

# MEDDELELSER

FRA

## KOMMISSIONEN FOR HAVUNDERSØGELSER

SERIE: FISKERI · BIND I

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# LARVAL EELS

(*LEPTOCEPHALUS BREVIROSTRIS*)

OF

## THE ATLANTIC COASTS OF EUROPE

BY

C. G. JOH. PETERSEN

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Since Prof. GRASSI more than 10 years ago published his interesting investigations from Sicily on the development of the eel and proved *Leptocephalus brevirostris* to be the larva of *Anguilla vulgaris*, these larvæ have also very often been looked for outside the Mediterranean, but very few have been found up to the present time, and none at all off the Atlantic coasts of Europe, where the grown-up eel is common enough. We cannot count to the larvæ of the common eel the two Leptocephali caught "on the surface of the ocean off New-York" by the American steamer "Albatros"<sup>1)</sup> unless we will identify the American eel with our European form, what we have no sufficient reason for, at least not at present. C. EIGENMANN and KENNEDY communicate (On the Leptocephalus of the American eel etc. Bull. U. S. F. C. Vol. XXI. p. 84 for 1901 (1902), that the number of vertebræ of the American eel is between 106—110. (Examples: 35 + 71, 35 + 72, 36 + 71, 36 + 73, 36 + 74, 42 + 65) and the two specimens which were found at New York have 40 + 65, 40 + 68, that means about the same number of vertebræ. The number of vertebræ of the European eel is stated by LILLJEBORG to 113 (45 + 68), by GÜNTHER (fide LILLJEBORG) (to 113—117, by KRÖYER to 112—115) (46 + 67), 45 + 67, 45 + 70), it has therefore a somewhat greater number of vertebræ. The investigations are however too few to allow us to draw any definite conclusions. To approach the solving of the question we would also have to count the vertebræ of males as well as of females separately. Provisionally I look upon the American and the European eel as belonging at least to different races<sup>2)</sup>.

In "Report for 1898 on the Lancashire Sea-Fisheries Laboratory 1899 p. 17—21" ANDREW SCOTT mentions, that he many times at the coasts of Lancashire, e. g. in *Zostera*, has found "Leptocephali, identical with the hemilarval stage described by Grassi". Some were kept in aquarium and developed into "young eels" — "no longer transparent". SCOTT describes these "Leptocephali" as follows: "The sizes ranged from  $2\frac{6}{10}$  to  $2\frac{9}{10}$  inches in extreme length,  $\frac{3}{16}$  of an inch in vertical depth, from fin to fin, and about  $\frac{1}{12}$  of an inch thick. They were flat, colourless and perfectly transparent, the viscera, and the heart and its movements being easily seen through the skin". According to this description I cannot but see that they in all respects are identical with the thousands of young elvers, that every spring appear also at our coasts, and which we have known for many years.

In the publications of the "Challenger Expedition (Report on the pelagic fishes)" GÜNTHER writes p. 42: "North Atlantic; April 13, 1876; form, *Leptocephalus brevirostris*" without further details; so it is very scarce. Thus it is after all very little next to nothing, which has been seen of the larvæ of our common eel outside the Mediterranean, still they surely must live near Europe in great numbers. I myself

<sup>1)</sup> C. EIGENMANN: The solution of the eel question p. 13. Trans. American Microsc. Soc. May 1902. vol. XXIII.

<sup>2)</sup> The smallest transformed eels are by GRASSI stated to be of c. 5 cm., I myself have seen none from Europe of less than c. 6 cm. In the Zoological Museum of Copenhagen, however, are kept 7 eels caught near Beloxi U. S. A. of which the two smallest only measure 45 mm., the largest 53 mm. They have been preserved in alcohol since 1854; this, however, may hardly be supposed to have diminished their length much. They belong without doubt to the American *Anguilla bortonensis*; their number of vertebræ only amounted to 103, 104, 106, 106, 109, 109, 113. For the sake of comparison the vertebræ were counted of 3 eels caught in a rivulet at Ribe (Jütland) in 1899, they measured 60, 62, 62 mm., and the number of vertebræ were 116, 117, 119.

have always thought it absurd to assume a different development for our North-European eel than for the Mediterranean ones. The Leptocephali will surely be found, I thought, if we seek them in the right time, place and manner. As now the "Thor" during its voyage to the Færø Isles and to Iceland in 1904 had to pass deep and warm Atlantic water I charged on purpose JOHS. SCHMIDT in his instructions also to seek the larval eel with the new young-fish trawl. At one of the stations S. W. of the Færø Isles on May 22. of 1904 he at night-time also in the Atlantic found one pelagic *Leptocephalus brevirostris* near the surface. The exact position was 61°21' N. and 10°59' W. The larva is a typical Leptocephalus before the transitional stage, ca. 15 mm. in vertical depth and ca. 77 mm. long, with anus as well as the foremost point of the dorsal fin situated far back the centre of the body; larval teeth and larval pectorals are present. Together with this larva another larval eel was caught at the same station, of greater length and of a quite different type; evidently of another genus, of those living their whole live at great depths. Besides these larval eels a few small young *Sebastes*, 2 young ones of *Gadus poutassou*, ca. 20 *Clione limacina*, *Diphyes*, *Physophoridae* etc. occurred. Rough sea constrained the investigations very much.

