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ADDITIONAL STUDIES ON THE JURASSIC TRIGONIIDAE OF
POLAND

Abstract. — Eleven trigoniid species of the genera *Trigonia* Bruguiere, *Myophorella* Bayle and *Rutitrigonia* van Hoepen, including one new species, *R. skorkovensis* sp.n., are described from the Jurassic of Poland. The representatives of the genus *Rutitrigonia* are reported for the first time from the Lower Kimmeridgian of Poland which markedly increases the stratigraphic and geographic range of that genus hitherto considered as limited to the Upper Kimmeridgian — Upper Cretaceous of the Philippines, Japan and the southern hemisphere.

INTRODUCTION

The studies on Polish trigoniids carried out by the present author first covered the material from the Dogger of Łęczycza, Polish Lowlands (Pugaczewska 1976). The present paper presents the results of studies on trigoniids from the Bajocian — Upper Callovian of southern Poland, Bathonian — Kimmeridgian of the Mesozoic margins of the Holy Cross Mts, Upper Oxfordian — Lower Kimmeridgian of western Pomerania and Callovian of glacial drift from Łuków in the Polish Lowlands (fig. 1). The difference between the assemblages here studied and that from the Dogger of Łęczycza concerns the lack of the genus *Vaugonia* Crickmay in the former. The genus *Rutitrigonia* van Hoepen, represented here by *R. skorkovensis* sp.n. was hitherto known from the Upper Kimmeridgian and Cretaceous of Africa, Philippines and Japan; its record from the Lower Kimmeridgian of the Holy Cross Mts indicates that its stratigraphic and geographic ranges are wider than it was previously assumed.

The trigoniids derived from Upper Jurassic rocks are usually represented by moulds often deformed, with obliterated sculpture and shell preserved in fragments whilst those derived from the Middle Jurassic — by shells and valves with well-preserved sculpture.

The material studied was collected in the course of field works carried out by the author or was made available through the courtesy of Dr. M.

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The systematics of Trigoniidae is accepted partly after McCormick & Moore (1969) and Kobayashi (1954). The abbreviations used in the paleon-

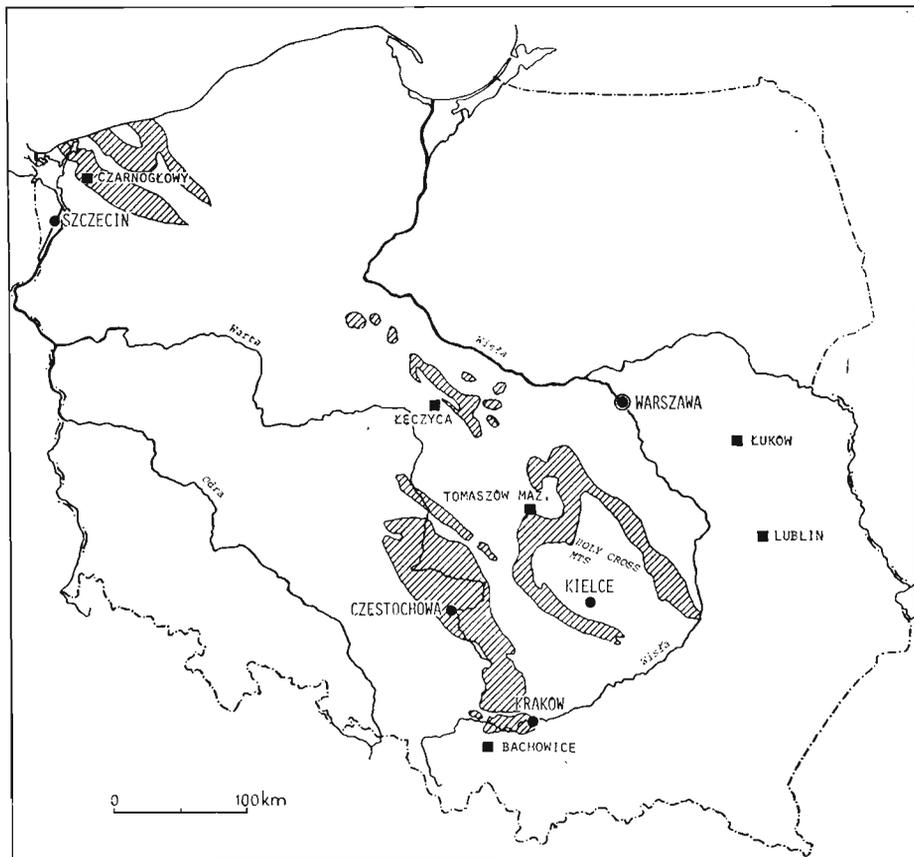


Fig. 1. Location of outcrops of the Middle and Upper Jurassic.

tological descriptions are as follows: H — height, L — length, L/H — length index, R — number of ribs and C — convexity. The collection is housed in the Institute of Paleobiology of the Polish Academy of Sciences (ZPAL).

