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Preliminary Note on Age Determination of Barents Sea Redfish

Sebastes Marinus

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When ERNEST HOLT Bear Island samples of redfish otoliths were collected and read in 1956, by counting the alternating opaque and hyaline zones in the usual way, age determinations so obtained were, in general, comparable with those of Travin (1951) for the Sebastes marinus of the Barents Sea with considerable differences between the sexes. Agreement of growth rates were also obtained from a small material of the species S. mentella first described by Travin in the same paper.

In March 1957 a codend cover-catch from Malangen's Ground (160 tons) of 183 young S. marinus was measured. Two modes occurred when the data were grouped into 10mm. length groups. These occurred at approximately 9.5 and 13.5 cms. and agreed well with Travin's Age Groups 2 and 3. Only one fish was found to be less than 8 cms. viz. 5.7 cms., and was thought to be the sole representative of the 1 Group (Travin's mean length was 6.26 cms.). The largest fish were 28 and 33 cms. Too few length data of pure S. marinus, i.e. uncontaminated by S. mentella, are available from market measurements to say whether other older age groups could be separated by Petersen's method.

Part of the cover catch, 126 fish, were otolithed and analysis of the otoliths established that the two main length groups represented fish possessing four and eight opaque zones respectively, whilst the larger fish had up to twenty opaque zones. This count of zones included the nucleus and the opaque zone on the edge. In the great majority of cases (c.a.90%,) the edge zone was virtually complete, whilst in 5-6% of the sample the opaque zone was complete and the edge just hyaline. Three otoliths showed the beginnings of an opaque zone being laid down on the edge.

Of authors working on redfish in many areas, all but Kotthaus (1949, 1952 and 1956) indicate a very slow growth rate. It is, however, difficult to argue why the Barents Sea redfish from oceanic water has a growth rate so low that the length groups referred to earlier, of 9.8 and 14.0 cms. respectively, represent fish of 4 and 8 years of age instead of the age groups 2 and 3 of Travin (51) and Bratberg (1956) and that the other age groups were absent from the shoal.

The opaque zones observed were not very obviously grouped into a series of rings, each one of which suggested a year's growth. Considerable variation in width of individual zones was observed, but the total width of the four-zone group was reasonably constant, irrespective of size of otolith, i.e. whether it had 4, 8, 12 or more zones.

A return to the original otolith samples of larger fish, i.e. of commercial size, showed that the count of single zones in fish from 30 to 50 cms. ranged from 8 to 28 and furthermore that their measurements were comparable, in March caught adult samples. In many cases the higher zone counts were accompanied by a change in character of the edge rings and it may be inferred from the work of Kotthaus at Iceland that the outermost, different zones, are related to the onset of maturity. No suggestion of the number of zones laid down per year at the greater lengths can be put forward but the increase in opaque zone number during the year is being studied in both the juvenile and the adult size ranges.

Whilst the cover of the present material is limited, both in number of otoliths and season of sampling, there is sufficient evidence to throw doubt on the practice of counting single zones, and on the use of criteria for ageing which have been derived from other species and populations (Trout 1956), i.e. assuming that a single zone represents a full year's growth. The present interpretation is that, at the end of March, the 4, 8, and 12 zone otoliths represent Age Groups 1, 2 and 3 and that some such multiple production of zones continues for 6 and 7 years.

A further observation on the older otolith samples may be of significance to the general biology of the species. The detailed appearance of the adult and juvenile otoliths in the samples examined from Bear Island and the Norwegian coast (70°N 17°E) respectively, is not entirely similar and it appears possible that recruitment to the Barents Sea redfish stock may be from two sources (a) those 'born' locally and (b) those, both juvenile and adult, born in other regions, which reach the Barents Sea as a result of their undoubted, but probably seasonal, pelagic behaviour. This possibility might also be inferred from the work of Tåning (1949) and Baranenkova et alia (1956), complementary papers dealing with the general distribution of Sebastes pelagic larvae. Such a recruitment may in fact explain the great spread in length of fish containing otoliths of similar opaque zone counts.

