tures, the I^{131} levels in milk fall rapidly within a matter of days.

The distribution of radionuclides in foods was reviewed by M. Eisenbud (New York University Medical Center). He pointed out that about 20 percent of the total normal radiation dose received by man arises from approximately 2300 $\mu\mu$c of potassium-40 ingested daily in food. In addition, about a half million people in the middle western section of the United States drink water which has a radium content more than ten times normal. Recent studies in Brazil have shown that foods grown in certain areas have radium and mesothorium contents 10 to 30 times normal.

Eisenbud presented data showing that the Sr^{90} content of foods increased between 1954 and 1959 and then declined during the temporary moratorium on weapons tests. The values have again increased progressively since the fall of 1961 and may be anticipated to increase further during the next year or two, even in the absence of further testing. American children receive about 50 percent of their Sr^{90} intake from milk, primarily because this food is a principal source of calcium. However, other foods, particularly vegetable crops, have higher Sr^{90}:Ca ratios. Short-lived Sr^{89} may be present in foods at levels 10 to 20 times greater than Sr^{90}, but Sr^{89} does not accumulate in food items.

Cesium-137 is distributed in all foods and parallels potassium distribution. Iodine-131 is found primarily in fresh milk because of the rapid processing of this product for consumption. Those dairy products and other foods requiring longer processing times contain almost no radioiodine.

The fact that theories of radiation damage have been radically modified in the past decade was emphasized by H. B. Jones (University of California, Berkeley). The threshold theory has been replaced by a realization that tissue damage is a function of the dose received, at least at the relatively large (compared to fallout) doses studied to date. At these levels, radiation can kill cells, cause mutations, induce cancer, and perhaps simulate aging. Extrapolation of these effects downward into fallout radiation levels gives estimates of changes in the human population which are too infrequent to separate from those resulting from natural radiation.

In the case of I^{131}, primary concern is given to the possibility of inducing thyroid cancer in infants and young children. Adequate data are lacking on this point. However, present estimates suggest that one roentgen of thyroid exposure may increase the risk of thyroid cancer in the range of 1 in 10,000 to 1 in a million. The sum of other causes of thyroid cancer is much greater, thus emphasizing the difficulty of documenting fallout effects. Similar calculations suggest that increments in bone cancer from radiostrontium will be comparably small. Jones stressed that with the growing knowledge and newer theories we must not neglect conscientious attempts to quantify the effects of fallout, and must be careful to weigh anticipated gain against potential risk. He estimated that if natural radiation decreases life expectancy by about one month, then present fallout radiation may reduce life expectancy by about 0.1 month. In contrast, the automobile (considering the maimed and the dead) may reduce average life span by as much as 2 to 3 years. Nevertheless, the results of increasing long-term exposure from continued testing may ultimately have to be reckoned with.

M. S. Read (National Dairy Council) discussed research directed towards developing countermeasures against radionuclides in food. He pointed out that good farming practices (for example, liming of soil, and so forth) decrease radionuclide uptake by plants. Similarly, normal food preparation and processing (such as washing, milling, necessary delay in transit) remove sizable portions of fallout contamination from foods. The animal, too, may be considered to be a "fallout filter," by depositing only about 25 percent of the ingested Sr^{90} in the carcass and about 10 percent in the milk.

Several methods for reducing food contamination are under study. Placing cattle on aged feed, in which I^{131} has been reduced through normal decay, was tried in two parts of the country during 1962 with limited success. However, data from individual farms suggest that reductions of I^{131} concentration may be achieved by this method. These studies have delineated many of the problems requiring solution before this technique can be applied on a large scale to the nation's milk supply. Read cited work directed toward removing Sr^{90} from fresh fluid milk. A pilot plant has been developed that is capable of removing over 90 percent of the Sr^{90} from 100 gallons of milk per hour. The method has not been scaled to commercial needs and the necessary equipment is not available for purchase by dairies. In addition, the nutritional and bacteriological safety of the treated product has not been evaluated.

He concluded that many investigations are in progress concerning countermeasures. However, no method is yet available for widespread or for individual use nor are countermeasures recommended by health officials at the present time.