TRIGONIDS IN THE JURASSIC DEPOSITS OF POLAND

The oldest assemblage of trigoniids studied by the author comprises 12 species derived from the Vesulian of Łęczyca (Pugaczewska 1976). The Vesulian is represented by a series of siltstone-clay deposits with sandy

intercalations, clay shaly siltstones with siderites and clay shales with siderites overlying iron ore deposits series with lumachelle intercalations (Znosko 1957). The deposits yield the trigoniid assemblage richest in species and individuals and generally characterized by excellent preservation of the material. The lithology of the Vesulian of that area indicates that the sedimentary basin of the Polish Lowlands was shallow, with poorly oxidated waters, that is, with reducing conditions.

A specific faunal assemblage is connected with Callovian deposits of glacial drift from Łuków in the Polish Lowlands (Makowski 1952). The Callovian is represented by calcareous and sideritic-clay nodules often with pyrite. The nodules are very rich in invertebrate remains including shells of two trigoniids: *Myophorella clavellata* and *T. costata*. The trigoniids are excellently preserved, with shell and very well visible sculpture.

The trigoniid fauna derived from the Upper Bathonian — Lower Callovian strata exposed by the Wola Morawicka quarry in SW margin of the Holy Cross Mts is well preserved similarly as that from Łuków. This assemblage comprises *Trigonia tenuicosta*, *T. denticulata* and *T. costata*. The specimens occur in nests in massive conglomerates with quartzite sandstone pebbles and in sandy limestones with onkolites. The deposits yield rich invertebrate fauna primarily comprising gastropods, brachiopods and pelecypods. The sedimentary basin of the SW margins of the Holy Cross Mts from the Late Bathonian and earliest Callovian times was characterized by highly agitated and shallow waters which is evidenced by conglomerates and the transgressive nature (Dayczak-Calikowska & Kopik 1973).

The trigoniid fauna from the Upper Oxfordian and Kimmeridgian of the Holy Cross Mts is very rich in species but poor in individuals which are usually represented by moulds or imprints with small fragments of the shell. The bulk of the material is derived from hard pelitic limestones and alternating layers of oolitic limestones, marls, oyster lumachelles and onkolitic limestones cropping out in the NW-SW margins of the Holy Cross Mts (Sulejów, Radomsko area, Góry Mokre, Oleszno, Skorków, Małogoszcz, Sobków). The presence of oolitic, microonkolitic and pisonkolitic intercalations indicates for deposition in shallow marine basin about 20 m in depth (Kutek 1969, p. 253). The following trigoniids were found here: *Trigonia monilifera*, *T. elongata*, *T. suevi*, *T. papillata*, *Myophorella bronni*, *M. bicostata* and *Ruttitrigonia skorkovens* sp.n. Tree of these species were also reported from the Iłża and Radom areas in NE margins of the Holy Cross Mts (Dąbrowska 1953, Dembowska 1953) that is *Trigonia monilifera*, *T. papillata* and *Myophorella bronni*. The last species occurs abundantly in the Kimmeridgian of the Iłża area (Dąbrowska 1953). It should be noted that in the Kimmeridgian of margins of the Holy Cross Mts *Trigonia costata* was found which is characterized by very wide stratigraphic ran-

ge. This species was reported from the Vesulian of Łęczycza (Pugaczewska 1976) and, at present, from the Callovian of Łuków in the Polish Lowlands; elsewhere it is known also from the Bajocian. *T. suevi*, hitherto known from the Volgian-Berriasian of the Moscow region, occurs in the Lower Kimmeridgian of the SW margins of the Holy Cross Mts (Góry Mokre region) and in the Portlandian of the Central Poland (bore cores).

The record of trigoniids from the Cracow-Częstochowa region is very poor. *Trigonia denticulata* was reported from yellow oolitic limestones cropping out in the Częstochowa region (Różycki 1953). This species is also known from the Lower Bajocian of Bachowice, the western Carpathian Mts. (Książkiewicz 1956). The largest trigoniid of the Polish Jurassic, *Trigonia meriani*, is reported from the Upper Callovian deposits of the Zalas-Sanka area, Cracow region, which are represented by yellow oolitic marls with nodules and pebbles of sandy, often oolitic limestones. *Trigonia meriani* was also found in higher horizons of the Lower Callovian from the Częstochowa region (Różycki 1953) and Upper Oxfordian of NE margins of the Holy Cross Mts (Radom area) Dembowska 1953).

