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REMARKS ON THE GREENLAND EEL, ITS OCCURRENCE AND REFERENCE TO *ANGUILLA ROSTRATA*

BY

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WITH 1 MAP IN THE TEXT

KØBENHAVN
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The first report on the occurrence of the Eel at Greenland we owe to the Missionary Otto Fabricius, deservedly esteemed for his work on the natural history of Greenland. In his "Fauna Groenlandica" (1780) he notes on p. 137, that the Eel (*Muraena anguilla* Linné) occurs, though rarely, in the southern streams and lakes[1]); the largest specimen he had seen was over 31 inches (790 mm) in length and about 6 inches (160 mm) in circumference. The Greenlanders, who called the Eel *Nimeriak*, did not care for it and, so far as he knew, did not eat it; some used the skins as wrapping for their lead bullets.

The next, published report on the Greenland Eel occurs in a paper by Johs. Schmidt from 1909: "Ferskvandsaalenes (*Anguilla*) Udbredning i Verden. I. Det atlantiske Ocean og tilgrænsende Omraader"[2]); on p. 124 of this work reference is made to a specimen of the Greenland Eel which I had given Schmidt from the collections of the Copenhagen Zoological Museum.

In addition to this known specimen, a request from the Zoological Museum to the settlement manager of that time in Julianehaab, Mr. Brummerstedt, as to whether he knew anything about the occurrence of the Eel in South Greenland, elicited the following reply in a letter from the autumn of 1900: "The Eel (*Nimeriak*) certainly occurs in Greenland; some years ago a specimen was taken in the large freshwater lake of the settlement and several years ago also a large Eel was caught in the neighbourhood of Nanortalik; but, as mentioned, it is a great rarety."

Later, Mr. Brummerstedt succeeded in obtaining a specimen, which he sent to the Zoological Museum in the autumn of 1903. It was taken in the same year in an arm of the fjord at the dwelling place Igdlukasik, about 4 Danish miles[3]) south of Nanortalik, by the Greenlander Elisa who had speared the eel with an arrow fixed to a pole. Regarding this

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[1]) Fabricius lived in South-west Greenland (Frederikshaabs District) during the whole of his sojourn in Greenland (1768—1773).

[2]) D. Kgl. Danske Vidensk. Selsk. Skrifter. 7. Række, Naturvidensk. og Mathem. Afd. VIII. 3. København 1909. — The same work appeared in English in Meddel. fra Kommis. for Havundersøgelser. Serie: Fiskeri. Bd. III. Copenhagen 1909.

[3]) 21 Engl. miles.

specimen I noted down the following immediately on reception: "It was preserved in salt and was in good condition, even in the inner parts. After being desalted in water, but before being placed in spirit, the following measurements were taken: total length 603 mm; distance from snout to beginning of dorsal fin 195 mm (32.3 % of total length); distance between

