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NEW COELOLEPIDS FROM THE UPPER SILURIAN ON OESEL (ESTHONIA)

BY

JOHAN KIÆR †

EDITED BY A. HEINTZ

WITH 2 PLATES

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Preface.

The remarkable material serving as a basis for this paper was collected during the summer of 1929 by Doctor A. Luha of Tartu University, who kindly proposed that Professor Kiær should undertake its description. Professor Kiær immediately began to examine the material. He worked out the fossils and prepared the fine photographs which were retouched under his direction but as Doctor Luha had meanwhile (summer 1930) collected a new, larger and better material from the same locality, which he intended to send to Professor Kiær, the latter pending the arrival of the second collection, did not commence his description of the first.

After Professor Kiær's death (October 1931) I found between his papers, principally in his monograph on „*Cyathaspidae*“, a few remarks only referring to the *Coelolepids* from Oesel, together with a series of beautifully retouched photographs. As the material in question is of exceptional interest and as Professor Kiær came to very unexpected results, I thought that a short report on this investigation would be very welcome.

As mentioned above no manuscript was found, and I have therefore written this paper myself. In doing so, however, I have tried exclusively to present Professor Kiær's ideas, basing this description on:

- 1) The discussions I have had with him,
- 2) The brief notes I found among his papers, and
- 3) The photographs retouched under the direction of Professor Kiær himself.

I would here express the gratitude of the Paleontological Museum, Oslo, to Doctor Luha, for his kind permission to publish this short report.

Paleontological Museum, Oslo, February 1932.

Description of the material.

The presence of Coelolepidian fishes in the Upper Silurian strata of Oesel was known about a hundred years ago and many new species have been described from this locality (Pander, Rohon and others) but, hitherto, only single isolated scales of these forms have been found. Dr. Luha's collection is therefore of great particular importance as he has found a number of perfectly preserved complete examples of *Coelolepis*.

The general shape of *Coelolepis* from Oesel is oblong, fish-like (Pl. III, fig. 1—3). No side lobes as, for instance, in *Thelodus* have been found. No marked limit denotes where the head, roundish in front, joins the body. The body gradually narrows backward and continues to become a relatively unsymmetrical tail. No traces of paired fins as real fins, spines or lobes are known. Only one very small median fin can be seen on the hind part of the body.

The scales. The whole fish from the top of the head to the posterior point of the tail is covered with quite homogeneous small rhomboidal shaped scales. They differ unessentially according to their position on the body. Those placed in the middle are more quadrangular than those on the dorsal and ventral sides which are more oblong. Especially the scales covering the tail and fin are relatively long. The scales are placed in more or less regular longitudinal rows, running continuously from head to tail (Pl. III, Pl IV, fig. 7 and 8). The scales along their longitudinal axis are strongly curved and form a ridge, which ends in a sharp point (Pl. IV, fig. 3 and 4). Developed on both sides of this ridge are some impressions making the whole scale streaked, the stripes running parallel to its longitudinal axis. The number and arrangement of the stripes vary strongly on the different scales (Pl. IV, fig. 3—7). In some, the great middle ridge is strongly developed and occupies nearly half of the scale (Pl. IV, fig. 4), in others, on the contrary, it is smaller, being nearly of the same size as the stripes on its sides (Pl. IV, fig. 3 and 5). Relatively few scales are absolutely symmetrical;

the greatest number shows a more or less unsymmetrical outline. On the inside the scales are smooth and concave (Pl. IV, fig. 6 and 8). As mentioned above, they are arranged in longitudinal rows so the ridge of one forms the immediate prolongation of the corresponding part of the other (Pl. IV, fig. 7). The single scales considerably overlap each other, thus only about half of each is seen (Pl. IV, fig. 7).

No microscopical sections have been made, it being practically impossible to find any scale which could be used for this purpose.

The head region is not sharply divided from the body and it is therefore impossible to find a limit between these two parts. In some species it seems as if the scales covering the head are larger and longer than those on the body (Pl. III, fig. 1), but in others even this difference cannot be observed. In specimens, which are compressed from above, the front part of the head is roundish, quite broad, reminding one of the head of *Thelodus* or *Lanarkia* (Pl. III, fig. 4, Pl. IV, fig. 1). On the contrary, in specimens pressed from the sides the front part of the head is more or less sharply pointed (Pl. III, fig. 1, 2, 3).