The Malm deposits from the western Pomerania (Czarnogłowy) yielded *Trigonia papillata*, *Myophorella bronni* and *M. bicostata*, also known from coeval strata of the SW margins of the Holy Cross Mts (Sobków, Góry Mokre, Radomsko area). Lower Kimmeridgian *Myophorella bronni* of the Czarnogłowy occurs in deposit represented mainly by clay and often by oolitic limestones and lumachelles. The detailed reconstruction of facies and paleoecological environment, carried out on the basis of lithological premises (Dmoch 1970; Wilczyński 1962) has shown that the deposition was taking place in shallow-water basin with sediment bottom and was discontinuous which is evidenced by hardground surfaces. *M. bronni* is reported from the Bononian of Tomaszów Mazowiecki.

The above review shows that the trigoniids lived mainly at shallow depths under variable environmental conditions.

SYSTEMATIC PART

Family **Trigoniidae** Lamarck, 1819

Subfamily **Trigoniinae** Lamarck, 1819

Genus *Trigonia* Bruguière, 1789

Trigonia denticulata (Agassiz, 1840)
(pl. 20: 2—4)

1932. *Lyriodon denticulatum* Agassiz (1840); Lebküchner: 92, pl. 11: 11—14, pl. 12: 1—8, pl. 13: 1—2 (see synonymy).

Material. — Three well-preserved shells and one left valve (ZPAL No. X/4—6, 18).
Dimensions (in mm):

H	L	L/H	R (ribs)
30—45	29—42	0.96—0.93	26—34

Supplementary description. — Valve 20 mm high, ornamented with 24 concentric ribs; ligament fulcrum short, 4×1.5 mm in size, situated in subumbonal part of posterior escutcheon margin; escutcheon very narrow and elongated, 24×6 mm in size.

Remarks. — The Polish specimens differ from those described from Germany by Lebküchner (1932) only in more crowded concentric ribs; their number on 20 mm valve flank equals 18 in German specimens.

Occurrence. — Poland: Lower Bajocian (Bachowice), Upper Bathonian (Częstochowa area) and lowermost Callovian (Wola Morawicka). Western Europe: Aalenian — Lower Callovian.

Trigonia tenuicosta Lycett, 1853
(pl. 20: 6)

1932. *Lyriodon tenuicostum* Lycett (1853); Lebküchner: 89, pl. 10: 9—10, pl. 11: 3—4 (see synonymy).

Material — Well-preserved right valve of adult individual (ZPAL Mo.X/3).

Supplementary description. — Valve 44 mm high, 40 mm long, ornamented with 37 concentric ribs; flank of valve 20 mm high ornamented with 25 ribs. Inter-rib spaces equally wide as ribs; this relation remains constant throughout the growth stages. Lateral teeth relatively narrow and long, 1.5×10 mm in size.

Remarks. — German specimens are characterized by variable interrib space to rib width ratio, ranging from 1:1.4 to 1:2.4 while the number of ribs on flank of valve 20 mm high is similar as in Polish specimen, equalling 22—27 (Lebküchner 1932: 89), English specimens figured by Lebküchner (*l.c.*: pl. 11: 3—4), of the same height as the Polish specimens, display 28 concentric ribs all the other features being similar. The species is rare.

Occurrence. — Poland: Upper Bathonian — lowermost Callovian (Wola Morawicka SW margin of the Holy Cross Mts). Western Europe: Bajocian — Bathonian.

Trigonia meriani Agassiz, 1840
(pl. 20: 7)

1874. *Trigonia Meriani* Ag.; Lycett: 167, pl. 33: 1—3.

1925. *Trigonia Bachelieri* d'Orb.; Cottreau: 18, pl. 39: 6—8.

Material. — Somewhat damaged left valve of gerontic individual (ZPAL Mo. X/11).

Supplementary description. — Valve large, over 110 mm high, 100 mm long; the maximum convexity marked in the mid-height equals 45 mm. Ribs S-shaped, distally depressed, not reaching marginal carina, 42 in number (15 in the first 20 mm from the umbo). Antecarinal furrow narrow and relatively deep, 3 mm wide, close to the ventral margin. Distal part of ribs narrowing and ending with spine-like processes directed ventrally. Main, second tooth large, convex, 27 mm high and 22 mm long, bilaterally bordered by teeth grooves 13 mm deep. Sinus beneath the tooth narrow and deep. Posterior adductor muscle scar uniformly depressed, not more than 5 mm, subcircular in outline, with slightly depressed upper margin, 20 mm in diameter.

Remarks.—The Polish specimen resembles the French ones in valve outline, degree of its convexity, course of ribs and shape of umbo, differing in almost 1.5 times larger size. The internal structure of the English and French specimens was not studied. In Poland, similarly as in other parts of Europe, *Trigonia meriani* is very rare.

Occurrence.—Poland: Lower Callovian (Sikorka), Upper Callovian (Zalas-Sanka), uppermost Oxfordian (Radom area) and Lower Kimmeridgian (Czarnogłowy). France: Callovian—Middle Oxfordian. England: Lower and Upper Oxfordian, Kimmeridgian. Switzerland: Lower Kimmeridgian.

