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Some results of increase in length at moulting in aquaria and in the sea, and moult frequencies in the sea of tagged lobsters (*Homarus vulgaris*) in Norway

by

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INTRODUCTION

Because of the lack of knowledge in determining the age in Crustacea, there is a great demand in measuring the growth rate by moulting.

To obtain information of the growth rate by moulting, at least two methods can be used. One of them is to keep lobster in aquaria under conditions which enable one to measure the increasing during moulting, and this involves no serious difficulties.

Both these methods have been in use for many years. Informations of the increasing in length of lobster during moult in the sea are dependent on a marking or tagging method where the marks or tags persist during moulting.

The first method which made this possible was designed by Appelløf (1909), and this method was used by Trybom (1905), Dannevig (1936), Simpson (1961), Thomas (1958) and Wilder (1953).

Using this method, the lobsters were selected in length groups which excluded individually measurement.

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Abrahamson (1965) designed a burning method first used on fresh-water crayfish, later used on lobster, Dybern (1964), which made it possible with individual numbers and therefore exactly determination of the increment in length, weight etc. during moult.

Later on an individually tag, which persists during moult, was designed by Gundersen (1962), Scarratt (1965).

This method involves a rather heavy surgical operation, but the lobsters seem to survive, and moulting have been observed for several years.

MATERIAL AND METHODS

This paper deals with results of tagging experiments on lobster in aquaria and in the sea. In aquaria the lobsters were kept in separate chambers in running seawater at a constant temperature about 16°C. The main purpose of this was to observe how the tag behaved during moulting, but besides all data concerning increasing in carapace, total length and weight were measured.

The data from the sea are taken from tagged lobster released and recaptured. When recaptured tagged lobster were found with the tag perfectly fixed, the lobster was released again for further experiments.

RESULTS

Table 1 gives the data from lobsters kept in aquaria. In this case both females and males seem to have the highest per cent increase in length at about 24 cm total length, and the males seem all over to have a little higher per cent increase than females.

Table 2 gives the results from recaptures of tagged lobsters in the sea. As a whole it seems to be clear that in all length groups the increasing in length are greater in sea than in aquaria, and both males and females seem to have the highest per cent increase at 22 cm.

Table 1.

Increasing in total length during one moult on tagged lobsters in aquaria

Females

Cm.	19	20	21	22	23	24	25	26	27
Number:	19	24	27	23	28	31	22	23	22
Mean :	1,6	1,6	1,7	1,7	1,8	2,0	1,8	1,8	1,8
% :	8,4	8,0	8,1	7,7	7,8	8,3	7,2	6,9	6,7

Males

Cm.	19	20	21	22	23	24	25	26	27
Number:	21	34	26	31	22	25	18	12	22
Mean :	1,6	1,6	2,0	2,0	2,1	2,5	2,2	2,1	1,9
% :	8,4	8,0	9,5	9,1	9,1	10,4	8,8	8,1	7,0

Table 2.

Increasing in total length during one moult on tagged lobsters in the sea

Females

Cm.	19	20	21	22	23	24	25	26	27
Number:	3	4	29	51	36	21	33	13	11
Mean :	2,0	1,8	2,2	2,4	2,1	1,9	2,0	1,9	1,8
% :	10,5	9,0	10,5	10,9	9,1	7,9	8,0	7,3	6,7

Males

Cm.	19	20	21	22	23	24	25	26	27
Number:	6	9	17	29	12	8	20	6	6
Mean :	1,8	2,2	2,4	2,6	2,1	2,6	2,7	2,6	2,3
% :	9,5	11,0	11,4	11,8	9,1	10,8	10,8	10,0	8,5

The material seem to give mostly the same picture of the increasing in length as earlier investigations in Norway, Dannevig (1936).

Compared with work done on the other side of the North Sea, the lobster on the south-east Scottish coast seems to have a little higher moult increment, Thomas (1958), while lobster in Wales seems to have mostly the same increment as in Norway, Simpson (1961). Gibson (1967) gives data from the east and south coast of Ireland. The mean increment here seems to be a little lower than in the Norwegian waters.

The result of this investigation seems to indicate that the tagging method used do not influence the increasing in length of the lobster during moult.

MOULT FREQUENCIES

The annual increase in length will depend upon the frequencie in moults. Experience seems to indicate that females, after being mature, because of the time required for mating, spawning and hatching, moults normally every second year, while males are suggested to moult every year up to a length of 30 cm total length.

In addition to the results of moult increments, the tagging experiment gives us some information of the frequencies in moult of lobsters on the west coast of Norway.

The tagging operations have taken place in spring, early summer and autumn.

Table 3 gives the data of a number of recaptures, all controlled by the author concerning total- and carapace length, weight and berried or not. These recaptures are also given a close examination whether they have moulted within a year or not.

Table 3.

Details and the percentage of female lobsters which moult every year in different length groups

Cm.	Recaptures	Not moulted within a year	Berried when tagged	Moulted yearly	%
17,5-18,4	1			1	100,0
18,5-19,4	4			4	100,0
19,5-20,4	7			7	100,0
20,5-21,4	16			16	100,0
21,5-22,4	63	5	1	57	90,5
22,5-23,4	71	9	4	58	81,7
23,5-24,4	37	2	2	33	89,2
24,5-25,4	28	5	12	11	39,3
25,5-26,4	25	4	14	7	28,0
26,5-27,4	23	7	14	2	8,7

Assuming that lobster which not have moulted during a year including the moulting period, July-December, and that females which were berried at tagging have entered the group which moult every second year, we get the number of lobster which moult every year as the difference between all recaptures and this groups. The column "Moulted yearly" indicate that female lobsters at the west coast of Norway moult every year up to a length of 22 cm total length. From this length the number decrease very steep, and nearly all females seems to have reached the group which moult every second year at a total length of 27 cm.

Table 4 gives the data for a number of males in the length groups from 18 to 27 cm total length which have been tagged and stayed at least one year at liberty before recaptured.

The table indicate that male lobsters in these length groups moult every year at the west coast of Norway.

Table 4.

The percentage of male lobsters which moult every year in different length groups

Cm.	Recaptures	Moulted every year	%
17,5-18,4	1	1	100,0
18,5-19,4	6	6	100,0
19,5-20,4	12	12	100,0
20,5-21,4	17	17	100,0
21,5-22,4	50	50	100,0
22,5-23,4	37	37	100,0
23,5-24,4	10	10	100,0
24,5-25,4	21	21	100,0
25,5-26,4	5	5	100,0
26,5-27,4	8	8	100,0

SUMMARY

1. The paper deals with increasing in length of tagged lobster in aquaria and in the sea.

2. There seems to be a marked difference in growth between lobster in aquaria and in the sea. Lack of common food in aquaria are supposed to be a reason for lower growth.

3. The increasing in length during one moult seems to be nearly the same as in earlier observations in Norway and in the United Kingdom and Ireland.

4. Female lobsters seem to moult every year up to a total length of 22 cm, while at a total length of 27 cm, they seem to moult every second year.

Male lobsters seem to moult every year at least up to a total length of 27 cm.

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