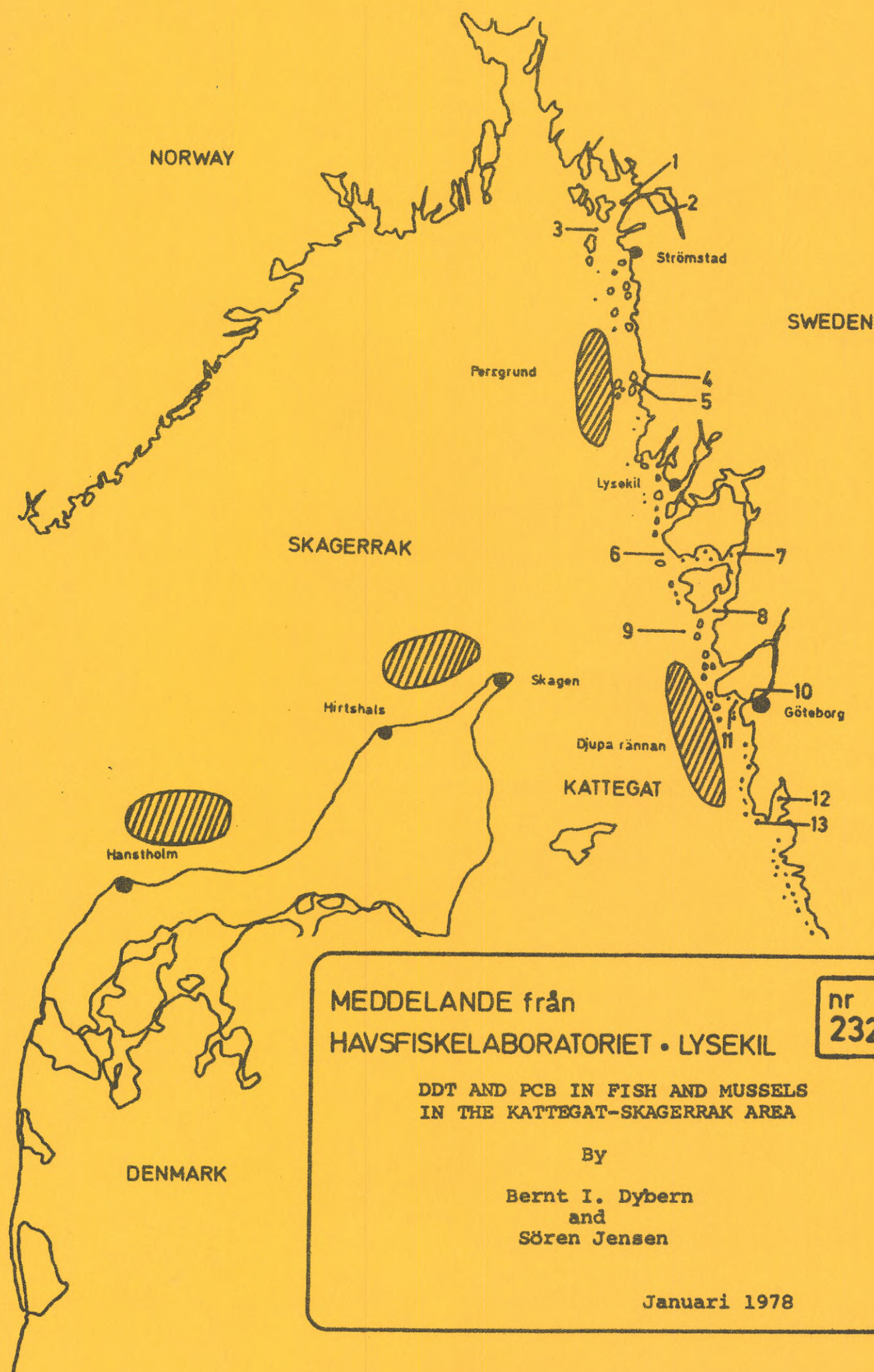




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DDT AND PCB IN FISH AND MUSSELS  
 IN THE KATTEGAT-SKAGERRAK AREA

By  
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Januari 1978

## DDT AND PCB IN FISH AND MUSSELS IN THE KATTEGAT-SKAGERRAK AREA

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## CONTENT

1. Introduction .....	2
2. Procedures .....	3
3. Results .....	5
4. Comparisons with results from other investigations in the Kattegat-Skagerrak area .....	10
5. Comparisons with the Baltic and North Sea areas .....	12
6. Summarizing discussion .....	14
7. Acknowledgements .....	17
8. References .....	17
Figures	
Tables	

## ABSTRACT

Figures for the concentrations of DDT and PCBs in fish and mussels from the Kattegat-Skagerrak area are given. Cod, plaice and herring do not show evident concentration gradients over the area but the levels may locally show an increase. Yellow eels and mussels (*Mytilus edulis*) show increased concentrations at some localities known to be polluted. On the whole the levels in the Kattegat-Skagerrak area are considerably lower than in the Baltic but generally higher than in the open North Sea.

The concentrations of PCBs in cod liver from the archipelago of Göteborg are so high that sale of this item has been forbidden.

## 1. INTRODUCTION

Swedish investigations on the concentrations of DDT and PCB in marine organisms began in 1965, and the first results of analyses of a few samples from the west coast (cod, plaice, picked dogfish and the mussel, Mytilus edulis) in 1967-1968 were published by Jensen et al. 1969. Results of a more comprehensive investigation, comprising some more fish samples from the west coast (herring, cod, flounder, plaice and sprat) in 1969-1970 were published by Jensen et al. 1972. In 1969-1971 annual investigations on pike and eel were carried out along the whole Swedish coast. In connection with this the levels of DDT and PCB were investigated in eels from 9 localities on the west coast (Jensen et al. 1978). The sampling localities of these three investigations are shown in Fig. 3.

During 1968-1970 a fisheries investigation was undertaken in the archipelago of Göteborg as part of a larger survey of the influence of sewage and other waste waters from Göteborg and the Göta River on the quality of the water of the archipelago and the sea outside (Dybern 1970). In connection with this sampling of cod, flounder and plaice was made in 1970 for later analysis for toxic substances. The results are shown below. Localities are shown in Fig. 1.

In 1971 the International Council for the Exploration of the Sea (ICES) established a Working Group for the International Study of the Pollution of the North Sea and its Effects on Living Resources and their Exploitation, in the work of which Sweden took part. Under the auspices of this Working Group a base-line study on toxic substances in fish and shellfish was carried out in the North Sea and adjacent waters, including the Skagerrak and the Kattegat, largely in 1972. In

connection with this samples of cod, herring, and plaice were collected off the Swedish coast, and the mussel, Mytilus edulis, in the archipelago from near the Norwegian border to south of Göteborg (Fig. 2). Results of the analysis of the fish and mussel material have in abbreviated form been included in the mentioned Working Group's report (ICES 1974). A fuller version is included in this paper.

## 2. PROCEDURES

### 2.1. Field Sampling

The field sampling was planned and carried out by the Institute of Marine Research, Lysekil. The material was stored deep-frozen until preparation for chemical analysis.

#### 2.1.1. Fish-sampling in the Göteborg archipelago

Cod, flounder and plaice were caught by means of bottom nets and fykes at seven localities during April-May 1970 (Fig. 1). The archipelago lies outside the Göta River estuary and the salinity increases from about 8-15 ‰ to 20 ‰ in the surface layers to about 30-32 ‰ at a depth of 20-25 m, the surface layers being a mixture of river and sea water and the bottom layers dominated by saline water from the Kattegat-Skagerrak area (Rindgård and Hallquist 1968 etc.). Therefore, samples were taken both from shallow water and from deep water, except at the two innermost stations which, in fact were situated in the estuary itself, and where the maximum depth was only 6 m (cf. Fig. 1 and Tables 1-4).

