

THE MIDDLE ORDOVICIAN OF THE OSLO REGION, NORWAY

12. Notostraca and Conchostraca

By

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Abstract. This paper deals with the first records of crustaceans of the orders *Notostraca* and *Conchostraca* from the Middle Ordovician of Norway. Two new species of notostracans are described, viz. *Technophorus stoermeri* and *Ischyrinia norvegica*, and furthermore *Eoasmussia heintzi* n.gen. et sp. of the order *Conchostraca*.

Preface

During the study of the material of pelecypods from the Middle Ordovician of the Oslo Region, some samples containing remains of small pelecypod-like crustaceans were found. As species of these groups never have been recorded from the Ordovician in the Scandinavian countries, and otherwise are scarce in Europe, I take the opportunity to describe two species of *Notostraca* and one species of *Conchostraca* which probably all are new to science.

I wish to express my heartiest thanks to Prof. L. Størmer who gave me the opportunity to work out this interesting material and allowed me to use his library. Prof. N. Novojilov, Moscow, has kindly studied two samples and has given his opinion on them. Dr. G. Henningsmoen and Dr. N. Spjeldnæs have helped me in many ways during the work and I am very indebted to both of them. Further I wish to extend my thanks to Miss Bergljot Mauritz and Mr. G. Brynhildsrud for making the photographs and to Prof. J. A. S. Adams who has corrected the manuscript.

Notostraca

The two species of *Notostraca* seem to belong to the genera *Technophorus* Miller, 1889 and *Ischyrinia* Billings, 1866. These genera are included in the family *Ribeiriidae* erected by Kobayashi (1933), who refers the family to the Notostracan order. The systematical position of this family is questionable and the species have been placed in several systematical units by various authors.

Sharpe (1853) erected the genus *Ribeiria* with *R. pholadiformis* Sharpe as the type of the genus. He noted that there was only one shell and therefore referred the genus to the Gastropoda. Salter (1884) was the first who assigned *Ribeiria* to the Crustacea. In 1865 and 1866, Billings erected 3 genera, viz. *Euchasma*, *Eopteria* and *Ischyrinia*, which all were referred to the Pelecypoda, and the same was the case with genus *Technophorus* Miller, 1889. During the years these genera were placed at random among gastropods, pelecypods, phyllopods and in the order *Archeostraca*. Schubert and Waagen (1903) discussed the systematical position of *Ribeiria* and placed it in the phyllopod family *Apodidae* together with a new genus, *Ribeirella* with *Ribeiria sharpei* Barrande, 1881 as type. Walcott (1924) erected a new genus *Ozomia*, which, however, now is considered to be a synonym of *Ribeiria*. The genera *Ribeiria*, *Ribeirella*, *Euchasma*, *Eopteria*, *Ischyrinia*, and *Technophorus* were placed in the order *Notostraca* Sars by Bassler (1913).

The most important study of these anomalous crustaceans is that of Kobayashi (1933), who summarizes all earlier works on the group and establishes a systematical arrangement of the genera. His family *Ribeiriidae* comprises the two subfamilies *Ribeiriinae* and *Ischyriniinae* with, in all, 13 genera of which he has described 7 from Manchuria as new. He follows Bassler in referring this group provisionally to the *Notostraca*, though he finds it possible that the *Ribeiriidae* should be separated from the *Notostraca* and placed in an order of its own. Later he places the genus *Technophorus* in the family *Eopteriidae* Miller (Kobayashi, 1937).

According to the view of Kobayashi, the *Ribeiriidae* appeared first in Eastern Asia in Cambrian times (*Ribeiriinae*) and migrated eastwards, eventually reached Europe and finally disappeared in the Atlantic region during the Cincinnatian period. Few species are

hitherto known from Europe, *viz.* two species of *Ribeiria* from the Lower Ordovician of Portugal and Llandeilo of England, and two species from the Lower and Middle Ordovician of Bohemia; one species of *Ribeirella* from the Upper(?) Ordovician of Bohemia, and one species of *Ischyrinia* from the Lyckholm beds in Estonia. The majority of the species of the family are recorded from the Wanwanian of Manchuria or from the Canadian of North America. The genera *Ribeiria* and *Ribeirella* are European, with the exception of *Ozomia* Walcott (probable synonym of *Ribeiria*), while *Ischyrinia* is known with one American and one European species and *Technophorus* with 12 Middle and Upper Ordovician species from North America.