Some few specimens show the mouth opening which forms a relatively small cleft at the front part of the head, a little beneath the median line (Pl. III, fig. 1 and 2). In specimens compressed from above the scales along the front part of the head are arranged regularly and symmetrically (Pl. III, fig. 4, Pl. IV, fig. 1). One or two rows of small short scales run along the front margin, and form a brim. In the middle of this brim we find a more or less symmetrically arranged field of small roundish scales (Pl. IV, fig. 1). This arrangement varies greatly in different specimens, but the brim of the small roundish scales along the front of the head is always present. It is very probable that this brim formed the upper (and under) limit of the mouth opening.

The eye openings have also been found. They are quite small and, as seen in a few species, are surrounded by fine, narrow scales, forming a kind of „sclerotic ring“ (Pl. III, fig. 3, Pl. IV, fig. 1). Seen from the side, the eyes were placed nearly in the middle of the head, near the front. In one specimen compressed from above, both eye openings are seen at the same time (Pl. IV, fig. 1 or). Their size and position remind one of those in *Thelodus* and *Lanarkia*.

No traces of nasal or pineal openings have been observed in any specimens, which considering their small size is not remarkable.

Much more unexpected is the fact, however, that nothing like gill openings can be found. The part of the body immediately behind the head region is very well preserved in a number of specimens and is compressed in all possible directions. Nevertheless, not a single specimen shows any trace of openings or clefts which might be regarded as branchial openings. The rows of the scales run continuously and without interruption. If *Coelolepis* really had developed gill openings, it is remarkable that no trace has been found among all the specimens in Dr. Luha's collection of more than 60.

No paired fins are present. Only a small anal fin can be noticed in some specimens (Pl. III, fig. 1, 2, 3, Pl. IV, fig. 2). It is very small, triangular shaped and covered with scales. These as mentioned above — are somewhat narrower and longer than the regular scales which cover the body. The fin merges forward into the body but to the rear it forms a small sharp point, distinct from the body.

The tail is quite long, comprising about $\frac{1}{4}$ of the whole length of the animal. It is unsymmetrically built, with its lower lobe considerably larger than the upper. Thus the tail here is of the same hypocercal type as the tail in *Anaspida*, *Cyathaspida* and *Pteraspida*. This indicates that the hypocercal tail was a common tail type in the old Paleozoic fishes. The tail is also covered with small rhomboidal scales which, as on the anal fin, are also here somewhat longer and narrower especially along the posterior limit of the lower lobe (Pl. IV, fig. 2).

No traces of the inner skeleton can be seen.

Although the scales of our *Coelolepis* show a resemblance to the scales of some previously known *Coelolepis* from Oesel, it is doubtful whether this resemblance is great enough to count our form as identical with any of the old ones.

It is therefore necessary to give this new form a name and it would be most natural to call it after Dr. Luha who discovered this remarkable fauna.

Thus this new form can be named:

COELOLEPIS LUHAI Kiær.

As holotypus specimen nr. 64 from Tartu Geological Museum is taken. This specimen is pictured on Pl. III, fig. 1.

The following definition of the new form can be given:

Coelolepis luhai Kiær, is a relatively small, oblong fishlike form, with head, body and tail covered with small, nearly rhomboidal, homogeneous scales. The eye openings are small and placed on the anterior part of the head. The small mouth opening is terminal. No traces of gill openings can be seen. No paired fins are developed. Only a small anal fin, also covered with scales, is present. The relatively large tail is of a hypocercal type. Upper Silurian, Oesel, Esthonia.

Systematic position. The new find has only confirmed that *Coelolepis* is closely related to the *Thelodus* and *Lanarkia* forms. The shape of the single scales is quite alike as is also their arrangement. From older papers it is known that the microscopic structure is also nearly identical. As we have now seen the shape of the head, the position and size of the eyes are also similar in *Coelolepis* and *Thelodus*. The strongly unsymmetrical tail in *Thelodus* has always hitherto been regarded an heterocercal. Our knowledge regarding the development of the tail in *Coelolepis* makes it more probable to suppose, that the tail in *Thelodus* was also hypocercal and that the small „dorsal“ fin known in this form must be regarded as an „anal“ fin.