Trigonia monilifera Agassiz, 1840
(pl. 20: 1)

1897. *Trigonia monilifera* Agassiz; Loriol: 99, pl. 13: 10.

Material.—Two shells and two valves fairly well preserved (ZPAL Mo. X/12—15).

Supplementary description.—Best preserved shell is 34 mm long and 32 mm high; maximum convexity marked in the mid-height equals 25 mm. Ribs 30 in number (16 in the first 20 mm from the umbo); inter-rib spaces as wide as ribs in subumbonal part of valves, about twice wider than ribs in the ventral part of valve. Ribs reaching marginal carina also in right valve. Distal parts of ribs ending with spine-like processes directed toward the ventral margin. Marginal carina arcuate, rapidly increasing in width reaching 4 mm at the ventral margin, its height being there 2 mm. Medial carina flat between the middle of valve and ventral margin, being equally high as neighbouring radial treads and its width reaches up to 4 mm; a narrow furrow is accompanying the medial carina posteriorly (pl. 20: 1a). Carinae ornamented with flattened tubercles set in imbricate pattern. Inner carina narrow, with finely tuberculated upper surface. Escutcheon flat, set at acute angle to inner carina below umbo and at right angles at ventral margin. Radial treads on area innumerable (4 and 6), low and cut by deeply incised growth lines.

Remarks.—The Polish specimens are most similar to the Swiss ones in shell outline, the character of ornamentation and shell geometry, differing in somewhat less numerous radial treads on the area as well as in somewhat smaller size (the illustrated Swiss specimens are 43 and 47 mm high).

Occurrence.—Poland: Oxfordian and Lower Kimmeridgian (Radom area, Hża area and Czarnogłowy). Western Europe: Middle and Upper Oxfordian USSR (Lithuania): Lower Kimmeridgian.

Trigonia elongata Sowerby, 1823
(pl. 20:5)

1955. *Trigonia (Lyriodon) elongata* Sowerby 1823; Gerasimov: 57, pl. 3: 7.

1965. *Trigonia elongata* Sowerby; Cox: 76, pl. 11: 8 (see synonymy).

Material.—Mould with partly preserved shell and somewhat damaged right valve (ZPAL Mo.X/16—17).

Remarks.—The Polish specimens are very similar to those described and figured in papers listed in the synonymy, differing in smaller dimensions and less numerous concentric ribs. These differences may be explained by the fact that Polish specimens represent juvenile growth stage.

Occurrence.—Poland: Upper Bathonian (Sikorka Dolna), Lower Kimmeridgian (Oleszno), and Upper Kimmeridgian (Sulejów). France: Callovian—Oxfordian. Switzerland: Middle—Upper Oxfordian. USSR: Middle Callovian. India and Tanganyika: Callovian.

Trigonia suevi Stremoukhov 1896
(pl. 19: 9–10)

1955. *Trigonia (Lyriodon) suevi* Stremoukhov 1896; Gerasimov: 57, pl. 3: 6 (see synonymy).

1969. *Trigonia (Trigonia) suevi* Stremoukhov Gerasimov: 71, pl. 9: 6–7.

Material.—Internal moulds of 2 right and 1 left valves with shell partly preserved (ZPAL Mo.X/20–22).

H	L	L/H	R
22.0–50.0	23.5–55.0	1.06–1.1	16–25

Supplementary description.—Shells of juvenile individuals are almost equally high as long whilst mature individuals are markedly longer than high. Width of concentric ribs increasing during the growth whilst the ratio of inter-rib space to rib width remains constant. Marginal carina narrow, nearly rectilinear.

Remarks.—The Polish specimens do not differ in shell dimensions and geometry and the style of ornamentation from the representatives of this species described from the USSR.

Occurrence.—Poland: higher horizons of Lower Kimmeridgian (Góry Mokre), Lower Portlandian (Central Poland, bore cores). USSR: Volgian—Berriassian.

Trigonia papillata Agassiz, 1840
(pl. 19: 4)

1872. *Trigonia papillata* Agassiz; Loriol: 304, pl. 16: 27.

1970. *Trigonia papillata* Agassiz; Dmoch: 89, pl. 10: 3, 5 (see synonymy).

Material.—Three shell moulds and 1 left valve with damaged posterior and ventral parts (ZPAL Mo. X/8–10, 23).

Dimensions (in mm):

H	L	L/H	R
25.0–52.0	23.0–50.0	0.9	25–28

Remarks.—The Polish specimens are identical with the German and French ones in shell outline, the style and density of ribbing, strongly coiled umbo, and character of marginal carina (see Lebküchner 1932: pl. 16: 10; Cossmann 1912; pl. 1: 6–9), differing in height exceeding somewhat their length, and thus in seemingly narrower outline. This feature brings the Polish specimens closer to a narrow variety distinguished by Bigot (see Lebküchner 1932: 105). The number of ribs in the first 20 mm from the umbo is similar on Polish and German specimens, equalling 17 and 16–18, respectively (see also Lebküchner *l.c.*: 106). The specimens described from the western Pomerania by Dmoch (1970) belong to a “broad” variety. A valve of this variety is ornamented with 10–12 ribs in the first 20 mm from the umbo which are markedly more loosely spaced than in the case of above discussed specimens (inter-rib space are here twice wider than ribs).

