News and Notes

Symposium on Nuclear Reactions in Light Elements

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Continuing a series of sessions on special fields of physics started last year, the Physics Division of the Oak Ridge National Laboratories arranged on June 8 and 9 a meeting on nuclear reactions in light elements. It was attended by approximately 150 guests, representing for the most part university and other research laboratories. The chief topic of the meeting was the study of energy levels and cross sections.

Accurate determinations of reaction energies were reported by W. W. Buechner (MIT). A large magnet with central core is used to deflect the reaction products emitted at 90° to the incident beam. Utilizing 180° focusing, the momentum spectrum is recorded with the aid of photographic plates. With careful corrections for angular spread, absorption in the target and in surface layers, energy values can be determined to an accuracy of about 1 kev. Results were given for the (d,p) reactions on B^{10} and B^{11}. In the latter instance the levels of the residual nucleus seem to be arranged in successive groups of 1, 2, 3, and 4, with increasing excitation energy. The α groups from B^{10} (p, α) Be^7 show only the well-known excited state of Be^7 at 430 kev. Transitions to the questionable states at 250 and 750 kev are less probable by a factor of at least a thousand. The N^{14} (d,p) N^{15} reaction reveals a number of doublets in N^{15}. Exact measurements of Q-values of 24 additional reactions were also reported.

The investigation of the interaction of tritons with protons and tritons was discussed by A. Hemmendinger (Los Alamos). The threshold of the (p,n) reaction on a Zr + T target was determined to 1019 ± 1 kev, yielding a neutron-hydrogen mass difference of 782 ± 2 kev, assuming zero neutrino mass. The cross section increases with increasing proton energy, indicating the presence of a resonance level above 2.5 mev. The same result is obtained from the gamma ray yield of the capture reaction. The excited level of He^4 involved is placed at about 21.6 mev above the ground state. No intermediate levels need be assumed, since coincidence absorption measurements show only one gamma ray of about 20 mev. The angular distribution indicates contributions to the reactions from ^1P and ^3P states of the excited He^4 nucleus. Preliminary results were presented suggesting that T + T reactions may lead to the formation of a short-lived He^5 nucleus or to the emission of a di-neutron.

The determination of position, width, and density of excited levels with the aid of fast monoenergetic neutrons was reported by H. H. Barschall (Wisconsin). Angular momenta are assigned on the basis of the interference between potential and resonance scattering and by calculating the reduced width of the resonances. This method has had outstanding results. The neutron scattering resonance of He^4 at about 1.2 mev is shown not to be a doublet but to correspond to a $P_{3/2}$ level only. Various nuclei in the region of $A = 20$ to $A = 40$ have level spacings of the order of 100 kev. The closing of a neutron shell in Ca^{40} seems to have no influence on the level density. The remarkable difference between Bi^{209} (no resonances) and Pb^{206}, Pb^{208} (with distinct resonance patterns) is not yet explained fully.

The fourth talk, given by T. W. Bonner (Rice Institute) dealt with the measurement of negative Q-values of (d,n)-reactions by observation of thresholds for neutron groups. Since the neutrons are emitted, near threshold, with comparatively low energy, they are detected with good efficiency by a BF_3 counter surrounded with a small amount of moderating material which is not sufficient for the slowing down of the high energy neutrons emitted to the lower levels. Using thin targets, a sharp rise of the neutron intensity is observed at the threshold permitting the determination of Q-values with an accuracy of a few kev and also an estimate of the level width.

