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Ostracodes of the Volgian "Serpulite" from Brzostówka near Tomaszów Mazowiecki, Central Poland

ABSTRACT: The ostracode assemblage from the serpulite limestone ("Serpulite") of the classical locality at Brzostówka near Tomaszów Mazowiecki (Middle Volgian, *zarajskensis* Subzone) comprises 11 forms, including one new species, *Macrodentina (Polydentina) volgiana* sp. n. The stratigraphic significance of the assemblage is discussed, and its bearing on the regional correlation with the Polish Lowland area is presented.

INTRODUCTION

The Volgian sediments in the vicinity of Tomaszów Mazowiecki, NW margin of the Holy Cross Mts, Central Poland, were the subject of many publications (*cf.* Lewiński 1923; Kutek 1962a, b, 1967; Kutek & Zeiss 1974).

The knowledge of ostracodes from this area was hitherto limited only to the incidental references by Lewiński (1923) and Witkowski (1969). The present paper deals with ostracodes found in the serpulite limestone of the classical section at Brzostówka. This limestone, called the "Serpulite" by Lewiński (1923) represents the lower part of the lithological horizon *IV* of Lewiński (*cf.* also Kutek 1962a, b, 1967) and corresponds to the *Zaraiskites zarajskensis* Subzone, i.e. the upper subzone of the *scythicus* Zone, which is the lower zone of the Middle Volgian Substage (*cf.* Kutek & Zeiss 1974, Table 1).

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GEOLOGICAL SETTING

The "Serpulite" at Brzostówka forms a layer c 1.5 meters thick in the lithological horizon *IV* of Lewiński (*cf.* Kutek 1962a). It is developed as cream-coloured limestone replete with serpulids. This layer yielded ammonites of the species *Zaraiskites zarajskensis* (cf. Kutek 1967) and lamellibranchs of the genus *Pleuromya, Phaladomya, Exogyra* and *Mytilus* (cf. Kutek 1962b). Its microfauna is represented by marine ostracodes, scarce foraminifers with *Lenticulina muensteri* (Roemer, 1839), as well as by echinoderm remains and fish teeth.

The following ostracodes have been found in the "Serpulite" under discussion:

Cytherella elongata Donze, 1964
Paracypris? sp. *A* Schmidt, 1955
Macrodentina (Polydentina) volgiana sp. n.
Macrodentina sp. *A*
Amphicythere? (Merocythere) plena pauciperforata Donze, 1960
Rectocythere rugosa Malz, 1966
Protocythere aff. *fistulosa* Ljubimova, 1955
Schuleridea sp. *A*
Vernoniella? sp. *A*
Paranotacythere (Unicosta) rimosa (Martin, 1940)
Procytheropteron ex gr. *brodiei* (Jones, 1894)

The presented ostracode assemblage contains *Paranotacythere (Unicosta) rimosa* and *Procytheropteron* ex gr. *brodiei,* which are characteristic of the lower part of the ostracode zone *F of* Bielecka & Sztejn 1966 (*cf.* also Marek, Bielecka & Sztejn 1969, Fig. 3; Bielecka 1975, p. 302, Tab. 3). The ostracode zone *F* is considered by Bielecka (1975) to be the basal zone of the "Upper Portlandian" of the Polish Lowlands and is thought to be underlaid by sediments of the *Virgatites pusillus* Zone.

From the data presented in this paper it follows that the lower part of the ostracode zone *F* corresponds to an upper part of the *zarajskensis* Subzone. Thus, the base of the zone *F* has to be considered as a diachronic one, with the underlying sediments being of *zarajskensis* age at Brzostówka, but of post-*zarajskensis* (that is to say *pusillus*) age in some other parts of the Polish Lowlands. However, the possibility cannot be ruled out that the latter sediments are also of the *zarajskensis* age (*cf.* Kutek, Matyja & Wierzbowski 1973, pp. 566—568).