The numbers and sizes (ages) of the fish specimens varied within certain limits as did the reproductive stages. Both sexes were represented in each sample, but in varying numbers.

### 2.1.2. Sampling of fish off the coast

The sampling was carried out at trawlings in the beginning of 1972 in connection with the ICES base-line study and mainly in accordance with the rules adopted by the international Working Group (ICES 1974). All cod and plaice were 3 years old and all herring 1-2 years old. Both sexes were represented in varying numbers. The localities are shown in Fig. 2. The depths varied between 40 and 95 m. The salinity was rather constant, about 33-34 ‰. Summarizing data are listed in Tables 5-7.

### 2.1.3. Sampling of the mussel, Mytilus edulis

The sampling was carried out in October-November 1972 and the localities are shown in Fig. 2. Depths and size groups of the mussels are shown in Table 8.

## 2.2. Laboratory analyses

### 2.2.1. Treatment prior to analysis

Muscle tissue, generally between 10 and 20 g, was cut out beneath the skin in the middle of the sides of the fish:



After having been homogenized the muscle pieces were stored deep-frozen until they were sent for chemical analysis. Metal knives and glass jars were used.

5-10 g pieces of cod-liver were cut out from the central parts of the livers and stored in the same way.

Mussels: The soft parts of 12 specimens of each size group from each locality were homogenized. Two sub-samples of about 10 g each were taken from the homogenate and deep frozen in glass jars.

The treatment prior to analysis of fish was made at the Institute of Marine Research, Lysekil, and of the mussels at the National Museum of Natural History, Stockholm.

### 2.2.2. Chemical analyses

These were carried out by the Special Analytical Laboratory of the National Environment Protection Board, Stockholm. The procedure used has been published by Jensen et al. 1972, pp 73-74, to which paper the reader is referred.

## 3. RESULTS

### 3.1. $\Sigma$ DDT and PCBs in the Göteborg archipelago (fish sampled 1970)

Concentrations of  $\Sigma$ DDT (DDT + DDE + DDD) and PCBs were investigated in fresh muscle tissue and fat extracted from muscle tissue of cod, flounder and plaice, and from cod-liver. The localities are shown in Fig. 1, and the results in Tables 1-4.

#### 3.1.1. Muscle tissue of cod

For the whole archipelago the mean values for  $\Sigma$ DDT for the different stations and depths ranged from 0.007 to 0.050 ppm in fresh tissue (Table 1). The total variation was 0.003-0.280 ppm. The highest values were found in cod from the bottom water of the locality Skalkorgarna in the central archipelago (Fig. 2) and the next highest concentrations in the mouth of the estuary of the Göta River.

For extracted fat the range for average values for  $\Sigma$ DDT was 1.4-8.2 ppm and the total range 0.5-36.0 ppm, the highest values found at the same localities as for the highest values in fresh tissue.

The average values for PCBs in fresh tissue ranged from 0.040 to 0.160 ppm and the total range was 0.012-0.750 ppm. The corresponding values for extracted fat were 8.8-31.0 resp. 3.4-120.0 ppm. As in the case of  $\Sigma$ DDT the highest concentrations were found at Skalkorgarna and in the mouth of the estuary.

No evident gradient from the river mouth towards the outer part of the archipelago was found. The cod is considered to be relatively stationary in the area but certainly moves around in the archipelago, which may be the cause for the fairly evenly distributed concentrations, also in relation to the depths.

### 3.1.2. Liver of cod

The average values for  $\Sigma$ DDT in fresh tissue ranged from 1.0 to 6.8 ppm and the total variation was 0.02-10.0 ppm (Table 2). For extracted fat the range for the average values was 3.9-20.0 ppm and the total range 2.4-45.0 ppm.

The levels of PCBs were generally very high, the averages for fresh tissue ranging from 5.3 to 27.0 ppm and the total variation being 0.1-59.0 ppm. For extracted fat the range of average values was 20.0 to 86.0 ppm and the total range 6.9-280.0 ppm.

The highest values for  $\Sigma$ DDT and PCBs were found at the same localities as those for muscle tissue.

### 3.1.3. Muscle tissue of flounder

Flounders are probably not moving around as much as cod but there is some evidence that they carry out certain inwards-outwards migrations in the archipelago according to the seasons.



Table 3 shows that the average concentrations of  $\Sigma$ DDT in fresh tissue ranged from 0.013 to 0.081 ppm, the total variation being 0.003-0.210 ppm. For extracted fat the corresponding values were 1.9-9.4 resp. 0.6-33.0 ppm.

The average concentrations for PCBs ranged from 0.130 to 0.480 ppm in fresh tissue, the total range being 0.031-1.30 ppm. Corresponding values for extracted fat were 18.0-60.0 resp. 3.5-230.0 ppm.

On the whole the concentrations of  $\Sigma$ DDT and PCBs in flounders were considerably higher than those in cod (cf. also Tables 9-10; mean values for the whole archipelago). The highest levels in flounders were found in the river mouth and in the surface water at Galterö Huvud.

#### 3.1.4. Muscle tissue of plaice

Plaice is rarely found at the two innermost localities of the Göteborg archipelago due to the low and varying salinity. They are more mobile than flounders.

The average concentrations for  $\Sigma$ DDT in fresh tissue were 0.004-0.020 ppm, and the total variation 0.001-0.047 ppm (Table 4). For extracted fat the average values ranged between 0.5 and 3.4 ppm, the total range being 0.3-8.2 ppm.

The average concentration range for PCBs in fresh tissue was 0.047-0.170 ppm and the total variation 0.025-0.340 ppm. The corresponding ranges for extracted fat were 5.9-28.0 resp. 3.2-59.0 ppm.

The highest levels of  $\Sigma$ DDT and PCBs were found in the surface water of the locality Skalkorgarna. On the whole the concentrations for plaice were lower than for cod and flounder (cf. also Tables 9-10).

### 3.2. $\Sigma$ DDT and PCBs in fish sampled 1972 in the Skagerrak-Kattegat area

Concentrations of  $\Sigma$ DDT and PCBs were investigated in fresh tissue and extracted fat from muscle tissue of cod, plaice and herring from 3-4 localities (Fig. 2; Tables 5-7). The figures for concentrations in fresh tissue have previously been published in ICES 1972.

#### 3.2.1. Muscle tissue of cod

The average concentrations of  $\Sigma$ DDT in fresh tissue ranged from 0.008 to 0.021 ppm, the total variation being 0.003-0.230 ppm (Table 5). The corresponding values for extracted fat were 1.8-4.3 resp. 0.5-51.0 ppm.

The average values for PCBs ranged from 0.023 to 0.045 ppm in fresh tissue (the total variation being 0.011-0.110 ppm) and from 4.3 to 8.3 ppm in extracted fat (total variation being 1.9-18.0 ppm).

On the whole the levels of  $\Sigma$ DDT did not differ much from those of cod in the Göteborg archipelago (cf. also Tables 9-10). The concentrations of PCBs, however, were, on the whole, lower than in the archipelago.

#### 3.2.2. Muscle tissue of plaice

The average concentrations for  $\Sigma$ DDT in fresh tissue ranged from 0.004 to 0.024 ppm, the total variation being 0.002-0.150 ppm (Table 6). For extracted fat the corresponding figures were 0.4-1.6 resp. 0.3-8.6 ppm.