Occurrence.—Poland: Upper Oxfordian—Upper Kimmeridgian (Sobków, Iłża area, Czarnogłowy). Western Europe: Oxfordian—Kimmeridgian.

Subfamily *Myophorellinae* Kobayashi, 1954Genus *Myophorella* Bayle, 1878*Myophorella bronni* (Agassiz, 1840)

(pl. 19: 8)

1905. *Trigonia bronni* Agassiz; Schmidt: 106, pl. 7: 1—6.
 1912. *Trigonia bronni* Agassiz; Cossmann: 18, pl. 1: 15, pl. 3: 14—16.
 1970. *Myophorella bronni* Agassiz; Dmoch: 91, pl. 10: 4.
 1972. *Trigonia bronni* Agassiz; Gavrilishin: 24, pl. 2: 1.

Material. — Left valve with damaged ventral part (ZPAL Mo.X/24).

Supplementary description. — Valve about 40 mm long and almost equally high. Umbo low, slightly incurved, submedial and slightly prosogyrous. Anterior valve margin gently rounded, posterior margin straight to the mid-height and subsequently descending and passing into ventral margin through a wide, rounded posteroventral lobe. In the first 20 mm from the umbo valve ornamented with about 12 rows of tuberculated ribs. Tubercles quickly increasing in size, finally becoming convex, irregularly rounded and 2 to 2.5 mm in diameter on the last rib. The tubercles are not connected by their bases and the intervals between them quickly increase up to about 5 mm at ventral margin. Ribs almost horizontal in upper half of valve, becoming progressively more arcuate towards ventral margin; last ribs do not reach marginal carina ending about 5 mm from it. Carinae on the area well-developed, ornamented with widely spaced, prominent, wide tubercles.

Occurrence. — Poland: uppermost Oxfordian — Upper Kimmeridgian (Góry Mokre, Czarnogłowy, Lublin area), Portlandian (Czarnogłowy) and Middle Bononian (Tomaszów Mazowiecki). Germany: Kimmeridgian. England and Ukrainian SSR: Oxfordian.

Myophorella bicostata (d'Orbigny, 1850)

(pl. 19: 5—6)

1929. *Trigonia bicostata* d'Orbigny; Boule, 109: pl. 54: 2.
 1965. *Trigonia bicostata*; Karczewski: 125, pl. 12: 2.
 1970. *Trigonia bicostata*; Dmoch: 90.

Material. — Two valves (right and left) somewhat damaged and with partly obliterated ornamentation (ZPAL Mo.X/1-2).

Dimensions (in mm):

H	L	L/H	R
14.0-15.0	17.0	1.1-1.2	13-14

Supplementary description. — Concentric ribs relatively thin in subumbonal part, gradually increasing in thickness and about 0.5-0.7 mm thick near ventral margin. Inter-rib spaces increase in width from 0.5 mm in subumbonal part to 2 mm near the ventral margin. Valves ornamented with smooth ribs up to the mid-height; subsequently tubercles appear at distal parts of ribs; tubercles increase in number from 1 to 4 at ventral margin and, at the same time, in width and height. The ribs are separated from marginal carina by a relatively wide antecarinal depression on the right valve whilst on the left valve all the ribs reach the carina except for two most posterior, ending in some distance from it. Marginal carina arcuate, ornamented with sharp tubercles representing swollen ends of transversal riblets of area. The tubercles marked on internal carina originate in the same way. Instead of

medial carina a furrow is marked about 2 mm distant from umbo. Siphonal margin of area S-shaped and about 6 mm high. Escutcheon ovate, depressed along internal carina, about 9 mm × 2 mm in size. Furrow along ligament lamina equal about a third of posterior escutcheon margin. Inner surface of valve uneven. Hinge relatively well preserved. Main 2nd tooth slightly predominating, 1.5 mm high; tooth grooves 0.5 to 1.0 mm wide, relatively deep (about 1 mm deep). Sinus beneath the main tooth deep and wide. Lateral teeth of the right valve long, protruding; the anterior tooth massive, straight and 5 mm long; and posterior tooth narrower, arcuate and somewhat shorter (4 mm long). Adductor muscle scars large, about 5 mm in diameter. Anal and branchial depressions well developed, 2 mm and 4 mm wide, respectively.