The ostracodes found in the "Serpulite" at Brzostówka are represented exclusively by marine forms. The brackish forms, *Mantelliana purbeckensis* (Forbes, 1955) and *Cypridea* sp., were reported from this locality by Lewiński (1923, p. 105). It is difficult to indicate their exact position in the section exposed; however, it is highly probable that they come from the sediments (underlaid by "Serpulite") of the upper part of the lithological horizon *IV*.

DESCRIPTION OF THE MATERIAL

The state of preservation of the collected material leaves much to be desired. Many specimens are badly incrusted and/or infilled with matrix, and they do not allow a precise determination. Some species therefore are left under open nomenclature, and some others for further study.

All the material figured in this paper is deposited in the collection of the Institute of Geology, University of Warsaw, under the numbers prefixed to the explanation of figures in Plates 1 and 2. The following abbreviations are used throughout the text:

C — carapace: *LV* — left valve, *RV* — right valve
L — valve length, *H* — valve height, *W* — carapace width

Genus *CYTHERELLA* Jones, 1849
Cytherella elongata Donze, 1964
(Pl. 1, Fig. 2)

1964. *Cytherella elongata* n. sp.; Donze, pp. 105—106, Pl. 1, Figs 2—9.
1973. *Cytherella elongata* Donze; Pokorný, pp. 26—28, Text-fig. 8a-i, Pl. 15, Figs 3—4.

Material. — A carapace and a single valve (*B.3—4*).
Dimensions (in *mm*):

	L	H	W
C♂	0.97	0.50	0.36
RV♀	0.71	0.43	

Occurrence. — Berriasian of the Massifs Subalpins Septentrionaux of south-eastern France (Donze 1964, p. 106) and Tithonian? of the Klentnice Formation, southern Moravia (Pokorný 1973, p. 28).

Genus *PARACYPRIS* Sars, 1866
Paracypris? sp. A Schmidt, 1955
(Pl. 1, Fig. 1)

1955. *Paracypris? sp. A;* Schmidt, p. 52, Pl. 1, Fig. 2.
1959. *Paracypris? sp. A;* Schmidt; Oertli, p. 19, Pl. 2, Fig. 36.

Material. — Six valves (*B.1—2*).
Dimensions (in *mm*):

	L	H
LV	0.68—0.73	0.36—0.37
RV	0.66—0.71	0.33—0.34

Remarks. — These specimens agree well with those figured by Schmidt, and they differ from specimens presented by Oertli by their somewhat more arched outline of dorsal margin. Interior features of valves have not been seen.

Occurrence. — Portlandian, Eimbeckhäuser Plattenkalk, of the Bergland of north-western Germany (Schmidt 1955; p. 52); "Portlandien" and "Mittel-Kimmeridgien" of the Swiss Jura (Oertli 1959, p. 19).

Genus *MACRODENTINA* Martin, 1940
Subgenus *POLYDENTINA* Malz, 1958
Macrodentina (Polydentina) volgiana sp. n.
(Pl. 2, Figs 4—8)

Holotype: C♂ (*B.5*), figured in Pl. 2, Fig. 6a-d.
Paratypes: LV♂ (*B.7*), RV♂ (*B.6*), LV♀ (*B.9*), RV♀ (*B.8*); figured in Pl. 2, Figs. 4—5, 7—8.
Type horizon: Middle Volgian (*Zaratskites zarajskensis* Subzone), the "Serpulite".
Type locality: Brzostówka near Tomaszów Mazowiecki, Central Poland.
Derivation of the name: after the Volgian Stage.
Diagnosis. — Rather small, oblong-shaped species with rounded posterior end and strongly pitted valve surface; pits arranged concentrically along anterior, ventral and posterior margins and irregularly spaced in central area of valves. Sexual dimorphism pronounced.