The average concentration range for PCBs in fresh tissue was 0.010-0.120 ppm, the total variation being 0.009-0.390 ppm. For extracted fat the ranges were 1.2-12.0 resp. 1.0-22.0 ppm.

The material was rather small, only two localities being sufficiently represented. Both the  $\Sigma$ DDT and PCB concentrations for these seem to be somewhat higher than the average for plaice from the Göteborg archipelago (cf. Tables 9-10).

### 3.2.3. Muscle tissue of herring

The average concentrations of  $\Sigma$ DDT in fresh tissue ranged from 0.092 to 0.150 ppm and the total variation was 0.030-0.330 ppm (Table 7). The average concentration range for extracted fat was 1.1-3.6 ppm, the total range being 0.9-13.0 ppm.

For PCBs in fresh tissue the corresponding values were 0.180-0.380 resp. 0.080-0.960 ppm and 2.7-6.3 resp. 2.0-19.0 ppm.

The levels of  $\Sigma$ DDT and PCBs in fresh muscle tissue of herring are on the whole much higher than those in muscle tissue of cod, flounder and plaice (cf. Tables 9-10). The levels in extracted fat are, however, relatively similar and in some cases even higher in the other species.

### 3.3. $\Sigma$ DDT and PCBs in mussels (*Mytilus edulis*), sampled in 1972

The mussels were sampled in the archipelago area on the Swedish west coast from the Norwegian border in the north to south of Göteborg (Fig. 2). The results of the analyses are shown in Table 8. Those for fresh tissue have been disclosed earlier (ICES 1972). Since only homogenates of 12 mussels from each locality and depth were analysed, the total variation for the individuals could not be registered.  $\Sigma$ DDT stands for DDD and DDE. DDT was not detected with the method used due to the relatively strong interference of PCB.

The samples have been divided into three groups according to the exposure of the localities (Table 11). There is a trend to higher concentrations of  $\Sigma$ DDT and PCBs in the inner parts,

medium concentrations in the central parts and lower concentrations in the outer parts of the archipelago. The  $\Sigma$ DDT values for Seläter at the mouth of the polluted Idefjord, in the Fjällbacka harbour and at the station KA 4 at the mouth of the Göta River (city of Göteborg) (stations 1, 2, 4, 10 and 11 in Table 8) were higher than for most other localities. No evident gradient was, however, found for mussels from the two localities KA 4 and Skalkorgarna in the Göteborg archipelago.

The PCB values were highest in the Fjällbacka and Göteborg archipelagos (stations 4, 5, 10 and 11 in Table 8) and relatively high inside the large islands Orust and Tjörn (stations 7 and 8).

In many, but not all, samples the mussels of smaller size contained higher concentrations of both  $\Sigma$ DDT and PCBs than the bigger ones. The reason for this is unknown.

#### 4. COMPARISONS WITH RESULTS OF OTHER INVESTIGATIONS IN THE KATTEGAT-SKAGERRAK AREA

As mentioned (p. 2) there are some results from other investigations on  $\Sigma$ DDT and PCBs in marine species from the actual area (Jensen et al. 1969, 1972, 1978). These results together with those from the present investigation have been summarized in Tables 9-10 (fish and picked dogfish) and 11-13 (mussels and eels). Among other things to establish any trends as to the geographical distribution of the concentrations. The material from the Göteborg archipelago (collected in 1970) has been treated as one sample because of its relative homogeneity. All analyses were carried out in the same laboratory, using the same methods (Jensen et al. 1972). The figures should therefore be comparable.

#### 4.1. Cod

The average concentrations of  $\Sigma$ DDT in fresh muscle tissue range between 0.008 and 0.038 ppm (Table 9). The highest value has been obtained for a sample from Hovs Hallar in the southern Kattegat (Fig. 3), but otherwise the concentration figures are fairly even, although figures for individual specimens may differ quite a lot. There is thus no obvious trend in the distribution of  $\Sigma$ DDT in fresh muscle tissue in cod from the area. The pattern for  $\Sigma$ DDT in extracted fat is not exactly parallel, but there are no obvious trends or gradients either.

The PCBs in fresh muscle tissue and extracted fat, on the other hand, show a light tendency to higher average concentrations at near-shore localities, such as the archipelagos of Göteborg and Lysekil and the mouth of the Kungsbacka fjord (Table 10).

#### 4.2. Flounder

Flounders have been sampled only in the archipelago of Göteborg and no comparisons can, therefore, be done with other parts of the actual area.

#### 4.3. Plaice

The averages for  $\Sigma$ DDT in fresh muscle tissue range from 0.003 to 0.024 ppm and in extracted fat from 0.40 to 1.70 ppm. Corresponding figures for PCBs are 0.003-0.120 resp. 0.7-12.0 ppm (Tables 9-10). Generally, the figures are lower than for cod. No definite trends can be seen but the average values are somewhat increased at two off-shore stations, Djupa rännan ( $\Sigma$ DDT) and Hirtshals-Skagen (PCBs).

#### 4.4. Herring

The figures for the average concentrations of  $\Sigma$ DDT and PCBs in fresh muscle tissue and extracted fat are scattered and

no trends can be seen (Tables 9-10). The figures for fresh tissue are fairly high compared with those for cod and plaice, ranging from 0.092 to 0.320 ppm for  $\Sigma$ DDT and from 0.180 to 0.450 ppm for PCBs in herring. The figures for extracted fat are more levelled out.

#### 4.5. Picked dogfish

This small shark lives off-shore and is fairly mobile. Only one sampling was done. The concentrations of  $\Sigma$ DDT and PCBs were not very high (Tables 9-10).

#### 4.6. Eel

Yellow eels were sampled annually during three years at nine near-shore localities. Only the levels of  $\Sigma$ DDT and PCBs in extracted fat from muscle tissue have been disclosed (Jensen et al. 1978). Localities 1, 4-5 and 9 (Fig. 3) have higher average figures than the others (Table 13). 1 and 4-5 are situated near the mouth of the polluted Idefjord and in the archipelago of Göteborg while 9 is near the mouth of the polluted Öresund.

#### 4.7. Mussels

A mussel sample was taken in the Lysekil area (on the border between inner and central archipelago) in 1967, and also the individual mussels were analysed. The results are given in Table 12. They fit well into the schemes in Tables 8 and 11.

### 5. COMPARISONS WITH THE BALTIC AND NORTH SEA AREAS

#### 5.1. Comparison with the Baltic Sea area

Results of investigations during 1965-1971 show that the DDT and PCB concentrations in fish and other organisms from the

Baltic are, on the whole, higher than those in the corresponding species at the Swedish west coast (Jensen et al. 1969, 1972) and the results of the present investigation confirm, in general, this statement. Results of an incomplete international survey in the Baltic in 1974-1975 (ICES/SCOR 1977) also seem to be in accordance with this.

Taking into account that there are differences from area to area the concentrations of  $\Sigma$ DDT in fresh muscle tissue are, very approximately, 2-10 times as high in Baltic cod than in cod from the Kattegat-Skagerrak area and 2-3 times as high in extracted fat. The PCB concentration in fresh muscle tissue may, in some cases, be 20-30 times higher in the Baltic. - The levels for both  $\Sigma$ DDT and PCBs in herring (fresh muscle tissue and extracted fat) seem, as a rule, to be about 2-3 times higher in the Baltic than in Kattegat-Skagerrak area. Too scanty material forbid comparisons between other species.

It is also possible to make comparisons between the figures for cod-liver in the Baltic and in the archipelago of Göteborg (Table 2 and Jensen et al. 1972). The concentrations of  $\Sigma$ DDT in fresh tissue is about 2-5 times and in extracted fat about 3-6 times higher in the Baltic. However, the corresponding figures for PCBs are 2-3 times resp. 2-4 times higher in the Göteborg archipelago.

