestone assemblage. This faunal assemblage includes ostracods, trilobites, Conchostraca and Charophyta. According to Baliński, its impoverishment probably resulted from changes in the salinity of the water.

Ecological conditions, somewhat similar to those at Jurkowiec, were described by Kesling & Soronen (1957) from the Middle Devonian (Transverse group) of the State of Michigan, USA. Limestones, containing vast quantities of valves and carapaces of the ostracod *Welleria aftonensis* Warthin, are included in the limestone series of the Transverse group containing many reefs and abounding in fossils. None other Devonian fossils occur in that area. Kesling & Soronen (1957) believe that the deposits containing *W. aftonensis* may be interpreted as lagoonal forms from lagoons whose waters became subject to a temporary pollution, which precluded the existence of other animals. Only ostracods, which, compared with other organisms, are marked by a higher degree of resistance to changes in salinity and by capability of a partial isolation from a disadvantageous environment by tightly closing their carapaces, could survive under such conditions.

Detailed paleoecological studies on the ostracods were conducted by Becker (1969, 1971) in the Middle Devonian of the Eifel Mountains. Lagoonal deposits were found by this author in the Spicberg Beds, assigned to the Givetian, in which ostracods are frequently the only fossils.

As shown by Głazek's and Markowicz-Łohinowicz's (1973) studies, hypersaline conditions of sedimentation occurred in the Middle Devonian of the southern part of the Holy Cross Mts. Identical sedimentation conditions of the eifelian dolomites in this area were also hinted at by Czermiński (1960). The occurrence of anhydrites in the Givetian limestones and dolomites has recently been found east of the Holy Cross Mts. (Żelichowski, 1972). It is not unlikely, therefore, that the abundant occurrence of ostracods and the lack of any other fauna in some beds was connected with a local appearance of a hypersaline environment during the marly limestone sedimentation in the area of Jurkowiec. The Beyrichiacea described here come from beds abounding in fossils.

## DESCRIPTIONS

Superfamily **Beyrichiacea** Matthew, 1886Family **Beyrichiidae** Matthew, 1886Genus *Kozlowskiella* (Přibyl, 1953)*Kozlowskiella jurkowicensis* sp. n.

(Pl. XXII, Figs 1—4)

*Holotype*: ZPAL O.XII/1; Pl. XXII, Fig. 1.*Type horizon*: Stringocephalus burtini Beds, Givetian.*Type locality*: A quarry, east of Jurkowice-Budy, Eastern Holly Cross Mountains, Kielce region.*Derivation of the name*: *jurkowicensis* — found at Jurkowice.

*Diagnosis*. — Three, well-developed lobes, the anterior and posterior ones protruding, in the form of cusps, above the hinge line. Posterior cusp bifurcate. Preadductorial node round or oval, adductorial sulcus short. Cruminal pouch in the anteroventral part of carapace fused with domicilium.

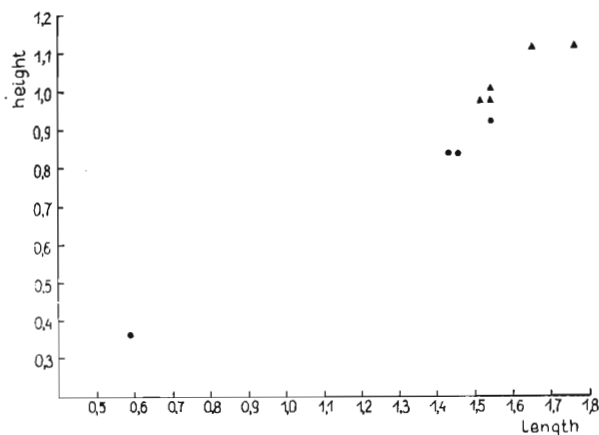


Fig. 1. Length versus height diagram for *Kozlowskiella jurkowicensis* sp. nov. Triangles — heteromorphs; dots — tecnomorphs.

*Material*. — One carapace of the heteromorph, one of a juvenile form, four valves of heteromorphs and four damaged valves of tecnomorphs.

Dimensions (in mm):

Carapace of the holotype, ZPAL O.XII/1; Pl. XXII, Fig. 1. Length 1.54, height 1.01, width 0.84.