This supposition is not so improbable as it may perhaps at first seem. The fact is that the head and the fore part of the body in *Thelodus* are flat rayfish-like. On the contrary, the hind part of the body and the tail are compressed from the sides. During fossilisation the head and the fore part of the body usually became flattened from above and did not change much in shape and size, whereas the hind part of the body and the tail became strongly bent. Thus, especially if we consider the bad preservation of the majority of *Thelodus*, it is very difficult to determine whether the large lobe of the tail was directed upward or downward. The same is the case with the median fin. Therefore, now we know that the tail in *Coelolepis* had an hypocercal shape, it is most natural to accept the supposition that this was the case in *Thelodus* and *Lanarkia* as well.

Finally, we must point out that gill openings were also never observed in *Thelodus* and *Lanarkia*. Thus the absence of gill openings seems to be a characteristic of this group of fishes. It is therefore most natural to divide the second great group of *Agnatha* forms, the *Diplorina*, into two orders, viz.

- I ord. *Thelodonti*, without gill openings.
 II ord. *Heterostraci*, with developed gill openings.

The first order contains *Coelolepis*, *Thelodus* and *Lanarkia*.

The second, *Psammosteida*, *Cyathaspida* and *Pteraspida*.

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Explanation of the Plates.

Plate III.

Coelolepis luhai Kiær. Upper Silurian. Oesel.

Af- Anal finn, M- mouth opening. Or- Orbital openings.

Fig. 1. The Type specimen (T. G. I. Nr. 64) seen from the side.

Fig. 2. Specimen Nr. 40 (T. G. I.) from the side.

Fig. 3. Specimen Nr. 62 (T. G. I.) from the side.

Fig. 4. Specimen Nr. 65 (T. G. I.) from above.

Plate IV.

Coelolepis luhai Kiær. Upper Silurian. Oesel.

Af- Anal finn. Or- Orbital openings.

Fig. 1. Specimen Nr. 23 (T. G. I.) from above.

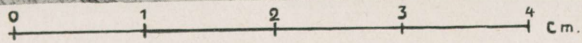
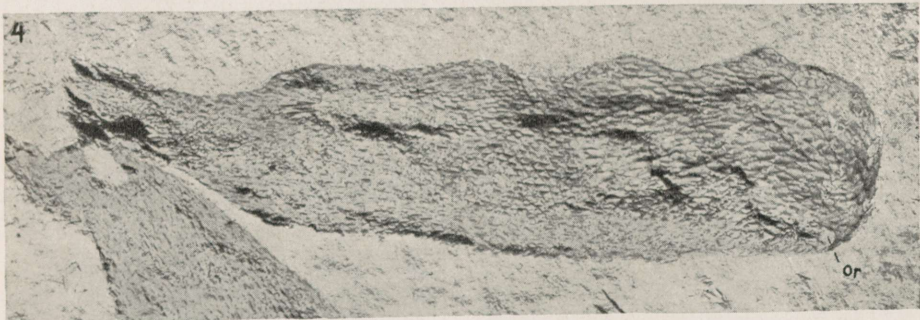
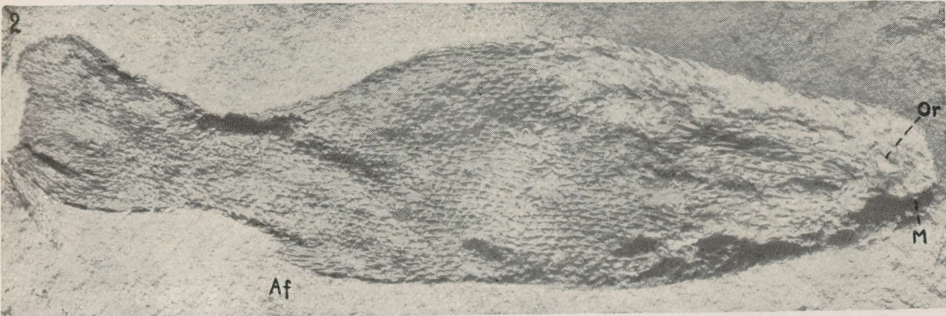
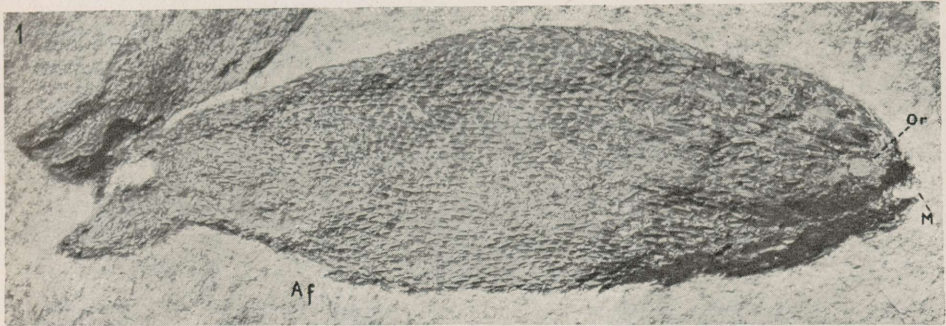
Fig. 2. The tail of specimen Nr. 9 (T. G. I.) from the side.

