OIL TOXICITY IN A EURYHALINE TELEOST: IMPAIRED OSMOREGULATION IN KILLIFISH, *Fundulus heteroclitus*

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Although aqueous extracts of both crude and refined oils are acutely toxic to teleost fish (Pollution and Physiology of Marine Organisms, pp. 285-310, 1974), little is known about mechanisms of oil toxicity. To determine if oil, like other organic pollutants, such as DDT, affects osmoregulation in teleosts (Environ. Hlth. Perspect. 1:169-173, 1972), we exposed sea water (SW) and fresh water (FW) adapted killifish to an aqueous extract (AE) of #2 fuel oil (oil obtained from American Petroleum Institute and AE prepared as described in Figure 1, legend). Experimental and control fish were maintained in separate static systems at 15°C as previously described (Environ. Hlth. Perspect. 1:169-173, 1972). Typically, SW killifish exposed to #2AE exhibited concentration dependent changes in behavioral patterns ranging from hyper-excitability to loss of both righting ability and buoyancy; after 15h exposure to undiluted (100%) #2AE, 10-30% of the experimentals were dead. We observed no mortalities in SW controls or experimentals exposed to #2AE diluted 1/1 with SW (50% #2AE). As shown in Figure 1, exposure to 100% #2AE caused transient impairment of osmoregulatory ability in both SW (elevated plasma Na) and FW (depressed plasma Na) killifish

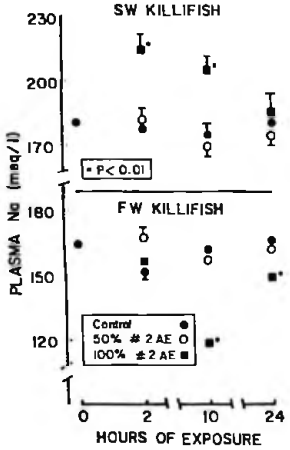

Figure 1. Effect of exposure to #2 fuel oil AE on plasma Na levels in SW and FW adapted killifish. AE was prepared by mixing oil with FW or SW (1/9) for 20h at 15°C. Fish were exposed to undiluted (100%) AE or AE diluted 1/1 with either FW or SW (50% AE). Each point represents the mean value derived from 8-18 (SW) or 3-7 (FW) fish; when large enough, variability is given by SE bars.

In SW fish, when 100% #2AE was replaced with fresh extract after 10h, plasma Na levels remained elevated for at least 14 additional h. Finally, initial experiments with killifish exposed to an AE from a South Louisiana crude show similar evidence of osmoregulatory impairment. Studies are in progress to identify target organs and mechanisms of oil toxicity in killifish. Preliminary data suggest that Na,K-ATPase activities in intestine and gill are not reduced in SW fish exposed to 100% #2AE for 10h.

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EFFECTS OF INGESTION OF A WEATHERED CRUDE OIL ON IMMATURE BLACK GUILLEMOTS, *Cepphus grylle*, AND HERRING GULLS, *Larus argentatus*

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Our recent studies have shown that crude oil ingestion inhibits growth and impairs plasma osmoregulation in immature herring gulls (Science, in press, 1977). Since oil spilled at sea rapidly changes composition