Remarks. — This species is assigned to the genus *Myophorella* taking into account the style of ornamentation. A detailed characteristics of external and internal morphology is here given for the first time as up to the present this species was known from moulds, imprints or valves embedded in rock. Poor preservation of the specimens is supposedly responsible for overlooking tuberculation on some parts of ribs. Poorly visible tubercles may be noted on illustration of d'Orbigny specimen (see Boule 1929: pl. 54: 2). The lack of similarly developed ribs in *Trigonia sauvagei* de Loriol (Loriol 1875) and *T. truncata* Agassiz (Loriol 1872) along with other features displayed by the species such as: more numerous ribs, more convex valves and circular outline of anterior margin, speak against the identity of *T. bicostata* d'Orbigny and both species described and illustrated by Loriol (*l.c.*), previously suggested by Dmoch (1970). The species is very rare.

Occurrence. — Poland: Upper Oxfordian — Kimmeridgian (Czarnogłowy, Radomsko area). France: Sequanian (= uppermost Oxfordian).

Myophorella clavellata (Parkinson, 1811)
(pl. 19: 1-3; pl. 20: 8)

1929. *Trigonia clavellata* Parkinson 1811; Arkell: 64, pl. 3: 6—10.

1934. *Trigonia clavellata* Sowerby; Stoll: 10, pl. 1: 18.

1961. *Myophorella (Myophorella) clavellata* (Sowerby 1826); Sibiriakova: 108, pl. 14: 10.

Material. — Over a dozen specimens, mainly valves and shell moulds (ZPAL Mo. X/25—35, 19).

Dimensions (in mm):

H	L	C	L/H
26.0-50.0	33.0-65.0	19.0-33.0	1.25-1.5

Supplementary description and growth changes. — Maximum convexity of shell marked above the mid-height. Umbo small, acute, curved, opistogyrous, situated in one-third of shell length from the anterior margin. Maximum convexity of the anterior margin marked below the mid-height. Posterior margin almost rectilinear along its whole length. Posteroventral lobe relatively slightly widened. In the first 20 mm from the umbo valve ornamented with about 10 rows of tuberculated concentric ribs. All the ribs are arcuate forming during the growth progressively more acute angle with the marginal carina and markedly lowering at the anterior margin; the last ribs join the ventral margin at almost right angles (pl. 19: 2a). During the initial growth stage the surface of concentric ribs is smooth except for a small tubercle with ventral spine on their ends; there are 4 such ribs and the number of tu-

bercles and spines steadily increases. The fifth rib displays 3 tubercles and 3 spines diverging from them. The next 3—4 ribs are completely tuberculated. Along with shell growth the distance between individual tubercles increases, the tubercles increase in size and their common basis lowers. The inter-rib space is initially equally wide as ribs, becoming twice wider than ribs close to the ventral margin. Area ornamented with transversal ledge-like riblets initially continuous and subsequently broken by medial carina. Marginal and medial carinae ornamented with small protruding tubercles, whilst internal carina — by wide tubercles (pl. 19: 2b). The tubercles originated from swollen terminal ends of riblets clearly separated from one another in the area. Marginal carina ornamented with very fine transversal striae between tubercles. Ligament lamina occupying about a third of posterior escutcheon margin (pl. 19: 1). Ligament furrow relatively narrow and deep; the ledge supporting the ligament is somewhat shorter than the furrow. External ligament preserved on two shells (pl. 20: 8), in the form of elongate ridge with transversal striae and composed of numerous thin fibrae also transversally striated. In living trigoniids the external ligament consists of light, homogeneous laminated conchiolin. In the case of fossil forms it is impregnated with carbonate matter (Lebküchner 1932: 14; Trueman 1969: 58), well-preserved shells display microornamentation of prismatic layer. The arrangement of individual prisms is linear. Broken shell surface displays elongate outline of prisms (pl. 19: 3; see also Pugaczewska 1976: pl. 22).

Remarks. — Arkell (1929) allocated several specific names including *M. bronni* in the synonymy of *M. clavellata*. According to the present author the species *M. bronni* and *M. clavellata* should be distinguished as they differ from one another in the following features: umbo submedial and somewhat prosogyrous in *M. bronni* while situated in a third of shell length from the anterior margin and somewhat opistogyrous in *M. clavellata*; the anterior margin is more convex in *M. bronni* than in *M. clavellata*; almost all rows of tubercles are concentric in *M. bronni* whilst only the subumbonal ribs are concentric, the subsequent ribs being oblique and finally even set at almost right angles to ventral margin, in *M. clavellata*; tubercles from carinae are smaller in *M. clavellata* than in *M. bronni*; tubercles occurring on marginal carina are separated by thin rings in *M. clavellata* but not in *M. bronni*; moreover, ventrolateral lobe is wider, larger and more rounded in *M. bronni* than in *M. clavellata*. Thus, the species compared differ in basic features of their external morphology. The internal morphology is still unknown.

The Polish specimens are most similar to those from the USSR in shell ornamentation and outline, being also similar to those known from the Mecklenburg (German Democratic Republic).