Material. — Ten valves and a carapace (*B.5—10*).
Dimensions (in *mm*):

	L	H
LV♂	0.75—0.76	0.41—0.43
RV♂	0.75—0.76	0.40—0.41
LV♀	0.66—0.69	0.39—0.43
RV♀	0.69—0.70	0.42—0.43
Lv (juvenile)	0.58	0.32

Description. — Carapace elongated, in dorsal view of regular elliptical outline; *LV* slightly larger than *RV*, overlapping it mainly along the ventral margin. Dorsal margin straight in *LV*, slightly arched in *RV*. Anterior margin broadly rounded; posterior margin rounded with its top situated near the longitudinal axis of the valve. A smooth stripe runs close to the thickened border of the anterior and, respectively, of the posterior margin; both stripes become very low and tiny in ventral direction. Lateral surface covered with more or less rounded pits. The pits are arranged concentrically along the anterior, ventral and posterior margins, and are set irregularly in the central valve surface. In the ventral area of the valves, the pits run subparallel to the ventral margin and are arranged in vertical rows, ribs between rows are well pronounced. Hinge imperfectly preserved in most specimens; in *RV* terminal elements carry 5 to 7 denticles discernible on their tops. Muscle scars not seen. Sexual dimorphism striking, males longer than females.

Remarks. — This new species resembles in shape *Macrodentina (Macrodentina) abbreviata* Malz, 1968, from the Portlandian of Ile d'Oleron (Charente Maritime) in France, but it is easily distinguishable from the latter by its more filled out posterior end and pitted ornamentation of valves. It bears some external similarity to *M. (M.) maculata* described by Malz (1957) from Mittlerer Münder Mergel in Germany, but differs by its straight dorsal margin of *LV* and valve ornamentation.

Macrodentina sp. *A*
(Pl. 2, Figs 13—15)

Material. — Three valves (*B.11—13*).
Dimensions (in *mm*):

	L	H
LV♂	0.86	0.44
LV♀	0.77	0.42
RV♀	0.78	0.44

Remarks. — This form is similar in shape and its pitted valve surface to *Macrodentina (Macrodentina) perforata* Klingler, 1955, known from the Upper Kim-

meridgian; it differs, however, by its valve proportions. The specimen referred to *Macrodentina* sp. ind. by Pokorný (1973, p. 37, Pl. 4, Fig. 3) from the Tithonian? of the Klentnice Formation in southern Moravia may well be the same species, but only single *RV* was found and, therefore, the identification is queried. Insufficient material in the investigated samples does not allow the establishment of a new species.

Genus *AMPHICYTHERE* Triebel, 1954
Subgenus *MEROCYTHERE* Oertli, 1957
Amphicythere? (Merocythere) plena pauciperforata Donze, 1960
(Pl. 1, Figs 7—9)

1960. *Amphicythere? (Merocythere) plena pauciperforata* n. subsp.; Donze, pp. 24—25, Pl. 6, Figs 70—73.

Material. — Over a dozen valves and carapaces (B. 14—17).
Dimensions (in *mm*):

	L	H
LV♂	0.68—0.80	0.37—0.42
RV♂	0.71—0.78	0.38—0.41
LV♀?	0.61—0.69	0.37—0.42
RV♀?	0.64—0.69	0.38—0.41

Remarks. — The specimens agree fairly well with the topotypes of *A.*? (*M.*) *plena pauciperforata* in their general shape, but they are more slender and larger, especially the males. Whereas the length/height ratio of the topotype RV♂ is about 1.68 (*cf.* Donze 1960, Pl. 6, Fig. 73), this ratio in measured six RV♂ from Brzostówka ranges from 1.85 to 1.91.

It seems that a great variability in valve proportions observable in the studied material can be due to parthenogenetic and sexual type of reproduction, as suggested by Dr. P. Donze, who kindly compared the Brzostówka specimens with his original material of *A.*? (*M.*) *plena pauciperforata.*

Occurrence. — Lower Portlandian of Ile d'Oléron (Charente Maritime) in France (Donze 1960, p. 25).

Genus *RECTOCYTHERE* Malz, 1958
Recocythere rugosa Malz, 1966
(Pl. 2, Figs 2—3)

1966. *Rectocythere rugosa* n. sp.; Malz, pp. 405—409, Figs 6—9.
1973. *Rectocythere rugosa* Malz; Pokorný, p. 59, Pl. 7, Fig. 4; Pl. 18, Figs 2—3; Pl. 20, Fig. 5.