The sessions of the second day were opened with a paper on the cross sections of thermonuclear reactions presented by W. A. Fowler (Caltech). Two reaction cycles converting hydrogen into helium have been proposed as energy sources in stars, the well-known carbon-nitrogen cycle and the $H(p,\beta^+)D(p,\gamma)He^3(p,\beta^+)He^4$ cycle. In order to evaluate the relative importance of the two mechanisms, the cross sections of the individual reactions must be known. Because of the thermal velocity distribution and the increase of cross section with energy, a rather well-defined band of energy, 10 to 30 kev for the different reactions, gives the largest contribution to the reaction rate. Since a direct measurement of the cross sections at these energies is impossible, the procedure adopted is to extrapolate the cross sections from resonances at higher energies by means of the dispersion formula. Direct measurements around 100 kev, performed with the aid of a high intensity proton beam, give reasonable agreement with the calculated values. In this way the reactions $D(p,\gamma)He^3$ for the H-He cycle and $C^{12}(p,\gamma)N^{13}$, $N^{14}(p,\gamma)O^{15}$, N^{15} $(p,\alpha)C^{12}$ for the C-N cycle were investigated. In the latter instance the second reaction was shown to be the slowest, leading to a half-life of $2.5 \cdot 10^5$ years for N^{14}. In the light particle cycle the reaction rate is determined by the first process $H(p,\beta^+)D$ for which only a theoretical estimate of the cross section is available. It appears that the light particle processes are the major source of energy for not too hot stars, and probably also for the sun.

In the last scheduled paper R. F. Christy (Caltech) made several remarks about the theoretical interpretation of experimental data. He pointed out that the reduced level width may vary by as much as a factor of

a 100 between different levels, making the assignment of angular momenta by this method uncertain. He recommended, as a more direct procedure, the study of angular distribution of gamma rays or particles emitted in reactions. The most interesting of different levels investigated is that of 480 kev in Li^7, for which a spin of 5/2 has been postulated. The angular correlation between the alpha particles and the gamma rays of the reaction $B^{10}(n, \alpha\ \gamma)Li^7$ shows, however, spherical symmetry, suggesting $J = 1/2$ for the excited state, though compatible with a special choice of higher angular momenta. The resonance scattering and absorption of protons lends itself to an analysis similar to that of neutrons, as exemplified by investigations on Be and Li.

The afternoon session was devoted to short contributed items and general discussion. The various topics included a preliminary measurement of an additional level in Li^7 at 850 kev, the use of NaI single crystals for scintillation spectrometers, especially for gamma rays, a circuit for magnetic resonance measurements, angular distribution of the deuterons and alpha particles from Be + p and of the alpha particles from Li^7 + p, a discussion of apparent subthreshold neutrons in (p,n)-reactions and a study of (d,n)-reactions indicating in some cases stripping of the deuteron at 15 mev rather than formation of a compound nucleus. Measurements of the Q- value of Li^7 (d, p) Li^8 by detecting the recoil nucleus and of the resonances of $P^{31}(p, \gamma)S^{32}$ were reported. Allen (Chalk River) described an investigation of the T + T reaction similar to that carried out at Los Alamos. He finds, at the low bombarding energy of 200 kev, that the probability of the emission of a di-neutron is smaller than 10^{-3}. An apparent peak in the He^4 recoil distribution indicating the formation of a di-neutron is found to be caused by deuteron contamination of the beam or the target.

A dinner in the evening and an informal outing to the Smoky Mountains on the following day closed this successful meeting.

About People

Edward A. Doisy, biochemist at the St. Louis University School of Medicine, has been appointed to the Atomic Energy Commission Advisory Committee for Biology and Medicine. He replaces **A. Baird Hastings,** of Harvard University.

Robert B. Lewy, clinical assistant professor of otolaryngology at the University of Illinois College of Medicine, will present a paper entitled "A Clinical and Anatomical Evaluation of the Sphenoid Palatine Ganglion" at the International Anatomical Congress at Oxford, England, July 24–28. While in England, Dr. Lewy plans to make a survey on advanced graduate education in otolaryngology at the United Oxford Hospital.

L. C. Knorr, associate plant pathologist at the Citrus Experiment Station, University of Florida, will be on leave to the Florida State Plant Board for a year to conduct investigations in Argentina on the control of tristeza, a virus disease affecting citrus fruits. His address after August 1 will be Estación Experimental, Concordia, Entre Ríos, Argentina.

Sidney W. Benson, associate professor of chemistry, University of Southern California, has been awarded a scholarship for work at the University of Paris under the terms of the Fulbright Act. Dr. Benson is also the recipient of a Guggenheim fellowship for the academic year. He plans to write a book on chemical kinetics during his stay in Europe.