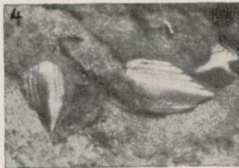
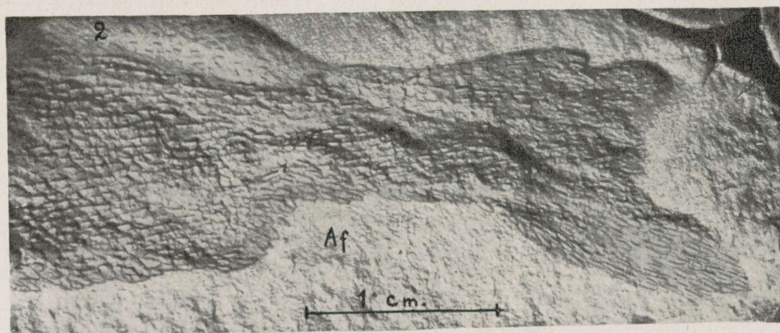
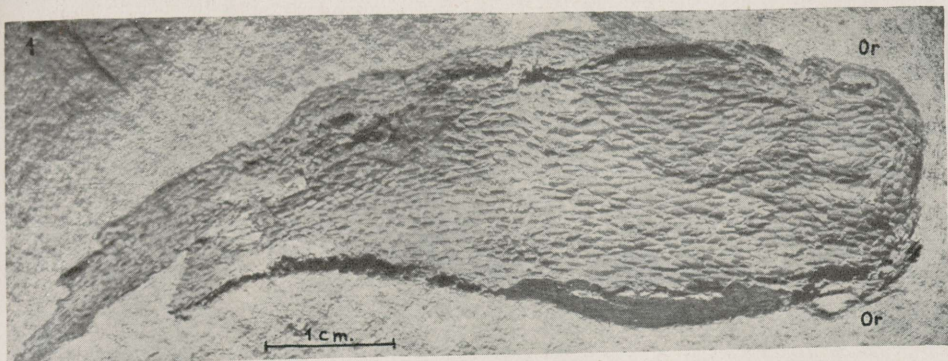
Fig. 3—5. Single scales from the outside.

Fig. 6. One scale from the outside (a) and one from the inside (b)

Fig. 7. A detail of scalecovering of the body.

Fig. 8. Impressions on the inside of the scales. A detail of a part of the body.





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Publications of the Geological Institution of
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Est. A-19429