As I have written previously in a little pamphlet: "Aalen" (published in the Danish language; Schubothe. Copenhagen.) I took SCHMIDT's find as an evidence for the view, that the larvæ of our North-European eel should be sought outside the North Sea area in the very Atlantic, and I therefore thought, that the larval eel possibly already in this year, 1904, had been caught during the Irish fishery-investigations. These investigations namely are the only one besides the Danish, which in 1904 were extended to the Atlantic, properly so called. For this reason I addressed myself to Dr. E. W. L. HOLT about the subject, and through his great obligingness I became acquainted with the find of another *Leptocephalus brevirostris*, namely a specimen of a length of 73 mm., found "40 miles N. by W. of Eagle Point on Ireland, August 11. 1904". The depth was 735 fms., but no information is offered with regard to the depth in which the larva was caught. It was captured from SS. "Helga". This larva is essentially in accordance with that taken by SCHMIDT. HOLT's counted ca. 116 vertebræ and ca. 265 and ca. 220 finrays, respectively in the dorsal and in the anal-fin. SCHMIDT's counted ca. 114, ca. 265 and ca. 210 respectively. It is a peculiar fact, that these larvæ, which otherwise differ so much from the full-grown eel, already possess all its anal and almost all its dorsal finrays. From what is known about the number of vertebræ (see above) we may already recognize these two specimens as belonging to the European and not to the American form.

I lay much stress on the finds of these two larval eels, not that I ever, since GRASSI in Rome showed me his preparations and transforming stages, doubted the correctness of his view about the development of the eel, but because it so evidently has shown a great want in our entire method of investigation, that we have not been able to find these larvæ outside the Mediterranean; a great want, which however partly is apparent, but also partly real. This want seems partly to be owing to the fact, that these larvæ really do not exist in many more closed waters (Kattegat, North-Sea) and consequently cannot be found there, the apparent want of good methods, partly, that they only exist in open seas, where the water is deep and warm, and where the modern fishing gears as yet have been used very little, but where the eels surely could be found in numbers and in all transforming stages from the egg and onwards; this has not yet happened, and here we have the real want by the investigations. Now we possess in the two mentioned finds a hint, that it is W. and N.W. of Scotland (both finding-places being here) in deep water, that we may cure this want and acquire certainty as to where the European eel breeds. Moreover those finds show, that the larvæ, like the American ones and like the other Leptocephali are pelagic, at least now and then, and not live in the bottom as believed by GRASSI. They will therefore be far easier to catch from a mere technical view, even if we may be prepared to filter much water, it is: to make long hauls. Even a great number of larvæ do not fill much in a bulk of water of a depth of 1000 to 2000 meters.

I have only discussed the question about the propagation of the eel from a quite scientific point of view, I must however also call the attention to the importance of this matter practically seen. The much talking about the propagation of the eel in fresh-water, may now have to cease; all eels immigrate into fresh-water or to closed inshore waters in the sea but emigrate from these to spawn. If they by physical hindrances are prevented from doing so, they must die without spawning. All eels from the Baltic e. g. will gradually, as they grow up, emigrate to the Atlantic, essentially through the Sound (see Report V from the Danish Biol. Station). They must surpass the North-Sea, if they cannot spawn in deep water further north, what I don't suppose, they are able to, as there is too low temperature in the depth. If these eels, when migrating towards the Atlantic, go north or south of Great Britain, is not known, it would not surprise me, if they went through the English Channel. What these migrations of the eel along the coasts, mean for the Swedish, German and Danish fishery is already well-known, but the yield might probably increase further if more rational methods of capture were adopted e. g. by means of light in the water (see my before mentioned pamphlet). If we completely understand the whole great migration-phenomenon of the eel and have found the exact position of the spawning-places, the whole matter will appear in its proper light with regard to Europe, and this view will be of importance for the practical fishery as well as for the principles of legislation with regard to the eel. It is to be hoped, that further information regarding this matter soon will be at hand. The following paper by A. C. JOHANSEN already throws more light upon the habit and the migration in the North Sea of the just metamorphosed *Leptocephalus*, the young elvers.

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### POSTSCRIPT.

This year, 1905, Dr. JOHS. SCHMIDT has succeeded in finding great quantities of *Leptocephalus brevirostris* in the depths of the Atlantic. Thus we have got an evidence more that the common eel does not spawn in shallow water, neither in the Baltic nor in the North Sea.