by the longer lived isotopes. However, the short-lived isotopes may be acquiring more significance than previously thought in view of the fact that fallout from the stratosphere has proven to be faster than estimated earlier, together with the possibility of selective concentration in some particular organ of the body (i.e., radioactive iodine in the thyroid). The question apparently merits greater attention than it has received in the past, particularly in forecasting the effects of future tests.

Significance of Carbon 14

Information provided for the hearings suggests that radioactive carbon 14 from past weapons tests could constitute a genetic hazard to the world's population. The magnitude of this hazard has been estimated to be comparable to, and in some estimates in excess of, the genetic hazard from other fallout isotopes. One of the principal problems in making these estimates is how to assess the hazard of a dose which may be comparable in magnitude to that from cesium 137 and other genetically hazardous fallout isotopes but which occurs over a much longer time period (the equivalent of 8,000 years compared with 40 years or so). Here again, a problem was presented for which available information appears to be inadequate. Greater emphasis should be given to means by which this problem may be properly evaluated.

Maximum Permissible Dose and Maximum Permissible Concentration

It was generally agreed that in considering acceptable exposure limits in the context of worldwide environmental contamination from fallout, the best assumption that can be made at present concerning the relationship of biological effect to radiation dose is to assume that any dose, however small, produces some biological effect and that this effect is harmful. The testimony made it clear that much difficulty now exists in evaluating the hazards of environmental contamination from worldwide fallout. This is because of the difficulty in attempting to apply to whole populations exposed to fallout the concepts behind "maximum permissible dose" and "maximum permissible concentration," which were developed for occupational exposures to individuals under controlled conditions.

Even if concepts developed for industrial application were clearly transferable, the testimony suggested confusion over such points as to how to apply existing maximum permissible concentrations for water to food in the fallout situation, how to handle diets (what time period to consider when "averaging"), and how to allow for the possible presence of other isotopes than the one being considered.

Further evidence of confusion concerning hazards evaluation in the testimony presented was given by the use, on the one hand, of industrially oriented exposure recommendations discussed above and by the use, on the other hand, of comparisons with natural background radiation levels. At present, it appears that each controversial situation involving fallout exposure is evaluated on an ad hoc basis, but with little understanding or agreement on how the evaluation is to be done.

Effects of Past and Future Tests

It was forecast that the average concentration of strontium 90 in human bone from past weapons tests will reach its maximum value in the period 1962–65. The predicted U.S. average value of 6 strontium units (S.U.) is slightly higher than for average Western populations (5 S.U.) and lower than the average for Eastern peoples (10 S.U.). Thus for testing already conducted, man's exposure to fallout radiation is and will be relatively small compared to the "normal background" radiation or the standard recommended by the International Commission on Radiological Protection (ICRP).

Assuming successive cycles of testing over the next two generations or less, following the same pattern as the past 5 years, the predicted average concentration in bone will be about 48 strontium units. This is close enough to the maximum permissible body burden of 67 strontium units recommended by the International Commission on Radiological Protection to suggest that a hazard to the world's population could result during this period.

Alternative Patterns of Testing

Testimony at the hearings indicated that—

Underground tests can be conducted with relatively small weapons, without contaminating the atmosphere with radioactivity. Great practical difficulties exist for testing large or megaton weapons underground.

Outer space tests can be conducted under conditions—among which are distance and yield of the device—which will reduce atmospheric contamination to an as yet unknown degree. To obtain test data, there exist practical problems of instrumentation which would require further tests in space to resolve.

Environmental testing is necessary to establish effects of nuclear weapons on military targets, equipment, radiation levels, etc.

Government Program and Organization

While the AEC has accelerated its efforts in fallout research in the past 2 years, particularly in sampling and analysis, the fallout program as a whole apparently has not received the high administrative level support it needs to give it the necessary impetus. Increased dollar outlays for facility and operating expenses have been useful but further improvements in the program, its administration and its organization, are required. These should include adequate staffing in the AEC Biology and Medicine Division to meet the broad requirements of an expanding program. Better coordination by the AEC of fallout information is essential. Adequate radiation standards must be developed in cooperation with the various Federal, State, and private agencies.

The Public Health Service, which has been conducting a survey of radioactive fallout debris in milk, operates a research laboratory in Cincinnati and has a newly created staff in Washington. However, expenditures and numbers of personnel remain small.

With regard to the fallout program, increased emphasis should be placed on the "hot spot" program, declassification and periodic publication of useful information, development and application of exposure standards, and better coordination among Government agencies in determining, controlling, and evaluating environmental hazards.

In implementing an effective program, the first job is to define clearly what the real problems are and then assign responsibilities for meeting these problems. In the process, care should be taken not to interfere with existing programs which are making major contributions to knowledge in the fallout field.

Scientists in the News

CHARLES A. ANDERSON has been named chief geologist for the U.S. Geological Survey, a position recently vacated by WILMOT H. BRADLEY, who was appointed in 1944. Anderson, whose career with the Survey began in 1942, has been heading the Mineral Deposits Branch.

