children in the Children's Science Fair (there were over 400 exhibits and 35,000 visitors at last year's fair), it is felt that the institute should broaden its scope. Dr. H. H. Sheldon, president of the institute, expressed satisfaction at the favorable reception the plan had received.

The Junior Science Clubs Plan Committee consists of the following members: Dr. Morris Meister, New York Teacher Training College; Herbert J. Arnold, Lincoln School of Teachers College; Alexander Brodell, Franklin K. Lane High School; Dr. John E. Brolles, George Washington High School; John A. Clark, Alexander Hamilton High School; Alexander Efran, John Adams High School; Irving Fine, James Monroe High School; Charles A. Gramet, John Adams High School; Doris Spier Harman, School Nature League; Rosalie Kant, Bryant High School; William R. Leng, Junior High School No. 55, Bronx; Paul B. Mann, Evander Childs High School; Irving Mosbacher, Morris High School; Professor S. R. Powers, Teachers College; Grace Fisher Ramsay, American Museum of Natural History; B. Taplitz, Grover Cleveland High School; Superintendent John L. Tildsley; Samuel Yacknowitz, Walton High School.

THE LOS ANGELES MEETING OF THE AMERICAN MATHEMATICAL SOCIETY

AT the final session of the recent summer meeting of the American Mathematical Society, held on the Los Angeles campus of the University of California, the following resolution was adopted:

> The American Mathematical Society wishes to place on record its recognition of the Los Angeles meeting as one of the most successful and enjoyable in the history of the society, its admiration for the genius of those who have won and are winning for the mathematical sciences their due place in the amazing cultural development of the Pacific Coast, and its gratitude to all those whose courtesy, hospitality and devoted effort have made the occasion memorable: to Professors E. R. Hedrick and W. M. Whyburn for their unremitting attention to every matter of plan and detail, to all members of the local committee on arrangements and its subcommittees including the faculty, students and ex-students of the University of California at Los Angeles, to Vice-president and Provost Ernest C. Moore, host at the luncheon on Tuesday, to Mrs. Phelps and those associated with her at Mira Hershey Hall, to Professor E. T. Bell and other members of the staff of the California Institute of Technology, to the staff of the Mount Wilson Observatory, to the Los Angeles Chamber of Commerce for assistance in registration, publicity and general information, to Professors D. N. Lehmer and Tibor Rado for their addresses delivered by special invitation of the society, and to Professor J. F. Ritt, whose colloquium, in addition to the significance of its content, has been by unanimous agreement one of the most notable for the lucidity of its oral presentation among all those which the society has heard. The secretary is directed to send copies of this resolution to the persons and groups designated.

SCIENTIFIC NOTES AND NEWS

THE autumn meeting of the National Academy of Sciences will be held at the University of Michigan on November 14, 15 and 16. The regular council meeting will be held on the preceding evening, Sunday, November 13. Members of the local committee are F. G. Novy, *chairman*, H. D. Curtis, C. F. Kettering, Frank Leverett, Walter B. Pillsbury and Moses Gomberg, *secretary*.

HITCHCOCK lecturers at the University of California for the year 1932 to 1933 are: Dr. Peter Debye, professor of physics at the University of Leipzig, September 15 to October 15; J. B. S. Haldane, Sir William Dunn reader in biochemistry at the University of Cambridge, head of the genetical department of the John Innes Horticultural Institute and Fullerian professor of physiology at the Royal Institution, October 15 to November 15, and Dr. George Sarton, research associate of the Carnegie Institution at Washington, lecturer on the history of science at Harvard University, and editor of *Isis*, January 15 to February 15. The establishment of the Hitchcock professorship to bring eminent men to Berkeley for periods of three weeks or longer, is made possible by a bequest, amounting to about $115,000, from the late Mrs. L. Hitchcock Coit. Mrs. Coit asked that this sum be added to a lecture fund presented by her father in 1872, which now amounts to $10,000, and that in honor of her father and mother the chair commemorate their name.

THE Remington Honor Medal for outstanding service to pharmacy has this year been awarded to Eugene G. Eberle, editor of the *Journal* of the American Pharmaceutical Association and a past-president of the organization. The presentation will be made in Baltimore, on October 12, at a testimonial dinner given in his honor by the New York and Baltimore branches of the American Pharmaceutical Association. Among the speakers will be Professor E. Fullerton Cook, chairman of the Revision Committee of the United States Pharmacopoeia; Dr. Henry V. Arny, dean of the School of Pharmacy, Columbia University, and Dr. E. F. Kelly, secretary of the American Pharmaceutical Association.

