a remnant of an original substratum in the coastal population. Many other tribes await fuller study.

The visit of the British delegation to India will undoubtedly react in many ways as a stimulus to the progress of Indian science. The most important scientific problems for India are biological. India is mainly an agricultural country of peasant villages. Her enormous and rapidly increasing population and the relatively primitive farming methods still employed render the problems of food production of prime importance in the economy of the country. Great irrigation schemes have extended agriculture over large areas which were formerly sterile. The Imperial Council for Agricultural Research was formed to stimulate the various lines of research concerned with crop production. This is done partly through grants to the numerous agricultural and plant breeding stations, for specific pieces of research bearing on the improvement and better utilization of plant crops and domestic animals.

Yet India's fundamental problem is that of population. So long as the population multiplies up to the limits of subsistence, any increase in the food supply affords only temporary improvement in the economic condition of the people. This distinctive problem of the East has yet to find a solution.

SCIENTIFIC EVENTS

AWARDS OF THE LALOR FOUNDATION

THE Board of Trustees of the Lalor Foundation have announced the selection of winners of five awards from the Lalor Foundation for research in chemistry for the academic year 1938–39. These awards comprise three fellowship grants of $2,500 each and two supplemental awards of $1,250 each. The recipients were chosen from a group of thirty-eight candidates.

The geographical areas in which the applicants received their undergraduate or advanced scientific training are represented by colleges and universities in more than twenty-four states, the District of Columbia, Canada and three foreign countries.

It is pointed out that the broad distribution of the institutions represented argues well for the public recognition of the opportunity to students of promise and ability under these awards and also indicates the wide area from which the Lalor Foundation is drawing persons desirous of achievement in the various fields of chemical research.

The recipients of the awards are:

Dr. Leland J. Haworth, of the University of Wisconsin, to continue his work with Professor F. G. Keyes in the Research Laboratory of Physical Chemistry at the Massachusetts Institute of Technology, on the fundamental properties of materials at low temperatures.

Dr. R. S. Livingston, associate professor at the University of Minnesota, to spend a sabbatical year working with Professor Frank, the Johns Hopkins University, on the study of photosensitized chemical oxidations.

Dr. Lucy Pickett, assistant professor at Mount Holyoke College, to carry on studies of absorption spectra of pure hydrocarbons with Professor Henri at the University of Liége, in Belgium, and for work at Harvard University. Dr. Pickett has also been awarded a fellowship by the Committee for the Relief of Belgium.

Dr. Walter W. Pigman, of the University of Maryland, for a year's leave of absence from his position in the Bureau of Standards in Washington, to work with Professor Helferich, of Leipzig, on the chemical nature and constitution of enzymes.

Dr. John W. Stout, of the University of California, to continue his researches with Professor Giauque on the thermal and magnetic properties of various substances at the lowest temperatures available by adiabatic magnetic cooling.

The selection committee acting for the foundation consisted of Dr. Roger Adams, director of the department of chemistry of the University of Illinois; Dr. Charles A. Kraus, of Brown University, president-elect of the American Chemical Society; Dr. Arthur B. Lamb, director of the Division of Chemistry of Harvard University, and C. L. Burdick, secretary of the Lalor Foundation.

CENTENNIAL OF THE MEDICAL COLLEGE OF VIRGINIA

THE fourth and final symposium of the series commemorating the Centennial of the Medical College of Virginia will be held on April 28, 29 and 30, with Dr. George R. Minot, professor of medicine at the Harvard Medical School and director of the Thorndike Memorial Laboratory, as the Stuart McGuire lecturer. The annual lectures are combined with the symposium this year. Other speakers on the program will be: Dr. H. E. Jordan, assistant dean of the department of medicine and professor of histology and embryology, University of Virginia; Dr. O. H. Perry Pepper, professor of medicine, University of Pennsylvania School of Medicine; Dr. Nathan Rosenthal, Mount Sinai Hospital, New York City; Dr. Alexis F. Hartmann, associate professor of pediatrics, Washington University School of Medicine; Dr. Harvey B. Stone, associate professor of surgery, the Johns Hopkins University School of Medicine; Dr. Edward D. Churchill, John Homans professor of surgery, Harvard Medical School, and Dr. Walter Bauer, associate professor and tutor in medicine, Harvard Medical School.

