DDT AND AROCLOR 1221 (Monsanto) DISRUPT OSMOREGULATION IN MARINE ADAPTED EELS (Anguilla rostrata) and KILLIFISH (Fundulus heteroclitus). William B. Kinter, Louise S. Markens, Ralph H. Janicki, and Anthony M. Guarino. Mt. Desert Island Biol. Lab., Salisbury Cove, Me. 04672; SUNY Upstate Med. Ctr., Syracuse, N.Y. 13210; Natl. Cancer Inst., Bethesda, Md. 20014.

Ability to osmoregulate was followed in individual eels (about 100 g) placed in 15 C sea water (2 liters) containing 0.1% ethanol and 1 ppm DDT [1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethane], a level which is lethal by 10 hr. At 6 hr, plasma milliosmolality averaged 462 ± 10 SE (5 fish) compared to 358 ± 10(5) for ethanol controls and much of this large increase was due to plasma Na. In additional experimants with ^{14}C-DDT, the fish had taken up about half the radioactivity by 6 hr and the ppm in intestinal mucosa and gill filaments averaged 7 ± 1(6) and 22 ± 2(6), respectively, on a wet weight basis. Using isolated eel gills incubated 1 hr in 15 C, oxygenated, artificial, sea water (M. Kamiya, Annot. Zool. Japon. 40:123, 1967), tha fractional ^{22}Na space was increased significantly ($P<0.01$) from 0.11 ± 0.00 (15 gills) to 0.16 ± 0.01(15) by 50 ppm DDT solubilized in the water with 0.5% N,N-dimethylformamide (DMF). Using eel gill homogenate and our assay procedure (Janicki and Kinter, Nature 233:148, 1971), the Na, K-activated ATPase was inhibited 38% ($P<0.01$) by 50 ppm DDT solubilized with 5% DMF. These and our previous data, including that from eel intestine (Janicki and Kinter, Science 173:1146, 1971), support the view that DDT inhibits Na transport in the primary osmoregulatory organs of marine teleosts. Finally, experiments with killifish (10 fish at 5 g) in 15 C sea water with 0.1% ethanol (2 liters) demonstrated roughly equivalent lethality (24 hr) for 0.25 ppm DDT and 75 ppm Aroclor 1221 (industrial mixture of polychlorinated biphenyls, PCBs, kindly provided by Monsanto Co.); 6-hr exposure to these levels increased ($P<0.05$) plasma milliosmolality from 365 ± 3 (6 samples, each from 3-5 ethanol control fish) to 389 ± 9(8) and 396 ± 7(9), respectively. These results suggest similar mechanisms of toxicity for DDT and PCBs in this marine adapted fish. (Supported in part by NIH Grants AM06479 and GM00293.)

Abstract: NIEHS meeting on PCBs, Dec. 1971.

MONS 071384