fifty feet, J. J. Thomson found the positive luminescence to travel in a direction opposite that of the cathode particles in the Crookes tube, with a velocity somewhat greater than half the velocity of light. If this involved an actual transfer of electrons by some hand to hand process, it did not involve matter which was concerned in producing spectrum lines, since no Doppler effect is shown in the positive luminescence (Spottiswoode and Moulton). It might be suggested that the positive luminescence was here produced by cathode rays which found their way around the bends of this long tube and finally struck the anode, but this seems very improbable, especially in view of the Wheatstone experiment.

It seems probable that the discharge from a Leyden jar, or from a Holtz machine, differs from that of a spark coil or from the current originating in an armature of a dynamo. If both positive and negative currents exist in these last-named circuits, they are superposed in their origin, where the E.M.F. is produced. In the Holtz machine, as in the Leyden jar discharge, the positive and negative charges are separately accumulated, and in this case the positive and negative currents may perhaps be prevented from being superposed in the same discharge conductor. One terminal of the machine or jar may be connected to a large many-pointed conductor, suspended in the outer air on silk fibers. That terminal of the machine is then grounded on the dust particles in the air. The other terminal may be grounded either in a like manner, or on the gas pipe. Wheatstone gaps may be made in either of these circuits of unipolar discharge. These gaps may be either in open air or in tubes having any degree of exhaustion. Wheatstone's experiment under these conditions is likely to tell us something about the motion of positive and negative electricity in a conductor.

It is interesting to observe here that a Crookes tube will operate well in either of these unipolar circuits. The same exposure to the X-ray will give pictures of equal density when developed together in the same bath. In one case, however, the cathode terminal is connected to the negative terminal of the machine. In the other circuit, it is connected to the air contact, and is acted upon only inductively by the anti-cathode which is connected to the positive terminal of the machine. In the first case the cathode discharge appears normal and stable. In the second case, it seems unsteady, it is greatly affected by the motion of surrounding bodies, and it can be suppressed entirely by bringing the open hands near the tube so as to partly enclose it.

The pointed air terminal may be replaced by a flaming gas torch made of gas-piping closed at its upper end and having many small perforations, the lower end being connected with the gas main by rubber and glass tubing, the latter being kept dry by heating. The carbon particles then serve as the carriers. An insulated water tank in open air, from which the water escapes in a fine spray, is also effective.

If what we call the free charges on the terminals of the machine are delivered to the small particles which float off into the air, it would seem that in these unipolar discharges we may find that even if positive and negative currents are superposed they may not be equal in value. For certainly in both circuits the dominating action comes from the machine.

Francis E. Nipher.

SCIENTIFIC NOTES AND NEWS.

Professor Simon Newcomb has been elected a corresponding member of the Vienna Academy of Sciences.

It is reported that the Nobel prize for medicine will this year be awarded to Dr. Robert Koch.

Professor William T. Sedgwick, head of the biological department of the Massachusetts Institute of Technology, has been elected an honorary member of the New England Water Works Association.

Professor Martens, director of the Institute for Testing Materials at Berlin, has been elected a member of the Berlin Academy of Sciences.

Professors Paul Mansion, professor of mathematics, at the University of Genth, M.

Laisant, of the Ecole Polytechnique, Paris, and Dr. Giuseppe Peano, professor of mathematics at the University of Turin, have been elected honorary members of the Physico-mathematical Society of Kasan.

PROFESSOR E. SALKOWSKI, chief of the Chemical Laboratory of the Pathological Institute of the University of Berlin, has been elected a foreign member of the Society of Sciences at Upsala.

DR. O. DRUDE, who has recently been in this country to attend the International Congress of Arts and Science, has celebrated his twenty-fifth jubilee as professor of botany at the Dresden Institute of Technology. Professor Drude is also director of the Botanical Garden at Dresden.

WE learn from *Nature* that the friends of Professor Carey Foster, F.R.S., are taking the occasion of his recent retirement from the principalship of University College, London, as an opportunity of showing their appreciation of him by promoting a fund with the object of having his portrait painted for presentation to the council of the college, and a replica for presentation to Mrs. Foster. The president of the movement is the Right Hon. Lord Reay, and the vice-presidents are Sir Norman Lockyer, Sir Oliver Lodge and Sir Arthur Rücker.