DR. C. N. MCBRYDE, director of the U. S. Bureau of Animal Industry Experiment Station at Ames, Iowa, was elected an honorary member of the American Veterinary Medical Association at the sixty-ninth annual meeting held at Atlanta, Georgia, from August 23 to 26.

DR. RALPH H. MCKEE, professor of chemical engineering at Columbia University, received the honorary doctorate of natural philosophy from the University of Tartu, Dorpat, Estonia, on the occasion of the tercentenary celebration of its founding.

DR. JULES BORDET, director of the Institut Pasteur of Brussels, was made doctor, *honoris causa,* of the University of Caen, on the occasion of the celebration of the fifth centenary of its foundation by Henry VI of England.

TH. BÄUERLE, director of the Volkshochschule at Württemberg, has been elected honorary senator by the university at Tübingen.

DR. PARKE R. KOLBE, president of the Polytechnic Institute of Brooklyn, has resigned to accept the presidency of the Drexel Institute. His service in Philadelphia begins on October 1.

DR. A. G. POHLMAN, professor of anatomy at St. Louis University, will succeed the late Dr. G. R. Albertson as dean of the school of medicine and professor of anatomy at the University of South Dakota.

J. T. STRATE, assistant professor of mechanical engineering at the University of Arkansas for the last eight years, has been appointed head of the mechanical engineering department at South Dakota State College. He succeeds H. C. Solberg, who died this summer after serving for forty years.

DR. W. B. UNGER has been appointed chairman of the department of zoology at Dartmouth College.

DR. EDWARD W. MORRISON has been appointed assistant professor of bacteriology in the New Jersey College for Women.

LLOYD R. SIMONS, for the past four years county agent leader on the faculty of the New York State College of Agriculture at Cornell University, has been appointed director of extension. He succeeds Dr. Carl E. Ladd, who is now dean of the Colleges of Agriculture and Home Economics.

DR. WALTER LANGDON BROWN has been appointed Regius professor of physic in the University of Cambridge in succession to Sir Humphry Rolleston, who retired on September 30 on the completion of his term of office. Dr. Brown is consulting physician to the Metropolitan Hospital, senior medical officer of the Provident Mutual Life Assurance Company and an examiner in medicine to the University of Cambridge.

E. J. W. BARRINGTON, of Oriel College, Oxford, has been appointed lecturer in zoology at University College, Nottingham.

DR. HAROLD MOORE, who has for many years been director of metallurgical research at the Research Department, Woolwich, England, has been appointed director of the Research Association, to succeed Dr. R. S. Hutton, who has been elected to the new Goldsmith professorship of metallurgy at the University of Cambridge.

THE directors of Imperial Chemical Industries, Limited, England, have released Sir Frederick Keeble, F.R.S., from executive and routine duties as controller of their Agricultural Research Station at Jealott's Hill, in order that he may be more free to devote himself to the many important problems now arising in the application of scientific results to modern agriculture. Sir Frederick Keeble remains a member of the Imperial Chemical Industries Research Council, and will continue to serve the company in an advisory capacity.

DR. CHAS. C. ADAMS, director of the New York State Museum at Albany, has been elected chairman of the Science Section of the American Association of Museums. Dr. Carl E. Guthe, director of the Museum of Anthropology, University of Michigan, is secretary.

DR. C. W. WARBURTON, director of extension of the U. S. Department of Agriculture, has been designated by Secretary Hyde to act as contact officer for the department in connection with its participation in the Century of Progress Exposition, which is to be held in Chicago in 1933, opening on June 1 and closing on November 1. In this capacity Dr. Warburton will arrange, in cooperation with the Office of Exhibits, Extension Service, with all bureaus and offices of the department and with allied industries, all details of the department's participation in the exposition.

DR. ALEXIS CARREL, of the Rockefeller Institute for Medical Research, arrived in New York on September 19 after spending two months in Brittany.

WILLIAM LLOYD WARNER, of the Peabody Museum, Harvard University, has returned from archeological exploration in County Clare, Ireland.

DR. R. S. BASSLER, head curator of geology in the U. S. National Museum, has returned from field-work in the Silurian and Mississippian strata of the central states, where he has been engaged in the study of the stratigraphy and in collecting fossil echinoderms for the Springer Collection. He was success-

ful in obtaining several hundred crinoids and blastoids in addition to specimens of other classes of fossils.