Occurrence. — Poland: Callovian (Łuków). Crimea and central parts of the USSR, England, Germany, Switzerland: Bathonian-Callovian.

Subfamily Rutitrigoniinae van Hoepen, 1929

Genus *Rutitrigonia* van Hoepen, 1929

Rutitrigonia skorkovensis sp.n.

(pl. 19: 7)

Holotype: Specimen no. ZPAL Mo.X/7: pl. 19: 7.

Type horizon: Lower Kimmeridgian, the *Sutneria platynota* Zone.

Type locality: Skorków (Małogoszcz area), SW margin of the Holy Cross Mts in central Poland.

Derivation of name: *skorkovensis* — from the type locality, Skorków.

Diagnosis.—Shell ovate, subtriangular, posteriorly rostrate. Umbo broad, prominent. Flanks ornamented with very numerous, fine, subconcentric costae and area — with progressively finer, radially arranged costellae.

Material.—Mould of adult individual with shell fragments.

Description.—Holotype over 40 mm high, over 55 mm long, with maximum convexity marked in the middle of anterior shell part and equal 22 mm. Umbo wide, moderately protruding, opistogyrous, situated in about a fifth of shell length from anterior margin. Anterior margin short, convex; posterior margin concave to the mid-height, rectilinear thereafter; ventral margin broadly arcuate, passing into the posterior through a large, rounded posteroventral lobe. Flanks ornamented with very numerous (over 50), weakly arcuate, concentric costellae more curved in posteroventral part of shell than in the anterior as well as in subumbonal part where they are almost horizontal. The costellae thin and densely spaced close to the anterior margin, flattened and widened elsewhere, becoming thinner once more terminally. Area ornamented with about 10 thin, protruding, radial striae.

Remarks.—*Rutitrigonia skorkovensis* sp.n. differs from other species of that genus primarily in radial course of costellae in the area, ornamentation marked on the whole lateral surface of shell, as well as more protruding and wider umbo situated closer to the anterior margin. *Rutitrigonia yeharai* Kobayashi, 1957, and *R. amagensis* Kobayashi, 1957, derived from the Lower Neocomian of the Phillippines, differ from the new species in lower, more rounded and less protruding umbones and concentric costellae confined to anterior parts of valves (Kobayashi 1957: 359—360, pl. 3: 1—2). The specimens of *R. sanchuensis* (Nakano, 1957) from Japan (Kobayashi & Nakano, 1958) have similarly lower umbones than the Polish specimens and the anterior part of valve is only partly ornamented, costellae being somewhat longer than on the above mentioned Phillippine species. *Rutitrigonia stefaninii* (Venzo 1960) from the Upper Kimmeridgian of Kenya (Cox 1965) is characterized by coarse, innumerable, short costellae also confined to anterior part of valve, less protruding umbo situated almost in the center of valve and less elongate outline. The above mentioned species differ from the Polish one in the ornamentation of posterior part of valves (area) with transversal, more or less fine costellae whilst the Polish species is ornamented with numerous, fine, radial striae. According to the present author the differences in ornamentation, shape and location of umbo, concave posterior margin of shells are sufficient for introducing a new specific name for the Polish specimens.

It should be added that Polish species derived from the Lower Kimmeridgian deposits markedly lowers the stratigraphic range of the genus *Rutitrigonia*, the earliest representatives of which were hitherto known from the Upper Kimmeridgian (Cox 1965). This is also the first record of the genus *Rutitrigonia* from Europe as it was hitherto known only from Japan, Phillippines, central (Kenya) and southern Africa (*R. peregrina* van Hoepen, 1929).

Occurrence.—As for the type-specimen.

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HALINA PUGACZEWSKA

DODATKOWE BADANIA NAD TRYGONIAMI Z JURY POLSKI

Streszczenie

Praca niniejsza stanowi kontynuację badań autorki nad Trigoniidae jurajskimi Polski (Pugaczewska 1976) i zawiera opisy 11 środkowo- i górnourajskich gatunków, należących do rodzajów: *Trigonia* (*T. denticulata*, *T. tenuicosta*, *T. meriani*,

T. monilifera, *T. elongata*, *T. suevi*, *T. papillata*), *Myophorella* (*M. bronni*, *M. bicostata*, *M. clavellata*) i *Rutitrigonia* (*R. skorkovensis* sp.n.) (Pls 19 i 20). Znaleźcie przedstawiciela *Rutitrigonia* w dolnym kimerydzie Polski rozszerza zasięg stratygraficzny i geograficzny tego rodzaju, znanego dotychczas z osadów od górnego kimerydu do górnej kredy Filipin, Japonii i południowej półkuli.

Przeprowadzona przez autorkę analiza cech gatunkowych w obrębie rodzaju *Myophorella* wykazała, że *M. bronni* i *M. clavellata* są odrębnymi gatunkami, zaś gatunek *T. bicostata* powinien być zaliczony do rodzaju *Myophorella*.