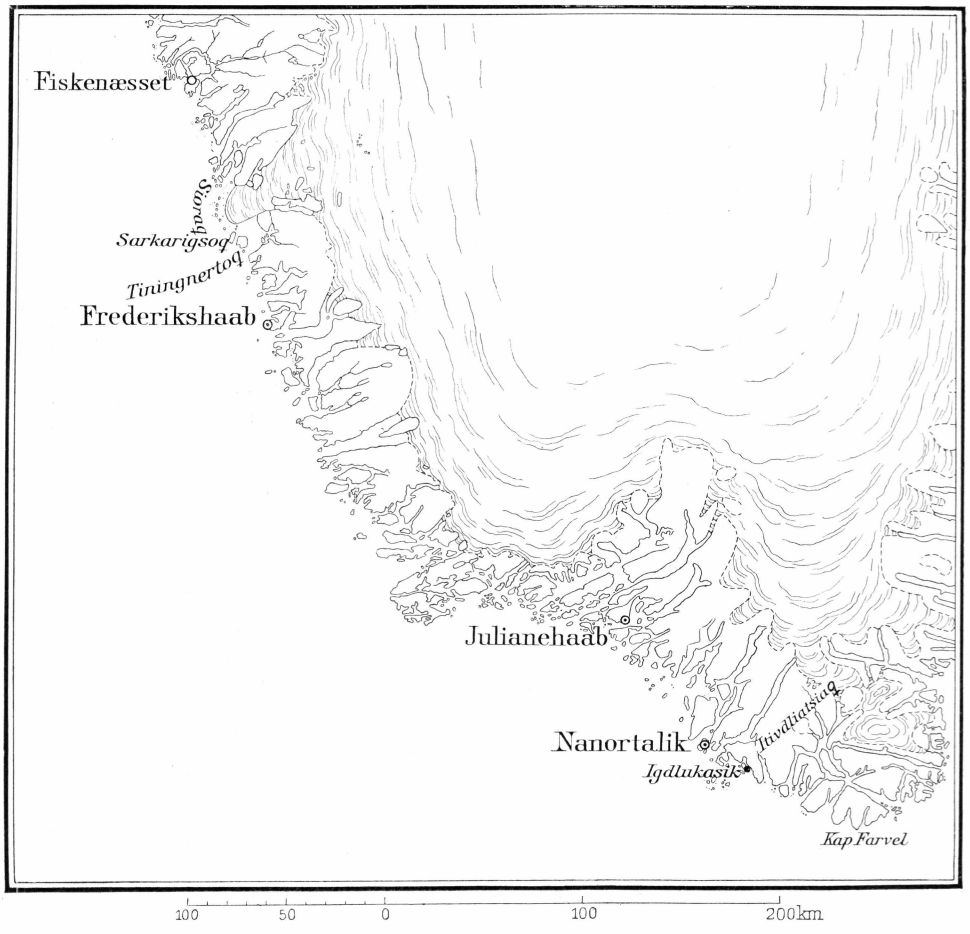

Fig. 1. Map of the coast from Fiskenæsset to Kap Farvel.

anterior end of dorsal and beginning of anal fin 61 mm (10.1 % of total length); length of head 69 mm (11.1 % of total length). To judge from these proportions, the specimen therefore does not belong to the European Eel *Anguilla vulgaris* Turt., but to the American *A. chrysypa* Raf., according to JORDAN & EVERMANN: "Fishes of North and Middle America", Part I, 1896, p. 347, Footnote, if the distinguishing characteristics given there by Dr. MEEK are correct. It is a female, "silvery"; the outlines of the scales are clearly seen, as also the lateral line; the pectoral

fins are dark and pointed; the ovaries much convoluted and white; the snout not greatly depressed; the eyes turned towards the sides and fairly large; in short, this Eel has all the appearance of being near sexual maturity."

A second specimen was forwarded by the then assistant HASTRUP in Nanortalik. It was caught by a Greenlander with a bird dart on the 14th of August 1909 at Qamánguarigsoq, a small river south of Itivdliatsiaq, the crossing place south of Nanortalik. Regarding this Eel I have noted at the time: "Its total length is 593 mm, distance from snout to dorsal fin 192 mm (32.4 % of total length); distance between beginning of dorsal and origin of anal fin 55 mm (9.3 % of total length); length of head 68 mm (11.5 % of total length). According to these measurements it belongs to the American Eel *Anguilla chrysypa*. The abdominal region is yellow."

A third Eel, 660 mm long, was forwarded by the Greenland Pastor GERT EGEDE. It was caught by a Greenlander in the beginning of September 1920 behind Igdlukasik Island at a place called Ersinartoq, where there is a small salmon river. The appearance is that of a silver Eel, colour very dark on the back, the eyes turned to the sides and somewhat large, scales and lateral line clearly seen. The ovaries are also well-developed, convoluted, broad and copious, as well as filled with fat.

The three specimens of the Eel forwarded from Greenland in the present century have thus all come from the Julianehaab District. From earlier times however we have in the Museum three other specimens, marked simply "Greenland"; but I have succeeded in determining, that they came from the Frederikshaab District and were forwarded by the Missionary JØRGEN FREDERIK JØRGENSEN. During the period he was stationed at Julianehaab (1838—41) and in Frederikshaab (1841—42) he kept in close contact with Professor J. H. REINHARDT and forwarded considerable zoological collections to the Kgl. Naturhistoriske Museum and University Museum. In REINHARDT's lists kept in the Zoological Museum of the collections he had received during a number of years from Greenland, it is noted under 25. October 1842 that a large collection came from the Missionary JØRGENSEN; among these as No. 50 three small Eels, about 5 inches in length, and as No. 59 two others, but damaged specimens. Regarding the place of origin of these specimens we have the following note in a letter from JØRGENSEN to REINHARDT, dated Frederikshaab 30. September 1841: "On my arrival in the colony of Frederikshaab I sought information almost immediately regarding the Greenland *Nimeriak*. At length I have received to-day (31. August) a bottle from the curate at Stor Island containing 5 specimens — 3 good and 2 bad. They were taken in the river at Tinninertok, which lies a

little south of Sakkariksok (situated south of the large Iceblink (Siorak)[1]) between Fiskenæsset and Frederikshaab) in the latter half of August."

Of the 5 specimens mentioned the first 3 are still present in the Zoological Museum, but not the last 2; they were presumably thrown out owing to their bad condition.

We thus have in all 6 specimens from Greenland; all taken in the southernmost settlements on the west coast, namely Frederikshaab and Julianehaab. Published and oral accounts regarding the occurrence of the Eel at Greenland also indicate these two districts — and no others — as the dwelling places of the Eel.

