ARCTIC
VOL. 36, NO. 2 (JUNE 1983) P. 204-205

A Unique International Polar Year Contribution: Lucien Turner, Capelin, and Climatic Change

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ABSTRACT. Lucien McShann Turner (1847-1909), one of the most able field naturalists in North America in his day, spent two years (1882-84) at Fort Chimo, Québec, as meteorological observer for the U.S. Army Signal Service during the first International Polar Year. Among his many activities over and above his IPY duties was the collection and description of the fishes of the region. This paper reports on the significance of Turner's first record, in 1884, of the presence of the capelin (*Mallotus villosus*) in very large numbers at the mouth of the Koksoak River. *Mallotus* is an excellent indicator of marine climate conditions, and the subsequent records of its presence and absence in Ungava Bay are reviewed in relation to climatic change in the North Atlantic-Subarctic region in general.

Key words: capelin, *Mallotus villosus*, Ungava Bay, International Polar Year

RÉSUMÉ. Lucien McShann Turner (1847-1909), l'un des meilleurs naturalistes sur le terrain en Amérique du Nord en son époque, passa deux ans à Fort-Chimo, au Québec, à titre d'observateur météorologique pour l'U.S. Army Signal Service au cours de la première Année polaire internationale (A.P.I.). En plus de ses devoirs découlant de l'A.P.I., il s'occupa à collectioner et à décrire les poissons de la région . Le présent article signale l'importance du premier rapport de Turner en 1884, portant sur la présence du capelin (*Mallotus villosus*) en grands nombres dans l'embouchure de la rivière Koksoak. *Mallotus* est un excellent indicateur de conditions climatiques marines, et les données signalant la présence ou l'absence du *Mallotus* dans la baie d'Ungava sont étudiées par rapport aux variations climatiques dans la région nord-atlantique-subarctique en général.

Mots clés: capelin, *Mallotus villosus*, la baie d'Ungava, la première Année polaire internationale

Traduit pour le journal par Maurice Guibord.

This is an account of an observation made a century ago which has proved very valuable in the light of observations made during the past 35 years, concerning marine climatic change as indicated by the presence and absence of a little smelt-like fish, the capelin (*Mallotus villosus* (Müller)). It illustrates, among other things, the wisdom of choosing for special purposes men who have a general interest in, and knowledge of, natural history, and also the value of the maintenance of such observations on a monitoring basis.

The author, together with Henry Hildebrand, spent the summer of 1947 working on the physical and biological oceanography of Ungava Bay, as the first season's field work of the Eastern Arctic Investigations of the Fisheries Research Board of Canada. This operation, which continued from that year on, finally developed into the Arctic Biological Station of the Department of Fisheries and Oceans at Ste-Anne de Bellevue, Québec. One of the papers to come out of the first three years of operations was an account of the fishes of Ungava Bay (Dunbar and Hildebrand, 1952), and it was during the preparation of that paper that Hildebrand looked into the work of L.M. Turner at Fort Chimo in 1882-84. We obtained a copy of Turner's unpublished manuscript on the fishes of that region, and I am indebted to Hildebrand for the biographic account of Turner.

Lucien McShann Turner was born in Hamilton County, Ohio, on 20 June 1847. Very little is known of his early life, and he seems to have been a retiring, non-assertive person. It is possible that he started his natural historical work with his friend Robert Ridgway, the ornithologist. His first official position was with the U.S. Army Signal Service at St. Michaels, Alaska, where he worked from May 1874 to July 1877, when he was relieved by E.W. Nelson, who later became chief of the U.S. Biological Survey. There seems to have been an association at that time between the Army Signal Service and the pursuit of natural history, which persisted throughout Turner's life. Turner returned to the U.S. (now we would say "the lower 48") and was barely out of uniform before he wrote to S.F. Baird about another collecting expedition. He rejoined the Signal Service and was sent to Unalaska in May 1878. He established meteorological posts in various parts of Alaska, returning home in July 1881.

Throughout these years Turner published important contributions to the natural history of Alaska. He also made ethnological studies and collections, and in his spare time he compiled vocabularies of the Unalet, Malemut, Nulato, Ingalet and Aleut dialects besides learning to speak and write Russian. He was not a man to waste his time.

At this point the International Polar Year intervened in Turner's life. Spencer Baird used his influence with the Signal Service, although it may be doubted whether Turner needed such influence, to have Turner reinstated and sent to Ungava Bay as the IPY "our man in Chimo". His orders included the usual injunction to make natural historical and other observations and collections, something which he clearly did not have to be told. He left Québec on 8 June 1882 on board the *Tropic*, transferred to the *Labrador* at Davis Inlet, and reached Fort Chimo on 6 August 1882, where he stayed until 4 September 1884.

