medium are steady states of motion the material medium is in a state of relative equilibrium, but, when an electric or magnetic disturbance is being propagated in the material medium, these steady states of motion will be disturbed and, under certain conditions, the effect of the disturbance will be to set up small oscillations about the steady states of motion; a material can be regarded as being perfectly transparent for a disturbance whose only effect is to set up small oscillations about the steady states of motion. A condition for this is that none of the frequencies involved in the disturbance are equal to or nearly equal to any of the natural frequencies belonging to the steady states of motion.

Fresnel's relations between the amplitudes of the incident, the transmitted and the reflected waves when a train of waves is incident on the surface separating two transparent media follow on this hypothesis, and also Fresnel's results for the propagation of waves in crystalline media. It should be noticed that on this hypothesis the electric and magnetic forces at a point in a material medium which appear in the equations are not the total electric and magnetic forces at the point, but the parts of them which are due to the disturbance.

Faraday's results for the rotation of the plane of polarization by an imposed magnetic field when light is being propagated in a non-magnetic transparent medium follow immediately from the above hypothesis without making any additional assumptions.

Further, on the same hypothesis there will be ranges of frequencies for which a material medium is transparent, the extent of such a range will depend on the intensity of the disturbances, and between any two consecutive ranges there will be a range of frequencies for which the medium is not transparent, and the mathematical treatment of the effect of disturbances involving these frequencies will require additional hypotheses.

The theory advanced above is not a mechanical theory of light in the sense that it is possible to construct a machine whose motions will resemble the motions involved in the propagation of light. The form of the electrokinetic energy function raises the question whether all the time rates of change involved in the propagation of a magnetic disturbance can be represented by moving points, and whether every time rate of change associated with physical phenomena involves change of position in space. It may be necessary to contemplate time rates of change which do not involve change of position in space, although they satisfy the laws of dynamics. In this connection it is of interest to observe that a result of Faraday's laws is that, when there are electric currents in a system of circuits which are in motion, the kinetic energy function does not contain terms which involve the product of an electric current and a velocity, a result which Maxwell verified experimentally.

A possible hypothesis is that physical phenomena are due to the interaction of time rates of change which satisfy the laws of dynamics, and the Lagrangian function in that case would be a homogeneous quadratic function of all the time rates of change. In actual cases only some of the changes are being observed, and the Lagrangian function which is obtained from the experimental evidence is a modified Lagrangian function where the unobserved changes are supposed to be eliminated. In certain cases this function will be expressed as the difference of a kinetic energy and a potential energy function; an important case is the case where the unobserved changes appear in the original Lagrangian function as velocities only and there are no product terms which involve a velocity belonging to the observed and a velocity belonging to the unobserved changes. There are also cases where the modified function is of this form approximately.

OBITUARY

WILLARD JAMES FISHER

DR. WILLARD JAMES FISHER, for the past twelve years research associate and lecturer in astronomy at the Harvard Observatory, died from heart failure on September 2. Dr. Fisher was born in Waterford, N. Y., in 1867. He was instructor in physics at Cornell University and professor at New Hampshire College and had been in charge of the departments of physics at the University of the Philippines and at the University of Hawaii. A correspondent writes: "Dr. Fisher's activity in recent years has been in the fields of lunar eclipse phenomena and meteoric astronomy. He has made many important contributions to knowledge of meteors, especially dealing with the phenomena of fireballs, meteoric dust, photographs of meteors, and the distribution of iron and stony meteorites. A paper by him now in press calls attention to the significant fact that iron meteorites are found in America abundantly only south of the region formerly covered by the Pleistocene ice sheet; apparently the known iron meteorites are the gleanings of many geological periods, and most of those that fell in our northern states prior to the glacial ages have been buried below the agriculturally explored surface. Some years ago Dr. Fisher very successfully guided the organization of special lunar eclipse observers throughout the American Arctic, obtaining the assistance of the Canadian Mounted Police, the fur

traders, the missionaries to the Esquimaux and the Alaskan Signal Service of the United States Army; instructions were broadcast from the more powerful American radio stations."