Harold Friese Plank, research assistant in the Chemistry Department, Massachusetts Institute of Technology, and **Marshall Nicholas Rosenbluth,** Department of Physics, Stanford University, have been appointed to the staff of the Atomic Energy Commission's Los Alamos Scientific Laboratory.

Edward Abrams, head of the Biology Division of the Institute of Textile Technology, Charlottesville, Virginia, has been appointed head of the Textile Section of the Southern Research Institute. Under his direction the institute plans immediate inauguration of an expanded and diversified service program to the textile industry.

Walter C. Bucher, professor in the Department of Geology, Columbia University, has been elected executive officer of the department for a three-year period. Dr. Bucher succeeds **Paul F. Kerr,** who will now serve as research coordinator. **Marshall Kay** was elected educational coordinator.

William G. Myers, research associate professor in the Departments of Physiology and Medicine, Ohio State University, and his wife, **Florence R. Lenahan,** instructor in medicine at the university, will spend two months this summer visiting European research laboratories that use radioactive isotopes for research. Dr. Myers and Dr. Lenahan will accompany **Paul Aebersold,** chief of the Isotopes Division of the Atomic Energy Commission, Oak Ridge, Tennessee.

Rolston L. Bond, technical director of the Butadiene Division of Cities Service Refining Corporation, Lake Charles, Louisiana, has been named assistant chairman of the Chemistry and Chemical Engineering Department at Armour Research Foundation, Illinois Institute of Technology. Dr. Bond will be in charge of the foundation's biochemistry and organic chemistry research activities.

Visitors to U. S.

Recent visitors at the National Bureau of Standards were **Donald F. McRae,** director, Department of Industrial Research Services, Ontario Research Foundation, Toronto; **Hans Pinardi,** director, Departamento Ciencias Puras, Universidad Nacional, Mendoza, Argentina; **Kwanzi Suda,** chief hydrographer, Hydrographic Bureau, Maritime Safety Agency, Japan; **Toshio Sudo,** assistant professor, Geological Institute, University of Tokyo, Japan; **A. C. van Dorsten,** research

physicist, Philips Research Laboratories, Eindhoven, Holland; **N. A. Whiffen,** technical secretary, Council for Scientific and Industrial Research, Commonwealth of Australia, Melbourne; **A. H. Gillieson,** head of the Emission Spectroscopy Group, and **A. A. Smales,** head of the Analytical Chemistry Group, Atomic Energy Research Establishment, Harwell, England.

Min Din, of Kamayuta, Rangoon, is currently studying microfossils, particularly the Cushman collection of Foraminifera, at the U. S. National Museum.

Grants and Awards

The Commonwealth Fund has awarded 20 fellowships for 1950–51, including the following for research in science: *Alan Rushton Battersby,* lecturer in chemistry, University of St. Andrews—to study structural problems in organic chemistry at the Rockefeller Institute for Medical Research, New York City; *Mary Bradburn,* senior lecturer in mathematics and dean, Royal Holloway College, London—to study mathematical physics at Radcliffe College; *Douglas Hames Millen,* lecturer in chemistry, University College, London—to study the techniques of microwave spectroscopy and the electrochemistry of strong acids at the Massachusetts General Hospital and Harvard University; *Donald Vernon Osborne,* research student at Cambridge—to investigate the properties of liquid helium II, at the Institute for the Study of Metals, University of Chicago; *John Donaldson Ross,* tuberculosis physician, Bangour Hospital Area, West Lothian, Scotland—to study epidemiological research methods as applied to tuberculosis at the Johns Hopkins University and the Henry Phipps Institute, University of Pennsylvania; *Derrick Rowley,* premedical student at St. Mary's Hospital Medical School, London—to study immunochemistry at the College of Physicians and Surgeons, Columbia University; *Astor Balfour Sclare,* medical registrar to the Psychiatric Unit, Killearn Hospital, Stirlingshire—to study psychosomatic medicine at the College of Medicine, University of Cincinnati; *Ian Ferguson Sommerville,* research assistant, Department of Biochemistry, University of Edinburgh—to study the physiological aspects of the metabolism of steroids at the Sloan-Kettering Institute for Cancer Research, New York City; *Frank Sidney Stone,* assistant lecturer in chemistry, University of Bristol—to study experimental techniques in photochemistry at Princeton University; *John Frederick Thomson,* assistant in philosophy, University College, London—to study mathematical logic at Harvard and Princeton Universities; *Barry Maurice Waller Trapnell,* holder of research award at the Davy Faraday Laboratory, Royal Institution, London—to study heterogeneous catalysis and magneto chemistry at Northwestern University; *Andrew Hugh Wallace,* assistant, Department of Mathematics, University College, Dundee—to study algebraic theories at the University of Chicago; *Ronald Karslake Starr Wood,* lecturer in plant pathology, Imperial College, London—to study plant pathology and nutrition at the College of Agriculture, University of California, Berkeley; *Andre Cyril Myburgh,* entomologist, Western Province Fruit Research Station, Department of Agriculture, Union of South Africa—to study the control of pests affecting deciduous fruits, at Cornell University, the U. S. Bureau of Entomology, and other centers.