MR. N. C. HAMNER, a graduate of the University of Virginia in the class of 1902, and Mr. A. W. Clark, a graduate of the University of Vermont in the class of 1904, have been appointed assistant chemists in the Agricultural Experiment Station of the Pennsylvania State College. The U. S. Secretary of Agriculture has appointed Mr. F. W. Christensen assistant expert in animal nutrition, in conformity with the agreement recently made with the station, and assigned him to duty in connection with the cooperative experiments with the respiration calorimeter. Mr. R. E. Stallings has been transferred from the position of assistant chemist to that of assistant in animal nutrition, and during the remainder of the year will devote his entire time to the investigations with the respiration calorimeter.

AT a recent meeting of the board of trustees of the Ohio State University, James S. Hine, associate professor of zoology and entomology, was granted leave of absence for the winter term of the present college year. He will spend the time in Guatemala collecting zoological specimens for the museum of that institution.

SIR DYCE DUCKWORTH has been appointed medical referee to the British treasury and adviser to the pensions' board, *vice* Dr. Lionel Beale, F.R.S., resigned.

THE Gedge prize in physiology of Cambridge University, has been awarded to Mr. K. Lucas, fellow of Trinity, for his paper on 'The Augmentor and Depressor Effect of Tensions on the Activity of Skeletal Muscle.'

AN examination of Black River near Bessemer was made last summer by a Michigan geological survey party including Mr. W. C. Gordon and C. E. Smith. The latter has had to resign from the Louisiana Survey on account of malaria.

MR. DESMOND FITZGERALD, of Boston, has recently returned from Manila, where he was sent by the United States government to report on questions of sanitation.

MR. JOHN MORLEY made the address at the celebration of Founder's Day at the Carnegie Institute, Pittsburg.

A MEMORIAL meeting was held at Chicago on October 23 in honor of the late Dr. N. S. Davis. The South Park commissioners have named a park in his honor.

PROFESSOR CLEMENS A. WINCKLER, the eminent chemist, died at Dresden on October 8, at the age of sixty-six years.

PROFESSOR MAX BARTELS, of Berlin, known for his publications on ethnology, died on October 22, at the age of sixty-two years.

DR. K. S. LEMSTRÖM, professor of physics at Helsingfors, died on October 2.

THE U. S. Civil Service Commission invites attention to the examination for scientific aid in the Department of Agriculture, applications for which may be filed at any

time. Eligibles are desired at this time to fill a vacancy in the position of scientific aid (male), with a knowledge of agricultural statistics, in the Bureau of Statistics, at $480 per annum, and other similar vacancies as they may occur. For the vacancy mentioned, only such applications will be considered as are filed with the commission at Washington prior to the hour of closing business on November 30, 1904. Applicants must be graduates of colleges in courses of study tending to qualify them for the scientific work of the Department of Agriculture. They are not assembled for this examination, but must submit all the required material with their applications.

The New York Historical Society has received a gift of about $200,000 toward its new building to be erected on Central Park West between Seventy-sixth and Seventy-seventh Street.

The French government proposes to establish a museum of industrial hygiene.

Mr. Seddon, the premier of New Zealand, has introduced a bill to prevent the further exportation of Maori antiquities from that colony. The penalty is fixed at £100.

Mylius Ericksen's expedition, after two years and a half exploration of Greenland, returned on November 6 to Copenhagen. It is said that valuable ethnological records have been collected, the explorers having lived with the natives, studying their language and customs.

The College of Physicians of Philadelphia announces that the next award of the Alvarenga prize, amounting to about one hundred and eighty dollars, will be made on July 14, 1905. Essays may be on any subject in medicine, but can not have been published. They must be received by the secretary of the college, Dr. Thomas R. Neilson, on or before May 1, 1905.

The South African Philosophical Society has asked for a charter under the name of the Royal Society of South Africa.

The National Association of State University Presidents met last week at Des Moines, Ia.

The twenty-second congress of the American Ornithologists' Union will convene in Cambridge, Mass., on Monday, November 28, at 8 P.M. The evening session will be devoted to the election of officers and the transaction of other routine business. The meetings, open to the public and devoted to the reading and discussion of scientific papers, will be held in the Nash lecture-room, University Museum, Oxford St., beginning on Tuesday, November 29, and continuing for three days. Information regarding the congress can be had by addressing the secretary, Mr. John H. Sage, Portland, Conn.

