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The Infection of Mytilus edulis with Mytilicola intestinalis

in the German Wadden-Sea from 1958 to 1963

by

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As has been repeatedly reported, an infection at a larger rate of the stocks of <u>Mytilus</u> with <u>Mytilicola intestinalis</u> has been observed in the German Waddon Sea between the estuaries of Ems and Elbe since 1951, while the mussel stocks, located between the river Elbe and the German-Danish border remained free from parasites (see References). During the years 1951-53 it was found that the mussel stocks between the rivers Ems and Jade were infected with <u>Mytilicola</u> at an average rate, which was between 75.2% and 85.5%, and the stocks between the rivers Jade and Elbe from 93.1% to 95.0%. The average number of parasites for each infected mussel was 5.2 to 9.0, respectively 7.7 to 7.9 and for each mussel investigated 3.9 to 7.8 respectively 7.3 to 7.4<sup>x</sup>).

Furthermore, it has been concluded from these previous studies that mussels, which were infected with about 5 parasites, had by about 15% less meat than mussels with fewer parasites and that mussels with lo parasites had even a 30% lower meat content.

In the following the results of further investigations on this subject, which were carried out since 1958, are reported. The mussel samples were investigated in the same manner as previously reported and were taken from the same areas on the German coast. Since the findings made within the areas Ems-Jade and Jade-Elbe do widely correspond to each other, the results from the various sub-areas were grouped into these two major areas only. Since 1959 also the meat content of the mussel samples has been determined by means of an analytical balance by subtracting the weight of the meat from the total weight of the mussel. Furthermore, the weight of the boiled meat was determined. The results given in Table 1 and in Figure 1 refer to the weight of the raw meat. Samples consisted of 50 to loo mussels each. The results are:-

1. The infection rate of the mussels with <u>Mytilicola intestinalis</u> has declined during the last years (since 1960-61).

1959: 87.0% resp. 84.9%; 1962: 76.0% (1963 only 47.2%) resp. 57.0%

During the years 1951 to 1953 the infection rate was similar high as in 1959, i.e., between 75.2% to 95.5%. The value for 1958 = 66.3% does not completely fit into this picture. Yet, although the value for 1963 is only preliminary (the infection rate often increases during the summer months), a generally declining tendency of the two curves can be concluded (Figure 1).

2. Also the number of parasites per mussel has decreased since 1960/1961

1960: 6.2 (5.3) resp. 5.7 (4.7); 1962: 4.3 (3.4) resp. 2.6 (1.5).

A further decline was observed in 1963: 2.6 (1.4). During the years 1951-53 these figures were between 5.2 (3.9) resp. 7.9 (7.4) and 9.0 (7.8). The number of parasites as found in 1958 was similar to that in 1961.

x) The data published in the Annales Biologiques, <u>11</u>, 1954 on page 184 for 1954 are not representative, as they refer to some spring samples only.

## 3. The meat content shows an increasing tendency since 1961

From 1959 until 1960 and 1961, the meat content has slightly declined, but has increased remarkably during the years 1962 and 1963. It was in 1959: 22.6% resp. 22.7%; 1960: 18.2% resp. 22.8%; 1961: 17.6% resp. 17.2%; 1962: 26.1% resp. 30.0% and 1963: 28.6%.

The decline in the meat content from 1959 to 1960 and 1961 cannot be related to an increased infection rate with <u>Mytilicola</u>, as shown by the figures, but is rather due to the fact that the mussels looked ill in general during these years and were of a very poor quality. So, many dead mussels were found in the samples and often the meat of the live mussels was unnaturally coloured. Contrary to this finding, the mussel of the west coast of Schleswig-Holstein was in a specially good condition, as indicated by a good growth-rate and a high meat content. Unfortunately we dispose of no investigation results on the meat content covering the years 1951-53, which makes a comparison between the meat content of <u>Mytilus</u> at the beginning of the <u>Mytilicola</u> infection and the infection during later years impossible. The finding on the fluctuation in the meat content of mussels in the southern coastal areas of the North Sea requires further attention.

The increase in the meat content may have the following reasons:

- 1) It is possible that the mussels have found better living conditions (eventually better feeding conditions) during the last years.
- 2) The decline in the rate of infection of <u>Mytilicola</u> may have caused the better meat content. This assumption, however, is likely not true, since the degree of the decline in the rate of infection can hardly explain the remarkable increase in the meat content.
- 3) The mussel has obtained a certain immunity against <u>Mytilicola</u> <u>intestinalis</u>. However, also this can only be an assumption and cannot be proved at the moment. We shall, therefore, continue to study the further development of <u>Mytilus</u> with <u>Mytilicola</u> and study more closer the symptoms of the infection.

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Table 1. Infection with Mytilicola in the years 951- and 1958-63

	-	Average values										
		1951	1952	1953	1954	1958	1959	1960	1961	1962	1963	
	No. of samples	32	7	35		16	16	17	19	9	5	
Area A Ems- Jade	Months of in- vestigation	II-VIII	IV,VIII-IX, XII	V-IX		III,IX-XII	II,III,IX, X, XII	II-V, VIII, X. XI	VI,VIII	VIII, IX, XI, XII	III,IV, VII	
	No. of infected mussels in % of total no. (infection rate)	75.2	83.7	85.5	72	66.3	87.0	85.5	76.1	76.0	47.2	
	No. of parasites per infected mussel	5.2	6.1	9.0	4.9	4.4	6.2	6.2	4 <b>.</b> o	4.3	2.6	
	No. of parasites per mussel inve- stigated	3.9	5.1	7.8		3.1	5.3	5.3	3.1	3.4	1.4	ו כ ו
	Meat content in %	-					22.6	18.2	17.6	26.1	28.6	
Area H	No. of samples	13	2			25	9	18	8	4		1.
Jade- Elbe	Months of in- vestigation	I-XII	III-XI			I,III,VII, VIII	I,IV,VI, IX	VIII-XII	VI, VII, IX, XII	IX, XI		
	No. of infected mussels in % of total number (infection rate)	93.1	95.0	-	-	76.3	84.9	81.8	82.3	57.0		
	No. of parasites per infected mussel	7.9	7.7			4.9	5.6	5.7	5.7	2.6	-	
	No. of parasites per mussel investigated	7.4	7.3			3.8	4.8	4.7	4.7	1.5		
	Meat content in %		-			-	22.7	22.8	17.2	30.0		



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