Material. — Two carapaces and a single valve (*B. 18—20*).
Dimensions (in *mm*):

	L	H	W
C	0.50	0.33	0.28
RV	0.55	0.33	

Remarks. — These specimens agree with the topotypes in all respects except their slightly smaller size. The variation in surface ornamentation mentioned by Pokorný (1973, p. 59) has not been observed.

Occurrence. — Lower Portlandian of Ile d'Oléron (Charente Maritime) in France (Malz 1966) and Tithonian? of the Klentnice Formation, southern Moravia (Pokorný 1973, p. 60).

Genus *PROTOCYTHERE* Triebel, 1938
Protocythere aff. *fistulosa* Ljubimova, 1955
(Pl. 2, Figs 9—12)

Material. — Over a dozen valves and carapaces (*B. 21—24*).
Dimension (in *mm*):

	L	H
LV♂	0.75—0.90	0.41—0.50
RV♂	0.84—0.90	0.42—0.45
LV♀	0.74—0.76	0.52
RV♀	0.71—0.72	0.40—0.44

Description. — Valves elongate, solid. Anterior end broadly rounded and thickened to form an anteromarginal rib. Posterior end of *LV* rounded, whereas posterior end of *RV* pointed medially. Dorsal and ventral margins straight and subparallel. Lateral valve surface crossed by three longitudinal ribs. The dorsal rib is equal in length to median hinge element and follows the dorsal margin. The median rib is merged anteriorly with a low muscle-scar node, whereas posteriorly is slightly bent ventralwards. The ventrolateral rib overhanges the ventral margin in *RV*, while in *LV* is separated from the ventral margin by a shelf-like flattened area. Exterior of valves pitted or smooth, the latter very probably secondarily. In ventral area, the pits seem to be arranged in rows parallel to the ventral margin of valves. Marginal area moderately broad. Hinge of *RV* consists of two terminal teeth, each divided into four or five lobes. Between the teeth there is a long, straight locellate? groove. Muscle scars not seen. Sexual dimorphism conspicuous; males are longer and narrower than females.

Remarks. — This form differs from *Protocythere fistulosa* recorded by Ljubimova (1955, pp. 83—84, Pl. 9, Fig. 7) from the Upper Volgian (*Epivirgatites nikitini* Zone) of the Central Volga area, by its less protruding ventrolateral rib and by its less stretched-out posterior end of valves.

Genus *SCHULERIDEA* Swartz & Swain, 1946
Schuleridea sp. *A*
(Pl. 1, Figs 10—11)

Material. — Over a dozen valves and carapaces (*B. 25—27*).
Dimensions (in *mm*):

	L	H
LV♂	0.76—0.90	0.44—0.52
RV♂	0.73—0.82	0.40—0.43
LV♀	0.66—0.74	0.46—0.50
RV♀	0.64—0.72	0.40—0.42

Remarks. — The males of this form are in shape and size like those of *Schuleridea spatiosa*, while the females — like *S. major* described under the name *Aequacytheridea* by Ljubimova (1955, pp. 100—101, Pl. 11, Figs 4, 6) from the *Pavlovia panderi* and *Virgatites virgatus* Zones of the Obshchij Syrt in USSR. Unfortunately, only single valves of both species, *RV* of *S. spatiosa* and *LV* of *S. major*, are originally figured and the description by Ljubimova does not suggest any character of dimorphism. It is impossible, therefore, to assign the Brzostówka specimens to any of the two species under discussion before a more precise examination of the material.

The investigated form, *Schuleridea* sp. *A*, is also close to *S. triebli oblonga*, described by Donze (1960, pp. 18—19 and Pl. 3; Figs 31—39) from the Lower Portlandian of Ile d'Oléron (Charente Maritime) in France, but it differs by its well pronounced eye-tubercle, outline of *RV*♂ and larger size.