- № 1*. H. Bekker, Ph. D., D. I. C., Mõned uued andmed Kukruse stratigraafiast ja faunast. — Stratigraphical and paleontological studies on the Kukruse stage of the Ordovician Rocks of Eesti (Estonia). plates, 1 map and 6 fig. in text. — Märts 1924.
- № 2*. — Devon Irboska ümbruses, stratigraafia, fauna ja paleogeograafia Devonian Rocks of the Irboska district (S. E. Estonia) with the description of a new cemented brachiopod. With 1 map, 6 plates and 15 fig. in text. — Okt. 1924.
- № 3. A. Öpik, Beitrag zur Stratigraphie und Fauna des estnischen Unter-Kambriums (Eophyton-Sandstein). Mit 10 Textfig. und 3 Taf. — Veebr. 1925.
- № 4*. A. Luha, Professor Hendrik Bekker, Ph. D. Sc. Nekroloog, pildiga. With English Summary.
A. Öpik, Beiträge zur Kenntnis der Kukruse-(C₂)-Stufe in Eesti. I. — Über die Kalksandsteinfacies des Vaginatenkalkes auf der Halbinsel Baltischport und über ein *Acidaspis*-Pygidium aus denselben Schichten. — Dets. 1925.
- № 5. K. Jaansoon-Orviku, Beiträge zur Kenntnis der Aseri- und der Tallinna-Stufe in Eesti. I. — Veebr. 1927.
- № 6*. A. Öpik, Über den estländischen Blauen Ton. — Juuli 1926.
- № 7. K. Jaansoon-Orviku, Rändpangaseid Eestis (Über die Glazialschollen in Eesti). Mit deutschem Referat. — Juuli 1926.
- № 8. K. Orviku, Die Rautenvariationen bei *Echinospaerites aurantium* Gy 11. und ihre stratigraphische Verbreitung im estnischen Ordovizium. — Märts 1927.
- № 9. A. Öpik, Die Inseln Odensholm und Rogö. Ein Beitrag zur Geologie von NW-Estland. — Sept. 1927.
- № 10. A. Öpik, Beiträge zur Kenntnis der Kukruse-(C₂)-Stufe in Eesti. II. — Sept. 1927.
- № 11. I. Reinvaldt, Bericht über geologische Untersuchungen am Kaalijärvi (Krater von Sall) auf Ösel. Mit Beiträgen von A. Luha. — Sept. 1928.
- № 12. A. Öpik, Beiträge zur Kenntnis der Kukruse-(C₂-C₃)-Stufe in Eesti. — Okt. 1928.
- № 13. A. Öpik, Über Trockenrisse und Regenspuren im Monograptus-Schiefer von Hodkovičky (Böhmen), und über die Entstehung der Graptolithenschiefer überhaupt. — Märts 1929.
- № 14. K. Orviku, Uhaku. Kirde-Eesti karstiaala stratigraafiast ja geomorfoloogiast. Deutsches Referat: Uha ku. Zur Stratigraphie und Geomorphologie des NO-estnischen Karstgebietes. — Mai 1929.
- № 15. A. Öpik, Studien über das estnische Unterkambrium (Estonium). I—IV. — Juuli 1929.
- № 16. A. Öpik, Über Muskelhaftstellen der Glabella von *Pseudasaphus tecticaudatus* Steinh. (*Crust.*, *Trilobita*) und über die Funktion der Fazialsutur. — Juuli 1929.
- № 17. A. Audova, Aussterben der mesozoischen Reptilien. I. — Aug. 1929.
- № 18. A. Öpik, Der estländische Obolenphosphorit. — Aug. 1929.
- № 19. P. W. Thomson, Die regionale Entwicklungsgeschichte der Wälder Estlands. — Detsember 1929.
- № 20. A. Öpik, Brachiopoda Protremata der estländischen Kukruse-Stufe. — Jaanuar 1930
- № 21. K. Orviku, Keskdevoni põhikihid Eestis. Deutsches Referat: Die untersten Schichten des Mitteldevons in Eesti. — Veebr. 1930.
- № 22. A. Luha, Über Ergebnisse stratigraphischer Untersuchungen im Gebiete der Saaremaa-(Ösel)-Schichten in Eesti. (Unterösel und Eurypterusschichten). — Jaanuar 1930.
- № 23. A. Heintz, Eine neue Rekonstruktion von *Heterostius* Asm. — K. Orviku, Die Glazialschollen von Kunda-Lammasmägi und Narva-Kalmistu (Eesti). — K. Orviku, Der Asaphiden-Kalkstein (Ordovizium) im Bohrloch von Lagedi (Eesti). — Juli 1930.
- № 24. A. Öpik, Beiträge zur Kenntnis der Kukruse-(C₂-C₃)-Stufe in Eesti IV. — November 1930.
- № 25. A. Öpik, Über einige Karbonatgesteine im Glazialgeschiebe NW-Estlands. — Mai 1931.
- № 26. Th. Heinrichson, Über *Porambonites wahlhi* n. sp., aus der ordovizischen Jõhvi-Stufe D₁ Estlands.
- № 27. Johan Kiær †, Edited by A. Heintz. New Coelolepids from the Upper Silurian on Oesel (Esthonia).