STRONTIUM-90 IN HUMAN DIET

RESPONSIBILITY for estimating the contamination of food by radioactive fall-out has now been transferred to the Agricultural Research Council. The report, "Strontium-90 in Human Diet in the United Kingdom, 1958" (London: H.M. Stationery Office, 1959. 4*s*.), thus continues the series formerly issued by the Atomic Energy Authority.

The general level of radioactivity in food in the United Kingdom for 1958 was small, comparable with that found in the United States, and well below any danger-level. Most of the radioactivity in milk and dairy products, bread and flour, and in leafy and root vegetables, was brought about by the deposition of radioactive debris on the leaves of herbage and crop plants during periods of rain, followed by foliar absorption of (in particular) strontium-90. Only the material deposited during the two months before herbage was eaten by cows or before crops were harvested appeared afterwards in appreciable amounts in human food. Once the debris penetrated into the soil, its 'availability' to plants was greatly reduced. Consequently, the accumulation of available strontium-90 in the soil since nuclear weapon testing commenced in 1945 had been slight.

The radioactivity of milk was highest in western areas of Britain and appeared to be related to the distribution of rainfall. The level of radioactivity increased in all areas during the latter half of 1958, partly as a result of an unusually high rainfall and partly of an increase in the number of nuclear tests.

Examination of certain upland areas that are characterized by high rainfall and by slow growth of herbage had shown that milk from these areas often contained very high levels of strontium-90. This could not be accounted for entirely on the basis of high rainfall, low soil-calcium, and low production of herbage per acre. It was thought that strontium-90 must become entrapped in the mat of vegetation and roots at the base of the sward, and be held available to the plant in successive seasons, in a way not observed on lowland pastures.

The report shows that when strontium was absorbed from the diet, it tended to replace calcium in bone tissue. High levels of strontium-90 in bone could damage the bone or bone marrow, ultimately causing tumours, leukæmia, or other bone diseases. However, it appeared that the replacement of calcium by strontium-90 in new bone tissue was governed not by the amount of strontium-90 in the diet but by its proportion relative to calcium (expressed as micro-microcuries of strontium-90 per gm. calcium). Furthermore, the human body, in absorbing mineral substances from the digestive tract, discriminated against strontium, so that the ratio of strontium-90 to calcium which was found in bone was only one-quarter of that in the food eaten.

The report also discusses other factors which tended to reduce the ratio of strontium to calcium in the diet. Thus, the cow discriminated against strontium when producing milk from grass, so that the proportion of strontium-90 to calcium in milk was only one-seventh of that in the herbage eaten. Leafy vegetables appeared to absorb strontium less efficiently than herbage, and contained correspondingly less radioactive material. Although wheat contained a fairly high proportion of strontium-90, milling, as in the preparation of white flour, removed much of the calcium and strontium in bran and offal, while the subsequent addition of strontium-free chalk as a calcium supplement further reduced the proportion of strontium to calcium in bread and flour products. The report noted that the ratio of strontium-90 to calcium in diets based on wholemeal bread was likely to be higher than average, as there was no legal requirement to add chalk to wholemeal flours, while the milling process did not tend to remove any of the strontium contained in the grain.

However, even on the most unusual food and living in the wettest area, no one in the United Kingdom was likely to consume a diet containing more than 23 μμc. of strontium-90 per gm. calcium, about half the ratio (40 μμc.) at which a Medical Research Council Committee thought that 'immediate consideration' should be given to the problem. It is emphasized that no evidence had been found of such a diet being consumed by anyone. The amount of strontium-90 per gm. calcium in the average diet was about 6 μμc., and, provided that the rate of deposition of the radioactive dust did not greatly increase in the future, either as a result of meteorological factors or because of further testing of nuclear devices, such a level should give no cause for anxiety.

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IMMEDIATE AND LOW-LEVEL EFFECTS OF IONIZING RADIATIONS

THE biological effects of low doses of ionizing radiations, a topic of obvious interest and importance, formed one of the main themes of a symposium held in Venice, June 22–26, under the joint sponsorship of Unesco, the International Atomic Energy Agency and the Comitato Nazionale per le Ricerche Nucleari of Italy. The Organizing Committee included Prof. Z. M. Bacq (Belgium); Profs. E. Boeri and A. A. Buzzati-Traverso (Italy); and Dr. A. Hollaender (United States). Those invited were fortunate in being able to take part in a conference of which content and programme arrangements were of a high order, and which was held in the beautiful surroundings of the Fondazione Giorgio Cini, on the Isola di San Giorgio Maggiore. Each of the nine sessions was arranged to contain only a few papers, so that there was ample time for discussion and for a few short communications which were relevant to the main themes. Sixteen countries, and a wide range of scientific disciplines, were represented among the 116 research workers who took part.

The symposium opened with a review of certain aspects of quantitative radiobiology by K. G. Zimmer (Kernreaktor, Karlsruhe, Germany). After discussing