Besides his routine meteorological and other geophysical observations, Turner compiled a large vocabulary of the native language and made extensive collections of birds, ethnological material, plants, molluscs, fishes, mammals and crustacea. His work was confined to Fort Chimo and the valley of the Koksoak River, which he penetrated to some 110 miles (177 km) upstream. Only some of this material was published.

For Turner's manuscript on his fish collection I am indebted

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to the Smithsonian Institution. The section on the capelin reads as follows:

> The Capelin abound in myriads along the Labrador coast during the months of May, June and July. They appear during the latter part of May and continue northward, remaining somewhere or another on the coast during that time.
>
> The fishermen report that these small fishes are, each year, going farther north and of course lead the Cod which devours incredible numbers of them, in that direction.
>
> Within Hudson Strait they had not been detected until several years ago when a few were seen in the neighboring waters of George's River. In the spring of 1884 they were observed in great numbers in that vicinity. On the 8th of August 1884 a school of several thousand individuals appeared four miles within the mouth of the Koksoak River. As many as were desired for specimens were secured by the hand as they swam near the shore. The salmon season was at that time at its height and the small fishes may have taken refuge in the river to escape the attacks of those larger fishes.
>
> This is the first instance known either to whites or natives of the appearance of Capelin in the southern portion of Ungava Bay.

There seems to be no record of either the presence or the absence of capelin in Ungava Bay between 1884 and 1947, when the Fisheries Research Board work began in the Eastern Arctic. During four seasons, 1947-1950, our studies produced only three young individuals, 5.5 cm long, taken in plankton nets at our Station 51 (Dunbar and Grainger, 1952), Pitulaksitik, between Whale River and George River, on 29 August 1947. During three seasons (1947-1949) some 750 Atlantic cod stomachs were examined at Port Burwell, and not a single specimen of *Mallotus* was found in them. But in 1959 the species was present in the eastern part of Ungava Bay in such numbers (Lejeune, 1959, 1963) that the flesh of the arctic char (*Salvelinus alpinus*) in the region changed from pink to white, caused by the change in diet from Crustacea to *Mallotus*.

The geographic range of the capelin shows it to be neither Arctic nor temperate (Boreal) in distribution, but rather to be restricted to the Subarctic mixed water (see Dunbar, 1968, 1976), and moreover as the climate of the region changes, so does the distribution of the Subarctic water and therefore of the capelin. Along with several other species, it is thus a very useful climatic indicator. Jensen (1939) records the changes in the capelin range during the remarkable climatic warming that occurred in Greenland waters from 1920 onward, a trend that began to reverse in the 1940s and later (Dunbar, 1982). Jensen records similar changes in capelin distribution along the coasts of Iceland.

It is known that there was a brief warm period in West Greenland in the decade of the 1880s, during which Atlantic cod was fished there, followed by disappearance of the cod in the first two decades of the present century. It is therefore interesting that the capelin appeared in Ungava Bay in the 1880s. Turner himself (1885 MS) comments on the northward movement of fish on the Labrador coast during that decade:

> The range of the large cod [*Gadus morrhua*] is now farther north than it was even but few years ago. The schools of Capelin (*Mallotus*) and Lance (*Ammodytes*) are pushing farther each year in that direction; and are, of course, followed by the Cod which consumes such incredible numbers that to believe the reports of fishermen, and they alone know best, would produce some startling numbers.

We have no information on the aquatic climate in Ungava Bay during the 1920s and 1930s, when the West Greenland change occurred.

Templeman (1948) records that in the waters of Newfoundland the capelin spawns when the surface temperature lies between 5.6 and 8.4 °C. Jensen (1939) shows surface temperatures in West Greenland (south of Juliánehåb and at the mouth of Godthaab Fjord) as between 3 and 5.2 °C during the warm period. These temperatures are higher than the maximum temperatures measured in Ungava Bay during 1947-1950. Unfortunately there is no evidence that Turner measured sea temperatures during his stay at Fort Chimo.

The capelin swarm in great numbers in southern Hudson Bay, for instance at the Belcher Islands. This Hudson Bay population appears to be a relict group from a former warmer period, possibly the 1880s, possibly much longer ago. Southern Hudson Bay surface temperatures are much higher than those of Ungava Bay.

It is to be inferred from this information that temperatures in Ungava Bay were higher in the 1880s than they were in 1947-1950, and that 1959 was warmer than the latter period. It is very useful indeed to have the information supplied by Turner; but it is frustrating that there have been so few maintained studies of either the fish populations or the temperature conditions in Ungava Bay since that time. Regular monitoring would have been, and would be for the future, well worth the effort.

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