Another similar form is *S. consobrina* recorded by Pokorný (1973, pp. 73—75; Pl. 17, Figs 5—6; Text-figs 32—33) from the Tithonian? of the Klentnice Formation, southern Moravia. The Brzostówka specimens differ from this species by their smooth or quite finally pitted valve surface (the valve surface of *S. consobrina* is coarsely pitted), and by considerably larger size.

Genus *VERNONIELLA* Oertli, 1957

Vernoniella? sp. *A*

(Pl. 1, Figs 12—13)

Material. — Eleven valves (*B. 28—30*).

Dimension (in *mm*):

	L	H
LV♂	0.82	0.50
RV♂	0.87—0.98	0.50—0.51
LV♀	0.81—0.88	0.49—0.51
RV♀	0.83—0.84	0.49

Description. — Valves elongated tapering posteriorly; *LV* slightly larger than *RV*, two valves similar in shape. Dorsal margin straight, ventral margin slightly convex. Anterior end rounded, posterior end more or less angular. Valve surface smooth with some irregularly spaced normal pore canals. Muscle scars and hinge structure not seen. Marginal areas narrow. Sexual dimorphism pronounced: males are longer and less high than females.

Remarks. — These specimens bear external similarity to the species of the genus *Galliaecytheridea* and are like *Vernoniella* in shape. They differ from the representatives of the first genus by lack of the peripheral compression of valves along the anterior margin. The identification as *Vernoniella* is questionable because the hinge structure could not been seen.

Genus *PARANOTACYTHERE* Bassiouni, 1974

Subgenus *UNICOSTA* Bassiouni, 1974

Paranotacythere (Unicosta) rimosa (Martin, 1940)

(Pl. 2, Fig. 1)

1940. *Orthonotacythere rimosa* n. sp.; Martin, p. 335, Pl. 6, Figs 84—86.
1974. *Paranotacythere (Unicosta) rimosa* (Martin); Bassiouni, pp. 68—69, Pl. 13, Figs 4—5 [*synonymy given*].
1975. *Orthonotacythere rimosa* Martin; Bielecka, p. 372, Pl. 14, Fig. 7.

Material. — A single valve and a carapace (*B. 31—32*).

Dimensions (in *mm*):

	L	H	W
LV	0.51	0.27	
C	0.49	0.27	0.26

Occurrence. — Purbeck of Germany (Triebel 1941, p. 393); upper part of the Middle "Portlandian" exposed in the cliff between Boulogne-sur-Mer and the Cap

de la Crèche in France (Oertli 1963, Pl. 51); Lower Purbeck, Vitabäck Beds of Scania (Christensen 1968, p. 41), and Upper Portlandian ostracode zone *F* of the Polish Lowlands (Bielecka 1975, p. 373).

Genus *PROCYTHEROPTERON* Ljubimova, 1955

Procytheropteron ex gr. *brodiei* (Jones, 1894)

(Pl. 1, Figs 3—6)

Material. — More than ten valves (*B. 33—37*).

Dimensions (in *mm*):

	L	H
LV	0.43—0.55	0.30—0.35
RV	0.46—0.61	0.30—0.37

Remarks. — Some of these specimens (Pl. 1, Fig. 3) are in shape and surface ornamentation (made of longitudinal ridges in the ventral half of valves) very close to *Procytheropteron barkeri* described by Anderson (1971, p. 122) from the Lower Purbeck of the Aylesbury area of Buckinghamshire, England. The Brzostówka specimens, two LV♀?, differ from the topotype female-carapace (Anderson 1971, Pl. 21, Fig. 6) by their more elevated valves and less symmetrical outline of dorsal margin. On the other hand, the specimen (C♂?) referred to *P. brodiei* by Bielecka (1975, Pl. 14, Fig. 3, p. 373), from the ostracode zone *F* of the Polish Lowlands, corresponds well with the holotype (C♂) of *P. barkeri* of Anderson (1971, Pl. 21, Fig. 5) and with specimens, figured under the name *P. brodiei*, by Barker (1966, Pl. 8, Figs 23—26; Pl. 9, Fig. 8); the latter specimens being included into *P. barkeri* by Anderson (1971, p. 122).