ARTHUR W. GRACE, professor and head of the department of dermatology and syphilology at the State University of New York Downstate Medical Center for more than 20 years, has retired and has been named professor emeritus of dermatology and syphilology. A native of Australia, he completed his studies in medicine and public health at the University of London, England, and also received the Diploma of Tropical Medicine and Hygiene of the Conjoint Board of Physicians and Surgeons of England in 1924.

He came to this country in 1931 as a member of the faculty of Cornell University Medical College, where he remained until he joined the Downstate Medical Center. Grace will continue his medical practice in Brooklyn and his duties as director of a research project on blood vessels of the skin at the Medical Center. At present he is in Africa for 2 months, delivering a series of lectures on skin and venereal diseases.

HENRY C. HARRISON, retired electrical engineer of Bell Telephone Laboratories, will be awarded an Elliott Cresson Medal by the Franklin Institute, Philadelphia, Pa., on 21 October.

FRANKLIN W. STAHL, associate professor of zoology at the University of Missouri, has been appointed associate professor of biology in the Institute of Molecular Biology of the University of Oregon.

VALY MENKIN, associate professor of experimental pathology at Temple University School of Medicine, has resigned and will be a guest investigator at the Henry Phipps Institute of the University of Pennsylvania, Philadelphia.

WAYNE TAYLOR has been appointed associate professor in the Science and Mathematics Teaching Center at Michigan State University. He was formerly on the staff of the University of Texas, where he served as center coordinator for the AAAS Science Teaching Improvement Program's Center for the Study on the Use of Science Counselors. Taylor is vice chairman of the AAAS Science Cooperative Committee on the Teaching of Science and Mathematics.

President Eisenhower has named ARTHUR S. FLEMMING, Secretary of Health, Education, and Welfare, chairman of the new Federal Radiation Council [see *Science* **130**, 490 (1959)].

Charles A. Anderson, chief geologist, U.S. Geological Survey.

HORACE M. POWELL, research adviser in the biological research division of Eli Lilly and Company, has retired after having been affiliated with the Lilly Research Laboratories for 34 years.

ALEXANDER H. FLAX, vice president and technical director of the Cornell Aeronautical Laboratory, has been named chief scientist of the Air Force. He will serve as scientific adviser to the Air Force Chief of Staff.

HOWARD W. JOHNSON, associate dean of the School of Industrial Management at Massachusetts Institute of Technology, has been appointed dean of the school effective 1 November. He will succeed E. P. BROOKS.

JOHN W. ROSS, formerly research microbiologist and biochemist at the Red Star Yeast and Products Company, has been appointed senior research microbiologist at the Squibb Institute for Medical Research, New York, N.Y.

DAVID F. BROWER, atomic physicist at General Dynamics Corporation, San Diego, Calif., has been appointed assistant manager of the engineering department of Rheem Semiconductor Corporation, Mountain View, Calif.

EDWARD W. D. NORTON, associate professor of ophthalmology at the University of Miami School of Medicine, has been appointed professor and chairman of the university's department of ophthalmology. The newly formed department was formerly a division of the department of surgery.

SIDNEY RIEGELMAN, assistant professor of pharmacy at the College of Pharmacy of the University of California Medical Center, San Francisco, was awarded the Ebert Prize at a recent meeting of the American Pharmaceutical Association for his paper "The kinetics of rectal absorption of anions and of undissociated molecules."

I. THOMAS REAMER, chief pharmacist at Duke University Hospital, has received the 1959 Harvey A. K. Whitney Lecture Award of the American Society of Hospital Pharmacists.

PAUL D. ROSAHN, pathologist at the New Britain General Hospital, New Britain, Conn., and associate clinical professor of pathology at Yale University School of Medicine, has been appointed visiting professor of pathology at the University of Medical Sciences, Bangkok, Thailand, for 1 year, beginning in September.

Recent Deaths

ANTHONY BASSLER, New York; 85; specialist in gastroenterology, who had practiced medicine for more than 60 years; former professor of gastroenterology at the Polyclinic Medical School and Fordham University; founder and chairman of the section on gastroenterology of the American Medical Association; 20 Aug.

FLANDERS DUNBAR, South Kent, Conn.; 57; psychiatrist with a private practice in New York; pioneer in psychosomatic medicine; author of *Psychiatry in the Medical Specialties*; 21 Aug.

LEE F. HAWLEY, Madison, Wis.; 77; retired research chemist and one of the founders of the U.S. Forest Products Laboratory; 19 Aug.

F. S. McKAY, Colorado Springs, Colo.; 85; dentist and a pioneer in the fluoridation of drinking water; 21 Aug.

A. FRANK OWINGS, Washington, D.C.; 37; deputy assistant director for Technical Information Service, U.S. Atomic Energy Commission; 15 June.

WILLIAM STROUD, Philadelphia, Pa.; 68; chairman of the department of cardiology at the University of Pennsylvania Graduate School of Medicine and chief of staff at Children's Heart Hospital; 19 Aug.

Errata: In Wilder Penfield's article, "The interpretive cortex," [*Science* **129**, 1719 (26 June 1959)], the word *psychical* should be substituted for *physical* on page 1719, column 3, line 15. On page 1723, column 3, last line, reference should be made to Fig. 6, not Fig. 3.