#### 5.2. Comparison with the North Sea proper

An international baseline study, including a survey of the concentrations of DDT and PCB in cod, plaice, herring and mussels in the North Sea area, was carried out in 1972 and the results have been summarized in ICES 1974.

The average concentrations of  $\Sigma$ DDT in fresh muscle tissue of

cod from the open, central, parts of the North Sea are, on the whole, lower than 0.005 ppm, that is considerably lower than the average concentrations in cod from the Kattegat-Skagerrak area (cf. Table 9). The average concentrations of  $\Sigma$ DDT in fresh muscle tissue of herring from the North Sea are somewhat lower than those in the herring of the Kattegat-Skagerrak area, while the concentrations in plaice are about equal. For extracted fat it is only possible to make a comparison for herring, the average concentrations in the open North Sea being considerably lower than those in the Kattegat-Skagerrak.

In coastal areas of the North Sea, especially in the southernmost part, the levels in fish are generally higher than for the open sea and can be similar to those in the Kattegat-Skagerrak area.

The concentrations of PCBs in fresh muscle tissue of cod from the open North Sea are lower than in cod from the Kattegat-Skagerrak area, but in herring and plaice they are of about the same size, or, sometimes, even higher. The levels are generally higher in the southernmost part of the North Sea.

All results for mussels are from near-shore populations. A comparison with figures from along the North Sea coast show that the Kattegat-Skagerrak levels for  $\Sigma$ DDT and PCBs are relatively low, especially compared with those from the southernmost North Sea.

## 6. SUMMARIZING DISCUSSION

The concentrations of  $\Sigma$ DDT and PCBs in fish and mussels from the Kattegat-Skagerrak area have been investigated and the results have been compared with those of other investigations in the same area and in the Baltic and North Sea areas.



The highest average concentrations of both groups of substances in fresh muscle tissue are found in herring, with considerably lower concentrations in cod, plaice and mussels, while the differences for extracted fat are more leveled out, but still, on an average, being lower in the three last-mentioned species (Table 9-11).

There are no obvious gradients of concentrations, e.g. from the coast outwards, or, in the archipelago of Göteborg, for surface water compared with deeper water, in cod, flounder, plaice and herring, which all are more or less mobile species.

At some localities the figures are, however, higher than at others, probably due to local conditions. Thus, in the archipelago of Göteborg, increased average concentrations of  $\Sigma$ DDT and PCBs in cod and flounder are found at the localities KA 4 and SE Stockholmen (Tables 1 and 3) and may depend on the immediate influence of the polluted Göta River. Increased concentrations in cod and plaice at the locality Skalkorgarna and in flounder at the locality Galterö Huvud (Tables 1, 3-4) may depend on influence of deposition of harbour mud from the city of Göteborg just between the two localities. The increased average concentration of  $\Sigma$ DDT in cod at the station Hovs Hallar in the southern Kattegat (Table 9) may depend on influence from the Baltic via the Öresund. Finally, the increased concentration of PCBs at the station Hirtshals-Skagen (Table 10) may depend on a local, land-based source. To the latter area is also a comprehensive ship traffic concentrated.

An obvious gradient is, however, shown for mussels, with higher concentrations of  $\Sigma$ DDT and PCBs in the inner archipelago of the Swedish west coast than at more exposed localities (Table 11). Yellow eels show increased concentrations in extracted fat

in near-shore areas where pollution is likely (cf. p. 12 and Table 13). Thus, the sessile mussels and the at least during part of their life relatively stationary eels are better indicators for local pollution than the previously mentioned fish species.

Comparisons between the Kattegat-Skagerrak material and results from the Baltic and North Sea areas (Jensen et al. 1969, 1972, ICES 1974, ICES/SCOR 1977) reveal that the average concentrations of  $\Sigma$ DDT and PCBs in cod and herring from the Baltic are, generally, 2-10 times higher than those in the same species in the Kattegat-Skagerrak area, while these in their turn have concentrations which mostly are higher than those of cod and herring in the open North Sea. On the whole, the Kattegat-Skagerrak levels (in at least these two species) are thus intermediary between those of the Baltic and the North Sea. The species, especially the herring, are mobile but can be used to show differences between large sea areas.

The quotient PCBs/ $\Sigma$ DDT shows high figures in the Kattegat-Skagerrak material (Tables 1-8 and 11-13). PCBs thus occur in higher concentrations than  $\Sigma$ DDT. Similar results can be calculated from the North Sea report (ICES 1974). For the Baltic, on the other hand, the quotient is generally below 1 (Jensen et al. 1972, 1978), indicating that  $\Sigma$ DDT is relatively more important as a pollutant in the Baltic.

The levels of  $\Sigma$ DDT and PCBs in cod-liver are of special interest. For both  $\Sigma$ DDT and PCBs the limit at which sale is forbidden has been set to 5 ppm in fresh tissue and extracted fat. Due to a very high content of  $\Sigma$ DDT in fresh tissue and extracted fat the sale of codliver from the Baltic area is forbidden in Sweden and Denmark. - Possibly due to the earlier

use of PCBs in the shipbuilding industries it is in the archipelago of Göteborg that the PCB concentrations are highest and so high that sale of cod-liver from the archipelago has been forbidden in accordance with the present investigation results. The change from  $\Sigma$ DDT to PCBs in these cases is in correspondence with the mentioned feature that  $\Sigma$ DDT is the strongest pollutant in the Baltic and the PCBs outside.

#### 7. ACKNOWLEDGEMENTS

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FIG. 1. GÖTEBORG ARCHIPELAGO.  
LOCALITIES FOR SAMPLINGS  
IN 1970.

FIG. 2. SWEDISH WEST COAST.

SAMPLINGS IN 1972

 TRAWLINGS FOR FISH. 1,2,3 ETC. SAMPLING OF MUSSELS.

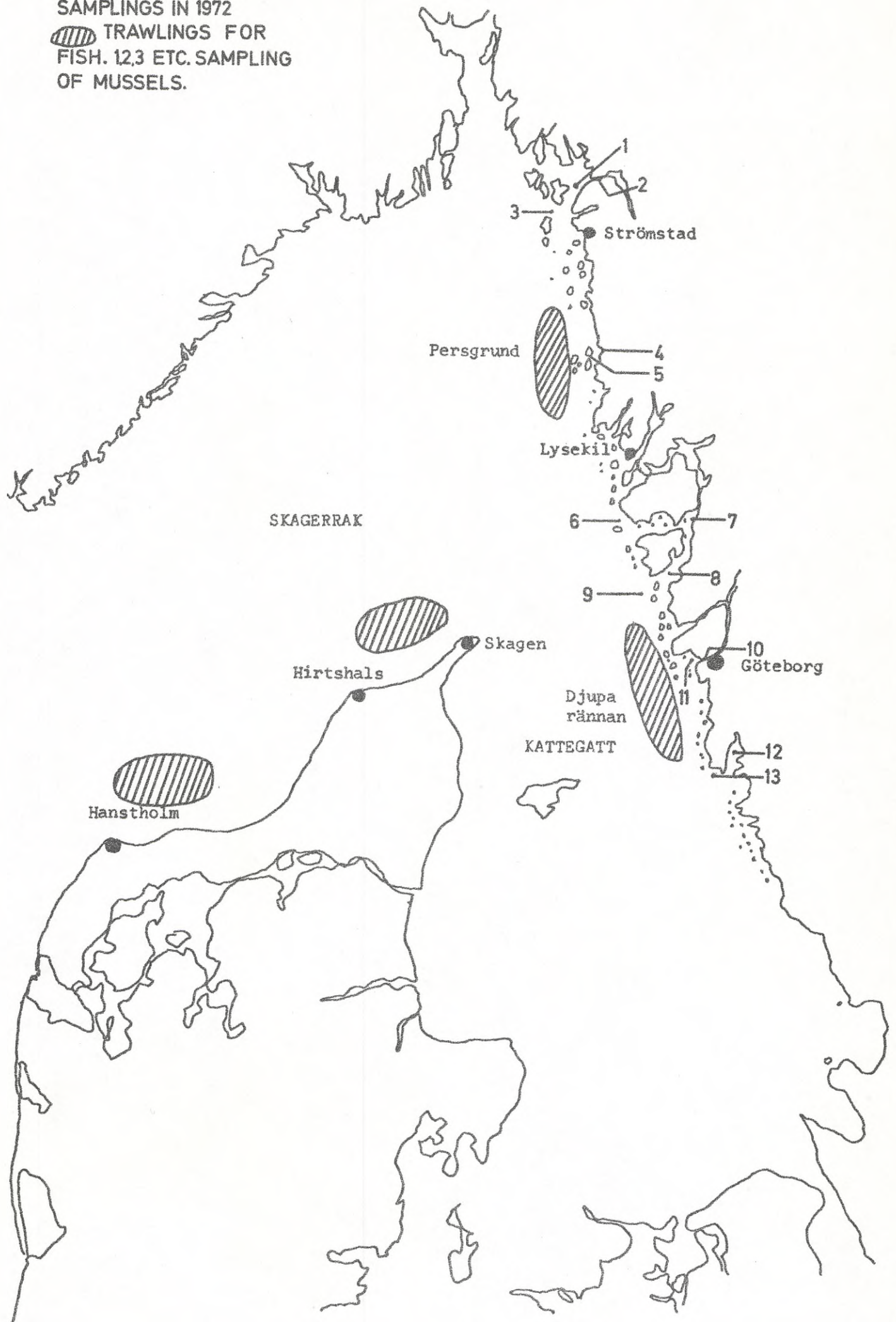


FIG.3. SWEDISH WEST COAST.  
SAMPLINGS 1967-1969

x = fish  
+ = mussels



Localities	Depths m	Numbers	Sizes cm	Fat %	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
					$\Sigma$ DDT	PCBs	$\Sigma$ DDT	PCBs	
KA 4	1.0- 4.5	9	47.4 (40.2-57.5)	37.0	6.8 ( 3.0-10.0)	27.0 (12.0-59.0)	20.0 (7.3-45.0)	86.0 (30.0-280.0)	4.3
SE Stockholmen	2.0- 2.5	9	45.8 (20.6-65.5)	29.0	3.0 ( 0.8- 6.1)	15.0 ( 3.4-43.0)	14.0 (5.6-36.0)	67.0 (24.0-150.0)	4.8
Skalkorgarna	1.0- 8.0	9	48.8 (24.0-59.4)	34.7	3.0 ( 1.6- 5.0)	13.0 ( 5.6-18.0)	9.0 (4.9-15.0)	39.0 (17.0- 64.0)	4.3
"	12.5-15.0	10	45.5 (15.9-63.1)	37.2	4.6 ( 2.3- 9.4)	19.0 (10.0-35.0)	15.0 (6.1-29.0)	67.0 (24.0-160.0)	4.5
Galterö huvud	1.0- 5.0	9	42.4 (29.2-57.2)	28.3	2.8 (0.02- 6.9)	12.0 ( 0.1-22.0)	10.0 (3.8-31.0)	44.0 (21.0- 90.0)	4.4
"	14.5-18.0	10	50.1 (40.3-59.2)	43.8	3.8 ( 1.2- 8.8)	13.0 ( 9.1-21.0)	9.5 (2.8-29.0)	31.0 (18.0- 70.0)	3.3
W Fotö	1.0- 5.0	9	46.2 (31.2-65.2)	33.4	1.8 ( 0.8- 4.7)	6.3 ( 2.9-13.0)	6.1 (2.8-20.0)	20.0 (12.0- 54.0)	3.3
"	14.5-18.0	9	38.6 (20.3-62.6)	24.9	1.0 ( 0.3- 1.8)	5.3 ( 2.9-12.0)	3.9 (2.4- 6.4)	24.0 ( 6.9- 42.0)	6.2
Knarrholmen	5.0- 5.5	10	52.5 (35.0-66.4)	31.3	1.6 ( 0.9- 2.5)	15.0 ( 9.5-21.0)	5.4 (3.4- 8.1)	51.0 (33.0- 78.0)	9.4
"	16.0-25.0	10	49.6 (37.1-64.0)	43.9	2.7 ( 0.9- 8.3)	14.0 ( 8.6-25.0)	6.9 (2.4-21.0)	37.0 (18.0- 85.0)	5.4
E Björkö	1.0- 5.0	10	31.6 (22.7-41.4)	30.6	2.2 ( 0.9- 3.8)	12.0 ( 4.1-19.0)	7.4 (5.4-10.0)	40.0 (24.0- 58.0)	5.4
"	14.5-18.0	10	43.8 (33.6-55.0)	38.1	2.5 ( 1.0- 4.4)	11.0 ( 5.9-16.0)	7.4 (3.0-20.0)	33.0 (16.0- 73.0)	4.5

Table 2. Cod from the archipelago of Göteborg. Average concentrations of  $\Sigma$ DDT and PCBs in liver on fresh weight resp. fat weight basis. Figures in brackets show variation ranges. In ppm.

Values for the quotient PCBs/ $\Sigma$ DDT are valid for both fresh tissue and extr. fat.

Localities	Depths m	Numbers	Sizes cm	Fat %	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
					$\Sigma$ DDT	PCBs	$\Sigma$ DDT	PCBs	
KA 4	1.0- 4.5	10	34.5 (31.9-37.2)	0.87	0.081 (0.028-0.210)	0.440 (0.170-1.000)	9.4 (3.6-19.0)	53.0 (20.0-130.0)	5.6
SE Stockholmen	2.0- 2.5	10	32.7 (28.9-37.1)	0.88	0.063 (0.008-0.091)	0.370 (0.051-1.000)	4.5 (1.0-11.0)	41.0 ( 6.9- 77.0)	9.1
Skalkorgarna	1.0- 8.0	10	32.7 (26.5-38.0)	0.63	0.016 (0.005-0.028)	0.130 (0.038-0.230)	2.6 (1.2- 4.9)	22.0 ( 7.7- 45.0)	8.5
"	12.5-15.0	10	32.2 (23.9-36.4)	0.76	0.036 (0.003-0.150)	0.250 (0.031-0.960)	4.9 (0.7-17.0)	34.0 ( 6.2-110.0)	6.9
Galterö huvud	1.0- 5.0	10	31.9 (25.5-35.0)	0.96	0.076 (0.017-0.170)	0.480 (0.087-1.100)	9.0 (1.6-33.0)	60.0 ( 8.3-230.0)	6.7
"	14.5-18.0	6	31.6 (27.5-35.0)	0.90	0.013 (0.005-0.032)	0.140 (0.056-0.300)	1.9 (0.8- 6.0)	18.0 ( 7.7- 57.0)	9.5
W Fotö	1.0- 5.0	---	---	---	---	---	---	---	---
"	14.5-18.0	7	29.7 (25.6-33.1)	0.93	0.023 (0.007-0.054)	0.240 (0.074-0.520)	2.5 (0.9- 4.2)	28.0 ( 8.9- 40.0)	11.2
Knarrholmen	5.0- 5.5	10	30.1 (26.2-34.7)	0.95	0.048 (0.006-0.202)	0.270 (0.035-1.100)	4.7 (0.6-17.0)	27.0 ( 3.5- 98.0)	5.7
"	16.0-25.0	10	30.0 (26.9-34.9)	1.00	0.049 (0.005-0.092)	0.280 (0.044-0.620)	5.9 (0.7-20.0)	30.0 ( 6.8- 75.0)	5.1
E Björkö	1.0- 5.0	9	30.3 (24.2-35.5)	0.80	0.026 (0.008-0.110)	0.190 (0.069-0.510)	2.8 (1.3- 8.0)	23.0 ( 9.9- 50.0)	8.2
"	14.5-18.0	10	30.0 (26.6-35.7)	0.71	0.053 (0.011-0.210)	0.330 (0.064-1.300)	7.7 (1.1-27.0)	48.0 ( 7.5-170.0)	6.2

Table 3. Flounder from the archipelago of Göteborg. Average concentrations of  $\Sigma$ DDT and PCBs in muscle tissue on fresh weight resp. fat weight basis. Figures in brackets show variation ranges. In ppm.

Values for the quotient PCBs/ $\Sigma$ DDT are valid for both fresh tissue and extr. fat.



Localities	Depths m	Numbers	Sizes cm	Fat %	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
					$\Sigma$ DDT	PCBs	$\Sigma$ DDT	PCBs	
KA 4	1.0- 4.5	---	---	---	---	---	---	---	---
SE Stockholmen	2.0- 2.5	---	---	---	---	---	---	---	---
Skalkorgarna	1.0- 8.0	4	27.8 (26.6-32.1)	0.65	0.020 (0.011-0.047)	0.170 (0.092-0.340)	3.4 (1.6-8.2)	28.0 (12.0-59.0)	8.2
"	12.5-15.0	8	28.4 (26.2-31.8)	1.07	0.012 (0.009-0.025)	0.092 (0.058-0.180)	1.1 (0.8-1.7)	8.4 ( 6.0-12.0)	7.6
Galterö huvud	1.0- 5.0	9	28.7 (23.9-33.3)	0.81	0.009 (0.001-0.016)	0.072 (0.011-0.140)	1.0 (0.5-1.8)	8.7 ( 5.4-17.0)	8.7
"	14.5-18.0	10	31.0 (26.3-36.6)	0.72	0.006 (0.004-0.010)	0.054 (0.040-0.086)	0.8 (0.5-1.2)	7.6 ( 5.2-13.0)	9.5
W Fotö	1.0- 5.0	---	---	---	---	---	---	---	---
"	14.5-18.0	6	28.3 (24.2-33.3)	0.78	0.004 (0.002-0.006)	0.047 (0.025-0.085)	0.5 (0.3-0.7)	5.9 ( 3.2-10.0)	11.8
Knarrholmen	5.0- 5.5	---	---	---	---	---	---	---	---
"	16.0-25.0	7	28.1 (24.8-37.1)	0.86	0.010 (0.006-0.020)	0.091 (0.055-0.150)	1.2 (0.6-2.0)	11.0 ( 5.6-15.0)	9.2
E Björkö	1.0- 5.0	6	27.8 (23.2-33.2)	0.78	0.012 (0.009-0.017)	0.080 (0.064-0.140)	1.6 (1.1-2.7)	10.0 ( 8.7-13.0)	6.3
"	14.5-18.0	4	27.8 (25.6-29.8)	0.92	0.008 (0.006-0.010)	0.084 (0.075-0.089)	0.9 (0.5-1.2)	9.4 ( 7.5-11.0)	10.4

Table 4. Plaice from the archipelago of Göteborg. Average concentrations of  $\Sigma$ DDT and PCBs in muscle tissue on fresh weight resp. fat weight basis. Figures in brackets show variation ranges. In ppm.

Values for the quotient PCBs/ $\Sigma$ DDT are valid for both fresh tissue and extr. fat.

Localities	Depths m	Numbers	Sizes cm	Fat %	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
					$\Sigma$ DDT	PCBs	$\Sigma$ DDT	PCBs	
Djupa rännan	40-92	15	46.8 (40.0-54.0)	0.55	0.011 (0.005-0.027)	0.045 (0.019-0.110)	2.1 (0.9- 4.3)	8.3 (3.3-18.0)	4.0
Persgrund	81-90	13	57.0 (46.0-67.5)	0.46	0.008 (0.003-0.018)	0.038 (0.021-0.079)	1.8 (0.8- 4.0)	8.3 (4.9-18.0)	4.6
Hirtshals-Skagen	47-90	15	52.1 (45.0-60.5)	0.57	0.021 (0.003-0.230)	0.023 (0.011-0.079)	4.3 (0.5-51.0)	4.3 (1.9-18.0)	1.0
N Hanstholm	42-95	15	48.5 (42.5-53.5)	0.45	0.011 (0.004-0.019)	0.035 (0.015-0.059)	2.5 (0.9- 4.8)	8.0 (3.7-15.0)	3.2

Table 5. Cod from the Skagerrak-Kattegat area in 1972. Average concentrations of  $\Sigma$ DDT and PCBs in muscle tissue on fresh weight resp. fat weight basis. Figures in brackets show variation ranges. All specimens 3 years old. In ppm.

Values for the quotient PCBs/ $\Sigma$ DDT are valid for both fresh tissue and extr. fat.

Localities	Depths m	Numbers	Sizes cm	Fat %	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
					$\Sigma$ DDT	PCBs	$\Sigma$ DDT	pp PCBs	
Djupa rännan	40-92	8	29.3 (24.5-33.0)	0.93	0.024 (0.002-0.150)	0.042 (0.015-0.150)	1.7 (0.3-8.6)	4.3 (1.5- 8.2)	2.5
Persgrund	81-90	2	33.0 (32.0-34.0)	0.89	0.004 (0.003-0.004)	0.010 (0.009-0.011)	0.4 (0.3-0.5)	1.2 (1.0- 1.4)	3.0
Hirtshals-Skagen	47-90	10	28.2 (25.0-32.0)	0.98	0.019 (0.004-0.071)	0.120 (0.037-0.390)	1.6 (0.4-4.0)	12.0 (3.5-22.0)	7.5
N. Hanstholm	42-95	---	---	---	---	---	---	---	---

Table 6. Plaice from the Skagerrak-Kattegat area in 1972. Average concentrations of  $\Sigma$ DDT and PCBs in muscle tissue on fresh weight resp. fat weight basis. Figures in brackets show variation ranges. All specimens 3 years old. In ppm.

Values for the quotient PCBs/ $\Sigma$ DDT are valid for both fresh tissue and extr. fat.

Localities	Depths m	Numbers	Sizes cm	Fat %	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
					$\Sigma$ DDT	PCBs	$\Sigma$ DDT	PCBs	
Djupa rännan	40-92	15	21.8 (15.5-26.5)	3.47	0.100 (0.030-0.330)	0.180 (0.080-0.380)	3.6 (0.9-13.0)	6.3 (2.0-15.0)	1.8
Persgrund	81-90	1	24.5 (24.5-24.5)	9.82	0.110 (0.110-0.110)	0.270 (0.270-0.270)	1.1 (1.1- 1.1)	2.7 (2.7- 2.7)	2.5
Hirtshals-Skagen	47-90	15	24.5 (19.0-27.5)	6.45	0.150 (0.056-0.230)	0.380 (0.170-0.650)	2.7 (1.1- 7.2)	6.7 (3.3-18.0)	2.5
N Hanstholm	42-95	15	23.7 (20.5-26.5)	5.09	0.092 (0.033-0.200)	0.280 (0.110-0.960)	2.1 (0.9- 6.0)	6.0 (2.6-19.0)	2.9

Table 7. Herring from the Skagerrak-Kattegat area in 1972. Average concentrations of  $\Sigma$ DDT and PCBs in muscle tissue on fresh weight resp. fat weight basis. Figures in brackets show variation ranges. All specimens 1-2 years old. In ppm.

