

EURYPTERID REMAINS FROM THE LUDLOW ZONE 9d OF RINGERIKE

BY

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In addition to his many very important discoveries of Paleozoic fossils on Ringerike, professor Dr. Johan Kiær in 1923 succeeded in finding a new plantbearing horizon in the marine Ludlow of Ringerike. The occurrence and the interesting plant *Chaetocladus capillatus* were described by Høeg and Kiær (1926).

The fossils occur in: "Thin irregular layers of limestone of varying thickness alternating with beds of a dark, calcareous, slightly shaly claystone which are thicker than the limestone-layers". Kiær refers the beds to the upper part of the Ludlow zone 9d distinguished by *Spirifer elevatus*, *Leperditia baltica*, and branched bryozoans (comp. Kiær 1908 p. 110).

In the plantbearing horizon Kiær noticed the following marine species:

Branched bryozoan (*Amplexopora* sp.?).
Rynchonella [*Camarotoechia*] *nucula* (Sow.).
Leperditia baltica (His.).
Cornulites sp.
Actinoceras [*Armenoceras*] sp.

The following fossils were supposed to indicate a fresh-water flora and fauna:

Chaetocladus capillatus, Høeg.
Problematica.
Eurypterid fragments.
Phyllocarid fragments.

After having studied the rich eurypterid layers from Rudstangen, Ringerike, mentioned by Kiær (1911, 1924), I have had the oppor-

tunity to study the above mentioned eurypterid fragments. Only two determinable specimens were found in the material. A short visit to the locality did not bring any new specimens. Curator O. A. Høeg collected a considerable material of *Chaetocladus* last summer, but did not find any further specimens of eurypterids.

Systematic description.

Genus *Eurypterus*, De Kay 1825.

Eurypterus laticeps, Schmidt.

Fig. 1, 2.

Eurypterus laticeps, Schmidt 1883, p. 63, pl. 3 a, fig. 16, and pl. 6, fig. 6.

Typoid: No. 40784, belongs to the Paleontological Museum, Oslo. The typoid has been figured by Høeg and Kiær (1926, fig. 1).

Description: Only one specimen, representing the prosoma, is known. The specimen is rather flattened out and the central portion badly preserved. The broad prosoma has a semiovale to subrectangular outline. The ratio length-width of prosoma is slightly less than 3:5. The antelateral corners are well rounded. A distinct marginal rim is present. Anteriorly traces of the doublure is preserved. Along the posterior margin the doublure is well marked. Here the prosomal test is partly removed. The doublure forms a narrow rim extending laterally about two third of the distance from the median line to the postlateral corners. The function of the doublure as an organ of articulation is demonstrated by Schmidt (1883) and Holm (1898) on *Eurypterus fischeri*, Eichw. The surface of the prosoma does not show the original convexity. The lateral eyes have partly been prepared out. On the left side the test is broken off leaving a round spot as an indication of the lateral eye. On the right side the eye is not very well exposed.

The median ocelli are not preserved.

Dimensions: Length of prosoma = 45 mm, width = 78 mm. Distance between lateral boundaries of lateral eyes = 38 mm.

Occurrence: Dark, calcareous, slightly shaly claystone, from the Ludlow zone 9d, Øgardsvika, Ringerike.

Remarks. The eurypterid specimen is associated on the slab by numerous specimens of *Chaetocladus*. The prosoma is badly preserved and it is interesting to notice that on the right side we

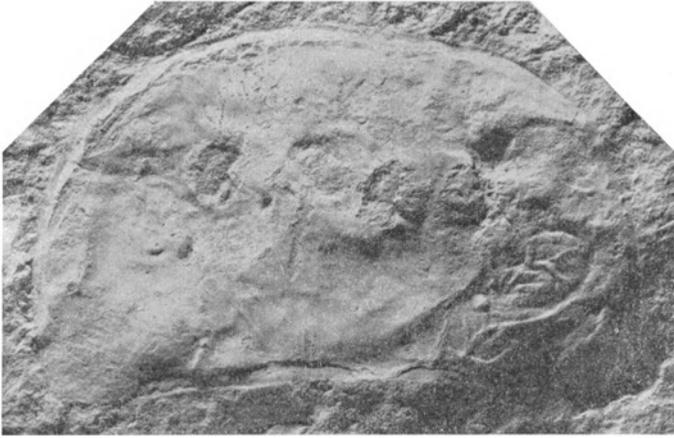


Fig. 1. *Eurypterus laticeps*, Schmidt. Prosoma with traces of branched organisms growing on the test. Nat. size. No. 40784, Paleontological Museum Oslo. Coll. Johan Kiær.



Fig. 2. Same specimen as fig. 1. Outline and main structures indicated.

The photographs fig. 1 and 3, taken by miss Lilly Monsen, are not retouched. The specimens have been whitened by NH_4CL . The Outline drawings fig. 2 and 4, are made by miss Liv Barstad and the author.

find traces of branched organisms growing on the test. It is probable that the prosoma represent an empty shell from the moulting. The empty shell was afterwards overgrown by the branched form. The state of preservation favours the view expressed by Kiær (Høeg and Kiær 1926, p. 5) that the plants and eurypterid remains were carried from fresh, or brackish water into marine conditions.