Very little is known about the systematical position of the group. Apparently they represent Crustacea though the appendages are not known, but whether they can be placed in any of the orders recognized to-day is questionable. As this group became extinct in the Cincinnati, they should be considered their own branch of primitive Crustacea as suggested by Kobayashi (1933).

THE NORWEGIAN MATERIAL

Two species which might be referred to the *Ribeiriidae* are present in the material at hand. One is a small, thin-shelled, elongate form, to some extent like *Ribeirella* Schubert and Waagen, but which I think more properly should be placed in the genus *Technophorus* Miller. The other is a rather large, thick-shelled species with deep scars of the clavicles on both sides of the umbo. This last species is so strikingly like *Ischyrinia* Billings that it must be referred to this genus in spite of some characters which differ from the descriptions of the two species hitherto known.

Genus *Technophorus* Miller, 1889

North American Geology and Palaeontology, p. 514.

Type of genus: T. faberi Miller, 1889.

This genus comprises rather curious species where the beaks of the two valves form a single pyramidal prominence on the casts (Ulrich, 1894, p. 613). Otherwise the rostrate form of the carapace with one or two curved keels with slight concavities above, and the

difference of the sculpture on the anterior and posterodorsal parts of the valves, are good characters. *Ribeirella* Schubert and Waagen, 1903, described as a genus of *Apodidae*, is considered a synonym by Clarke (1904). One specimen, which certainly should be placed in this genus, was among the better preserved fossils and is therefore described here. So far I know, this is the first record of *Technophorus* from Europe.

Technophorus stoermeri n.sp.

Plate I, fig. 1.

Name: I have the honour to name this species after Prof. Dr. Leif Størmer of the University of Oslo.

Holotype: One left valve, P.M.O. no. 5849. Leg. Th. Vogt.

Type locality: Ostøya, Bærum.

Type horizon: 4b β (possibly δ).

Diagnosis: Carapace small, compressed, elongate, inequilateral, with a distinct long rostrum. Anterior margin (missing) apparently evenly rounded, ventral margin convex, dorsal margin forms two straight parts with a slight curvature inbetween. Umbonal clavicles not seen. Umbones (missing) in the anterior $\frac{1}{4}$ or $\frac{1}{5}$, a distinct keel or fold of the carapace starts near the umbo and runs in a slight curve to the posteroventral margin, where it broadens. The upper part seems to have been torn away and the lighter stone beneath forms a greyish white slit through the surface. There are some indefinite tubercle-like irregularities along the keel. There is a marked depression on the dorsal side of the keel and partly also on the ventral side. A second dorsal keel is seen in the middle of the posterodorsal part, especially distinct posteriorly with a slight concavity above, otherwise it slopes rather steeply to the dorsal margin. Posterior margin of the rostrum ends on the dorsal keel in an angle of 90° .

Sculpture on surface in front of keel consists of raised, concentric lines, close-set in the older part of the valve, more distant towards the margin. The interspaces are broader than the lines, of which 19 could be counted. Between the keels there are also traces of faint lines, but the dorsal slope is smooth.

Dimensions of the holotype: Length 6.3 mm, height 2.5 mm.

Remarks: *Technophorus stoermeri* bears a resemblance to *Ribeirella sharpei* (Barrande) Schubert and Waagen, 1903, but the latter is higher and has a more compressed dorsal part.

Genus *Ischyrinia* Billings, 1866

Cat. Sil. Foss. Anticosti. Geol. Survey of Canada, 1866, p. 16 and p. 52.

Type of genus: *I. winchelli* Billings, 1866.

The character which is most conspicuous of this genus, is the two strong interior ridges which radiate from the beak on both sides. Further, the carapace is elongate triangular with the anterior end short and round, and the surface marked by a number of radial lines (Kobayashi, 1933). The original diagnosis contains the word "equivalve" indicating that Billings supposed there were two valves. Ulrich (1894, p. 13, footnote) however, who has studied the type of *I. winchelli*, says that the evidence is fairly conclusive that the beaks were united in casts as in *Technophorus*.

Apparently Billings oriented his specimens in such a way that the radiating striae and the more truncated margin were considered to represent the anterior side (cf. Kobayashi, 1933, pl. X, figs. 13a-c.) while Teichert (1930) and Kobayashi (1933) in his diagnosis apparently reversed the position.

Ischyrinia norvegica n.sp.

Plate I, fig. 2, 3.

Holotype: Internal cast of a right side, P.M.O. no. 38267. Leg. J. Kiær, 1896.

Type locality: Furuberget, Hamar.

Type horizon: Cyclocrinus shale, 4b.

Material: Sample no. 38267 contains one cast of the right side (holotype) and one defective cast of the left side. Another sample (no. 37861) from the same locality, legit O. Holtedahl 1907, contains one cast of the right side and one mould of the left side; both are slightly shorter than the holotype, about 15 mm.

Diagnosis: Carapace convex, nearly equilateral, umbo bluntly pointed, slightly turned backwards. Anterior margin rounded, ventral margin evenly convex, posterior margin nearly straight, postero-

ventral corner distinct, and posterodorsal margin straight. Posterior part broader than the anterior part but slightly longer. Anterior and posterior clavicles strong, the anterior one curved, continuing in a shallower, nearly horizontal slight ridge which forms a low connection between the two clavicles, the posterior clavicles straighter and broadest dorsally, bordered posteriorly by a sulcus separating the clavicle from a ridge which is extended to the middle of the posterior margin and there divided into two ridges by a median sulcus. These sulci and ridges are naturally reversed on the cast.

Dimensions of the holotype: Length 16.4 mm, height 11 mm, semidiameter about 2 mm.

Remarks: This species is quite different from *I. winchelli*, but resembles to some degree *I. schmidti* Teichert, 1930, which, however, has a longer anterior part.

Conchostraca

One sample containing a small, bivalved pelecypod-like specimen, which must have had a very thin shell, and two other samples not so well preserved, seem to be referable to the order *Conchostraca*. Professor L. Størmer was so kind as to send two of these specimens to Dr. Nestor Novojilov, Moscow, whose opinion was that they belonged to the superfamily *Cyzicoidea* Stebbing and to the family *Glyptoasmussiidae* Novojilov, 1958.

True conchostracans are, however, not found earlier than Lower Devonian, and they are freshwater forms, except the one genus *Rhabdostichus* Raymond, 1946, which has been found in marine strata, possibly of Silurian age, but it may be Devonian.

Many marine Cambrian species have been described as conchostracans, (e.g. Ulrich and Bassler, 1931) but they are not considered true conchostracans by Raymond (1935, 1946). A few species, however, belonging to the genera *Lepiditta* Matthew (= "*Leperditta*" of Raymond) and *Fordilla* Walcott, are considered as possible ancestors of *Conchostraca* by Raymond (1946, p. 304). These are of Lower and Middle Cambrian age. As there existed a rich and differentiated fauna of conchostracans in Devonian times, one must expect to find pre-Devonian forms also.

To place the specimens from the Middle Ordovician in one of the

younger genera containing freshwater forms is not advisable. To create a new genus seems to be the only solution, though characters separating it from other genera are vague. All relationships concerning these bivalved crustaceans are of course obscure as only the carapaces are known, and the classification must only be used as a practical tool until more is known of the animals.

Eoasmussia n.gen.

Type of genus: *Eoasmussia heintzi* n.sp.

Diagnosis: Carapace thin, ovate, somewhat inequilateral, anterior and posterior margins rounded, and continuing in the convex ventral margin. Dorsal margin probably nearly straight with large, more or less projecting umbones. The surface is ornamented with numerous raised concentric lines.

Eoasmussia heintzi n.sp.

Plate I, figs. 4, 5.

Name: I have the honour to name this species after Prof., Dr. A. Heintz of the Palaeontological Museum, Oslo, who collected the type specimen.

Holotype: P.M.O. no. 18901. Leg. A. Heintz 1933—34.

Type locality: Slepden, Asker, at the new Drammensvei.

Type horizon: Lower Chasmops shale, 4ba.

Material: Besides the sample containing the holotype there is another sample (P.M.O. no. 72039) from the roof of the tunnel W. of Billingstad, Asker, 4ba, leg. N. Spjeldnæs, 1958. Further there is a valve (P.M.O. no. 8258) from Juern, below Frok, Ringerike, Lower Chasmops limestone, 4b β , leg. J. Kiær, which probably belongs to a related species.

Diagnosis: Carapace small, thin, ovate, not much inflated, the two sides of equal size, inequilateral, umbones before the middle, apparently not projecting beyond the hinge line. Anterior margin semicircular from the umbo to the convex ventral margin. Posteriorly subrostrate with rounded posterior margin, posterodorsal margin slightly convex. A decided concavity along the hinge line from umbo towards the posterodorsal corner. Sculpture consists of numerous

regularly spaced concentric lines nearly as broad as the interspaces. Microsculpture invisible.

Dimensions of the holotype: Length 7 mm, height 5 mm.

Remarks: So far I know these remains of *Conchostraca* are the first recorded from Ordovician strata and may therefore be of more than local interest. The vague characters do not allow a distinct description, but the figure of the holotype (pl. I, fig. 4) certainly will be helpful when this species is compared to the new material which undoubtedly will be found in the coming years. The specimen from Billingstad (pl. I, fig. 5) is not complete and probably somewhat distorted, but the number and course of the concentric lines agree fairly well with the holotype. Both samples are from the Lower Chasmops shale, 4ba, and therefore more or less contemporaneous. The third specimen, from Juern (pl. I, fig. 6) is from 4b β , and apparently belongs to another species. The concentric lines are narrow and sharp, and the interspaces are much broader than the lines. The characters are, however, so indistinct that I have refrained from describing it.

List of species and their occurrence

NOTOSTRACA

- Technophorus stoermeri* n.sp. — 4b β (possibly δ) — Oslo—Asker.
Ischyrinia norvegica n. sp. — Cyclocrinus beds — Hamar—Nes.

CONCHOSTRACA

- Eoasmussia heintzi* n. gen. et sp. — 4ba — Oslo—Asker.
 Gen. et sp. indet. — 4b β — Ringerike.

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PLATE I.

Specimens whitered with ammonium chloride. Photographs not retouched.

- Fig. 1. *Technophorus stoermeri* n.sp. Holotype. Left valve from Ostøya, Bærum, 4b β , P.M.O. no. 5849. Length 6.3 mm. x 10 — p. 126.
- Fig. 2. *Ischyria norvegica* n.sp. Holotype. Internal cast of right side from Furuberget near Hamar, Cyclocrinus beds, 4b, P.M.O. no. 38267. Length 16.4 mm. x 3 — p. 127.
- Fig. 3. *Ischyria norvegica* n.sp. Paratype. Mould of left side from Furuberget near Hamar, Cyclocrinus beds, 4b, P.M.O. no. 37861. Length 15 mm. x 3 — p. 127.
- Fig. 4. *Eoasmussia heintzi* n.gen. et sp. Holotype. From Slepden, Asker, 4ba, P.M.O. no. 18901. Length 7 mm. x 6 — p. 129.
- Fig. 5. *Eoasmussia heintzi* n.gen. et sp. From Billingstad, Asker, 4ba, P.M.O. no. 72039. Length 5.5 mm. x 6.8 — p. 129.
- Fig. 6. *Conchostraca* sp. From Juern, Ringerike, 4b β , P.M.O. no. 8258. Length 4.3 mm. x 11.4 — p. 129.