Whilst the possibility of confusion with the third species (S. viviparus) must not be overlooked in this small material, an explanation is still required for the absence of otoliths of intermediate zone number.

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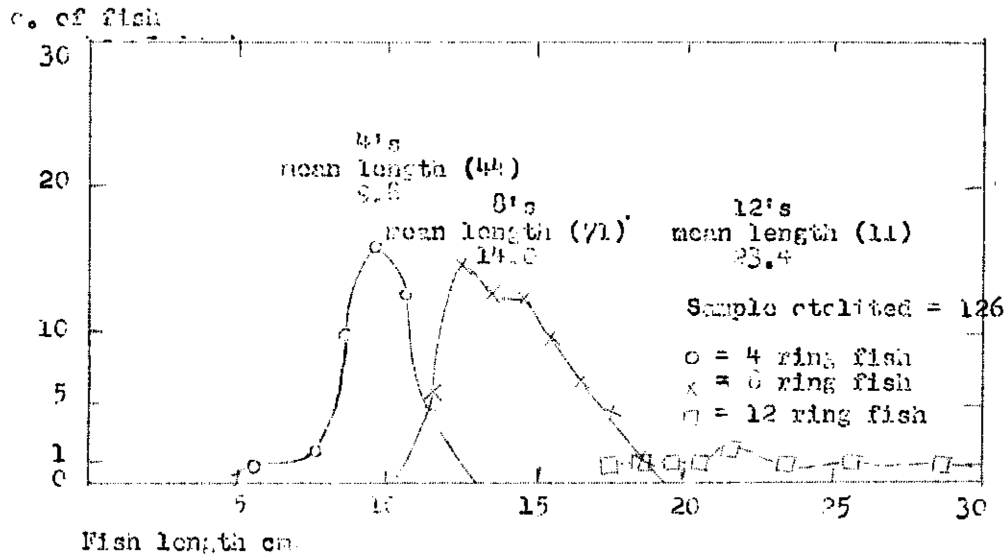