Relationship: The described specimen resembles closely *Eurypterus laticeps* from the Oesel beds of Esthonia. According to Schmidt (1883) this species is only represented by two specimens. *E. fischeri*, on the other hand, is extremely common. The Norwegian form has the broad prosoma characteristic of *E. laticeps*. The position of the lateral eyes is also identical. The size of prosoma is very nearly the same. The Norwegian specimen is slightly broader than those described from Esthonia, but the difference in the ratio length-width is only 3:5 — 2:3.

From Sweden only *E. fischeri* is known (Lindstrøm 1885).

The British species do not resemble the above described species.

Among the many American species of *Eurypterus* only *E. pustulosus* Hall, (Clarke and Ruedemann 1912, pl. 23, fig. 1) resembles in size and width the present form. The lack of pushules on the Norwegian species however, denies a closer relationship.

In spite of the bad preservation it is possible to identify the described prosoma as belonging to the species *Eurypterus laticeps*. Holm (1898, p. 56) finds it probable the *E. laticeps* belongs to the genus *Dolichopterus*. He bases his argument on the occurrence of an operculum, metastomae and swimming legs of this genus, in the same beds, and corresponding in size. Clarke and Ruedemann (1912, p. 261, footnote), agree with Holm, although they point out in another connection (loc. cit. p. 172) that the difference between *E. laticeps* and *E. fischeri* is duplicated by the difference of *E. lacustris* and *E. remipes*. The shape and position of the lateral eyes, as well as the general shape of the prosoma, seem to me more typical for the genus *Eurypterus* than the genus *Dolichopterus*. On the other hand, a specimen figured by Schmidt (1883, pl. 6, fig. 7) as *Eurypterus fischeri* exhibits distinct *Dolichopterus* or *Stylonurus* characters. Schmidt says that the specimen has a peculiar appearance only on account of the preservation. The position and shape of the right lateral eye and also the marginal rim suggest a stylonurid genus.

Mixopterus (?) sp.

Fig. 3, 4.

Typoid: No. 40785, belongs to the Paleontological Museum, Oslo.

Description: The small prosoma is badly preserved along the anterior margin. The outline of prosoma is subquadratic with the antelateral corners cut off by diagonal lines. The margin is well

preserved on the right side. The lateral margins converge slightly anteriorly. The anterior margin was probably transverse, the posterior margin slightly curved.

The surface of the prosoma does not show many details. The lateral eyes are indicated near the antelateral corners. The eyes have an antemedian position. The actual size of the eyes is not possible to determine on account of the fragmentary preservation.

Dimensions: Length of prosoma = 11 mm, width = 14 mm.

Relationship: The peculiar shape of prosoma is only known in the genera *Mixopterus* Ruedemann, *Eusarcus* Grote et Pitt and *Echinognathus*, Wallcott. The last genus is only represented by one Ordovician species. The outline of prosoma is imperfectly known (Ruedemann 1916, p. 108). The genus *Eusarcus* includes a number of British and North American species (Clarke and Ruedemann 1912, p. 132). Small and large species occur. As a general rule the prosoma of *Eusarcus* has a triangular to trapezoid outline. The lateral margins do not show the antelateral angles. In this character the above described specimen differs from the species of the genus *Eusarcus*. Only a small and imperfectly known Ordovician species, *E. linguatus* (loc. cit. p. 414) has curved lateral margins. The Norwegian specimen has almost parallel lateral margins and distinctly diagonal and straight antelateral margins. These characters are more typical in the recently erected genus *Mixopterus* (Ruedemann 1921, p. 7). Ruedemann suggested (loc. cit. p. 10) that the peculiar outline was due to ventral plates being flattened out. The discovery by Kiær (1924, p. 16, 32) of the beautifully preserved specimens of *Mixopterus* from the Downtonian sandstone of Rudstangen, Ringerike, has furnished valuable contributions to our knowledge of this genus. The described outline is typical for the genus. The outline of the prosoma of the figured specimen of *M. multispinosus* Ruedm. represents the actual outline, except for the anterior tongue-like process which probably was the dislocated epistoma. The direction of the antelateral margins is a little more transverse than in the described specimen, Schmidt (1904) described from the eurypterid beds of Oesel a species *Stylonurus* (?) *simonsoni* which Ruedemann refers to the genus *Mixopterus*. The large species is closely allied to the large Rudstangen species.

It is probable that the present, small species might represent a larval stage of a *Mixopterus* species. The slight difference in

shape of the antelateral corners might be due to different growth stages.

As the anterior margin of the discovered specimen is not preserved, a distinct determination has not been possible.

Stratigraphical remarks.

In Norway eurypterids are known in great abundance from the base of the Downtonian sandstone of Ringerike (Kiær, 1911, 1924). The fauna does not include the species *Eurypterus laticeps*. The



Fig. 3. *Mixopterus* (?) sp. Prosoma. Anterior margin not well defined. Nat. size.
No. 40 785, Paleontological Museum, Oslo. Johan Kiær, Coll.

