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wildlife in Israel. This may be due to the low priority programme of marine research and long term studies.

However, some changes have been noted in recent years, particularly amongst the coral reef tables at Eilat. A general decline of marine macrofauna has occurred, although this cannot be linked to the effects of any specific pollutants. Similarly, a rapid decline in the numbers of living corals has been investigated and attributed to factors including crude oil, solvent emulsifiers, phosphate contamination and low tides (Fishelson; 1973). Avifauna are naturally scarce in the inshore waters of Israel.

Oil and Tourism

There appears to be no decline in tourist activity at Eilat, where hotel accommodation has expanded from 800 rooms in 1971 to 2300 rooms in 1973, despite oil, untreated sewage and solid wastes from shipping polluting the tourist beaches. Furthermore, tourists have become accustomed to oil contaminated beaches, regularly using facilities provided by local authorities to remove oil residues from their body and clothing. Reports of oil pollution in the press can be damaging to the local tourist interests resulting in an attitude that 'no news is good news'.

At Ashkelon it is believed that oil operations have influenced tourist activity. With the construction of the terminal and transfer facilities and the news of early spillages, outside investment into tourist amenities has levelled off and now declines.

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Trace Metal Content in the American Oyster

Information about the transfer of pollutants from adult aquatic animals to their progeny is relatively unknown. The present study was designed to measure the transfer of metals from adults to eggs of the American oyster. Two groups of oysters containing significantly different levels of copper and cadmium were induced to spawn, the eggs were collected and trace metal contents measured. The eggs from both groups of oysters contained the same amount of copper, while cadmium levels were below detectable limits in both groups of eggs. Silver, lead, and zinc concentrations also were determined. The concentrations of these metals were similar for both groups of adults and eggs; thus, no conclusion could be made about the transfer of these three metals from adults to eggs of oysters.

Trace metal composition of many marine organisms has been reported in the literature (Alexander *et al.*, 1973; Bryan, 1973; Pringle *et al.*, 1968; Shuster & Pringle, 1969; Windom *et al.*, 1973). These data have been obtained on adult animals and little is known about trace metal burdens in immature stages. Only one article could be found in the literature reviewed on the subject of trace metal burdens in immature stages of aquatic animals. In that article Forrester *et al.* (1972) examined the mercury content of ovarian dogfish embryos and found that these young animals contained less than 0.03 ppm of mercury in muscle tissue compared to levels of greater than 0.5 ppm in the muscle of adult dogfish.

In the present study the spawned eggs from two different groups of adult American oysters *Crassostrea virginica* were examined for trace metal levels. One group had considerably higher levels of copper and cadmium than the second. The purpose of the study was to determine to what extent copper and cadmium would be transferred from the adult female to the eggs in both high and low copper and cadmium concentration groups.

Materials and Methods

Oysters were obtained from the Housatonic River, Connecticut, and off the City of Branford, Connecticut. Adult oysters were induced to spawn by raising the temperature of the water in which they were held from 20 to 28°C. When spawning began, the oysters were transferred to individual dishes of clean seawater for collection on a 20 μm filter after they were passed through a 75 μm filter to remove detrital and other large materials. The eggs were washed by centrifugation in a small volume of seawater and the supernatant decanted. Eggs from two females were pooled for chemical analyses.

The eggs were prepared for chemical analyses as follows: the oyster eggs were dried in the centrifuge tubes at 105–115°C for 18 h. Three ml of concentrated nitric acid were added to the dried sample and the tubes were heated at 70°C until the samples were completely dissolved. Fat globules were removed by paper filtration (Whatman No. 2) and samples were brought to a final volume of 5 ml.

The adult oysters were prepared for chemical analyses as follows: The entire oyster, including shell liquor but minus the shell, were placed individually in 250 ml glass beakers and dried at 105 to 115°C for 18 h. These oysters did not

exceed 25 g in weight. Sufficient concentrated nitric acid was added to cover the dried sample and then evaporated to dryness by careful boiling. This process was repeated as many times as necessary to oxidize the organic material completely and to end up with a whitish residue. The residue was transferred with 10% nitric acid by repeated additions of small volumes of acid to the beakers and paper-filtered (Whatman No. 2) into graduated cylinders, then brought to a final 25 ml volume with 10% nitric acid.

In both cases standards of metals and blanks were carried through the same procedures as the samples. Analyses of all samples were done on a Perkin–Elmer atomic absorption spectrophotometer (Model 403).

Results and Discussion

As shown in Table 1, the levels of copper and cadmium in adult oysters obtained from the Housatonic River were nearly double those found in oysters obtained from Branford. The mean concentrations of copper and cadmium for these two groups of oysters were statistically different as measured by the Student's *t*-test (p=0.01). The eggs from both collections of oysters had very similar levels of copper at about 28 ppm and cadmium at less than 1.6 ppm. Although copper and cadmium were of particular interest, levels of lead, silver, and zinc were also obtained. Zinc levels in eggs from the Housatonic River oysters averaged 82.4 ppm compared to an average of 65.9 ppm for eggs from Branford oysters; compared to these values were the 10,400 ppm and 8300 ppm levels in adults for these same two locations, respectively (Table 1). The average values for both eggs and adults, however, were not statistically different for the two groups as measured by the Student's *t*-test (p=0.01). Silver levels were about 12–16 ppm for both groups of adult females, while levels of silver were below detectable amounts in both groups of eggs. Lead concentrations were below detectable amounts in all but one of the samples; the lead content for this sample was 7.1 ppm for adults obtained from Branford. The detection limit for adult oysters was lower at 4.1 ppm than for eggs at about 10 ppm; this was due to the fact that a greater sample weight could be analyzed for adults than for eggs. The conclusion drawn from the above data is that although fairly substantial differences in cadmium and copper concentrations can exist in adult American oysters, the eggs from these oysters contain similar concentrations of these metals. This suggests that the amount of metal transferred from adult to egg is fairly constant and not dependent on the amount of metal available in the adult oyster. To confirm this latter hypothesis, however, adult oysters with a much greater range of concentrations of these metals would have to be examined. No conclusion could be drawn from the silver, lead, and zinc concentrations because the levels of these metals were quite similar for adults and eggs for the two groups of oysters examined.

TABLE 1

Trace metal concentrations in eggs and adults of the American oyster *Crassostrea virginica*.

Metal	N*	Metal concentrations (ppm, dry wt) Avg.	S.D.	N*	Avg.	S.D.
		Housatonic River, Connecticut				
	12	Adult oysters		4	Oyster eggs	
Ag		12.1	4.45		<1.6	-
Cd		28.1	7.49		<1.6	-
Cu		2208.	793.		28.9	3.96
Pb		<4.2	-		<10.0	-
Zn		10460.	2483.		82.4	8.05
		Branford, Connecticut				
	13	Adult oysters		4	Oyster eggs	
Ag		16.4	6.02		<1.2	-
Cd		15.6	3.46		<1.2	-
Cu		1260.	415.		27.8	7.80
Pb		7.1	2.45		<9.9	-
Zn		8300.	1800.		65.9	19.6

*Number of individual oysters examined for adults and number of pools of eggs from two oysters for the eggs.

Mention of product name is merely to facilitate description and does not imply endorsement by the National Marine Fisheries Service.

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Use of Sorbents for Oil Spills

It is generally acknowledged that removing spilled oil from the sea is preferable to dispersing it, but there have been severe problems in devising methods of collecting oil from thin slicks. In this article the merits of various methods of absorbing spilled oil are reviewed.

In accidental oil spills, the oil is frequently dispersed but this treatment may not always be desirable (Kondo, 1972).