

News and views

Nobel Prizes for 1951

Cockcroft-Walton; McMillan-Seaborg

Nuclear science dominated the most recent Nobel awards in physics and chemistry, announced in mid-November. The 1951 Nobel Prize for Physics was shared by Sir John D. Cockcroft, director of the British Atomic Energy Establishment at Harwell, and E. T. S. Walton, professor of natural and experimental philosophy of Trinity College in Dublin, for "their pioneer work on the transmutation of atomic nuclei by artificially accelerated atomic particles". The Chemistry Prize was given jointly to Edwin M. McMillan and Glenn T. Seaborg, both of the University of California at Berkeley, for "their discoveries in the chemistry of the trans-uranium elements".

The term "Cockcroft-Walton" has come to be associated almost too closely with the high voltage accelerating equipment bearing their names, and the Swedish Academy of Sciences, which makes the annual Nobel awards, has performed a valuable service to physics by having refocused attention upon the men and their work rather than upon the machine. In actual fact, however, the two scientists and their namesake cannot easily be dissociated, for the voltage multiplier system for accelerating protons, developed by Cockcroft and Walton in 1929, is historically important because it provided the setting less than three years later for the first artificial nuclear transformation ever to be recorded.

Working in Rutherford's laboratory in Cambridge, England, Cockcroft and Walton, by ionizing hydrogen in a discharge tube, successfully produced protons having enough energy to penetrate the atomic nuclei in a lithium target and to cause the observable ejection of alpha particles. It was later established that the isotope lithium-7 was involved in the alpha particle production, and that two such particles were produced in each transformation. Comparison of the energy produced in the reaction and of the change in mass that accompanied the event led to the ultimate verification of the mass-energy relationship formulated by Einstein and thus to even more far-reaching scientific and social results.

Dr. Cockcroft, who is fifty-four, graduated from the Manchester College of Technology in 1922 as an electrical engineer and received his doctorate of philosophy from St. John's College, Cambridge, in 1928. Early in 1939 he was named Jacksonian Professor of Natural Philosophy at Cambridge, succeeding Sir Edward Appleton. With the outbreak of World War II, he became

assistant director of research in the British Ministry of Supply. From 1944 to 1946, he served as director of the Canadian National Research Council's atomic energy division, after which he became Harwell's director. He was knighted in 1948.

Professor Walton is forty-eight years old, is a native of Belfast, and was educated at Methodist College in that city, at Trinity College in Dublin, and at Cambridge University. He has been a Fellow of Trinity College since 1934.

The chemistry award has been given to Drs. McMillan and Seaborg for their work in filling in six squares at the far end of the periodic table. Before 1940, elements of atomic number exceeding 92 were unknown, and for all practical purposes did not exist. In that year, during experiments on the fission process in which uranium oxide was exposed to slow neutrons, McMillan and P. H. Abelson discovered a short-lived beta-emitting substance that was later shown to be a new element of atomic number 93 and mass number 239, the first genuine transuranic element known. It subsequently was named neptunium, after the planet lying beyond Uranus in the solar system. A short while later, Seaborg, McMillan, J. W. Kennedy, and A. C. Wahl discovered a second short-lived neptunium isotope having a mass number of 238. An alpha-emitting substance was noticed during this experiment which could be separated away by chemical means. This was identified as the element of atomic number 94 and was correspondingly named plutonium after the planet lying beyond Neptune. Having reached the limits of the solar system, Dr. Seaborg and coworkers were forced to abandon planetary names for the last four elements to be discovered. Element 95, americium, was named by analogy with europium, which occupies a similar position among the rare-earth elements. Element 96, curium, was named in honor of Marie and Pierre Curie, by analogy with the naming of gadolinium, its rare-earth homologue, which had been named after J. Gadolin, a pioneer in the study of the rare-earth elements. Element 97, berkelium, by the same principle, was named after Berkeley to correspond with the naming of the homologous rare-earth element terbium, from Ytterby, a Swedish town known as a source of rare-earth elements. Californium, element 98, was related in name type to its rare-earth homologue only by the devious argument that dysprosium comes from the Greek word meaning "difficult to get at" and that the gold seekers of a hundred years before had found it troublesome to reach California. In addition to the Berkeley researchers mentioned above, several others, including A. Ghiorso, R. A. James, L. O. Morgan, and S. G. Thompson, worked with Seaborg in the discovery of elements 95 through 98.

Dr. McMillan, a native Californian, is forty-five years old. A physicist, he graduated from the California Institute of Technology in 1928 and received his PhD at Princeton University in 1932. He joined the University of California faculty in the same year and somewhat later became the brother-in-law of another Nobel



John D. Cockcroft



E. T. S. Walton



Edwin M. McMillan



Glenn T. Seaborg

laureate and Berkeley physicist, Ernest O. Lawrence. He did research during the war at the Navy Radio and Sound Laboratory in San Diego, and in 1943 joined the Manhattan District's Los Alamos Laboratory in New Mexico. He returned to Berkeley in 1946 where he was responsible for modifying the 184-inch cyclotron in a way that made use of the phase stability principle so that the oscillation frequency could be varied to compensate for the increase in mass of accelerated particles traveling at high speeds. The altered cyclotron, rechristened the synchrocyclotron, was thus made to accelerate particles having twice the amount of energy originally expected.

Dr. Seaborg, who is thirty-nine years old, received his doctor's degree in chemistry from the University of California in 1937, when he became a member of the faculty.

Except for some wartime lapses, the Nobel Prizes have been awarded annually since 1901 and are made possible by the \$9,000,000 trust fund left by Alfred Nobel, the inventor of dynamite, who died in 1896. Selection of the award winners in physics and chemistry is in the hands of the Swedish Academy of Science. Presentation ceremonies take place in Stockholm on December 10th of each year, the date of Nobel's death.

National Science Foundation

On Submitting Research Grant Proposals

The first draft of a guide to assist scientific research investigators in the preparation of proposals for National Science Foundation research grants has been issued by the Foundation, and it has been announced that copies will be distributed widely to institutions

and organizations in a position to carry on competent scientific research. The Foundation has earmarked approximately \$1,500,000 for support of basic research in the mathematical, physical, medical, biological, and engineering sciences, and grants will be made to educational, industrial, governmental, or other institutions, or to individuals. Ordinarily, grants will be awarded to institutions for research by specified individuals.

Proposals are in most cases expected to be initiated by the scientist interested in carrying out the research. He may submit a proposal at once, or he may first choose to discuss the project informally, either by letter or in person, with an appropriate NSF staff member, in which case a proposal will usually follow. Emphasis in the review of proposals is placed by the Foundation on the scientific merit of the suggested research, including the competence of the investigator.

Payments will be made in advance on a quarterly, semiannual, or annual basis depending on the relative size of the grant, which normally will be sufficient to cover such items as salaries, materials, equipment, necessary travel, publication, and other direct costs. In addition, the grant will usually be sufficient to cover indirect costs up to 15% of the total direct costs.

The Foundation will not ordinarily require that title to equipment purchased with granted funds vest in the Government; such equipment may thus be retained by the grantee, and no accounting for equipment will be necessary. Quarterly or semiannual financial reports, annual progress reports, and a final report on the project will be expected in order that the Foundation may be kept adequately informed of the progress of work covered by the grant and of the use of funds made available. Publication of research papers may take the place of progress or final reports.