MEMORIALS

A STATUE of Benjamin Franklin, believed to have been executed from life by the French sculptor, François Marie Suzanne, was presented to the Franklin Institute by A. Atwater Kent, president of the Benjamin Franklin Memorial, on July 16. The statue was discovered about fifteen years ago in an obscure shop in New York.

FUNDS are being solicited to establish a memorial in honor of the late Dr. Charles Spencer Williamson, professor of medicine at the University of Illinois College of Medicine. It is hoped to accumulate a fund of $500 for a suitable portrait of Dr. Williamson, to be hung in the library of the university, and a sum between $5,000 and $10,000 to establish a lectureship in internal medicine.

A MEMORIAL bronze plaque, in memory of Luther Marion Defoe, has been hung under his picture in the Engineering Library of the University of Missouri. This plaque, about 12 by 18 inches, was placed there by the members of the faculty of the College of Enginering. It bears the following inscription: "In memory of Luther Marion Defoe, A.B., 1860–1933. Professor of mechanics, University of Missouri, 1892–1933. Inspiring Teacher—Wise Counsellor—Just Judge."

A MONUMENT to John Lamont, the Scottish astronomer, who died in 1879, was unveiled at Inverary, his birthplace, on September 10, during the meeting at Aberdeen of the British Association for the Advancement of Science. Professor Lamont is known for his pioneer work in terrestrial magnetism. He was for many years director of the Royal Observatory at Munich.

RECENT DEATHS

DR. KARL FREDERIC KELLERMAN, associate chief of the Bureau of Plant Industry at the U. S. Department of Agriculture, died on August 30, at the age of fifty-four years.

HARRY CREIGHTON PEFFER, chemical engineer and founder of the School of Chemical Engineering at Purdue University, died from heart failure on July 17. Professor Peffer had been at Purdue since 1911, building up the School of Chemical Engineering to its present prominence. He also developed a number of research projects in chemical and industrial processes, building materials, etc.

DR. GEORGE C. BRANDENBURG, head of the department of education at Purdue University and director of its summer school, died on September 3. He was fifty-five years old. He is known for his work on child development and personality.

DR. MAURICE FISHBERG, specialist in tubercular disease, chief physician of Montefiore Hospital and Bedford Sanitarium, known for his work on the physical anthropology of the Jew, died suddenly on August 20. He was sixty-two years old.

DR. WILLIAM CAMPBELL POSEY, ophthalmologist, president of the College of Physicians, Philadelphia, died suddenly on September 6. He was sixty-eight years old.

CHARLES FREDERIC AUGUST SCHAEFFER, entomologist and for twenty-nine years until his retirement last March associate curator of coleoptera at the Brooklyn Museum, died on August 30. He was seventy-four years old.

WELLESLEY CURRAN CLINTON, professor of electrical engineering at University College, London, died on August 18 at the age of sixty-three years.

THE death is announced of Dr. William Mitchinson Hicks, emeritus professor of physics and first vice-chancellor of Sheffield University, at the age of eighty-three years.

PROFESSOR CARL OLAF JENSEN, director of the Danish Agricultural and Veterinary School, died on September 3, at the age of seventy years.

SCIENTIFIC EVENTS

COOPERATION AMONG LONDON MEDICAL SCHOOLS

PLANS are announced, according to an article in the London *Times*, for the closer cooperation for educational purposes of three medical schools in London in order to extend facilities for their students. Similarly, the London Voluntary Hospitals Committee and the Hospitals and Medical Services Committee of the London County Council have agreed upon plans for a greater degree of cooperation, one result of which is the linking up of twelve undergraduate teaching hospitals with a number of municipal hospitals.

The public importance of the decision of the governing bodies of St. Bartholomew's Hospital Medical College, St. Thomas's Hospital Medical School and Guy's Hospital Medical School to establish a closer cooperation for the advancement of medical education is emphasized in a statement issued by the deans of the college and schools concerned. They write: