Table 2

PLASMA, CSF, AND BILE LEVELS OF DDT IN THE DOGFISH

Dogfish no., sex, wt		Time (hrs)	μg/ml
3, Female, 3.0 kg	Plasma	1/2	2.68
		1	1.61
		4	0.21
		6	0.13
		9	0.088
		18	0.049
		24	0.043
	CSF	24	0.006
	Bile	24	0.79
4, Female, 2.3 kg	Plasma	1/2	1.60
		1	0.59
		4	0.12
		6	0.09
		9	0.058
		18	0.03
		24	0.022
	CSF	24	0.003
	Bile	24	0.3

1969 #2

DETERMINATION OF DDT ISOMERS AND METABOLITES IN SOME MARINE ORGANISMS

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Chlorinated hydrocarbon pesticide residues have been found in fish from remote streams and from the oceans and even in penguins and seals from the Ross Sea area of Antartica (Nature, 210:670, 1966).

The results to be presented in this report were obtained from specimens collected from Leland Cove, near Laboratory Point, a few from laboratory tanks, and the dogfish from Frenchman Bay. Specimens were frozen in individual plastic bags, transported frozen to Bethesda, and analyzed for DDT isomers and metabolites by the procedures given in the sections, indicated below, contained in the Pesticide Analytical Manual, Volume I, Second Edition, 1968, published by the Food and Drug Administration, U. S. Department of Health, Education, and Welfare.

Each sample was first separated from any hard shell-like material, as in the case of shellfish, and ground in a blender or food chopper when necessary to obtain a homogeneous sample. A representative 20-gram portion was taken for analysis. If the total weight of sample was less than 20 grams, the entire sample was analyzed.

Table 1

Specimen*	PPM (parts per million) in: Wet weight		Extracted fat	
	p,p'-DDT	p,p'-DDE	p,p'-DDT	p,p'-DDE
Fucus (brown algae)	0.024	0.002	283	32.1
Lobster (Homarus)	0.029	0.028	2.73	2.59
Hermit crab (Pagurus)	0.017	0.010	0.567	0.306
Rock Crab (Cancer)	0.220	0.033	17.8	2.66
Whelk (Buccinum?)	0.007	0.004	1.44	0.823
Moon Snail (Natica?)	0.094	0.016	1.18	0.200
Mussel (Mytilus)	0.057	<0.002	9.10	<0.391
Horse mussel (Modiolus)	0.043	0.005	44.9	5.01
Scallop (Pecten mag.)	0.031	0.006	2.58	0.507
Clam (Mya)	0.044	0.002	9.07	0.439
Starfish #1 (Asterias)	0.030	0.005	6.92	1.23
Starfish #2	0.053	0.019	3.02	1.13
Brittle-Star (Ophiura)	0.088	0.011	15.1	1.86
Sea urchin (Strongylocentrotus)	0.034	0.004	5.24	0.553
Sand dollar (Echinarachnius)	0.038	0.008	3.23	0.677
Sea cucumber #1 (Cucumaria)	0.032	0.005	2.49	0.403
Sea cucumber #2	0.025	<0.002	2.67	<0.178
Sea peach (Cynthia)	0.029	0.004	13.8	2.16
Dogfish (Squalus)				
Liver #1	2.38	0.938	4.20	1.64
Liver #2	2.73	1.84	4.04	2.72
Plasma #1	0.019	<0.002	141	<18.5
Plasma #2	0.033	<0.002	303	<20.8
Candle #1	0.603	0.468	4.15	3.22
Fundulus	0.017	0.042	11.6	4.58
King O'Norway	0.033	0.013	8.16	3.21

*Whole organism(s) exclusive of shell-like material, unless otherwise noted.

Abbreviations: DDT, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane; DDE, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene; DDD, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane; DDMU, 1-chloro-2,2-bis(p-chlorophenyl)ethylene, from the abbreviation of the generic dichloro diphenyl monochloro unsaturated derivative of DDD.

Extration of fat was performed according to Section 211.13a. The fat obtained was taken through the acetonitrile partitioning described in Section 121.14; when the amount of fat obtained was substantial, no more than 3 grams were taken for cleanup. Further cleanup was accomplished by chromatography through Florisil (Section 121.15). The 6% diethyl ether-petroleum ether eluate, which contained the DDT isomers and metabolites, was concentrated to a suitable volume for subsequent vapor phase chromatography.

Chromatographic analysis was performed with a Glowall Chromalab instrument equipped

with a radium^{226} electron capture detector and a 50 mv recorder. Instrumental parameters were as follows:

Column:	3' x 1/4" O.D. glass packed with a 1:1 mixture of 7% QF-1 and 9% OV-17, both on 80/100 mesh Gas-Chrom Q
Injection Temperature:	250° C
Column Temperature:	226° C
Detector Temperature:	244° C
Nitrogen (Carrier) Flow Rate:	120 ml/min
Detector Voltage (DC):	12 v
Sensitivity:	3×10^{-11} amp = full scale response

Identification and quantitation of sample peaks were performed by comparison to retention times and calibration curves obtained by analysis of standard solutions of reference compounds.

1969 #3

EFFECT OF VARIOUS BARBITURATES AND MORPHINE IN THE DOGFISH

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The effects of various barbiturates are being investigated in marine species so that one may choose a suitable anesthetic. Thus far, we have investigated the effects of hexobarbital, thiopental, and pentobarbital in the dogfish (S. acanthias). Various doses were injected i.a. or i.v. to 3-4 fish at each dose and the fish were allowed to swim freely in confined tanks, observed for loss and recovery of righting reflex, period of anesthesia, and respiratory depression as measured by opercular movement. Loss of righting reflex occurred within 1 minute after injection of any of the three barbiturates at all doses studied. The duration of complete anesthesia at doses of 20 mg/kg varied from 15-20 minutes with hexobarbital to 3 hours with pentobarbital. Thus far, these studies (summarized in Table 1) would lead us to recommend a dose of hexobarbital of 20 mg/kg for short procedures and a dose of 20 mg/kg of pentobarbital when a long period of anesthesia is required in the dogfish.

Table 1

EFFECT OF VARIOUS BARBITURATES IN DOGFISH

Barbiturate	Dose mg/kg	Time of complete anesthesia	Time for recovery of righting reflex	Respiratory depression
Hexobarbital	100	Death		
	50	-	6 hrs	yes
	25	-	4 hrs	yes
	20	15-20 min	3 hrs	minimal
Thiopental	20	50 min	3 hrs	yes
Pentobarbital	20	3 hrs	6-8 hrs	yes