*Description*. — The heteromorph. Lateral outline of carapace nearly preplete. Left valve somewhat larger. Dorsal margin long and straight. Hinge consisting of a groove on the right valve and a corresponding ridge on the left. Anterior and posterior lobe protruding above the hinge line in the form of cusps. Syllobial cusp bifurcate, its external part, somewhat

longer, is directed more posteriorly. Preadductorial node, situated before the middle of carapace, is surrounded by anterior and adductorial sulci. Node surface reticulate. Adductorial sulcus, situated behind the middle of valve, is shallow, short and turning around the adductorial node. Anterior and adductorial sulci, fused together under preadductorial node, form a very shallow depression running perpendicularly to the ventral margin of valve. Such a depression does not occur in male individuals. Carapace surface reticulate, particularly in the ventral part. Subvelar field also reticulate. A velar ridge is developed along the free margin.

The tecnomorph. Carapaces of male individuals flattened. Cusps longer and thinner than in female individuals and distinctly directed posteriorly.

*Remarks.* — This species is closely related with *Kozlowskiella foveatula* (Kummerow, 1953), from which it differs in longer cusps, bifurcation of the posterior cusp and reticulation of carapace surface. It also displays a certain similarity to *Kozlowskiella semicircularis* (Kummerow, 1953), in particular in such morphological characters as lobation and sulcation.

#### Genus *Reversoscapha* Rozhdstvenskaja, 1972

##### *Reversoscapha? sandomiriensis*, sp. n.

(Pl. XXIII, Figs 1—3)

*Holotype*: ZPAL O.XII/14; Pl. XXIII, Fig. 2.

*Type horizon*: Stringocephalus burtini Beds, Givetian.

*Type locality*: A quarry, east of Jurkowiec-Budy, Eastern Holy Cross Mountains, Kielce region.

*Derivation of the name*: After Sandomierz, a city SE of the Holy Cross Mts.

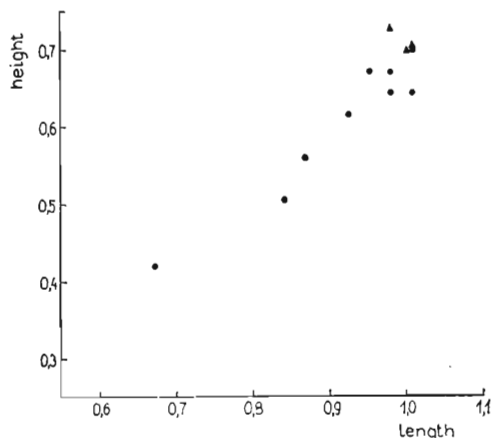


Fig. 2. Length versus height diagram for *Reversoscapha? sandomiriensis* sp. nov. Triangles — heteromorphs; dots — tecnomorphs.

*Diagnosis.* — A species of *Reversoscapha* with a cruminal pouch strongly protruding anteroventrally and outside the free margin, and with a velar structure very slightly outlined. Valve surface smooth.

*Material.* — Nine carapaces of tecnomorphs and three of heteromorphs, the latter poorly preserved.

Dimensions (in mm):

Carapace of holotype ZPAL O.XII/14; Pl. XXIII, Fig. 2.

Length 1.01; height 0.70.

*Description.* — The heteromorph. Carapace triangularly rounded, the highest in the middle of carapace. Dorsal margin straight, fairly long. Dorsal angles indistinct. Anterior angle more distinct than posterior. Posterior end extended upwards, rounded in the upper and truncate in the lower part. Anterior margin of valve considerably more rounded than posterior. Ventral part of the free margin slightly rounded. Left valve larger, in the ventral part distinctly overlapping the right. Hinge margin slightly concave. A strongly swollen cruminal pouch is situated in the anteroventral part of carapace. Dorsally, cruminal pouch turns gradually and almost imperceptibly into the valve. In the posterior part, it is slightly separated from carapace surface. In the ventral part, it protrudes outside the free margin, which is situated in a narrow depression. Velar structure in the form a bendlike swelling, which, in females, runs at the base of cruminal pouch. Valve surface smooth.

The tecnomorph. Its carapace considerably differs in thickness from that of a heteromorph.

*Remarks.* — In a general shape of carapace, *Reversoscapha* ? *sandomiriensis* resembles *R. martinssoni* Rozhdestvenskaja, from which it differs in a somewhat more distinctly outlined posterior part of cruminal pouch, in a cruminal more strongly protruding outside the ventral margin and in a considerably thinner carapace of tecnomorph. The lack of velar ridge and the presence of bendlike velar swellings make this species similar to the genus *Saccarchites* Swartz & Whitmore.

Family **Welleriellidae** Abushik, 1971

Genus *Welleria* Ulrich & Bassler, 1923

*Type species:* *Welleria obliqua* Ulrich & Bassler, 1923

*Remarks.* — Species of the genus *Welleria* Ulrich & Bassler, known so far, come from the territory of North America. *Welleria primitioides* Kummerow, 1924, described from the Upper Silurian erratic boulders of the environs of Bützow, German Democratic Republic, probably does not belong to this genus.

