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Radiocarbon Activity of Shells from Living Clams and Snails

As a logical extension of an artificial tracer study on snail shells (*1*), measurements were made of the natural carbon-14 activity of shells from living clams and snails collected from a variety of environments. Three samples were measured, representing growth in lime-poor, fairly soft, and lime-rich waters (Table 1). Samples were collected by D. W. Taylor in September and October 1959, and measured at the U.S. Geological Survey's radiocarbon laboratory. Sample W-1003 (*2*), from lime-poor water, had approximately 10 percent less C^{14} than the conventional modern standard (95 percent N.B.S. oxalic acid standard); W-1006 (*3*), from fairly soft water, was 22 percent deficient; and W-1004 (*4*), from lime-rich water, was 32-percent deficient. These deficiencies correspond to errors of approximately 800, 2000, and 3000 years if no correction is made for initial activity in computing sample ages. These measurements agree essentially with those of Broecker and Walton (*5*) and Keith and Anderson (*6*).

Table 1. Radiocarbon activity of shells.

Sample No.	Environment	δC^{14} (per mil)
W-1003	Spring pool in basalt, lime-poor water	−96.6
W-1006	Snake River, fairly soft water	−224.9
W-1004	Portneuf River, in limestone area, lime-rich water	−323.3

The tracer study (*1*) indicated that a snail can incorporate 10- to 12-percent inorganic carbon in making its shell and "the remainder of the carbon in the shell carbonate must come from food or the atmosphere, and the resulting C^{14}/C^{12} ratio will be essentially the same as in those sources." The control laboratory snails ate "modern" food (lettuce), whereas the natural snails ate food with a C^{14}/C^{12} ratio similar to their environment and so showed the greater deficiency in C^{14}. The limiting value of a system in contact with the atmosphere is 50-percent "dead" carbon, theoretically possible, but not yet measured anywhere. Even such a great deficiency in C^{14} as this will produce a constant error in the dating of unknown nonmarine carbonate samples of one C^{14} half life (5568 or 5730 years). Of greater significance is the postdepositional alteration and replacement of the original shell composition, which can add or subtract material. Neither visual nor mineralogic criteria can be used to predict the degree of this alteration (*7*). This can be determined only by mass spectrometric isotopic studies (*8*).

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Mutations: Incidence in Drosophila melanogaster Reared on Irradiated Medium

Abstract. *An increase in the rate of mutation has been found in* Drosophila melanogaster *reared on a basic medium that was irradiated with a sterilizing dose (150,000 rads) of cobalt-60 gamma rays. In Muller-5 tests, sex-linked recessive lethals occurred only in the F_2 progenies of the male test flies obtained from breeding the parent flies on irradiated medium, while visible changes occurred in experimental cultures from both the control and irradiated media. The frequency of sex-linked recessive lethals was 0.35, 0.55, and 0.8 percent in three independent experiments. Visible changes were two to six times more frequent in the irradiated series than in the controls.*

Earlier studies on the effects of irradiated culture media (White's basic medium, potato mash, and fruit juices) on mitosis in root meristems of *Hordeum,* sp. (barley), *Vicia faba* (broadbean), and *Allium cepa* (onion) have revealed that the products of such irradiation may have radiomimetic effects (*1*). In view of the obvious bearing of these data on assessing the wholesomeness of food sterilized by irradiation, we studied *Drosophila melanogaster* to ascertain whether there is an increase in mutations in flies that are fed irradiated food.

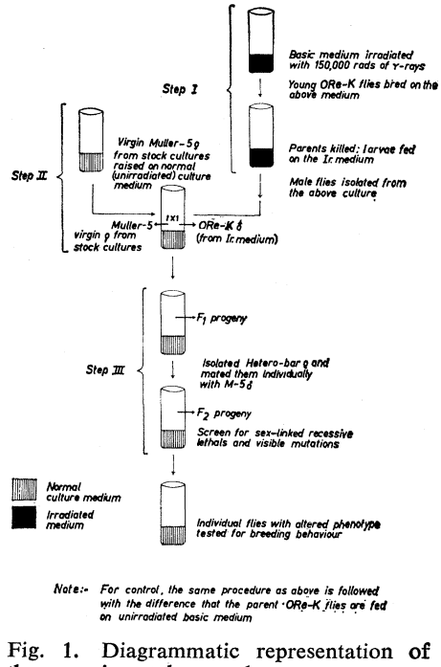

Fig. 1. Diagrammatic representation of the experimental procedure.