Administrative Department, it aids research in engineering and the sciences, conducts the Engineering Societies Library, the largest strictly engineering library in America, and carries on numerous other activities.

MEETINGS OF GEOLOGISTS IN NEW YORK CITY

THE forty-eighth annual meeting of the Geological Society of America will be held on Thursday, Friday and Saturday, December 26, 27 and 28, in New York City. The headquarters, place of registration, scientific sessions and exhibits will be in the Waldorf-Astoria Hotel, Park Avenue at 50th Street.

Fellows are urged to submit without delay the titles and abstracts of papers which they wish to present at the meeting, so that the Program Committee may arrange to advantage a program of the sessions. No paper will be considered unless the title is accompanied by an abstract suitable for printing in the *Proceedings* of the society.

The address of the retiring president, Dr. Nevin M. Fenneman, professor of geology and geography in the University of Cincinnati, will be delivered on December 26 at 8 o'clock. His subject will be "Cyclic and Non-Cyclic Aspects of Erosion." A smoker will follow the address. The regular dinner of the society will be held on Friday evening, December 27, at 7 o'clock.

In conjunction with the Geological Society the Paleontological Society (Secretary, B. F. Howell, Princeton University) will hold its twenty-seventh annual meeting, and the Mineralogical Society of America (Secretary, Paul F. Kerr, Columbia University, New York City) will hold its sixteenth annual meeting.

Section E of the American Association for the Advancement of Science will meet in St. Louis, Missouri, on December 30 and 31. A joint session with the Seismological Society will be held on December 30. Papers dealing with the geology and geography of the Mississippi Valley will be welcomed for the program of December 31. Full information regarding the meeting may be obtained from the secretary of Section E, Kirtley F. Mather, Harvard University, Cambridge, Mass.

In order to appear in the preliminary programs, abstracts of papers should be in the hands of the various secretaries by November 25.

RECENT DEATHS

PROFESSOR CHARLES LORING JACKSON, who was a member of the faculty of Harvard University for forty-four years until his resignation as professor of chemistry in 1912, died on October 28 at the age of eighty-eight years.

HARRY S. SWARTH, curator of ornithology and mammalogy of the California Academy of Sciences at San Francisco for the past eight years, died suddenly on October 22. He was fifty-seven years old.

DR. ANNA LAURA HINTZE, since 1929 assistant professor of physiology and hygiene at Goucher College, died on October 27 at the age of forty-seven years.

DR. JOHN GOODMAN, professor emeritus of civil and mechanical engineering at the University of Leeds, died on October 28 at the age of seventy-three years.

SCIENTIFIC NOTES AND NEWS

SIMON NEWCOMB, William Penn and Grover Cleveland were elected to the Hall of Fame of New York University in the eighth quinquennial election. The elections have been ratified by the senate of New York University and commemorative tablets and busts to the three men will be placed in the Colonnade at University Heights at ceremonies to take place probably next spring. Sixty-one votes, or a three-fifths majority, were necessary for election. Penn headed the list of candidates with eighty-three votes; Newcomb was second with seventy-eight votes and Cleveland was third with seventy-seven votes. Walter Reed, with fifty-seven votes, and Willard Gibbs, with fifty-five votes, stood next to those elected.

DR. EUGENE H. POOL, professor of clinical surgery at the Cornell Medical Center, was elected president at the San Francisco meeting of the College of Surgeons for the 1936–37 term. Dr. Emile Holman, professor of surgery in Stanford University Hospital, was elected first vice-president, and Dr. George E. Wilson, assistant professor of surgery in the University of Toronto, second vice-president. These officers will be inducted at the end of next year's congress. Officers-elect for the 1935–36 term named at the last congress are: Dr. Donald C. Balfour, of Rochester, Minn., *president;* Dr. Arthur W. Allen, of Boston, *first vice-president,* and Dr. John A. Gunn, of Winnipeg, Canada, *second vice-president.*

THE *British Medical Journal* states that the Leningrad Institute of Post-Graduate Medical Studies has founded a chair in pathology and physiology of the higher nervous activity. It is dedicated to Professor I. P. Pavlov, who presided at the recent International Physiological Congress. The director of studies will be Dr. M. K. Petrova, one of Dr. Pavlov's pupils and collaborators. The purpose of the institute is to en-

able students to study various forms of artificially conditioned neuroses by experimentation on animals, with a view to applying the knowledge to the treatment of human patients.