A revision of the genus *Welleria* was conducted by Kesling (1956), who analyzed differences between the type species of *Kloedenia* and

*Welleria* and presented their revised descriptions, including these genera, like former authors, in the family Kloedeniidae Ulrich & Bassler.

The new family Welleriellidae was erected by Abushik (1971), who believed that it differed from the family Beyrichiidae in the lack of the velar ridge and from the Kloedeniidae in the lack of both the velar ridge and velar bend. Several genera, so far included in the Kloedeniidae, among them the genus *Welleria*, were included by this author in the Welleriellidae.

*Welleria aequiconvexa* sp. n.

(Pl. XXIV, Figs 1—2)

*Holotype*: ZPAL O.XII/23; Pl. XXIV, Fig. 1.

*Type horizon*: Stringocephalus burtini Beds, Givetian.

*Type locality*: A quarry, east of Jurkowice-Budy, Eastern Holy Cross Mts, Kielce region.

*Derivation of the name*: *aequiconvexa* = Lat. *aequo* — equal, *convexus* = convex; a name related with an equal degree of convexity of the brood pouch.

*Diagnosis*. — An extensive posterior lobe, slightly protruding above hinge line and fused with ventral lobe. Preadductorial node small, round. Adductorial sulcus narrow, short. Ventral lobe forms, in female individuals, a cruminal pouch fused dorsally with the rest of lateral surface.

*Material*. — Nineteen mostly well-preserved carapaces of tecnomorphs and two of heteromorphs.

Dimensions (in mm):

Carapace of holotype ZPAL O.XII/23; Pl. XXIV, Fig. 1. Length 1.46; height 0.92; width 0.87.

*Description*. — The heteromorph. Carapace nearly preplate in lateral outline. Hinge line straight, about three-quarters the length of the entire carapace. Left valve larger, slightly overlapping the right one along the

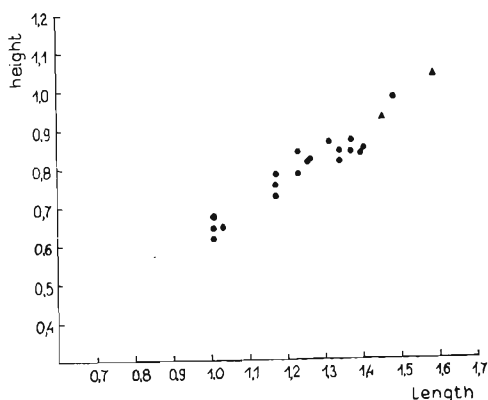


Fig. 3. Length versus height diagram for *Welleria aequiconvexa* sp. nov. Triangles — heteromorphs; dots — tecnomorphs.

entire free margin. Cardinal angles distinct. The anterior angle larger than posterior. Carapace the highest in the anterior and the thickest in the posterior part. Posterior lobe the largest, slightly protruding above hinge line. In well-preserved specimens, the posterior lobe has a very small cusp, situated close to the dorsal margin. Preadductorial node small, round, fused with the anterior part of carapace. Adductorial sulcus narrow, short, the anterior sulcus very slightly outlined. Cruminal pouch includes the entire ventral part of valve and is fused dorsally with domicilium without any trace of a separating line. Ventral part of valves slightly protrudes outside the free margin. Submarginal ridge very narrow. Surface pitted.

The tecnomorph. It differs from the heteromorph in smaller dimensions in lateral outline and in a smaller width of carapace.

*Remarks.* — *Welleria aequiconvexa* sp. n. displays a considerable similarity to *Walleria aftonensis* Warthin, from which it differs in a less distinct anterior sulcus, less strongly developed velar structure and considerably smaller width of carapace. *W. aequiconvexa* also resembles *W. bisulcata* Smith, from which it differs in less distinctly outlined sulci and rounder preadductorial node. The same as *W. bisulcata* it has a small cusp developed on the dorsal surface of posterior lobe.

#### Genus *Welleriella* Abushik, 1971

##### *Welleriella rakoviensis* sp. n.

(Pl. XXV, Figs 1—2)

*Holotype*: ZPAL O.XII/44; Pl. XXV, Fig. 1.

*Type horizon*: Stringocephalus burtini Beds, Givetian.

*Type locality*: A quarry, east of Jurkowice-Budy, Eastern Holy Cross Mountains, Kielce region.

*Derivation of the name*: A name connected with Raków, a town in the eastern part of the Holy Cross Mts.