JASON R. SWALLEN, assistant botanist in the Grass Herbarium of the U. S. National Museum, has returned from a several weeks' trip to Yucatan. He visited Chichen Itza, Uxmal, Peto, Lake Chichenkanab, Tulum and Cozumel Island, the last by airplane. He brought back a collection of grasses, sedges and parasitic rusts. The trip was made in cooperation with the University of Michigan and the Carnegie Institution of Washington.

DR. FRANCIS G. BENEDICT, director of the Nutrition Laboratory of the Carnegie Institution of Washington at Boston, left the United States on August 18, accompanied by Mrs. Benedict, for a tour of several months in Europe. They attended the Fourteenth International Physiological Congress in Rome and are now visiting various research institutions and physiological laboratories, conducting investigations on basal metabolism and related subjects. They expect to return to the United States in March, 1933. Dr. Benedict will lecture, by special invitation, at several institutions on the techniques and findings of the Nutrition Laboratory.

DR. WALTER S. MCCLELLAN, medical director of the Saratoga Springs Commission of the State of New York, sailed on September 22 for six months' study and research in Europe. In London he will be in conference with Dr. Fortescue Fox and Dr. W. S. C. Copeman, of the International Society of Medical Hydrology. He plans to go to Paris for the International Congress on Rheumatic Conditions and for a council meeting of the International Society of Medical Hydrology. The following three months he will spend in work with Dr. Franz M. Groedel at the Kerckhoff Institute for Study of Affections of the Heart at Bad Nauheim. The last two months will be spent at the Hydrotherapeutic Station of the Virchow Hospital in Berlin, under Professor Laqueur, the director. He will also spend some time with Professor Zoerkendoerfer at Marienbad.

THE New York State Museum has received a donation of geological specimens, historical objects, Indian materials and copies of old publications of the museum from Mrs. Edward E. Davis, of Norwich. The collections were made by the late Edward E. Davis, and have been given to the museum in accordance with his wish.

THE Field Museum of Natural History has received a new shipment of 4,000 photographic negatives of historic plant specimens preserved in the herbarium of the Botanical Garden and Museum of Berlin. The total number of such photographs being gathered as a joint project of Field Museum and the Rockefeller Foundation of New York has reached a total of 20,000. The shipment came from J. Francis Macbride, assistant curator of taxonomy, who for three years has been in Europe engaged in the work of carrying out this project. The museum has also received a collection of some 1,100 specimens of South American plants, for the herbarium of the department of botany from Dr. F. C. Hoehne, of the Biological Institute of São Paulo, Brazil. According to Paul C. Standley, associate curator of the herbarium, this gives the museum a representation of Brazilian plants of the coffee family which is not equalled in any other herbarium of the United States.

AN exhibition of material relating to the metric system, to celebrate its formal introduction into Austria sixty years ago, was opened in the Museum für Kunst und Industrie, in Vienna, on September 15. It will remain open until October 30.

PROFESSOR W. D. BANCROFT, of Cornell University, the founder and editor of *The Journal of Physical Chemistry,* announces that arrangements have been completed whereby, beginning on January 1, 1933, Williams and Wilkins, of Baltimore, Maryland, will publish the journal. It is in its thirty-sixth volume. Until eleven years ago all deficits were met by Professor Bancroft, but since this time they have been covered by the Chemical Foundation, Inc. The foundation not being able to continue this support after 1932, the new arrangements have been made. For the last eleven years editorial responsibility has been shared by the Chemical Society (London), the Faraday Society and the American Chemical Society. The members of the editorial board representing the British societies are at present W. E. Garner, James Kendall, T. M. Lowry and J. R. Partington. Those representing the American Chemical Society are J. N. Pearce, J. H. Walton, H. B. Weiser and F. K. Cameron. The terms of Drs. Weiser and Cameron expire with the calendar year, and J. W. McBain and T. R. Briggs have been elected to succeed them. Professor Bancroft will retire as editor and his successor, to take office on January 1, 1933, is about to be elected by the editorial board.