In the lively discussion period following the symposium, another important point was emphasized. Populations living at high elevations have 2 to 4 times the normal background radiation observed at sea level. Similarly, several population groups have lived for generations in environments giving radiation doses upwards to 100 times those usually considered normal. No adverse effects of these radiation levels have been demonstrated.

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Biomedical Information

One of the major events at the 47th annual meeting of the Federation of American Societies for Experimental Biology at Atlantic City, was a symposium on biomedical information on 17 April 1963.

The session opened with a brief description of the general growth of the scientific information problem and some explicit information about the expansion of the area of Federation interest by Robert A. Harte, chairman of the session and executive officer of the American Society of Biological Chemists. This was followed by a statement of government responsibility presented by F. Ellis Kelsey, special assistant to the surgeon general of the U.S. Public Health Service. Kelsey's statement was based largely on the conclusions reached by the Surgeon General's Conference on Health Communications (November 1962) and on the results of subsequent thinking in the Public Health Service on the problems speci-

fied there. The Public Health Service program concentrates on six general areas: (i) scientific publications, (ii) unpublished information, (iii) abstracting and indexing services, (iv) evaluation of scientific information, (v) the information clearing house, and (vi) information service centers.

Philip H. Abelson, editor of *Science*, addressed the audience on "An editor's view of publication problems." The primary publication as the source document for formal scientific communication is a critical point in the entire process and the quality of such publication is directly related to the meticulousness with which the refereeing process is carried out. This varies widely from journal to journal. In addition, journals must be well funded either through private sources, subscription income, page charges, or some combination of these if the editor is to be able to discharge his responsibilities to his journal and to the scientific community both promptly and efficiently.

Raymund L. Zwemer (American Physiological Society) summarized some of the "New approaches to 'keeping up' with the literature." These included, in his view, such elements as permuted indexing and variations thereof, key word indexing, source indexing, and translation services, both cover-to-cover and selective, as well as the conventional abstracting services. The value functions of these several approaches were explored in some detail and the problems of their effective implementation reviewed.

"Current trends in documentation research" was the subject of the fifth paper presented by Harold Wooster (Air Force Office of Scientific Research), who discussed some of the more important modern methods under study. These involve the application of both computer techniques and other methodologies to such problems as chemical structure storage and search, mechanical translation, optical scanning to facilitate input to machines, and the various alternatives being considered as potential substitutes for the present scientific journal. It is perhaps significant that a very large number of enterprises listed in the National Science Foundation roster of current activities in research and development are being supported by agencies such as the Air Force Office of Scientific Research. This phenomenon necessarily focuses attention on the great and growing importance of the informal re-

port literature generated in such voluminous quantities as a result of government-financed programs in science and technology.

The symposium concluded with a statement of the importance of the problem from the viewpoint of the national interest, presented by Julius N. Cahn (director of the Medical Research project of Senator Humphrey's Subcommittee on Reorganization of the United States Senate Committee on Government Operations). Cahn underlined the importance with which the government views the information problem and its vital interactions with the health and welfare of the nation. With the real understanding exhibited by the Senate Committee and its appreciation of the problems before the scientific community, the outcome of the Committee studies may be expected to provide a continuing impetus for greater accomplishment by the scientific community.

The symposium was outstanding in the sense that the audience it attracted contained predominantly working scientists rather than professional documentalists, information specialists, or librarians. Effective progress in battling the "exploding literature" can only be attained to the extent that the working scientist is aware of the problem and appreciative of the necessity for taking effective steps to overcome it. Any forum, therefore, which brings the problem to the working scientist and enlists his sympathetic understanding represents an important contribution to the attainment of better solutions.

The papers presented at the symposium will be published later this year in *Federation Proceedings*.

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Blood Flow

Physiologists, engineers, mathematicians, and physicists from the United States and seven foreign countries attended the first international symposium on pulsatile blood flow which was held at the Presbyterian Hospital in Philadelphia, 11 to 13 April. Recent progress in the dynamic analysis of blood flow was reviewed, the present state of our knowledge of the field was re-evaluated, and the existing problems and their possible solutions were outlined.