DR. TANON, professor of hygiene in the Paris Faculty of Medicine and member of the Superior Council of Hygiene of France, has been elected a member of the Academy of Medicine in the section of hygiene. Drs. de Wildeman, of Ghent; Fernandez, of Madrid; Angelescu, of Bucharest, and Presno Bastioni, of Havana, Cuba, have been elected foreign corresponding members.

Nature reports that the following awards by the Royal Aeronautical Society have recently been made: Society's Silver Medal to C. C. Walker and Major F. B. Halford; Simms Gold Medal to Dr. L. Aitchison; Taylor Gold Medal to F. Rodwell Banks, and the Busk Memorial Prize to Dr. H. Roxbee Cox.

DR. A. BAIRD HASTINGS has resigned as professor of biochemistry in the department of medicine of the University of Chicago to accept the Hamilton Kuhn professorship in biological chemistry at the Harvard Medical School. This is the chair held by the late Otto Folin.

THE Bronson professorship of comparative anatomy at Yale University has been filled by the appointment of Associate Professor John S. Nicholas. There has been no appointment to this chair since 1927 when Dr. Ross G. Harrison was named to a Sterling professorship. Professor Nicholas, who received his doctorate at Yale University in 1921, has hitherto had general charge of pre-medical students.

DR. LINWOOD L. LEE, research specialist in land utilization at the New Jersey Experiment Station, has been granted a year's leave of absence to continue as director of the Soil Conservation Service of the U. S. Department of Agriculture.

R. E. BREWER, of the School of Chemistry of the University of Minnesota, has become associate chemical engineer in the Chemical Division of the Bureau of Mines at Pittsburgh, Pa., where his work will be on the physico-chemical properties of coal.

C. F. W. MUESEBECK, entomologist in the Bureau of Entomology, has succeeded Dr. Harold Morrison as chief of the Division of Insect Identification.

DR. I. T. HAIG, chief of the Division of Forest Management at the Northern Rocky Mountain Forest and Range Experiment Station at Missoula, Mont., has been appointed assistant chief of the Division of Silvics in Washington.

DR. G. LOUIS WELLER, JR., clinical instructor in medicine at the School of Medicine of the George Washington University, has been awarded a grant by the Committee on Scientific Research of the American Medical Association for the study of the action of indol upon the hematopoetic tissues of the chick.

DR. HUGH S. CUMMING, U. S. Surgeon General, has returned to the United States after attending the meeting of the Health Committee of the League of Nations in Geneva and the sessions of the Permanent Committee of the International Health Office in Paris.

DR. J. E. WODSEDALEK, professor of zoology at the University of Minnesota, has leave of absence for a year. He has been appointed visiting professor of zoology at the California Institute of Technology, Pasadena, where he is engaged in cytological research in the Wm. G. Kerckhoff Laboratories of the Biological Sciences. Before returning to the University of Minnesota next summer he will spend some time at the Scripps Institution of Oceanography and at the University of Arizona.

WILLIAM G. HASSLER, herpetologist of the American Museum of Natural History, returned on October 29, after seven months passed in studying the life and habits of reptiles and amphibians in Haiti and Dominica. The expedition brought back more than 2,000 preserved specimens, and 430 reptiles and fish were sent back alive.

PROFESSOR BJORN HELLAND-HANSEN, director of the Geophysical Institute at Bergen, Norway, is traveling in the United States. The object of his visit is in part in connection with the committee appointed by the Norwegian government for the promotion of technical industrial research. He plans to study the organization and administration of various foundations, including institutions for international and human relations, and to visit oceanographic and geophysical institutions.

DR. BERTIL HANSTROM, director of the Zoological Institute, University of Lund, Sweden, arrived at the Bass Biological Laboratory on October 23. He has been at the Marine Biological Laboratory at Woods Hole as a stipendiary of the Rockefeller Foundation and has been transferred to Englewood for a month, where he will continue his experimental work with crustaceans.

A GROUP of European health officers, who plan during November to study health problems in leading American cities under the auspices of the League of Nations, arrived in New York on October 31. Members of the delegation include Dr. L. S. Fridericia, professor of hygiene at the University of Copenhagen; Dr. J. Parisot, professor of hygiene at the University of Nancy; Professor R. M. F. Picken, Welsh National School of Medicine, Cardiff; Dr. E. Rietz, chief medical officer of health, Stockholm, and Dr. H. van der

Kaa, chief health officer of the Netherlands. It is planned to visit Baltimore, Knoxville, Cincinnati, Chicago, Albany, Boston, New Haven and New York City.