Values for the quotient PCBs/ $\Sigma$ DDT are valid for both fresh tissue and extr. fat.

Nr on Fig. 1	Localities	Depths m	Exp. i	Size group cm	Dried tissue		Fresh tissue		Extr. fat		PCBs/DDD + DDE
					DDD + DDE	PCBs	DDD + DDE	PCBs	DDD + DDE	PCBs	
1	Seläter	2.0-2.0	i	4.6-5.0	0.760	0.82	0.087	0.094	10.40	11.5	1.1
2	Kattholmen	0.5-1.0	m	4.6-5.0	0.140	0.40	0.020	0.057	2.00	5.7	2.9
3	Korsholmen	1.0-1.5	m	5.6-6.0	0.022	0.22	0.003	0.029	0.33	3.3	10.0
4	Fjällbacka harbour	1.0-3.0	i	5.1-5.5	0.134	1.95	0.027	0.390	1.16	17.5	15.1
5	Dyngö	1.0-3.0	m	5.1-5.5	0.334	0.80	0.012	0.150	0.74	9.6	13.0
	"	1.0-3.0	m	5.6-6.0	0.022	0.68	0.004	0.125	0.27	8.3	30.7
6	Måseskär	0.5-0.5	o	5.1-5.5	0.025	0.28	0.004	0.044	0.41	4.6	11.2
7	Lerskiten	0.5-3.0	i	5.1-5.5	0.034	0.68	0.006	0.125	0.38	7.6	20.0
	"	0.5-3.0	i	5.6-6.0	0.033	0.73	0.005	0.115	0.37	8.0	21.6
8	St Dyrön	0.5-1.0	m	5.1-5.5	0.021	0.68	0.004	0.110	0.26	8.4	32.3
	"	0.5-1.0	m	5.6-6.0	0.035	0.60	0.007	0.100	0.45	7.8	17.3
9	Pater Noster	2.0-2.0	o	5.1-5.5	0.032	0.29	0.004	0.040	0.44	4.0	9.1
	"	2.0-2.0	o	5.6-6.0	0.018	0.27	0.003	0.038	0.23	3.6	15.7
10	KA 4	2.0-3.0	i	5.1-5.5	0.089	1.60	0.012	0.215	0.96	17.0	17.7
	"	2.0-3.0	i	5.6-6.0	0.076	1.50	0.009	0.190	0.75	15.0	20.0
11	Skalkorgarna	1.0-2.0	m	4.6-5.0	0.051	0.99	0.008	0.165	0.51	9.9	19.4
	"	1.0-2.0	m	5.1-5.5	0.057	1.15	0.009	0.190	0.60	11.5	19.2
	"	1.0-2.0	m	5.6-6.0	0.068	0.97	0.012	0.170	0.79	11.0	13.9
	"	1.0-2.0	m	6.1-6.5	0.054	1.10	0.009	0.175	0.58	11.5	19.8
12	Kalvön	1.0-2.0	i	5.6-6.0	0.024	0.32	0.004	0.049	0.32	4.3	13.4
13	Onsala peninsula S end	0.5-1.5	o	5.6-6.0	0.025	0.34	0.004	0.047	0.35	4.7	13.4

Table 8. Mussels (*Mytilus edulis*) from the northern and central Swedish west coast in 1972. Average concentrations of DDD, DDE and PCBs in homogenized mussel tissue on dry weight, fresh weight resp. fat weight basis. Figures show mean values for two homogenates of each 12 mussels from each locality and size group. No DDT was found. In ppm. Values for the quotient PCBs/DDD + DDE are valid for fresh tissue and extr. fat. Exposure of localities: i = inner, m = middle, o = outer archipelago.

Localities	Exposure	Year of Sampling	n	Fresh tissue	Cod	Extr. fat	n	Fresh tissue Flounder	Extr. fat	n	Fresh tissue Plaice	Extr. fat	n	Fresh tissue Herring	Extr. fat	n	Fresh tissue Picked dogfish	Extr. fat
Arch. of Göteborg	Archipelago	1969	---	---	---	---	---	---	---	---	---	---	31	0.241 (0.074-0.660)	1.74 (0.5- 3.8)	---	---	---
"	"	<u>1970</u>	120	0.015 (0.003-0.280)	---	2.83 (0.53-36.0)	102	0.044 (0.003-0.210)	5.41 (0.59-33.0)	54	0.010 (0.001-0.047)	1.19 (0.27-8.20)	---	---	---	---	---	---
Lysekil	"	1968-1969	12	0.014 (0.007-0.026)	---	2.70 (1.40- 5.0)	---	---	---	---	---	---	---	---	---	10	0.015 (0.005-0.040)	0.85 (0.4-1.9)
Hovs Hallar	Coastal	1969	15	0.038 (0.005-0.019)	---	2.10 (0.90- 3.8)	---	---	---	---	---	---	14	0.150 (0.080-0.290)	1.60 (0.9- 2.2)	---	---	---
SW Falkenberg	"	1969	15	0.028 (0.006-0.120)	---	5.00 (1.20-23.0)	---	---	---	---	---	---	15	0.160 (0.054-0.950)	3.50 (1.1-22.0)	---	---	---
NE Varberg	"	1969	---	---	---	---	---	---	---	---	---	---	14	0.320 (0.100-0.720)	1.70 (0.6- 4.3)	---	---	---
Mouth of Kungs- backafjord	"	1969	15	0.022 (0.011-0.036)	---	3.30 (1.90- 5.9)	---	---	---	---	---	---	---	---	---	---	---	---
Onsala peninsula	"	1967-1968	1	0.005 (0.005-0.005)	---	1.70 (1.70- 1.7)	---	---	---	2	0.007	1.50	---	---	---	---	---	---
Djupa rännan	"	<u>1972</u>	15	0.011 (0.005-0.027)	---	2.10 (0.90- 4.3)	---	---	---	8	0.024 (0.002-0.150)	1.70 (0.30-8.60)	15	0.100 (0.030-0.330)	3.60 (0.9-13.0)	---	---	---
W Hönshuvud + W St Pölsan	"	1969	13	---	---	---	---	---	---	---	---	---	13	0.140 (0.052-0.270)	5.75 (2.1-11.0)	---	---	---
Persgrund	"	<u>1972</u>	13	0.008 (0.003-0.018)	---	1.80 (0.80- 4.0)	---	---	---	2	0.004 (0.003-0.004)	0.40 (0.30-0.50)	1	0.110 (0.110-0.110)	1.10 (1.1- 1.1)	---	---	---
Koster area	"	1967-1968	---	---	---	---	---	---	---	1	0.003 (0.003-0.003)	0.90 (0.90-0.90)	---	---	---	---	---	---
Hirtshals-Skagen (NW Skagen)	Open sea	1969-1970	---	---	---	---	---	---	---	---	---	---	4	0.170 (0.063-0.400)	6.70 (2.9-14.0)	---	---	---
"	"	<u>1972</u>	15	0.021 (0.003-0.230)	---	4.30 (0.50-51.0)	---	---	---	10	0.019 (0.004-0.071)	1.60 (0.40-4.00)	15	0.150 (0.056-0.230)	2.70 (1.1- 7.2)	---	---	---
N Hanstholm	"	<u>1972</u>	15	0.011 (0.004-0.019)	---	2.50 (0.90- 4.8)	---	---	---	---	---	---	15	0.092 (0.033-0.200)	2.10 (0.9- 6.0)	---	---	---

Table 9. Summary of average values for ΣDDT in muscle tissue on fresh weight resp. fat weight basis. Cod, flounder, plaice, herring and picked dogfish from the Skagerrak-Kattegat area 1967-1972. Figures in brackets show variation ranges. In ppm. Note that the 1970 samplings in the Göteborg archipelago have been brought together to one sample. Figures from the present investigation (underlined years) and from Jensen et al. 1969, and Jensen et al. 1972.