W osobnym rozdziale zestawiono dotychczas poznana faunę trygonii jury Polski na tle stosunków stratygraficzno-facjalnych, oraz zamieszczono mapkę znanych punktów występowania trygonii w jurze Polski (fig. 1).

Niniejsza praca została wykonana w ramach problemu międzyresortowego II/3.

ХАЛИНА ПУГАЧЕВСКА

ДОВАВИТЕЛЬНЫЕ ИССЛЕДОВАНИЯ НАД ЮРСКИМИ ТРИГОНИЯМИ ИЗ ПОЛЬШИ

Резюме

Настоящая статья является продолжением исследований автора над *Trigoniidae* юры Польши (Пугачевска 1976). Она содержит описание 11 средне- и верхнеюрских видов, принадлежащих к родам: *Trigonia* (*T. denticulata*, *T. tenuicostata*, *T. meriani*, *T. monilifera*, *T. elongata*, *T. suevi*, *T. papillata*), *Myophorella* (*M. bronni*, *M. bicostata*, *M. clavellata*) и *Rutitrigonia* (*R. skorkovensis* sp. n.). Обнаружение представителя *Rutitrigonia* в нижнем киммеридже Польши расширяет стратиграфическое и географическое распространение этого рода, известного до сих пор из отложений от верхнего киммериджа до верхнего мела Филиппин, Японии и южного полушария.

Проведенный автором анализ видовых признаков в пределах рода *Myophorella* показал, что *M. bronni* и *M. clavellata* являются отдельными видами, в то время как вид *T. bicostata* должен быть причислен к роду *Myophorella*.

В отдельном разделе составлена известная до настоящего времени фауна тригоний юры Польши на основе стратиграфическо-фациальных отношений, а также дана карта известных мест выступлений тригоний в юре Польши (фиг. 1).

EXPLANATION OF THE PLATES

Plate 19

Myophorella clavellata (Parkinson)
Callovian, Łuków

1. Fragment of right valve, ZPAL Mo. X/25: ligament area and high posterior tooth visible, $\times 2$.
2. Shell of adult specimen, ZPAL Mo. X/26: *a* left valve, *b* posterior area, $\times 1.5$.
3. Fragment of shell surface, ZPAL Mo. V/27: prisms in top and side views, $\times 10$.

Trigonia papillata Agassiz
Lower Kimmeridgian, Sołków near Chęciny

4. Left valve, ZPAL Mo. X/8: "narrow variety", $\times 1$.

Myophorella bicostata (d'Orbigny)
Lower Kimmeridgian, Czarnogłowy

5. Left valve of adult specimen, ZPAL Mo. X/1: *a* external, *b* internal surface, $\times 2$.
6. Right valve of adult specimen, ZPAL Mo. X/2: *a* external, *b* internal surface, $\times 2$.

Rutitrigonia skorkovens sp.n.
Lower Kimmeridgian, Skorków near Małogoszcz

7. Shell of adult specimen, ZPAL Mo. X/7: left valve, $\times 1$.

Myophorella bronni (Agassiz)
Lower Kimmeridgian, Góry Mokre

8. Shell of adult specimen, ZPAL Mo. X/24: left valve, $\times 1$.

Trigonia suevi Stremoukhov
Lower Kimmeridgian, Góry Mokre

9. Left valve of young specimen, ZPAL Mo. X/20: $\times 1$.
10. Right valve of adult specimen, ZPAL Mo. X/21: $\times 1$.

Plate 20

Trigonia monilifera Agassiz
Upper Oxfordian, Czarnogłowy

1. Shell of adult specimen, ZPAL Mo. X/12: *a* posterior area, *b* right valve, $\times 1$.

Trigonia denticulata Agassiz
Upper Bathonian, Wola Morawicka

2. Shell of adult specimen, ZPAL Mo. X/4: anterior view, $\times 1$.
3. Shell of old specimen, ZPAL Mo. X/5: *a* posterior view, *b* right valve, $\times 1$.
4. Left valve of adult specimen, ZPAL Mo. X/6: *a* internal, *b* external surface, $\times 1$.

Trigonia elongata Sowerby
Lower Kimmeridgian, Oleszno

5. Fragment of right valve, ZPAL Mo. X/16: $\times 1$.

Trigonia tenuicosta Lycett
Upper Bathonian, Wola Morawicka

6. Right valve of adult specimen, ZPAL Mo. X/3: *a* internal, *b* external surface, $\times 1$.

Trigonia meriani Agassiz
Callovian, Zalas-Sanka near Cracow

7. Left valve of old specimen, ZPAL Mo. X/11: *a* internal, *b* external surface, $\times 0.5$.

Myophorella clavellata (Parkinson)
Callovian, Łuków

8. Shell of adult specimen, ZPAL Mo. X/28: external ligament placed subumbonally, along posterior margin, $\times 3$.