In the collected material from Brzostówka there are also some forms (Pl. 1, Figs 4—6) with very narrow anterior flange and lack of the ornamentation on lateral valve surface (due to preservation?); they are closer in shape to *P. brodiei* Jones, 1894); sensu Anderson (1964, p. 154, Pl. 12, Figs 64—66; 1971, p. 122, Pl. 21, Fig. 7), than to *P. barkeri*.

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MAŁŻORACZKI Z SERPULITU BRZOSTÓWKI KOŁO TOMASZOWA MAZOWIECKIEGO

(Streszczenie)

Przedmiotem pracy jest analiza zespołu małżoraczków pochodzących z wapieni serpulowych środkowego wołgu (poziom litologiczny *IV* Lewińskiego, 1923, reprezentujący podpoziom *Zaraiskites zarajskensis* — *patrz* Kutek 1962a, b; 1967). W badanym zespole (*por.* pl. 1—2) stwierdzono m. in. obecność form *Paranotacythere (Unicosta) rimosa* i *Procytheropteron* ex gr. *brodiei*, charakterystycznych na Niżu Polskim dla dolnej części poziomu małżoraczkowego *F* (*por.* Bielecka & Sztejn 1966; Marek, Bielecka & Sztejn 1966; Marek, Bielecka & Sztejn 1969, Fig. 3; Bielecka 1975, s. 302, tab. III), który uważany jest za młodszy od poziomu *Virgatites pusillus*. Obecność rozważanych form w podpoziomie *zarajskensis* w Brzostówce, zaś w utworach dużo młodszych na Niżu Polskim wskazuje, iż zasięg tych form uzależniony był od przyczyn facjalnych.

PLATE 1

1 *Paracypris?* sp. *A* Schmidt; RV *(B. 1)* in lateral view

2 *Cytherella elongata* Donze; RV♀ *(B. 3)* in lateral view

3—6 *Procytheropteron* ex gr. *brodiei* (Jones); *3* LV *(B. 33; a* lateral, *b* dorsal view); *4* LV *(B. 34)*, *5* RV *(B. 36)*, and *6* LV *(B. 35)* in lateral view; × 70

7—9 *Amphicythere? (Merocythere) plena pauciperforata* Donze; *7* LV♀ *(B. 15)* in lateral view; *8* C♂ *(B. 14: a* right, *b* dorsal, *c* ventral view); *9* RV♀? *(B. 16)* in lateral view

10—11 *Schuleridea* sp. *A; 10* C♀ *(B. 26: a* right, *b* dorsal, *c* ventral view); *11* C♂ *(B. 25: a* left, *b* right, *c* ventral view)

12—13 *Vernoniella?* sp. *A; 12* LV♂ *(B. 29)*, *13* RV♀ *(B. 28)* in lateral view

All figures × 50, unless otherwise stated

PLATE 2

1 *Paranotacythere (Unicosta) rimosa* (Martin); LV *(B. 31)* in lateral view; ×70