The fourth Pan-American Medical Congress will meet in Panama during the first week in January. According to the New York *Medical Record,* the Panama government has appropriated $25,000 for the scientific sessions and the entertainments. The afternoons will be devoted to the scientific sessions and the mornings and evenings to trips and social functions. So far as can be learned, the program in Panama will be a reception on the first day by President Amador, and the formal opening session of the congress the same evening. On the second day, an excursion to the canal in the morning, meeting of the various sections in the afternoon, and a banquet in the evening. On the third day, an excursion down the bay to Taboga Island, where a Panama breakfast will be served, scientific sessions in the afternoon, and a ball in the evening. On the fourth day, an excursion to the U. S. army barracks in the morning, section meetings in the afternoon, and the formal closing session in the evening. On the fifth day, an excursion to the plantation of the United Fruit Company; and on the afternoon of this day, those who intend going to Cuba by way of Jamaica to attend the meeting of the Public Health Association, will sail for Kingston, while those who intend going by way of Vera Cruz, or returning home by way of New Orleans or New York, will remain until the following Tuesday.

The School of Demonstration in Plant and Animal Breeding conducted at St. Louis un-

der the auspices of the American Association of Agricultural Colleges and Experiment Stations appears to have been a marked success. It was no little work to keep such a school in running order under the circumstances of a large shifting audience, but Professor J. H. Shepperd, of the North Dakota Agricultural College, who was in charge of this work, seems to have accomplished what it was intended the school should be, carrying out the full detail of the work as to preparation of buildings, equipments and the construction of a daily program. Speakers came from nearly all the experiment stations and colleges, and there was presented, before this audience of practical farmers and animal breeders, many of the newest and best ideas in regard to plant and animal breeding. During the last session, October 3–15, the demonstration work upon plant breeding was emphasized, showing that much work is being done at the experiment stations at the present time in developing broader methods. Results were divided into breeding cereals for resistance to drought and plant diseases. Professor Ten Eyck, of the Kansas Agricultural College, is making extended experiments upon drought resistance. Professor H. L. Bolley, of the North Dakota Agricultural Experiment Station, gave two lectures on breeding cereals for disease resistance. Assuming that the struggle for existence among plants and a survival of the fittest represents the principle which the breeder should use, Professor Bolley has for several years conducted plant breeding experiments eliminating by a harsh environment or the promotion of disease weak strains and types in a farm crop.

As we have already noted, Captain Robert S. Scott was expected to open the new session of the Royal Geographical Society on November 7 with an account of the British Antarctic expedition. We learn from the London *Times* that at subsequent meetings Lieutenant Royds will deal with the meteorology of the expedition, Mr. Ferrar with the geology, Dr. Wilson with the zoology, and Mr. Bernacchi with the terrestrial magnetism. Captain Scott has consented to tell the story of some of the leading incidents of the expedition to young people about Christmas, when there will be an abundance of lantern illustrations. At the second meeting of the session, on November 21, Dr. Hunter Workman will give an account of the explorations in the Western Himalaya recently accomplished by himself and his wife, Dr. Fanny Bullock Workman. At the next meeting, on December 12, Major Delmé Radcliffe will deal with the results of the Anglo-German Boundary Commission in East Africa, on which he was the principal British representative. After Christmas, Colonel L. Jackson, R.E., will give an account of another Anglo-German Boundary Commission, that which was recently at work in Nigeria. Another African paper will be that by Mr. B. H. Jesson, the surveyor who accompanied Mr. McMillan's expedition; he will deal with the portion of the Sobat basin in Abyssinia which has not hitherto been explored. Colonel P. H. M. Massy will give an account of his explorations in Asia Minor, which extended over several years. There will be two South American papers, one by Dr. H. Hoek on explorations in various parts of South America, while a paper by Mr. C. Reginald Enock will give an account of two recent journeys in outlying parts of Peru. It is hoped that during the session one of the leading members of the recent Tibetan mission will give an account of the geographical results which were obtained, and which are believed to be of considerable importance.

UNIVERSITY AND EDUCATIONAL NEWS.

THE alumni of the Massachusetts Institute of Technology are collecting a fund for current expenses, which now amounts to over $100,000 to be used in the course of the next five years.

HARVARD University has received from Miss Maria Whitney a gift of $5,000, to be known as the 'Josiah Dwight Whitney Fund,' the income of which is to be applied as a scholarship, not exceeding $200, or as two scholarships of $100 each, to aid meritorious students in the study of field geology or geography in the summer months, preferably in the mountain region of the western United States.