Meetings

Sulfur Isotopes

An international symposium on the biogeochemical cycle of sulfur isotopes was held at Yale University from 12 to 14 April. The symposium, sponsored by the National Science Foundation, was organized by M. L. Jensen (department of geology, Yale). Participating were more than three dozen scientists (including representatives from Canada, England, Japan, New Zealand, and Sweden) who are doing research on the bacteriological, biological, chemical, and geological role of sulfur and the distribution of stable sulfur isotopes.

The meetings offered an opportunity for all investigators (with the exception of the Russians) who have made extensive studies on sulfur isotopes to gather together and agree upon the acceptance of sulfur isotope standards. During the past, troilite from the Cañon Diablo meteorite has been accepted by several investigators as the standard, but its absolute S^{32}/S^{34} composition has been assumed by various groups to be 22.200, 22.210, 22.220, and 22.222!

Even though the precision of sulfur isotope measurements, in comparison to a standard, is at least ± 0.02 percent, the absolute values cannot be measured with a precision better than about 1 percent. It was agreed, therefore, to assume an absolute value of 22.220 for the S^{32}/S^{34} composition of Cañon Diablo troilite. This value will, therefore, be taken to equal zero per mil, and δS^{34} per-mil values from different laboratories will henceforth be strictly comparable.

The present National Bureau of Standards No. 120 standard of native sulfur is apparently not satisfactory, as variations of more than 2 per mil have been obtained by different investigators. Variable preparation techniques and slight oxidation of this native sulfur supply at the Bureau may be causing the discrepancy in values. A small group of the investigators will, therefore, provide the NBS with at least two more satisfactory sulfur isotope standards.

The majority of the papers presented pertained to the role of bacteria in oxidizing or reducing sulfur or sulfur compounds. Sulfate reducers of the *Desulfovibrio desulfuricans* and *Clostridium nigrificans* varieties are apparently capable of producing vast quanti-

ties of hydrogen sulfide appreciably enriched in the lighter isotope. The geological role of this effective reductant in forming ferrous sulfide concentrations along marine coastal margins is certainly becoming more fully understood through the variety of studies by scientists of supposedly quite different interests, such as bacteriologists, biologists, geologists, limnologists, and oceanographers.

The papers presented, and the speakers, were as follows: "Biogenic ore deposits," M. L. Jensen (Yale); "Sulfur isotopes of the gold-quartz deposits of Yellowknife, N.W.T.," R. Wanless (Geological Survey of Canada); "New Zealand sulfur standards in relation to meteoritic sulfur," J. R. Hulston and T. A. Rafter (Wellington); "Sulfur isotope measurements on New Zealand, Australian, and Pacific Island specimens," T. A. Rafter; "Summary of sulfur isotope standards," W. Ault (U.S. Geological Survey, Hawaii); "Sulfur isotope standards—results and recommendations," N. Nakai (Yale, and Nagoya, Japan) and M. L. Jensen; "Diagenesis of sulfur in recent sediments," C. H. Oppenheimer (Miami); "Pyrite spheres in sediments," L. G. Love (Yale, and Sheffield, England); "A chemical study of pyrite spherules isolated from the surface sediments of Little Round Lake, Ontario," J. R. Vallentyne (Cornell); "Observation on microbial association with some mineral sulfides," H. L. Ehrlich (Rensselaer); "Experimental studies of sedimentary iron sulfide formation," R. A. Berner (Harvard); "Chemistry of the shallow water marine mud biological environment," J. W. Kanwisher (Woods Hole); "Some necessary conditions for fractionation of sulfur isotopes by *Desulfovibrio desulfuricans*," G. E. Jones (La Jolla) and R. L. Starkey (New Brunswick, N.J.); "Biogenic oxidation and reduction of sulfur in lake sediments," N. Nakai; "Precipitation of elemental sulfur by *Thiobacillus*," W. Vishniac (Rochester); "Sulfur isotope cycle in fresh water lakes," E. S. Deevey, Jr. (Yale), and N. Nakai; "Sulfur cycle in recent marine muds," I. Kaplan (California Institute of Technology); "Carbon isotope fractionation in bacterial processes," S. R. Silverman and W. D. Rosenfeld (La Habra); "Carbon isotopes of Gas Hills Uranium District, Wyoming," E. S. Cheney (Yale); "C^{13}/C^{12} variations of the fatty acids," P. L. Parker (Geophysical Laboratory, Washington, D.C.).

Other participants in the discussions were Alan M. Bateman (Yale); W. Broecker and F. Fraser (Lamont); H. Dequasie (Millville, N.J.); T. Hoering (Geophysical Laboratory, Washington, D.C.); Shinya Oana (Nagoya, Japan); Göte Ostlund (Stockholm); D. Runnells (Harvard); T. Tatsumi (Tokyo); H. G. Thode (McMaster University); K. K. Turekian (Yale); P. E. Yankwich (Urbana); R. L. Ames, R. L. Armstrong, G. Holland, and R. I. Tilling (Yale); and W. G. Smitheringale (Massachusetts Institute of Technology).

A symposium volume is being prepared. While the supply lasts, copies of this volume will be made available on request to anyone interested in the subject. Requests should be addressed to M. L. Jensen.

M. L. JENSEN
Department of Geology, Yale University, New Haven Connecticut

Plant Tissue and Organ Culture

A symposium on plant tissue and organ culture was held at Delhi jointly by the University of Delhi and the UNESCO South Asia Science Cooperation Office, New Delhi, from 22 through 29 December 1961, with P. Maheshwari as president. Forty-one delegates, representing India, Ceylon, Burma, Singapore, the United Kingdom, France, Germany, and the United States, participated. Most of them came from universities and research institutions of India. Special mention might be made of the following delegates: F. C. Steward (Cornell, United States); H. E. Street (Swansea, Wales); J. P. Nitsch (Gif sur Yvette, France); and J. Reinert (Berlin-Dahlem).

The 35 papers read covered a wide range of subjects, but the majority dealt with the rearing of reproductive organs of phanerogams (such as male cones of pine) and with flowers, anthers, ovaries, ovules, seeds, nucelli, and embryos of angiosperms. It was shown that the number of embryos in *Citrus* and *Dendrophthoe* could be greatly multiplied by chemical control of the nutritive medium. Other papers pertained to the nutrition of roots; the growth of tumors and cells; experimental control of morphogenesis; and the effect of gamma radiation on culture media and naturally occurring growth substances in relation to plant tissue culture. In addition, special