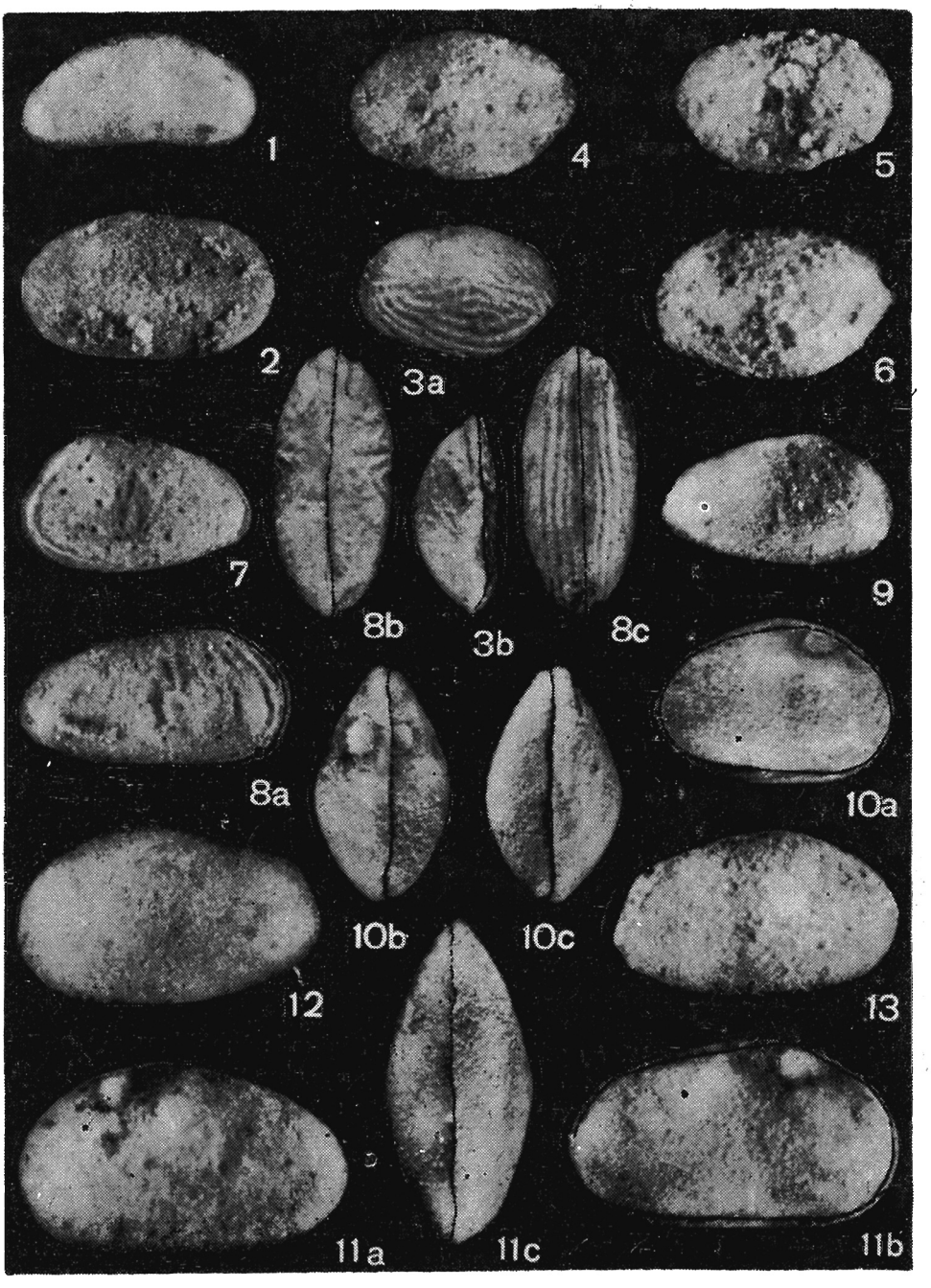
2—3 *Rectocythere rugosa* Malz; *2* RV *(B. 20)* in lateral view; *3 C (B. 18: a* left, *b* right view); × 60

4—8 *Macrodentina (Polydentina) volgiana* sp. n.; *4* LV♀ *(B.9)*, *5* RV♀ *(B.8)*, *7* RV♂ *(B.6)*, *8* LV♂ *(B.7)* in lateral view; *6* holotype, C♂ *(B.5: a* left, *b* right, *c* ventral, *d* dorsal view)

9—12 *Protocythere* aff. *fistulosa* Ljubimova; *9* C♀ *(B. 22: a* left, *b* right, *c* ventral, *d* dorsal view); *10* LV♀ *(B. 21)*, *11* RV♂ *(B. 23)* in lateral view; *12* RV♀ *(B. 24)* in lateral interior view

13—15 *Macrodentina* sp. *A; 13* LV♂ *(B. 11)*, *14* RV♀ *(B. 13)*, *15* LV♀ *(B. 12)* in lateral view