PROFESSOR EDWIN G. CONKLIN, of Princeton University, will give a lecture on "Scientific and Social Progress" on November 13 before the New York University Chapter of Sigma Xi. The lecture will be given at 8:15 P. M. in the Nichols Chemical Laboratory at University Heights.

DR. MAURICE C. HALL, chief of the Zoological Division of the Bureau of Animal Industry, spoke before the Sigma Xi Club of Oregon State College on October 8 on "What is Scientific Research?" Dr. H. B. Lewis, professor of biological chemistry in the Medical School and director of the College of Pharmacy at the University of Michigan, spoke on October 19. His subject was "Vitamines and Hormones."

DR. WILLIAM D. MACMILLAN, professor of astronomy at the University of Chicago, on October 29 gave a public lecture entitled "Dynamical Astronomy" in the series of lectures now being given at the university on "The History of Science."

DR. A. B. STOUT, director of the laboratories of the New York Botanical Garden, gave a lecture on November 7 before the Lancaster Branch of the American Association for the Advancement of Science on "Sterilities in Flowering Plants."

THE first lecture in the Smith-Reed-Russell Series for this year at the George Washington University School of Medicine was given before the student body, members of the faculty and invited guests on October 24. The guest speaker for the occasion was Surgeon General Charles R. Reynolds, Medical Corps, U. S. Army. The subject of his address was "The Medical Corps of the United States Army."

DR. BERNARDO A. HOUSSAY, professor of physiology and director of the Institute of Physiology of the University of Buenos Aires, will give at Harvard University on November 22, 25 and 27 the 1935 Edward K. Dunham Lectures for the Promotion of the Medical Sciences. His subject will be "Recent Studies on the Functions of the Hypophysis."

THE one hundredth anniversary of Thomas Nuttall's expedition to the Pacific coast in 1834, 1835 and 1836 was observed by exercises in the open air at the Jepson Laurel, Spring Valley Lakes, California, on October 20. Papers were read by representatives of various organizations: Cornelia C. Pringle, Cooper Club, "Pica Nuttallii, its Geographic Range and Habits"; Professor E. Fritz, Division of Forestry, University of California, "Cornus Nuttallii, its Place in the Forest"; Dr. E. R. Hall, California Museum of Vertebrate Zoology, "Thomas Nuttall as a Mammalogist and Ornithologist"; Dr. W. L. Jepson, California Botanical Society, "The Trail of Nuttall Across the Continent in 1834"; Frank L. Dodd, Berkeley Teachers College, "The Botanist as an Idealist in the World as We Find it"; Professor W. W. Mackie, University of California, acted as master of the day.

A SYMPOSIUM entitled "Ultra-Violet Light at Work for Better Human Health" will be held at 9 P. M. on Thursday, November 14, under the auspices of the American Institute at the American Museum of Natural History, New York City. Exhibits and demonstrations will be made by the National Carbon Company; Standard Brands, Inc.; Hanovia Chemical and Manufacturing Company; Westinghouse Electric and Manufacturing Company; The R.U.V. Engineering Corporation, and others. Exhibits will include apparatus for producing irradiated vitamin D milk, irradiated yeast, viosterol, and other products, ultra-violet radiation meters, etc. Dr. William H. Park, Bureau of Laboratories, of the Department of Health, New York, will preside at the symposium, at which the individual subjects and speakers are as follows: "Ultra-Violet Radiation," Dr. M. J. Dorcas, advisory engineer, National Carbon Company; "Irradiated Milk," Dr. G. C. Supplee, director of research, Dry Milk Company; "Irradiated Pharmaceuticals," Dr. Carl Nielsen, director of nutritional research, Abbott Laboratories, and "Irradiated Cholesterol," Dr. James E. Waddell, director, Biological Laboratory, E. I. du Pont de Nemours and Company.

THE *Journal* of the American Medical Association states that an anonymous contribution has made possible the establishment of a foundation for dental research in the Chicago College of Dental Surgery, the dental division of Loyola University, which will have available annually $25,000 as a minimum. The major part of the work will be carried on in the laboratories of the dental school, while another part will be undertaken at the John McCormick Institute for Infectious Diseases. Some of the problems to be investigated will be a study of the bacteriology and histopathology of dental caries and the diseases that involve the supporting structures of the teeth as well as their effects on general health.