PUBLIC lectures at the New York Botanical Garden are being given through the season from September 3 to November 26 on Saturday afternoons at 3:30 o'clock. The speakers with their subjects during October and November are as follows: October 1, "Dahlias," Dr. Marshall A. Howe, assistant director; October 8, "Jungles and Gardens in Florida," Dr. H. Beaman Douglass, physician; October 15, "Autumn Coloration," Dr. A. B. Stout, director of the laboratories; October 22, "Grasses, the Plants of Greatest

Economic Importance to Man," Dr. Elmer D. Merrill, director-in-chief; October 29, "Our Native Ferns," Mr. Albert C. Smith, associate curator; November 5, "Australia, Past and Present," Dr. Arthur Hollick, research associate in paleobotany and Dr. Forman T. McLean, supervisor of public education; November 12, "Crocuses and How to Use Them," Mrs. Wheeler H. Peckham, honorary curator of Iris and Narcissus collections; November 19, "Planting the Bulbs," Mr. Kenneth R. Boynton, head gardener; November 26, "A Winter in Bermuda," Dr. Fred J. Seaver, curator.

APPORTIONMENT of $5,000,000 emergency forest highway funds to be expended in thirty-four states and territories in the fiscal year 1933 has been approved by Secretary Hyde. Building of new highways in the national forests will be begun at once to give employment and open up the national forests to greater use and protect them from fire. The $5,000,000 is part of the 322,000,000 voted by Congress for public works as an emergency measure. Vermont and Mississippi share in national forest highway apportionment this year for the first time.

MORE than 100,000,000 trees were distributed by State forestry departments for forest planting in 1931, says the Forest Service on the basis of reports from the States. These were grown in State nurseries. The figure does not include any privately grown trees. Of the total number, 25,500,000 were sent out for farm planting, 38 States and 2 Territories cooperating with the Forest Service in this activity. In addition, 52,500,000 were planted on State lands and 24,800,000 were distributed for planting on private lands other than farms. Total plantings of all these three classes were nearly 30 per cent. over 1930. In total trees distributed for planting on all classes of lands other than national forests, New York led, Michigan was second, and Pennsylvania third. In farm plantings Pennsylvania led, followed by New York, Ohio, Puerto Rico, and Michigan. Pines and spruces were far in the lead among the species sent out for farm planting. Under the Clarke-McNary Act the Forest Service cooperates with the States in growing forest trees for planting on farms. Distribution is made through the State forestry agencies direct to farmers and usually at cost. The Federal Government does not distribute any stock for State or private planting.

DISCUSSION

THE FUNDAMENTAL PARTICLES

THE experiments of Millikan and Anderson on the tracks due to cosmic radiation in an expansion chamber offer very convincing evidence for a positive particle whose mass is small compared with the mass of the proton. This extremely important observation indicates that it may be profitable to examine more seriously the suggestions from the theoretical side that there are different possible aspects of the electron. The fact that the theory has resisted so stubbornly the efforts to dispose of the negative energy electron or to distort the positive electron into a proton causes us to regard it now with increased respect.

The present theory of the electron seems to lead inevitably to an electron with negative energy and—with the help of the assumption due to Dirac that the negative energy states are almost all filled—to a positive electron of the same mass. Furthermore, as Dirac has shown, the theory provides for a magnetic pole with its corresponding negative energy states and pole of opposite sign. The existence of any one of these particles seems practically to imply all the others. We may therefore regard any one of them, *e.g.*, the electron, as the fundamenal particle. Or perhaps we could say more conservatively that the electron and the Dirac magnetic pole are the fundamental particles.

The problem then arises of constructing with these constituents alone all the observed physical entities. In other words, we require models of the proton, the neutron and possibly the photon. The last could be constructed of a positive and negative electron so close that the potential energy almost compensates the rest mass. The separation would be of the order of 10^{-13} cm. The system would have higher levels and the low level would not be reached in one transition. The jumps on the way down would result in radiation of half the frequency of the exactly analogous hydrogen frequency. Unfortunately, if these were emitted in the sun, they would not be easily visible, as Lyman $_\alpha$ would occur at 2430 Å and the limit of the Balmer series would be above 7200 Å, so that no lines would appear in the visible region.

There is, however, another possibility, much more interesting to the present writer, which depicts the photon as a combination of an ordinary and a negative energy electron. Under suitable conditions the Dirac equation for such a system reduces to one close to that customarily used for the photon. The mass term vanishes and the system moves with the velocity of light.

The most interesting new feature of the program is the picture of the neutron. This is built of a positive and negative magnetic pole. The argument by which the existence of the Dirac pole is inferred suggests that not only is the ratio of pole strength of the magnetic to the electric particle equal to $\frac{1}{2\alpha}$