*Diagnosis.* — A punctate species of the genus *Welleriella*, having an anteroventral, long cruminal pouch, fused dorsally with domicilium. A round preadductorial node occurs before an pit-line adductorial sulcus and a long cusp in the middle part of posterior lobe.

*Material.* — Twenty-nine carapaces of tecnomorphs and two carapaces and two valves of heteromorphs, all of them mostly well-preserved.

Dimensions (in mm):

Carapace of holotype ZPAL O.XII/44; Pl. XXV, Fig. 1.

Length 1.65; height 1.04.

*Description.* — The heteromorph. Carapace subamplete in lateral outline. Left valve larger, overlapping right one along the entire free margin. Hinge line long, straight. Cardinal angles distinct. Preadductorial node round, small, partly fused with the anterior lobe. Anterior sulcus very slightly outlined. Adductorial sulcus small, short, pitlike. A long cusp occurs halfway the posterior lobe. A long cruminal pouch situated in the

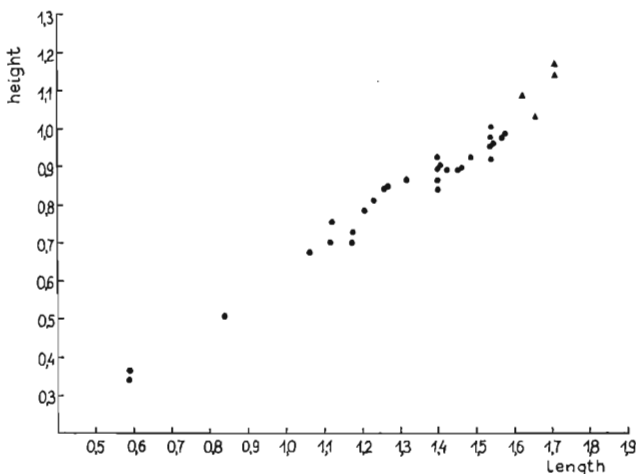


Fig. 4. Length versus height diagram for *Welleriella rakoviensis* sp.nov. Triangles — heteromorphs; dots — tecnomorphs.

anteroventral part of carapace, is fused with domicilium in the dorsal part. In the ventral part, cruminal pouch slightly projects outside the free margin. Carapace surface punctate.

The tecnomorph. Its system of lobes and sulci is similar to that in the heteromorph.

*Variability.* — As the result of the presence of adult and young forms, the variability concerns the dimensions of carapaces. In juvenile forms, carapace is more preplete in lateral outline than in the adults. In younger forms, the cusp on the posterior lobe is larger, as compared with the dimensions of carapace, than in the adults.

*Remarks.* — *Welleriella rakoviensis* sp. n. is similar to *W. prostrata* Abushik from the Lower Devonian of Podolia, from which it differs in a less oblique cruminal pouch overlapping the anterior lobe to a smaller degree, in a less distinctly outlined anterior sulcus and in the presence of the cusp on the posterior lobe. It also resembles *W. centrreticularis* Abushik.

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## BEYRICHIACEA Z ŻYWETU GÓR ŚWIĘTOKRZYSKICH, POLSKA.

*Streszczenie*

Opisano cztery nowe gatunki małżoraczków nadrodziny Beyrichiacea z wapieni górnego żywetu (= Stringocephalus burtini Beds) z miejscowości Jurkowice — Budy w Górach Świętokrzyskich. Gatunki zaliczono do rodzajów *Kozłowskiella* (Příbyl), *Reversoscapa* Rozhdestvenskaja, *Welleria* Ulrich & Bassler, *Welleriella* Abushik. Podano wstępne obserwacje paleoekologiczne całego zespołu małżoraczków, związane z występowaniem w zespole wapieni, obok warstw z bogatą fauną morską, przeławiczeń marglistych wapieni zawierających jedynie małżoraczki, trylobity, *Conchostraca* i *Charophyta*. Zubożenie zespołu być może związane było ze zmianami zasolenia wód w żywecie na tym obszarze.

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ЭВА ОЛЕМПСКА

## BEYRICHIACEA ИЗ ЖИВЕТА СВЕНТОКШИСКИХ ГОР (ПОЛЬША)

*Резюме*

Описаны четыре новых вида остракод надсемейства Beyrichiacea из верхне-живетских известняков (= Stringocephalus burtini Beds) местности Юрковице-Буды в Свентокшиских горах. Рассмотренные виды относятся к родам *Kozłowskiella* (Příbyl), *Reversoscapa* Rozhdestvenskaja, *Welleria* Ulrich & Bassler, *Welleriella* Abushik. Представленные общие палеоэкологические данные по всему сообществу остракод. Они состоят в том, что в толще известняков, наряду со слоями с богатой морской фауной, представлены прослой мергелистых известняков, содержащих единственно остракоды, трилобиты, *Conchostraca* и *Chrophyta*. Обеднение сообщества было очевидно обусловлено изменением солености вод в живетском веке в этой части бассейна.

