during purification (*10*). Indeed, the low RNA/DNA ratio (1:3) reported by Smith and Stoker (*11*) for *Coxiella burnetii* may reflect such losses and suggests the physicochemical lability of rickettsial RNA.

The differences between the results obtained at 36°C and at 4°C suggest the participation of enzymatic processes in the loss of nucleic acids from the rickettsiae. Since the omission of glutamic acid did not influence the experimental results, "energy metabolism" does not seem to be of importance. The present findings are perhaps analogous to the degradation of RNA in resting cultures of *Escherichia coli* H, which has been reported by Stephenson and Moyle (*12*).

The loss of nucleic acids from *R. mooseri* upon incubation at 36°C may be one of the reasons for the concomitant inactivation of the biological properties of this organism.

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4 October 1957

Barium-140 Radioactivity in Foods

We wish to report the presence of the fission products barium-140 and lanthanum-140 in certain foodstuffs in the United States during periods of nuclear weapons tests. The presence of these nuclides in the amounts observed in no way constitutes a hazard; it carries none of the potential implications associated, for example, with strontium-90. It is of practical concern primarily to those engaged in measurements of radioactivity near the natural levels, and when an accurate summation of total radiation is desired. As in the case of cesium-137 (*1*), measurements of barium-140/lanthanum-140 may also be of value in the study of the fallout process.

Barium-140 has a half-life of 12.8 days, and its daughter lanthanum-140 has a half-life of 40.2 hours. Because of their somewhat similar biochemistry and the short half-life of lanthanum, secular equilibrium is likely to be maintained in biological systems, and both nuclides will follow the chemistry of barium. The biochemical behavior of barium-140 is similar to that of calcium and of strontium-90, but the short half-life of barium-140 and the larger biological discrimination factors against it render it potentially much less dangerous than strontium-90.

The presence of barium-140 was first noted in some deer in New Mexico during the summer of 1956—presumably the result of the United States nuclear test Operation Redwing. It was detected and identified (by its half-life) by means of the Los Alamos human counter (*2*), a large 4π liquid scintillation counter designed especially for the measurement of radioactivity at natural levels in people and foodstuffs. A threefold increase was noted in the gamma activity in the spectral region from 1 to 2 Mev (normally potassium-40 only). This corresponds roughly to a barium-140 activity of 0.03 μc per 70 kg, which is 6 percent of the maximum permissible amount for man, on the basis of the "large population" value (*3*). A cow taken directly from the New Mexico range showed a similar amount of barium-140, but commercial beef did not, perhaps because of different feeding habits or because of the time lag between slaughtering and the appearance of the meat on the retail market. While the apparent potassium-40 activity of milk samples showed a few instances of slight increases during 1956, it was not possible to identify the excess activity.

Barium-140 appeared in several United States milk samples during the months of June, July, and August, 1957, presumably as a result of distant fallout from the test operation in Nevada, Operation Plumb-bob, and perhaps from test operations of the U.S.S.R. Identification of the excess activity in the potassium region of the spectrum was again possible on the basis of the measured half-life. Confirmation of the assignment of the activity to barium-140 was obtained by spectral analysis, for which an 8- by 4-inch sodium iodide crystal in a steel room similar to the installation developed by Marinelli and his coworkers at the Argonne National Laboratory (*4*) was used. All five of the prominent barium-140/lanthanum-140 gamma peaks were identified.

Table 1 summarizes dates and concentrations of barium-140 in powdered milk for those locations at which the barium-140 gamma activity exceeded that of natural potassium-40. While detectable increases in activity in the upper energy channel occurred at other sampling points during the summer months, at none of them did the increase reach this level. Thirty-seven points are routinely sampled.

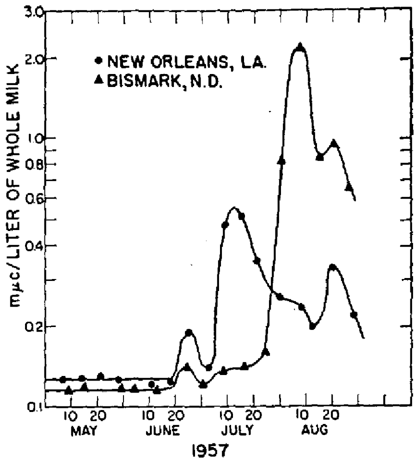

Fig. 1. Typical curves of upper channel activity versus date, for Bismarck, N.D., and New Orleans, La.

The dates reported in Table 1 are those on which the samples (50 to 100 pounds of nonfat-dry milk solids) were received at Los Alamos. In general, the delay between production and arrival is about 1 week, and for accurate correlation with meteorological data, the actual production date must be ascertained.

Table 1. Barium-140 peak levels in milk.

Date received (1957)	Estimated barium-140 content (mμc/lit of whole milk)
Bismarck, N.D.	
7 Aug.	2.2
20 Aug.	0.85
Idaho Falls, Idaho	
10 June	0.40
5 Aug.	0.32
26 Aug.	0.54
Payette, Idaho	
19 June	0.12
9 Aug.	0.46
Louisville, Ky.	
21 July	0.27
9 Aug.	0.46
New Orleans, La.	
15 July	0.36
20 Aug.	0.19
Willows, Calif.	
10 June	0.31
Ladysmith, Wis.	
16 Aug.	0.23
Des Moines, Iowa	
9 Aug.	0.18
Ogden, Utah	
19 June	0.06
14 Aug.	0.15
Monroe, Utah	
11 June	0.09
25 July	0.12