

**BIOLOGICAL BOARD
OF CANADA**

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 163E.

Title

STARFISH INVESTIGATIONS

AT

PRINCE EDWARD ISLAND BIOLOGICAL STATION

Author

G. F.M. Smith

1938

STARFISH INVESTIGATIONS

at

PRINCE EDWARD ISLAND BIOLOGICAL STATION

1938

G. F. M. Smith

STARFISH INVESTIGATIONS AT P.E.I. BIOLOGICAL STATION, 1938.

The starfish work laid out in 1938 consisted of three distinct lines of attack. The first, starfish growth under unnatural conditions in sunken boxes with an abundance of food; the second, observations of movements of marked starfish under natural conditions; the third, laboratory experiments to determine probable maximum temperature and minimum salinity that recently metamorphosed starfish are able to endure.

The growth experiments were not expected to reflect in any way the actual growth under natural conditions but rather to indicate possibilities. Starfish of various sizes were placed in sunken crates with either an abundance of oyster spat or small mussels as food. The crates were set out on May 28th and the last measurement made on September 30th. Starfish that were fed mussels alone grew more rapidly and had better survival than those fed on oyster spat. The average growth during the four month period was as follows:

<u>Diameter of starfish</u>	<u>Percentage increase</u>	<u>Food</u>
10.5 cm.	4 %	Oyster spat
7.7	13	"
5.4	35	"
7.2	52	Mussels
5.5	73	"

In all cases there was an excess of food for the duration of the experiments.

About 5,000 starfish obtained by mopping were stained with Nile blue sulphate and released at two known points near the Biological Station at Ellerslie, between May 16th and 28th. A total of about 5,000 starfish were marked and recovery of starfish was made by further mopping. In each case the starfish were released at places where there was not an abundance of food but in one case there were concentrations of oysters not far distant. The movements exhibited by the stained starfish were quite limited, the greatest distance travelled by an individual being 200 yards in four months and the average distance travelled only about 20 yards. In the case of starfish nearest to large concentrations of oysters the resulting movements appeared to be only slightly more towards the oysters than any other direction, whereas in the other case the movements seemed to be strictly random. The returns of stained starfish were only about 4%. It is not known whether this reflects on the efficiency of mopping as a method of obtaining starfish or whether the survival of stained starfish was small. The absence of movement of the starfish towards oyster concentrations is not out of agreement with an experiment previously reported in which starfish travelled 20 feet in a day directly to a concentration of oysters. It would seem, therefore, that the

movement of starfish towards food is not well marked unless the stimulus is quite strong and the food near at hand.

In 1934 a series of experiments was carried out in the laboratory to determine the probable maximum temperature and minimum salinity that adult starfish could endure. From those experiments it was reported that adult starfish could not survive a temperature of 25°C . nor a minimum salinity below 14 per mille, for a three day period. The smallest starfish used in these experiments were over a centimeter in diameter. It was further observed that small starfish could survive a somewhat higher temperature than larger individuals. Previous year's field observations indicate that starfish of the current year survived in places where those a year old were killed by extreme temperatures. This suggested carrying out similar experiments on recently metamorphosed starfish to determine their temperature and salinity tolerance. The results of these experiments indicate that the minimum salinity for the recently metamorphosed starfish was the same as for larger starfish, namely, about 14 per mille, but the temperature tolerance was somewhat higher, being about $27\frac{1}{2}^{\circ}\text{C}$. The higher temperature tolerance of the current year's starfish would, therefore, appear to be the principal reason that starfish of the current year survive in some places where other starfish do not as the temperatures in excess of $27\frac{1}{2}^{\circ}\text{C}$. are very rarely encountered.

G. F. M. Smith,
October, 1938.