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## EXPLANATION OF PLATES

All specimens from Jurkowice—Budy, Holy Cross Mountains, Middle Devonian, Givetian,  $\times 40$

## Plate XXII

*Kozłowskiella jurkowicensis* sp.n.

- Fig. 1. Heteromorph carapace; a right lateral view, b dorsal view, c ventral view; Holotype, ZPAL.O.XII/1.  
 Fig. 2. Right tecnomorph valve; a lateral view, b interior view; ZPAL.O.XII/6.  
 Fig. 3. Juvenile carapace; a right lateral view, b dorsal view, c ventral view; ZPAL.O.XII/10.  
 Fig. 4. Left lateral view of heteromorph valve: ZPAL.O.XII/2.

## Plate XXIII

*Reversoscapha? sandomiriensis* sp.n.

- Fig. 1. Heteromorph carapace; a left lateral view, b dorsal view, c ventral view, d posterior view; ZPAL.O.XII/11.  
 Fig. 2. Tecnomorph carapace; a right lateral view, b dorsal view, c ventral view; Holotype, ZPAL.O.XII/14.  
 Fig. 3. Tecnomorph carapace; a right lateral view, b dorsal view, c ventral view; ZPAL O. XII/15.

## Plate XXIV

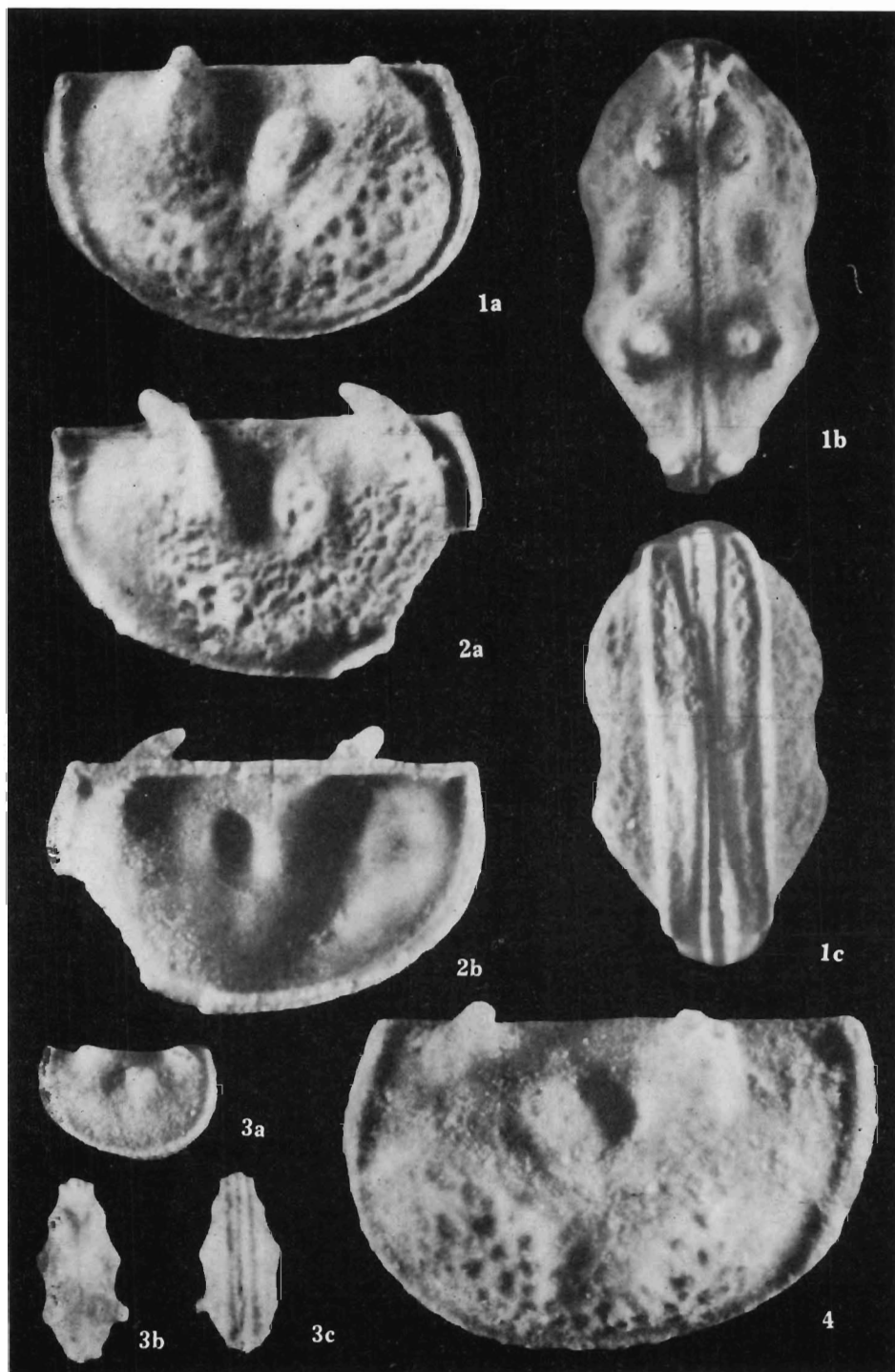
*Welleria aequiconvexa* sp.n.