The question may be raised now however, whether these specimens from Greenland really belong to the American species, *Anguilla rostrata* Le Sueur[2]), as defined in recent years by JOHS. SCHMIDT's researches. The European and American Eels are very closely related and in outer habit are difficult to distinguish, if at all, but in his fundamental work "On the Classification of the Fresh-water Eels (*Anguilla*)"[3]), SCHMIDT succeeded in showing that the separation is possible by means of certain numerical characters, his work being based on the examination of a large number of Eels from both sides of the Atlantic. The number of vertebrae especially is a good character, the European Eel having about $7^1/_2$ vertebrae more than the American (about 114.7 against 107.2). If one takes the trouble of counting the vertebrae, we should find but very few specimens in a thousand, which we could not with certainty refer to the one or other species, since the number of vertebrae in the American Eel (*Anguilla rostrata* Le Sueur) lies between 103 and 111, but in the European Eel (*Anguilla anguilla* Linné)[4]) between 111 and 119; further, the only number common to the two species, namely 111, occurs so rarely that it was only found three times in altogether 532 specimens of the two species. With regard to the other characters discussed by SCHMIDT in the work mentioned, namely, number of pectoral and anal rays, as also number of branchiostegal rays, they are less serviceable for the separation of the species — especially when, as in the present case, we are dealing with only a few specimens — since the numbers overlap considerably, and the specific difference is shown mainly in the different mean value.

In biological regards, as SCHMIDT has demonstrated in another

[1]) On the chart given here (fig. 1) these localities are given as: Tiningnertoq, Sarkarigsoq and Sioraq.

[2]) Also named *Anguilla chrysypa* Rafinesque; but B. A. BEAN in "Science" N. S. Vol. XXIX, p. 871 (New York, 1909) has shown, that the title *A. rostrata* Le Sueur has priority, since this was given the species in 1817, not as stated in 1821, thus some months before the title given by RAFINESQUE was published.

[3]) Medd. fra Kommiss. for Havundersøgelser. Serie Fiskeri, Bd. IV, No. 7. Copenhagen 1914.

[4]) Synonym: *Anguilla vulgaris* Turton.

work[1]), the two species differ widely, the American Eel attaining to its full development from egg to glass-eel (elver) in about 1 year, whilst the European Eel requires about 3 years.

In SCHMIDT's publication of 1913: "First Report on Eel Investigations"[2]), a chart is given (Fig. 3) showing the distribution of the two *Anguilla* species "according to countings of vertebrae", and here a mark for the American Eel is recorded on South-west Greenland, though one cannot see from the text, that this record is based on number of vertebrae. I may explain, however, that the earlier mentioned, 593 mm long, specimen taken in 1909 at Kamangovaritsok was lent to SCHMIDT and has evidently been dissected for the purpose of counting the vertebrae; we may assume, therefore, that it was on this basis that SCHMIDT in his work of 1913 referred the Greenland Eel to *Anguilla rostrata.*

One main object of the present, brief notice has been to establish the actual condition with regard to number of vertebrae in the whole available material from Greenland and the result has been as follows:

No.	Year of capture	Total length	Number of vertebrae
1.....	1841	109 mm	107
2.....	1841	110 —	104 or 105
3.....	1841	110 —	107
4.....	1903	603 —	106
5.....	1909	593 —	105
6.....	1920	660 —	107

In all 6 specimens the number of vertebrae thus falls within the values determined by SCHMIDT for the American Eel. The Greenland Eel may therefore be referred with certainty to *Anguilla rostrata.*

However small the available material from Greenland may be, a certain amount of interest is connected with it.

In the first place it appears, that at South-west Greenland there may occur both the fry and adult Eels, and of the latter both "yellow" (immature dress) and silver Eels (mature). Again, the Eels of South-west Greenland represent the northernmost occurrence of the American species; whereas, on the American mainland, in Labrador, *Anguilla rostrata* hardly reaches to 60° N. L., the northernmost locality in Greenland (Tiningnertoq) lies at 62°18′ N. L.

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[1]) The Breeding Places of the Eel. Philosoph. Trans. of the Royal Society, London, Ser. B, Vol. 211. 1922.

[2]) Rapports et Procés-Verbaux du Conseil international pour l'Exploration de la Mer. Vol. XVIII, Copenhague 1913.

As is well-known, JOHS. SCHMIDT has proved, that the spawning area of the American Eel lies to the north of the West Indies, between ca. 20°—30° N. L. and ca. 60°—80° W. L., and that the pelagic larvae (*Leptocephalus* stage) occurs in the Western Atlantic between the West Indies and the banks of Newfoundland (ca. 17°55′—42°19′ N. L. and 50°22′—78°44′ W. L.)[1]). To reach the south-west of Greenland, therefore, the Eel-fry must travel a further 20° towards the north and over wide stretches of open and deep water, which separates Greenland from America.

In reality one might have expected, that the Eels which arrive in Greenland should be European, i. e. belong to *Anguilla anguilla*, since it is this species which occurs at West Iceland and we have here, up along the west coast, a branch of the Gulf Stream (Irminger Current), which continues over towards East Greenland, then bends southwards, passing the south point of Greenland and proceeding north-west up along the south-west coast of Greenland. On the other hand, the most recent hydrographical investigations indicate that no branch of the Gulf Stream goes directly to the Davis Strait. Hence, it can hardly be due to the marine currents, that the few specimens of the American *Anguilla rostrata* succeed in reaching to South-west Greenland; this must come from active efforts on the part of the fish.

[1]) JOHS. SCHMIDT l. c. 1922.

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