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Zinc-65 Levels in Oysters in the Thames River (Connecticut)

Abstract. Levels of zinc-65 in oysters from selected sites in the Thames River (Connecticut) have been determined for a 12-month period. The highest levels of radioactivity were in oysters from a bed situated opposite the United States submarine base in March 1961 (1637 micromicrocuries per kilogram of moist tissue). None of the samples assayed showed sufficient amounts of radioactivity to represent a health hazard.

Perkins and Nielsen (*1*) reported that appreciable quantities of zinc-65 were present in various foods grown along the Columbia River and in individuals who have presumably ingested foods containing zinc-65. Japanese workers (*2*) have made numerous observations of the zinc-65 level in marine organisms.

In a laboratory experiment, Chipman and his co-workers (*3*) investigated the uptake and accumulation of zinc-65 in marine organisms, but their work did not involve a study of low-level zinc-65 already in the environment and organisms.

Murphy *et al.* (*4*) reported that zinc-65 levels in Chesapeake Bay oysters were 124 $\mu\mu$c/kg in March 1958, and 178 $\mu\mu$c/kg in January 1959. Perkins *et al.* (*5*) found that fresh West Coast oysters contained a total of 63,500 $\mu\mu$c/kg of zinc-65 in 1960.

As part of a larger study it was the purpose of the research reported here to determine the concentration of zinc-65 in the oyster (*Crassostrea virginica*) in the Thames River (Conn.) at three selected sites. From knowledge of existing oyster beds, the sites were located as follows: area A, above the United States submarine base; area B, opposite the United States submarine base; area E, below the United States submarine base and opposite the United States Coast Guard Academy.

Oysters have been gathered from one bed at each of these locations every 2 weeks, weather permitting, since May 1960. The organisms have been analyzed for total zinc and for zinc-65 during this period. Estimations of total zinc have been made by the zinc dithizonate colorimetric procedure. These data are recorded in Table 1.

Since zinc-65 content is very low in this area, it was necessary to use the meat from 50 oysters for each sample. The procedure adopted was to remove the meat and weigh it, after draining off the liquid. The pooled meat was dried and ashed, and then the ash was dissolved in nitric acid and centrifuged. The insoluble ash was washed three times with small amounts of nitric acid and centrifuged. Excess ammonium hydroxide was added to the combined acid supernatants, the insoluble hydroxides were separated by centrifugation, and the ammoniacal solution was decanted and saved. The insoluble hydroxides were washed with ammonium hydroxide until no further blue coloration appeared in the supernatant. Hydrogen sulfide was added to the combined ammonium hydroxide supernatants; then the mixture was centrifuged, and the supernatant liquid decanted. The solid sulfides obtained were dissolved in concentrated hydrochloric acid, and the solution was evaporated to dryness. The residue was transferred to culture tubes, and the centrifuge flasks were rinsed with small quantities of 2*N* hydrochloric acid. The contents of the culture tubes were brought to a volume of approximately 5 ml (capacity of well in scintillator crystal) and were assayed for radioactivity. Results of radioactive analysis appear in Table 1.

Concentrations of zinc-65 in the oyster in the Thames River from May 1960 through February 1961 were slightly lower than values reported for Chesapeake Bay oysters (*4*) and were much less than the values for West Coast oysters (*5*).

From March 1961, zinc-65 content in Thames River oysters has been as much as 10 times that reported for Chesapeake Bay oysters but only about 1/40th of the zinc-65 content in West Coast oysters.

Table 1 shows that in March 1961 there appears to have been a peak concentration with a marked reduction for April and a continued decline in May. It is also evident that total zinc does not increase in a corresponding fashion (*6*).

Table 1. Total zinc and zinc-65 content of oysters collected from selected sites in the Thames River. The zinc-65 content is given in micromicrocuries per kilogram of moist tissue.

Date	Area A (above submarine base)		Area B (opposite submarine base)		Area E (below submarine base)	
	Zinc-65 ($\mu\mu$c/kg)	Total zinc (%)	Zinc-65 ($\mu\mu$c/kg)	Total zinc (%)	Zinc-65 ($\mu\mu$c/kg)	Total zinc (%)
23 May 1960	43.1	0.201	47.3	0.173		
6 June 1960	29.7	.185				
5 July 1960	31.2	.150				
1 Aug. 1960					38.3	0.212
25 Aug. 1960			45.5	.160		
29 Aug. 1960	65.0	.174			54.7	.166
13 Sept. 1960	45.2	.163			59.6	.183
27 Sept. 1960	51.6	.163			45.5	.175
11 Oct. 1960	35.1	.193	41.9	.148	46.1	.177
24 Oct. 1960	31.9	.181	49.3	.156	61.3	.208
21 Nov. 1960	41.9	.176	40.2	.159	67.6	.211
20 Dec. 1960	50.9	.241	24.0	.192	17.9	.204
3 Jan. 1961	35.9	.209	33.9	.191	20.7	.202
18 Jan. 1961	46.2	.185	24.4	.188	65.0	.225
13 Feb. 1961			95.1	.148		
16 Feb. 1961	51.8	.223			67.1	.280
1 Mar. 1961	295.2	.224	293.9	.188	141.1	.225
13 Mar. 1961	455.0	.199	694.0	.215	179.9	.230
28 Mar. 1961	1237.7	.197	1637.6	.184	314.8	.217
10 Apr. 1961	1239.3	.181				
12 Apr. 1961			868.6	.170	1061.6	.219
25 Apr. 1961	722.9	.174	766.8	.135	766.7	.198
8 May 1961	628.4	.161	907.1	.147	392.2	.190

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Table 1 shows that in March 1961 there appears to have been a peak concentration with a marked reduction for April and a continued decline in May. It is also evident that total zinc does not increase in a corresponding fashion (*6*).

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