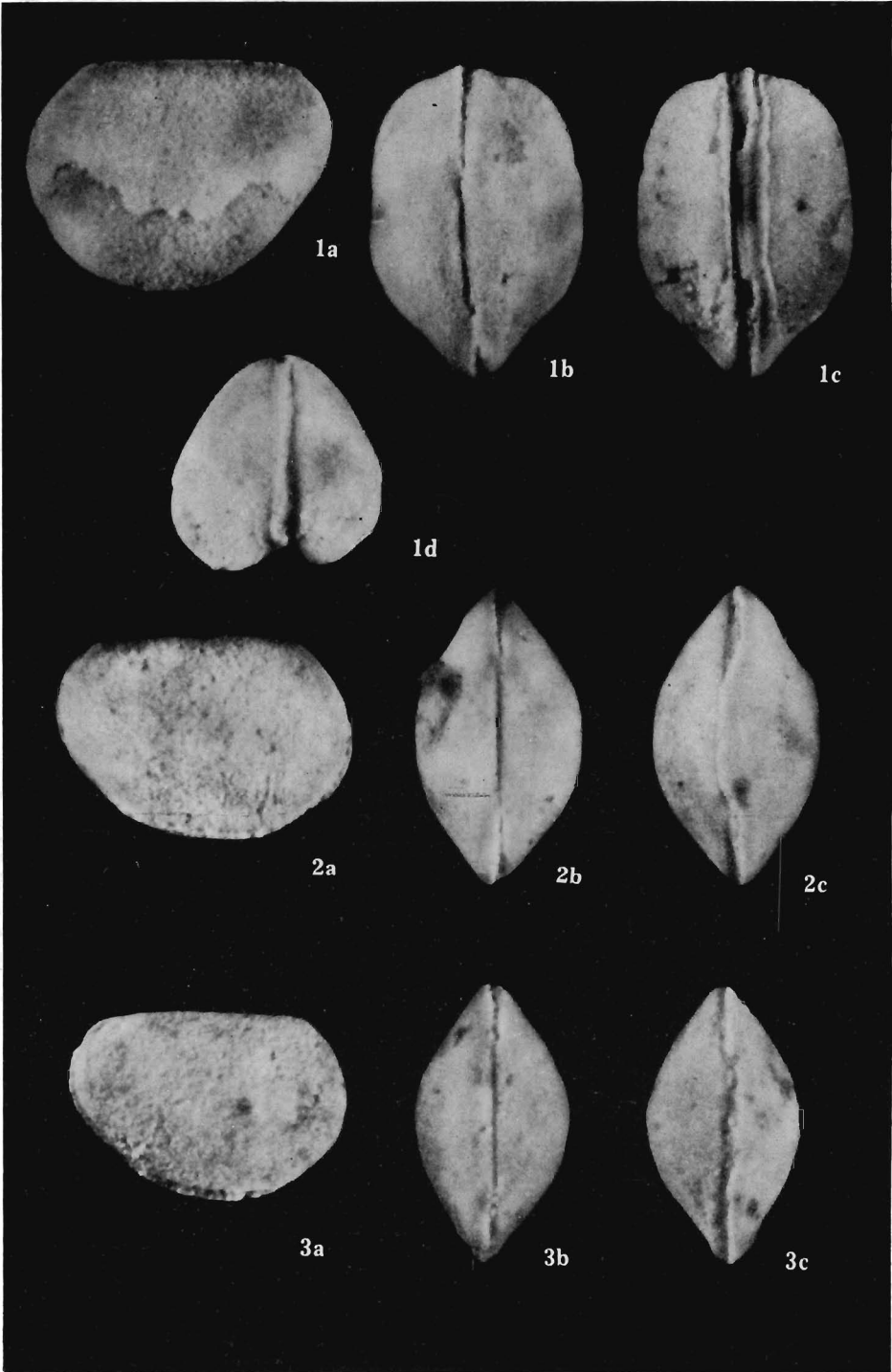
- Fig. 1. Heteromorph carapace; a left lateral view, b dorsal view, c ventral view; Holotype, ZPAL.O.XII/23.  
 Fig. 2. Right lateral view of heteromorph carapace; ZPAL.O.XII/24.  
 Fig. 3. Tecnomorph carapace; a right lateral view, b dorsal view, c ventral view; ZPAL.O.XII/25.

## Plate XXV

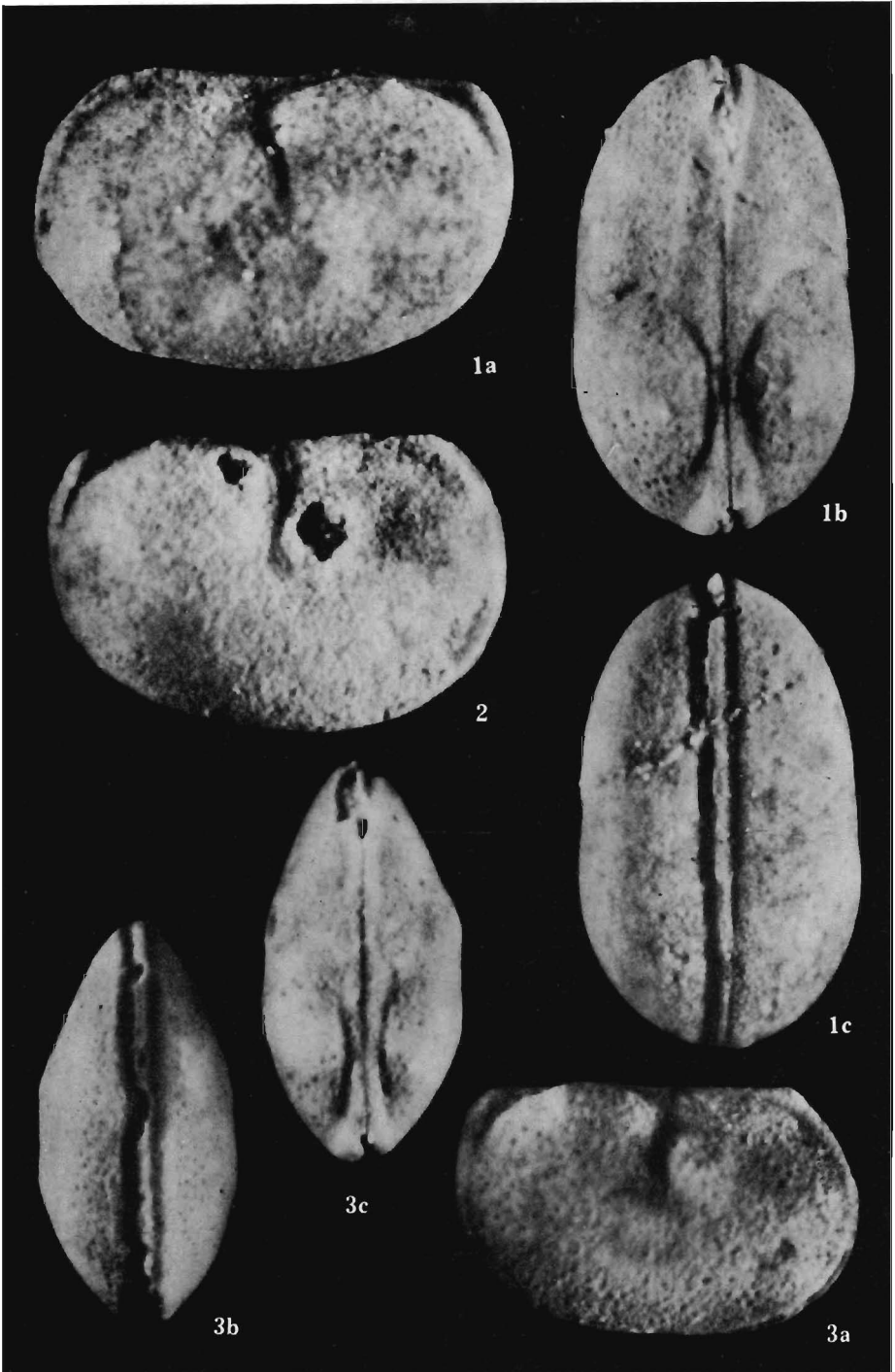
*Welleriella rakoviensis* sp.n.

