mg/kg ^{14}C-DDT in a minimal volume of ethanol. Plasma and urine were collected at various time intervals and, on sacrificing the fish, various tissues were taken for combustion for determination of ^{14}C. The plasma disappearance of ^{14}C was rapid (Table 2) as previously reported for the ^{3}H-DDT. Less than 1% of the radioactive dose was found in the water (i.e., excreted by

Table 2

DDT AND METABOLITES IN DOGFISH 1969 AND 1970

Sample	Amount found* - PPM					
	DDMU	pp'DDE	op'DDD	op'DDT	pp'DDD	pp'DDT
Liver #1, 1969	0.38	0.94	<0.11	0.33	0.32	2.38
Plasma #1, 1969	<0.007	<0.002	<0.005	0.01	<0.005	0.019
Liver #2, 1969	0.74	1.84	<0.14	0.47	0.55	2.73
Plasma #2, 1969	<0.006	<0.002	<0.004	0.02	<0.004	0.03
Candle #1, 1969	0.21	0.47	<0.039	0.12	0.15	0.60
Liver #1, 1970	<0.08	1.14	<0.08	<0.039	0.73	1.67
Plasma #1, 1970	<0.001	0.006	<0.001	<0.001	0.014	0.024
Liver #2, 1970	<0.08	1.06	<0.077	<0.039	0.82	1.67
Plasma #2, 1970	<0.001	0.008	<0.001	<0.001	0.015	0.027
Candle #2, 1970	<0.006	0.51	<0.006	<0.003	0.42	0.86

*Amount PPM on wet weight basis.

the gills) during the first hour—a time at which the plasma level is highest. DDT was, however, bound to plasma proteins at greater than 95%. The greatest amount of ^{14}C was found in the liver, but the kidneys and red cells contained significant amounts of radioactivity. The bile/plasma ratio at 24 hours was 20-40, indicating concentration of DDT and/or metabolites and excretion via the bile. Samples of urine are currently being examined to determine the metabolites of DDT in this species and further studies on protein binding of DDT are contemplated. In general, we have confirmed our previous studies using the ^{3}H-DDT and find that the ^{14}C-DDT: (1) rapidly disappears from plasma; (2) though extremely lipid soluble is not excreted across the gills; (3) is bound to plasma proteins; (4) is taken up by the liver, and (5) ultimately is excreted by the biliary system.

1970 #2

RESPIRATION RATES OF INVERTEBRATE TISSUE HOMOGENATES AS A POSSIBLE INDEX OF ENVIRONMENTAL STRESS

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Respiration of tissue homogenates determined with a YSI model oxygen electrode was studied as a possible procedure for evaluating physiological response to environmental change. Two species of hermit crabs, Pagurus acadianus and P. pubescens and one gastropod, Thais lapillus,

were used in these studies. Samples of digestive gland tissue (hepato-pancreas) of 150-350 mg were homogenized in a buffered solution of sterile sea water. Rates of respiration, measured in μl O_2 consumed/ml homogenate/min, were determined for homogenates over a pH range of 5.2-8.1. It was found that peaks of maximum uptake .0023 μl O_2/ml/min ± .007 and .0025 μl O_2/ml/min ± .004 for Thais lapillus occurred at pH 5.4 and 6.6, respectively. Minimum values of about .0011 μl O_2/ml/min were recorded at pH 6.2 and 7.7.

Both species of pagurids showed maximum O_2 uptake at pH 7.7: for P. acadianus .0042 ± .0008 and for P. pubescens, .0050 ± .0002 μl O_2/ml/min. Lowest respiration rates .0029-.0030 were observed at pH values between 5.2 and 5.4. Because P. pubescens showed consistently higher rates than P. acadianus, protein analyses of homogenates were made using the Biuret technique. The results indicated that the two crabs did not differ regarding percentage protein by wet weight of hepato-pancreatic tissue. These ranged from 4.97% to 8.01%, and are close to the values cited by Watermann (The Physiology of Crustacea, 1960, vol. I, 302) for Cancer pagurus. Manometric studies of the metabolic rate of the crab, Pagurus hirsutiusculus (Life Sci. 1963, 131-33) show that 96% of the variation in oxygen consumption is explainable by variation in the weight of individuals used. In the present studies it seems reasonable to assume that differences in O_2 uptake rates in tissue homogenates of equal volume from the two crab species were due to endogenous factors unrelated to size.

Crabs of both species were placed in a heated, oxygenated aquarium at a temperature of 23° C ± 1.5. Others were placed in a cage sunk in Salisbury Cove (11° C - 12° C) at a depth of 30 feet for 72 hours. After 72 hours in the heated aquarium, the rates for P. acadianus were .0030 ± .0006 μl O_2/ml/min. All but one of the P. pubescens died. The respiration of tissue from both species from the sunken cage averaged .0030 μl O_2/ml/min. That rates of O_2 uptake varied so little between these two experimental groups, indicates that respiration of the hepato-pancreatic tissue is to at least some extent, independent of the past thermal history of individuals. This is significant, for it implies that the two pagurids possess mechanisms for regulating internal metabolic rates which are detectable in whole tissue homogenates.

Hepato-pancreas homogenates from recently caught crabs at pH 7.7 - 8.0 showed respiration rates of .0042 ± .0007 and .0051 ± .0002 μl O_2/ml/min for P. acadianus and P. pubescens respectively. The wide difference of respiration rates between these crabs and those caged for three days with little food, demonstrates the ability of specific tissues to compensate for environmental change which is detectable at the sub-cellular level. The detection of such compensation by oxygen monitoring of endogenous respiration in tissue homogenates may prove an effective method for determining general physiological response to environmental perturbation.

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1970 #3

EFFECTS OF CHLORAMPHENICOL AND CYCLOHEXIMIDE ON PROTEIN SYNTHESIS AND MORPHOGENESIS IN EMBRYOS OF Fundulus heteroclitus

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In order to investigate mechanisms of control over the events of early embryogenesis, we