All figures × 50, unless otherwise stated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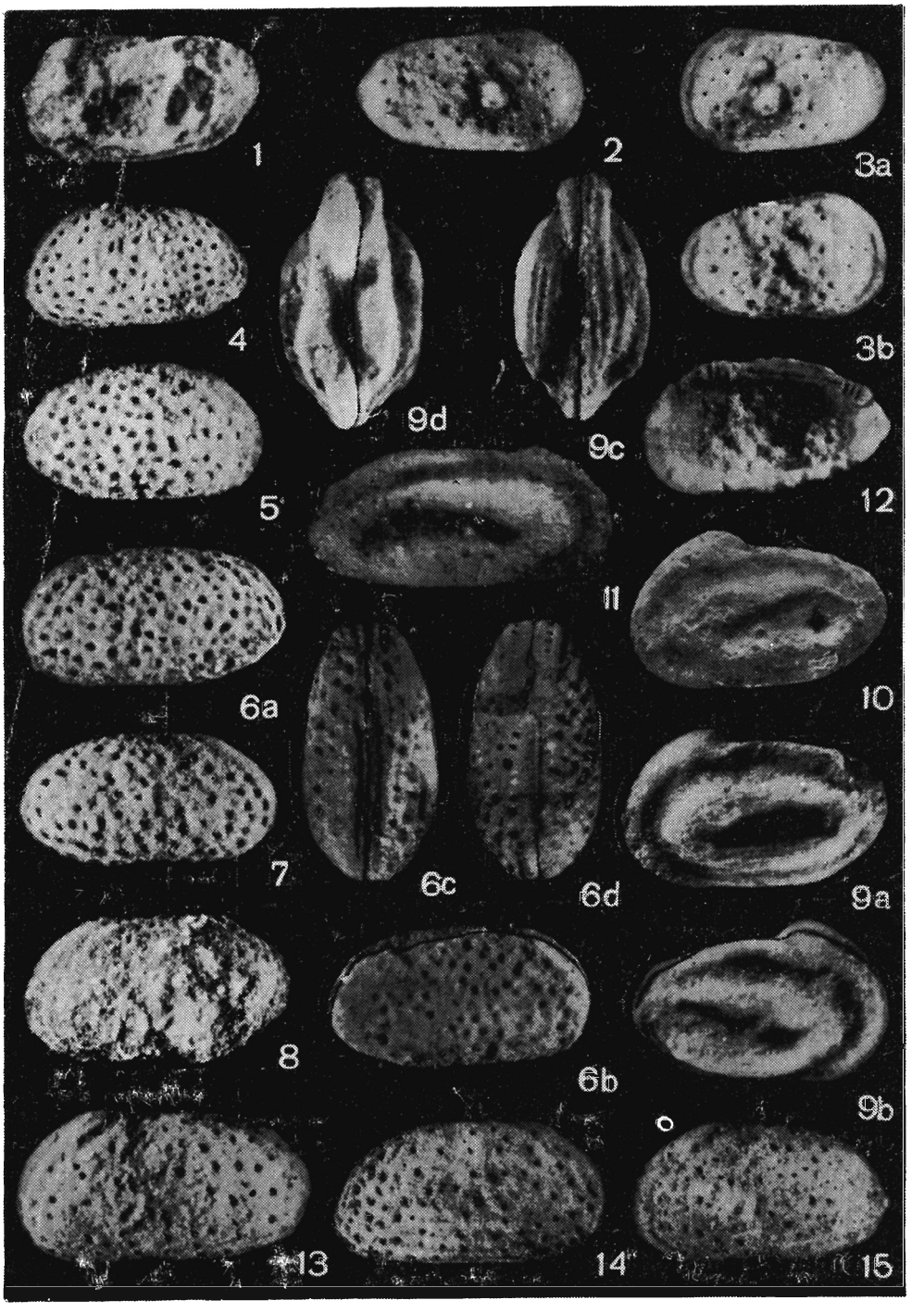
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