- Fig. 1. Heteromorph carapace; a right lateral view, b dorsal view, c ventral view; Holotype, ZPAL.O.XII/44.  
 Fig. 2. Tecnomorph carapace; a right lateral view, b dorsal view, c ventral view; ZPAL.O.XII/48.
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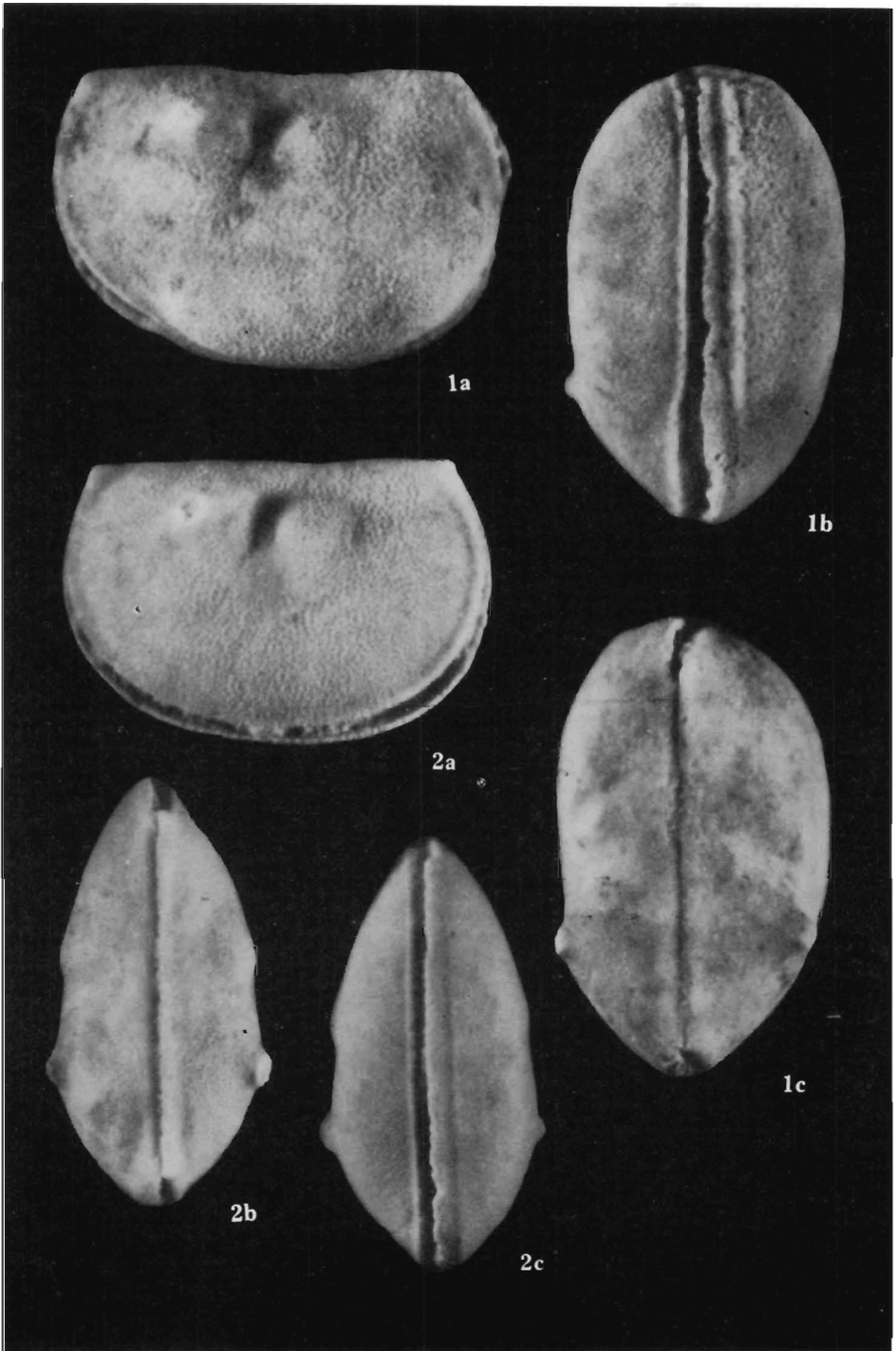




Phot: M. Wąsák



Phot: M. Wąsək



Phot: M. Wąsack