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1972 FASEB Abstract Form

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DISRUPTION OF OSMOREGULATION IN MARINE ADAPTED EELS (Anguilla rostrata) AND KILLIFISH (Fundulus heteroclitus) BY DDT AND A POLYCHLORINATED BIPHENYL (PCB) MIXTURE. Louise S. Merkens*, Ralph H. Janicki*, and Wm. B. Kinter. Mt. Desert Island Biol. Lab., Salisbury Cove, Me. 04672.

Ability to osmoregulate was followed in eels (100 g) placed in 15 C sea water (2 liters) with 0.1% ethanol and 1 ppm DDT [1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethane] 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. Much of this rise was due to Na; ppm ^{14}C-DDT in gut and gill averaged 7 ± 1(6) and 22 ± 2(6). In isolated gills incubated 1 hr in 15 C oxygenated sea water, ^{22}Na space was increased 45% (P<0.01) by 50 ppm DDT solubilized with 0.5% N,N-dimethylformamide (DMF). Using gill homogenate and our assay procedure (Science 173: 1146, 1971), Na,K-ATPase was inhibited 38% (P<0.01) by 50 ppm DDT solubilized with 5% DMF. These and our previous intestinal data support the view that DDT inhibits Na transport in the primary osmoregulatory organs of marine teleosts. Finally, experiments with killifish (10 @ 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 PCB mixture provided by Monsanto Co.); 6-hr exposure to these levels increased plasma milliosmolality from 365 ± 3 (6 samples, each from 3-5 ethanol control fish) to 389 ± 9(8) and 396 ± 7(9), respectively, suggesting similar mechanisms of toxicity for these types of environmental contaminants. (Supported by NIH Grants AM06479 and GM00293.)

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