

PhD thesis students and a number of research associates.

In addition to his research at Maryland, Koopman was a consulting scientist with the Maryland Institute of Technology, Inc., the Atlantic Research Corporation, and Versar, Inc. At Versar he was a co-discoverer of the laser guidance of electrical discharges in gases; this work led to his collaboration over the last five years with scientists at the US Naval Research Laboratory on high voltage, laser-guided sparks.

Koopman's work at Maryland in recent years has been concerned with momentum transfer and other dynamical aspects of rarefied plasma flow. These novel experiments involve laser-produced plasmas expanding into a stationary background plasma, studied by means of tunable lasers, holography and resonant scattering by ions.

Another program in which Koopman took great pride was the development of tunable coherent light sources in the vacuum ultraviolet. He and colleagues accomplished this in 1978 for the spectral region of hydrogen Lyman-alpha radiation—around 122 nanometers. Applications of this technique will make possible the measurement of hydrogen isotope concentrations in magnetically confined plasmas of the Tokamak type.

Those of us who have worked with David Koopman will remember him particularly for his high standards in scientific research, his persistence and patience with himself and others in solving even the most complex problems, and the good humor he brought to his scientific and personal relationships with us.

RITA MAHON
THOMAS D. WILKERSON
*Institute for Physical Science and
Technology
University of Maryland*

Edward P. T. Tyndall

Edward P. T. Tyndall, former professor of physics at the University of Iowa, died in Long Beach, California, on 29 September. He was 86. Tyndall retired from his long-term teaching career at the University of Iowa in 1960.

Tyndall was born in Durban, South Africa, in 1893, of English parents. The family later moved to the Zulu Reservation high in the mountains north of Durban, where his father owned a trading post for the Zulu natives. When he was four years old the family returned to England for one year, then came to the US in 1898. Tyndall was educated in the Richmond, Va. public schools and received his AD degree from Richmond College in 1912. He taught in high schools in Virginia and North Carolina for the next three years.

Tyndall enrolled as a part-time gradu-

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obituaries

ate student in the summer sessions in 1915 and 1916 at Cornell University. There he came under the sponsorship of Floyd K. Richtmyer. Tyndall was teaching in Richmond when he was suddenly offered an assistantship at Cornell in December 1916; he quit his job and left at once for Cornell.

During World War I, Tyndall worked at the Bureau of Standards in Washington, D.C., returning to Cornell for completion of his graduate studies in 1919. He completed his PhD work in 1922 and took a job at the Bell Telephone Laboratory in New York City. But his interest in teaching and university research led him to leave the Laboratory after two years to take a job at the University of Iowa.

Tyndall's research was divided roughly into two parts. In his younger years, he carried on experiments in optical properties of materials. Abstracts and publications show numerous papers in the optical properties of metallic compounds and of numerous organic materials, including dyes. The major part of the research of Tyndall was solid-state physics—begun by him at Bell Telephone. There he carried out some work on Barkhausen noise in ferromagnetic materials. By 1930 he was beginning to develop a program of research in elastic and plastic properties of solids at Iowa.

Tyndall's research was "low-budget physics." The average graduate student had less than \$1000 of new money for the research. Ted was a great believer in the optical lever, and his laboratories were full of mirrors, optical sources, telescopes, gratings and the like. One of his students, an accomplished musician, used his clarinet to determine beat frequencies for measurements of elastic constants. I remember spending many days making a reliable frequency-dividing system using multivibrators for measurement of the

TYNDALL



resonant frequency of a composite oscillator.

Physics was fun for Tyndall, and it was also fun for his students. The fondness of Ted for university teaching became so evident to all of us, that many of us went into careers of teaching—I can count at least 15 of his students who became college and university teachers.

Tyndall was a gentle man, a patient teacher of small as opposed to big physics. A great many of us teachers might wish to have the products of our teaching permeate so many research laboratories, small colleges and large universities as did Tyndall's.

CHARLES A. WERT

University of Illinois at Urbana-Champaign

Laurence O. Brockway

Laurence O. Brockway, professor emeritus of physical chemistry at the University of Michigan, died on 17 November 1979 at the age of 72.

He was a pioneer in the field of electron diffraction; under his leadership this experimental approach was developed into a precise method for determining molecular structure and one that is widely practiced today. In the course of analyzing the structures of a great many types of molecules, he established the characteristic configurations and dimensions of a variety of important structural groups. This work, which was initially carried out in collaboration with Linus Pauling, played a significant role in subsequent advances in chemistry and molecular biology. Brockway's contributions to structural chemistry won him the American Chemical Society Award in Pure Chemistry in 1940. Subsequently his interests broadened to include the study of surface phases and adsorbed films. During World War II he applied his expertise to defense projects as a consultant for the Naval Research Laboratory, the National Advisory Committee for aeronautics, and the General Electric Company.

Brockway helped to found the American Crystallographic Association (formed by the merging of two earlier societies) and was elected president in 1953. He was appointed to the executive committee, division of physical sciences of the National Research Council and served for several years as chairman of the NRC National Committee for Crystallography. He was active in the International Union of Crystallography in many capacities and twice served as chairman of the Commission on Electron Diffraction of that organization.

Brockway received his bachelor's and master's degrees from the University of Nebraska in 1929 and 1930 and his doctoral degree from Caltech in 1933. Fol-