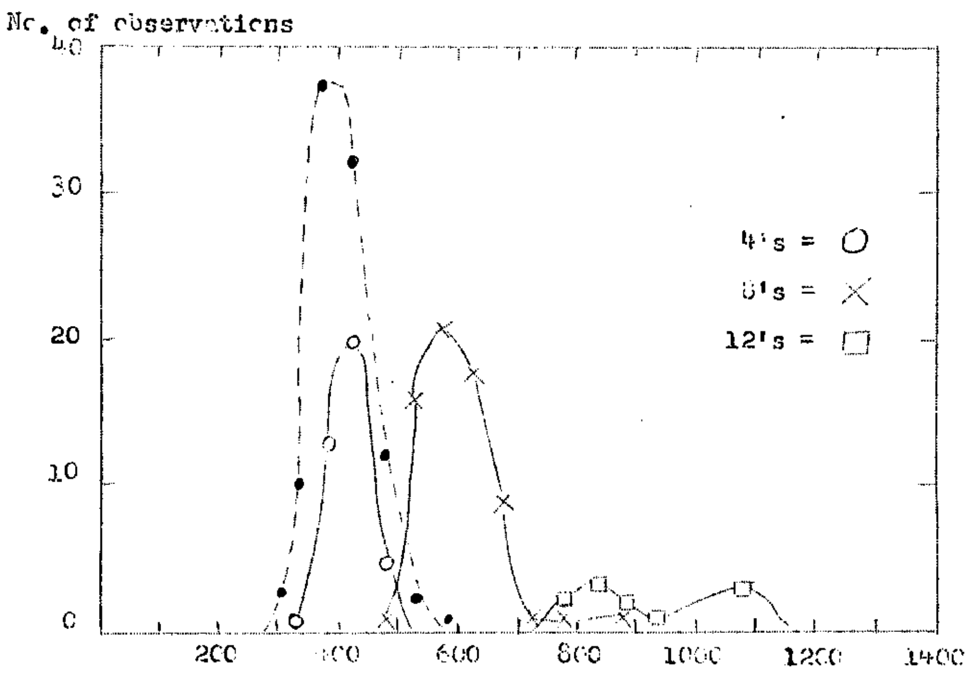
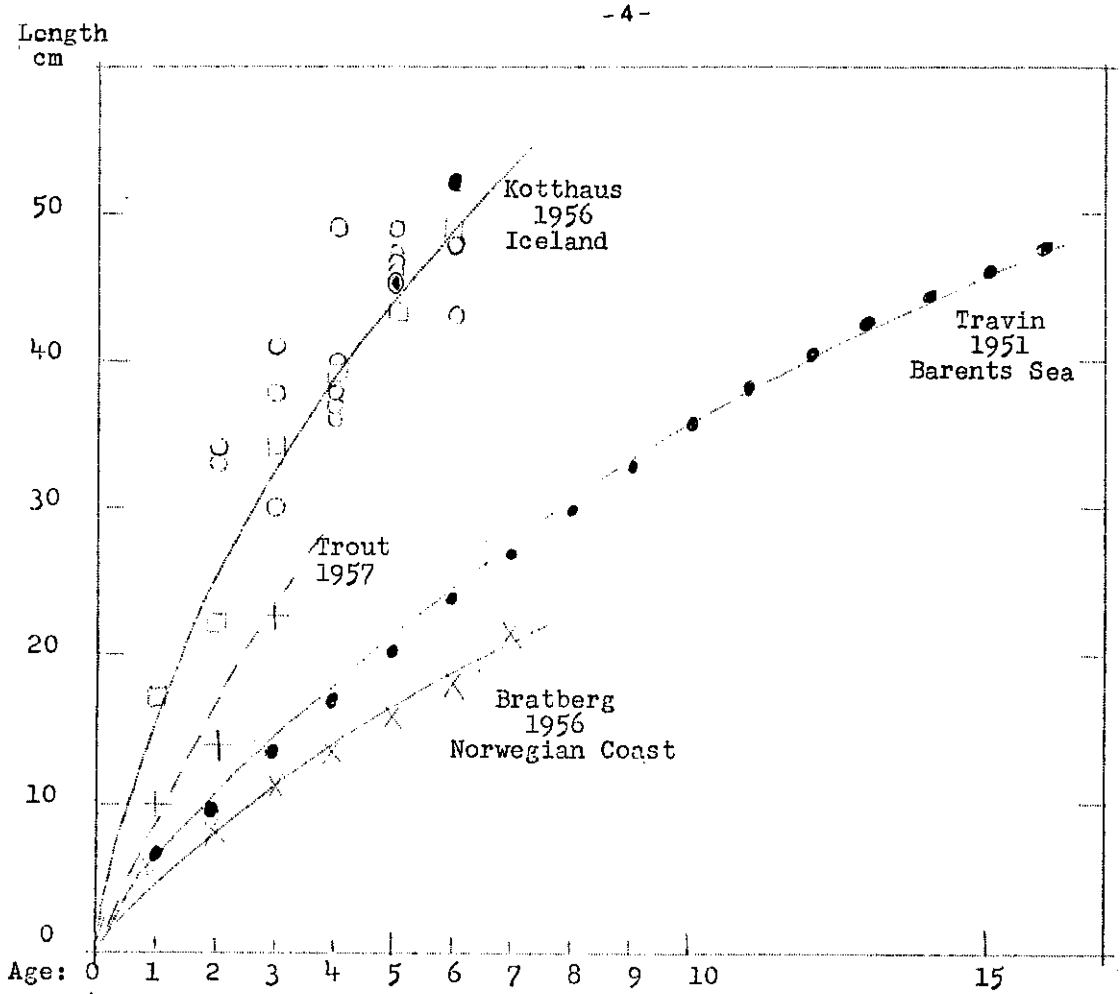


Length Frequency Curve



Eye Piece Units
Width of 4, 8 and 12 Zone Otoliths



● = Age determination of Barents Sea female if reading each zone as one year.