A NEW building to cost approximately $400,000 will be erected by New York University at University Avenue and 180th Street, the Bronx, to house part of the institution's College of Engineering. It will be erected in cooperation with the Reconstruction Finance Corporation. The present plant will be turned over to experimental purposes. On the first floor will be material-testing laboratories and the hydraulic laboratories, while on the second floor there will be lecture halls and offices. The third floor will house the univer-

sity's meteorological laboratories which are now charting air currents on the outdoor campus.

THE trustees of the Rockefeller Foundation have made a conditional offer of £60,000 to aid the National Hospital, London, a leading center for the treatment and study of nervous diseases. The money is to defray the cost of new buildings and equipment on the condition that the balance required, estimated at £120,000, is raised within two years. If the condition is fulfilled, the trustees will give a further £60,000 toward an endowment for research.

THE London *Times* reports that the Danish government's scientific expedition ship *Dana* sank recently in the North Sea sixty miles west of Ringkjöbing, Jutland, after a collision in thick fog with the German trawler *Pickhuben*. The leader, Dr. Vedel Taaning, and the crew, in all twenty-two men, were saved by the *Pickhuben* and brought to Esbjerg. The *Dana* was the ship used by the late Professor Johannes Schmidt, as director of the physiological department of the Carlsberg Laboratorium, on oceanographic expeditions to trace the migration of eels. Oceanic life was studied at the greatest depths with special echo-sounding gear, which is now lost, together with the results of expeditions during the last three years.

DISCUSSION

THE BORN THEORY OF THE ELECTRON

THE theory of the electron as formulated by Dirac has been especially successful in its application to atomic physics. However, when it comes to a treatment of phenomena in which the scale of the quantities involved in the calculations are of a lower order of magnitude than those considered in atomic physics, then discrepancies occur. This is readily understood when it is remembered that the Dirac equations are founded on the concept of a point electron. Born[1] has attempted to remedy the situation by replacing the concept at the basis of the classical electron of Lorentz by another set of fundamental ideas. As yet there is much discussion of the validity of his hypotheses. Perhaps the best test of any theory is the comparison of its predictions with experiment. In this note we shall give the results of the investigation of one of the properties of the Born electron. Before we discuss this we shall review briefly some of the other properties of the theory as they have a bearing on the problem.

(a) The Born electron has a finite mass. This is a property which any theory of the electron must guarantee.

(b) The theory requires that the effective electric intensity for electric waves of wave-length less than the radius of the electron be an average of the true electric intensity over the electron. In calculating problems in quantum mechanics involving electric waves of this character, the theory supposes that the equations of Dirac be used with the effective electric intensity substituted for the true intensity.

(c) This is the problem where the deviations from the classical theory are the most striking. The Born electron has properties which correspond in the theory of ponderable media to a dielectric constant and magnetic susceptibility. The field equations are non-linear. This results in the effective electric force acting on an electron in an intense electric and magnetic field being proportional to the sum of two terms: in the one, the electric intensity is the predominating term; in the other, the magnetic intensity. As a consequence of this, the effective electric force acting on an electron in a strong electric and magnetic field is greater than the force arising from the effect of the electric intensity alone. A situation where these considerations are important is in the problem of the production of photons by a high energy electron impinging on a nucleus. In the solution of this problem one method is to choose a system of axes in which the electron is at rest and then to consider the field of the nucleus acting on the electron as a system of electric waves. The scattering of the waves by the electron has for an observer at rest with respect to the nucleus the effect of the emission of radiation. According to this theory, the probability of the emission of two photons simultaneously is to the emission of one photon as the ratio of $2\pi e^2$ to hc where e is the charge on the electron, h Planck's constant and c the velocity of light. This ratio is equal to 1/137. Hence the chance of two photons being emitted simultaneously is negligible. On the Born theory, however, the increase in the effective electric intensity in those regions where the electric and magnetic fields are strong results in an increase of this ratio to $2\pi e^2\varepsilon/hc$ where ε is greater than one. If Z is the atomic number of the nucleus struck by an electron of kinetic energy ξ as measured in units of mc^2 then the production of small showers, *i.e.*, the simultaneous emission of two or more photons at a collision, should occur when the following relation is satisfied: $2\times10^3 \leqq Z\xi \leqq 2\times10^4$. This relation requires that the showers should be softer the heavier the nucleus involved in the collision. Such a theory also would require a revision of the theory of the hyperfine structure of spectral lines. We merely mention these illustrations to show where we may

[1] M. Born, *Proc. Roy. Soc.*, A 143: 410, 1934; M. Born and Infeld, *Proc. Roy. Soc.*, A 144: 425, 1934.