On the Wednesday preceding the lectures the ex-internes of the Hospital Division will have their annual meeting. A portrait of the late Dr. Manfred Call, clinical professor of medicine, will be presented to the college by the ex-internes.

The climax of the celebration will come at commencement on June 7 with a centennial program at ten thirty o'clock in the morning, with the usual commencement exercises in the evening. Dr. Henry A. Christian, Hersey professor of medicine in the Harvard Medical School, will be the chief speaker on the morning program, and J. Rion McKissick, president of the University of South Carolina, will be the speaker at the commencement exercises proper. Colleges and universities throughout the nation will be invited to send representatives for the morning program. About a hundred and forty students will be graduated on June 7 from the schools of medicine, dentistry, pharmacy and nursing.

THE EIGHTIETH BIRTHDAY OF MAX PLANCK

On the twenty-third of April, Max Planck, originator of the quantum theory, celebrates his eightieth birthday. To him we owe the discovery of the initial clue to one of the most astonishing series of advances in the history of science. Among living physicists of the highest distinction he is the senior—a man of outstanding character, universally revered by his colleagues in every land. It is therefore fitting that we should take cognizance of the occasion and join in congratulations to him for his continued vigor.

Planck was born in 1858 in Kiel, where his father was professor of law. He attended the university at Munich to which his father had been called in 1867 and attained his doctorate at the age of twenty-one. From 1880 to 1885 he was privat-docent in physics at Munich. Thence he was called to a professorship in his native city of Kiel and after four years to become successor to Kirchhoff in Berlin.

Just a year younger than Heinrich Hertz, Planck like Hertz was to owe his advancement in part to v. Helmholtz, the outstanding figure in German physics at the beginning of Planck's career. Boltzmann was at the time actively at work in the development of the kinetic theory of matter, but his point of view still occupied a subsidiary place with respect to thermodynamics as an approach to the study of the properties of matter. So it was that Planck's first scientific interest was in the field of thermodynamics. In fact that remained his primary interest for many years and ultimately led to the discovery of the quantum. His many publications prior to 1900 deal chiefly with the clarification of the fundamental principles of thermodynamics with applications to physical chemistry and heat radiation.

Thermodynamics is a subject of maximum appeal to the conservative scientist who seeks to introduce as few special hypotheses as possible into his thinking. Planck's genius is of just this cautious type—he must find the speculations of present-day nuclear theoretical physics extremely distasteful. Nevertheless the work of Planck has led to a reformulation of the principles of physics so drastic that we can compare it only with the adoption of the Copernican view of astronomy or with the replacement of the kinematics of Newton by that of Einstein. As the Copernican system gave the key to the heavens, so the quantum theory of Planck has supplied the key to the sub-microscopic world and to the understanding of the structure of matter. On the philosophic side it has torn the law of causality from its central position as the essential basis of science and on the practical side it has provided the stimulus for a vast wealth of experiments and of experimental discoveries. The possibility that such an avalanche of change could result from the work of a conservative like Planck arose, of course, from the circumstances that the initial position of the science of physics was an unstable one.

The first of the series of researches which were to culminate in the overthrow of classical physics was apparently begun in 1894. Early in the following year Planck presented to the Berlin Academy of Science a paper on electrical resonance in which he calls attention to the harmony between his results and Kirchhoff's law relating the emission and absorption coefficients of matter for thermal radiation. Clearly he had in mind at this time the task of reconciling the electromagnetic theory of heat radiation with the demands of thermodynamics. This meant the application of the entropy concept to electromagnetic waves and the study of the equilibrium between radiation and model sources of light.

The path of progress was not a straightforward one. Planck conceived the process of establishing thermodynamic equilibrium between radiation and matter as a pure electromagnetic resonance phenomenon involving, however, an irreversible increase in entropy. The reversibility in time of the electromagnetic equations led to the same quandary here as that involved in reconciling the reversibility of the mechanical equations of motion with the entropy principle in statistical mechanics. The paradox was solved by the introduction of the postulate of a chaotic distribution of amplitudes and phases for the elementary vibrations of "natural radiation." By an analysis of the resonance phenomenon Planck was then able to derive a simple relation of proportionality between the average energy of charged linear oscillators of frequency ν and the specific intensity of radiation of the same frequency in equilibrium with these oscillators.