Fig. 4. Same specimen. Outline drawing with traces of lateral eyes indicated.

mode of occurrence is also different. In the famous eurypterid fauna of Oesel the mentioned species is found in a few specimens. *Mixopterus* is also known in a few fragments. The typical fossil *E. fischeri* is not known from Norway. From Sweden Lindström (1885) mentions *Eurypterus fischeri* and *Pterygotus osiliensis* which occur in the basal layers of Ludlow (Lindström 1888, Hede 1920). Holm (1897, p. 475) describes remains of *Pterygotus* from Dalarne in beds probably older than those of Oesel.

The *Eurypterus fischeri*-fauna is known from Podolien where it seems to occur in slightly higher beds (comp. Frebold 1926, p. 309).

The British and American eurypterid faunas show no closer connection, with the Øgarsvika species.

The age of the eurypterid beds of Oesel has been discussed by various authors. The comparison with the Silurian in the Oslofield is carried out by Kiær (1908, p. 563), who finds that the lower part of the K-zone of Esthonia corresponds to the zone 9 b—c of the Ludlow of the Oslo-field. The Oesel beds have been restudied in

details by Luha (1930). Luha compares the K_1 zone, the „Eurypterus-Komplex“, with the 9 b—c zones as Kiær did. 9 a forms a transition from J_2 to K_1 . K_2 is compared with 9 d. The eurypterid remains at Øgarsvika belong to the zone 9 d (Kiær 1926, p. 4) and hence correspond fairly well in age to the eurypterid bed of Oesel. The Norwegian fauna occurs apparently in slightly higher beds than the Baltic.

The eurypterids in the marine Ludlow of the Oslo-field, seem to represent the Baltic *Eurypterus fischeri*-fauna of about the same age.

Bibliography.

- CLARKE J. M. and RUEDEMANN, R., 1912. The Eurypterida of New York. Memoir New York State Museum 14, 2 vols.
- FREBOLD, H. 1926. Zur Gliederung des Obersilurs in Gotland und im Ostbalticum nebst Beschreibung eines neuen ostpreussischen Obersilurgeschiebes. Centralblatt f. Min. etc. Abt. B. pp. 297—313.
- HEDE, J. E. 1920. Gotlands Silurstratigrafi. Sveriges Geol. Unders. Aarbok 14, no. 7, pp. 1—100.
- HOLM, G. 1897. Om förekomsten af en Pterygotus i Dalarnas Öfversilur. Geol. Fören. Förh. Bd. 19, p. 475.
- 1898. Über die Organisation des Eurypterus Fischeri. Mem. Acad. Imp. d. Sci. St. Petersburg, ser. 8, tome 8, no. 2, pp. 1—57.
- HØEG O. A. and KLÆR, J. 1926. A new Plantbearing Horizon in the marine Ludlow of Ringerike. Vid. Akad. Oslo. Avh. I Mat. Nat. Kl. 1926 no. 1.
- KLÆR, J. 1908. Das Obersilur im Kristianiagebiete. Skr. Vid.-Akad. Oslo. I Mat. Nat. Kl. Bd. 2, pp. 1—595.
- 1911. A new Downtonian Fauna in the Sandstone series of the Kristiania area. Ibid 1911, no. 7, pp. 1—22.
- 1924. The Downtonian Fauna of Norway. I. Anaspida. Ibid. 1924, No. 6 pp. 1—136.
- LINDSTRÖM, G. 1885. Förteckning på Gotlands Siluriske Crustaceer. Öfversigt Kongl. Vet. Akad. Förh. 1885, No. 6. Stockholm, pp. 37—99.
- 1888. Über die Schichtenfolge des Silurs auf der Insel Gotland. N. Jahrb. f. Min. etc. 1898, pp. 147—164.
- LUHA, A., 1930. Über Ergebnisse stratigraphischer Untersuchungen im Gebiete der Saaremaa- (Ösel-) Schichten im Eesti. Acta et Comm. Univ. Tartuensis (Dorpatensis). A, Bd. 18, nr. 6.
- RUEDEMANN, R. 1916. Paleontologic Contributions from the New York State Museum. N. Y. State. Mus. Bull. no. 189, p. 111.
- 1921. A recurrent Pittsford (Salina) Fauna. Ibid. no. 219, pp. 1—13.
- SCHMIDT, F. 1883. Die Crustacean Fauna der Eurypterenschichten von Rootziküll auf Oesel. Mem. Acad. Imp. d. Sci. St. Petersburg, ser. 7, tome 31, no. 5. Miscellanea Silurica III, pp. 28—88.
- 1904. Über die neue Merostomenform *Stylonurus* (?) *Simonsoni* aus dem Obersilur von Rootziküll auf Oesel. Bull. Acad. Imp. d. Sci. St. Petersburg, ser. 5, tome 20, no. 3, pp. 99—105.