Localities	Exposure	Year of Sampling	n	Fresh tissue	Cod	Extr. fat	n	Fresh tissue	Flounder	Extr. fat	n	Fresh tissue	Plaice	Extr. fat	n	Fresh tissue	Herring	Extr. fat	n	Fresh tissue	Picked dogfish	Extr. fat
Arch. of Göteborg	Archipelago	1969	---	---	---	---	---	---	---	---	---	---	---	---	31	0.367 (0.093-0.590)	2.6 (1.0- 9.6)	---	---	---	---	---
"	"	<u>1970</u>	120	0.083 (0.012-0.750)	16.0 (3.4-120.0)	102	0.291 (0.031-1.30)	36.0 (3.5-230.0)	54	0.080 (0.025-0.340)	10.0 (3.2-59.0)	---	---	---	---	---	---	---	---	---	---	---
Lysekil	"	1968-1969	12	0.087 (0.037-0.190)	13.0 (6.5- 22.0)	---	---	---	---	---	---	---	---	---	---	---	---	---	10	0.047 (0.011-0.120)	2.85 (0.90-7.00)	---
Hovs Hallar	Coastal	1969	15	0.038 (0.016-0.094)	6.7 (3.0- 17.0)	---	---	---	---	---	---	---	---	14	0.180 (0.094-0.390)	1.9 (1.1- 2.8)	---	---	---	---	---	---
SW Falkenberg	"	1969	15	0.050 (0.017-0.130)	8.5 (3.0- 28.0)	---	---	---	---	---	---	---	---	15	0.250 (0.100-0.530)	5.5 (2.0-13.0)	---	---	---	---	---	---
NE Varberg	"	1969	---	---	---	---	---	---	---	---	---	---	---	14	0.450 (0.190-0.750)	2.4 (1.3- 3.5)	---	---	---	---	---	---
Mouth of Kungs- backafjord	"	1969	15	0.087 (0.037-0.190)	13.0 (6.5- 22.0)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Onsala peninsula	"	1967-1968	1	0.008 (0.008-0.008)	2.5 (2.5- 2.5)	---	---	---	---	---	2	0.003	0.7	---	---	---	---	---	---	---	---	---
Djupa rännan	"	<u>1972</u>	15	0.045 (0.019-0.110)	8.3 (3.3- 18.0)	---	---	---	---	---	8	0.042 (0.015-0.150)	4.3 (1.5- 8.2)	15	0.180 (0.080-0.380)	6.3 (2.0-15.0)	---	---	---	---	---	---
W Hönöshuvud + W St Pölsan	"	1969	---	---	---	---	---	---	---	---	---	---	---	13	0.175 (0.076-0.300)	9.1 (3.2-21.0)	---	---	---	---	---	---
Persgrund	"	<u>1972</u>	13	0.038 (0.021-0.079)	8.3 (4.9- 18.0)	---	---	---	---	---	2	0.010 (0.009-0.011)	1.2 (1.0- 1.4)	1	0.270 (0.270-0.270)	2.7 (2.7- 2.7)	---	---	---	---	---	---
Koster area	"	1967-1968	---	---	---	---	---	---	---	---	1	0.056	14.0	---	---	---	---	---	---	---	---	---
Hirtshals-Skagen (NW Skagen)	Open sea	1969-1970	---	---	---	---	---	---	---	---	---	---	---	4	0.290 (0.130-0.420)	12.0 (6.0-17.0)	---	---	---	---	---	---
"	"	<u>1972</u>	15	0.023 (0.011-0.079)	4.3 (1.9- 18.0)	---	---	---	---	---	10	0.120 (0.037-0.390)	12.0 (3.5-22.0)	15	0.380 (0.170-0.650)	6.7 (3.3-18.0)	---	---	---	---	---	---
N Hanstholm	"	<u>1972</u>	15	0.035 (0.015-0.059)	8.0 (3.7- 15.0)	---	---	---	---	---	---	---	---	15	0.280 (0.110-0.960)	6.0 (2.6-19.0)	---	---	---	---	---	---

Table 10. Summary of average values for PCBs in muscle tissue on fresh weight resp. fat weight basis. Cod, flounder, plaice, herring and picked dogfish from the Skagerrak-Kattegat area 1967-1972. Figures in brackets show variation ranges. In ppm. Note that the 1970 sampling s in the Göteborg archipelago have been brought together to one sample. Figures from the present investigation (underlined years) and from Jensen et al. 1969, and Jensen et al. 1972.

Exposure of localities	n	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
		$\Sigma$ DDT	PCBs	$\Sigma$ DDT	PCBs	
inner	7	0.021 (0.004-0.087)	0.168 (0.049-0.390)	2.1 (0.3-10.4)	11.6 (4.3-17.5)	5.5
central	11	0.008 (0.003-0.020)	0.127 (0.029-0.190)	0.65 (0.3- 2.0)	8.8 (3.3-11.5)	13.5
outer	4	0.004 (0.003-0.004)	0.042 (0.038-0.047)	0.4 (0.2- 0.4)	4.2 (3.6- 4.7)	10.5

Table 11. Average values for homogenates of 12 mussels each at localities of different exposures in the archipelago. Figures in brackets show the variation range for all localities of a given exposure.

Exposure	n	Fresh tissue		Extr. fat		PCBs/ $\Sigma$ DDT
		$\Sigma$ DDT	PCBs	$\Sigma$ DDT	PCBs	
inner/central	10	0.015 (0.005-0.040)	0.047 (0.011-0.120)	0.8 (0.4- 1.0)	4.2 (0.9- 7.0)	5.3

Table 12. Concentrations of  $\Sigma$ DDT and PCBs in individual mussels from the Lysekil area, sampled in November 1967. From Jensen et al. 1969.



Localities (Nr on Fig. 3)	n	Extr. fat		PCBs/ $\Sigma$ DDT
		$\Sigma$ DDT	PCBs	
1	45	1.8 (0.60- 5.0)	8.1 (2.0 -89.0)	4.5
2	45	1.2 (0.60- 3.7)	3.2 (0.90-12.0)	2.7
3	30	1.0 (0.11- 3.3)	3.9 (0.51- 7.3)	4.0
4	28	2.2 (0.60- 3.8)	8.4 (2.7 -13.0)	3.8
5	44	2.1 (0.61- 7.3)	7.3 (2.2 -23.0)	3.5
6	45	1.5 (0.54- 4.0)	3.0 (0.9 - 4.3)	2.0
7	45	1.7 (0.87- 2.7)	3.1 (1.4 - 7.6)	1.8
8	10	1.3 (0.80- 4.0)	2.7 (1.1 -11.0)	2.1
9	45	3.8 (0.94- 6.4)	5.0 (0.9 - 9.8)	1.3

Table 13. Eel from near-shore localities along the Swedish west coast sampled 1969-1971. Average concentrations of  $\Sigma$ DDT and PCBs in extracted fat. In ppm. Figures in brackets show the variation ranges. From Jensen et al. 1978.