The Netherlands Society for Refrigeration has conferred the **Kamerlingh Onnes Medal** upon F. E. Simon, Oxford, England, in recognition of his contributions to refrigeration techniques at very low temperatures. The presentation will take place in Leyden on September 21, the birthday of the late H. Kamerlingh Onnes.

The American Association of University Women presented its annual achievement award of $2,500 to Elizabeth C. Crosby on June 21. Dr. Crosby is professor of anatomy at the University of Michigan Medical School, and plans to use the award for the purchase of equipment for her research.

A grant of $10,000 has been awarded to John G. Gibson 2nd, of Harvard Medical School, by the **National Institutes of Health, Public Health Service.** The grant will enable Dr. Gibson to continue his studies on the fundamental problems of the preservation of blood, which he has conducted in collaboration with Edwin J. Cohn, Higgins University Professor of Harvard, and other associates. Dr. Gibson is research associate at Harvard Medical School.

Colleges and Universities

The University of Rochester has made a number of appointments to its Physics Department to enlarge its teaching program and to increase cosmic ray investigation, theoretical physics, and research with the university's two cyclotrons. New appointments are: Arthur Roberts, State University of Iowa, associate professor of physics; Harry W. Fulbright, Princeton University, assistant professor; John H. Tinlot, Columbia University, assistant professor; Richard Wilson, Clarendon Laboratory, Oxford, England, and David M. Ritson, Dublin Institute for Advanced Studies, Ireland, both research associates. Visiting research associates for the summer are C. H. Ynag and Kenneth M. Case, both of the Institute for Advanced Study, Princeton, New Jersey.

Brown University's third symposium on plasticity will be held September 8–9 under the auspices of the university's Graduate Division of Applied Mathematics. Papers will be presented by both foreign and American experts in the field on stress-strain relations and problems and methods in the analysis of structures and continuous media. Further information may be obtained from D. C. Drucker, Associate Professor of Engineering, Brown University, Providence 12, Rhode Island.

Cornell University has established a center for integrated aerial photography to train scientists to use this technique for surveys in various fields and, through research, to ex-

tend its use to new areas. Donald J. Belcher is director of the center. The program includes technical work in the College of Engineering, in the fields of optics, geodesy, cartography, photogrammetry, instrumentation, and aeronautics. The Departments of Agronomy and Conservation and Soils in the College of Agriculture and the Department of Geology assist in air photo interpretation problems. The Department of Land Economics and the College of Architecture participate in land planning.

Meetings and Elections

The Illuminating Engineering Society will hold its national technical conference in Pasadena, California, August 21–24. Arrangements have been made for a special train leaving Chicago August 18, that will stop over one day at the Grand Canyon. Registration fees are $18 for society members and $9 for members of their families. Further information and advance registration forms may be obtained from Illuminating Engineering Society, 51 Madison Avenue, New York City.

The National Shade Tree Conference will hold its annual meeting August 21–25 in Syracuse, New York, with headquarters at Hotel Syracuse. Among those presenting papers will be Curtis May, U. S. Department of Agriculture, Paul J. Kramer, Duke University, and J. C. Carter, Illinois Natural History Survey. The program will include a number of plant clinics, exhibits of products for tree care by commercial companies, and field demonstrations at the New York College of Forestry, in collaboration with Cornell University. Those wishing to attend should write to L. C. Chadwick, Secretary, National Shade Tree Conference, Department of Horticulture, Ohio State University, Columbus.

A conference of biological societies will be held at Ohio State University September 11–14, under the sponsorship of the American Institute of Biological Sciences. Member societies assisting in the plans for the meeting are the American Society for Horticultural Science, the American Society of Plant Physiologists, the Botanical Society of America, the Ecological Society of America, the Genetics Society of America, and the Mycological Society of America. Additional groups participating in the program include the American Bryological Society, the American Society for Human Genetics, the American Society of Limnology and Oceanography, the American Society of Naturalists, the American Society of Plant Taxonomists, the Phycological Society of America, the Society for the Study of Evolution, and the Society of Industrial Microbiologists. An attendance of 2,500 biologists is expected. A biological sciences exhibit, to be held at the museum of the Ohio State Archaeological and Historical Society, will be a feature of the program. Further information may be obtained from Dr. C. H. Hylander, Carnegie Institution of Washington, 1530 P Street, N.W., Washington, D. C.

A new laboratory for medical research using radioisotopes has been opened at the National Institutes of Health, Bethesda, Maryland. Much of the construction and equipment of the five chemistry laboratories comprising the facility is experimental, and allows the addition or replacement of equipment as new materials and techniques are developed. The laboratory will afford maximum facilities for experimentation and maximum protection against radiation hazards. A "radiation safety group" of five scientists trained in handling radioactive substances will monitor operations, to permit correction of abnormal conditions before there is danger to the staff, and also before the validity of experiments is affected.

The CARE-Unesco Book Fund Program in the Pakistan and India area was launched in June by the contribution of 53 volumes on farming and engineering to the University of Sind, in Karachi, and 80 technical books to Punjab University at Lahore. Educational institutions in India, Ceylon, Burma, and Jordan soon will receive gifts. Approximately $160,000 worth of books already have been delivered to more than 250 foreign institutions under the program, which now reaches 20 countries.

Universities, research laboratories, and other institutions and individuals who may have important new scientific movies appropriate for showing in the **Science Theatre** at the AAAS Annual Meeting in Cleveland, Ohio, December 26–30, are invited to write at once to the AAAS Science Theatre, 1515 Massachusetts Avenue, N.W., Washington 5, D. C.

Recently Received

A Bibliography of the Herpetology of Japan. Carl Gans. Vol. 93, Art. 6, American Museum of Natural History, NYC. $1.25.

Proceedings and Papers, 17th Annual Conference, California Mosquito Control Association, and Annual Conference, American Mosquito Control Association. California Mosquito Control Association, P. O. Box 649, Berkeley 1, Calif.

Development of a Test for Selecting Research Personnel. American Institute for Research, Pittsburgh, Pa.

Rational Exploitation of the Sea Fisheries with Particular Reference to the Fish Stock of the North Sea. Special Scientific Report: Fisheries No. 13. G. P. Baerends. Translated by Jan Hahn. U. S. Department of Interior, Washington, D. C.

The Zoology of Iceland. Vol. II, Part 20a. *Oligochaeta 1. Lumbricidae,* Helge O. Backlung. Vol. IV, Part 59. *Amphineura.* Jorgen Knudsen. Part 62. *Scaphopoda.* Jorgen Knudsen. Part 63. *Marine Bivalvia.* F. Jensenius Madsen. Part 72. *Marine Pisces.* Bjarni Saemundsson. Ejnar Munkgaard, Copenhagen, Denmark, and Reykjavik, Iceland.

Biochemical Aspects of Genetics. Biochemical Society Symposia No. 4. Cambridge University Press, 51 Madison Avenue, New York City. $1.50.