ing will not be occupied by students and can be engaged by members.

The announcements here made are only those that have been reported well in advance and represent a small part of the programs. More than one thousand papers and addresses will be presented at the meeting, which will represent fully the advances of the natural, exact and applied sciences during the past year. There will, indeed, be so many simultaneous programs of interest that the difficulty will be to choose among them. A meeting of this size, however, will be held only once in four years, and the conflict is after all not so serious as if the meetings were held in different cities. A joint meeting of scientific men working in all fields gives opportunity for them to meet personally and to consult through committees and boards on means of promoting the advance of science by joint action. A meeting of such magnitude also serves to impress on the general public the strength which science has attained in this country, and the need of supporting scientific research for the welfare of the nation.

SCIENTIFIC NOTES AND NEWS

The John Fritz medal was awarded in January, 1916, to Dr. Elihu Thomson, for "Achievements in Electrical Inventions, in Electrical Engineering, in Industrial Development and in Scientific Research." We learn from the *Electrical World* that the medal will be presented to Dr. Thomson at a meeting to be held in Boston on Friday evening, December 8. The presentation will take place in the Central Lecture Hall of the new buildings of the Massachusetts Institute of Technology. The program of the evening will include addresses by John J. Carty, chairman of the presentation committee of the board of award; E. W. Rice, Jr., president of the General Electric Company, and Dr. Richard C. Maclaurin, president of the Massachusetts Institute of Technology. The presentation will be made by Dr. Charles Warren Hunt, and the ceremonies will conclude with the response of Dr. Thomson. The John Fritz medal is awarded from time to time for notable scientific or industrial achievement, and was provided for in a fund subscribed in memory of the great engineering pioneer, John Fritz. The award of the medal is made by a permanent board composed of four members from each of four American national engineering societies, namely, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers and the American Institute of Electrical Engineers. The members of the 1916 board are: Representing the civil engineers—Charles Warren Hunt, John A. Ockerson, George F. Swain, Charles D. Marx; representing the mechanical engineers—John R. Freeman, Ambrose Swasey, John A. Brashear, Frederick R. Hutton; representing the mining engineers—Albert Sauveur, E. Gybbon Spilsbury, Charles F. Rand, Christopher R. Corning; representing the electrical engineers—Ralph D. Mershon, C. O. Mailloux, Paul M. Lincoln, John J. Carty.

The trustees of Cornell University have accepted the resignation of George Sylvanus Moler, professor of physics, to take effect in June, 1917. Professor Moler will retire from teaching, having reached the age limit. The board placed upon its minutes the following resolution:

Resolved, that the trustees in accepting the resignation of Professor Moler desire to express their high appreciation of his faithful and devoted service to the university in the department of physics for over forty years. As a teacher he is held in affectionate and grateful remembrance by many generations of university students. For twelve years he shared with Professor Anthony the entire work of the department and during that period in collaboration with him designed, constructed and installed the first dynamo in America, the first arc-lighting system (that on the campus of Cornell University), and the first apparatus for the electrolytic production on a considerable scale of oxygen and hydrogen. He has also devised countless original and ingenious pieces of apparatus of incalculable value to the department of physics. And the photographic laboratory in Rockefeller Hall, with its original and unique equipment, is largely of his planning.

DR. R. A. MILLIKAN, professor of physics in the University of Chicago, has been appointed Hitchcock lecturer at the University of California for 1917, and will give a series of lectures at Berkeley, beginning about February 1. Among the Hitchcock lecturers of recent years at the University of California have been Thomas Hunt Morgan, professor of zoology in Columbia University; Henry Fairfield Osborn, research professor of zoology in Columbia University; Dr. A. D. Waller, director of the physical laboratory of the University of London; Julius Steiglitz, professor of chemistry in the University of Chicago; Harry Fielding Reid, professor of dynamical geology and geography in the Johns Hopkins University, and Dr. Richard M. Pearce, professor of research medicine in the University of Pennsylvania.

DR. FRANK D. ADAMS, Logan professor of geology and dean of the faculty of applied science, McGill University, has just completed a course of six lectures on pre-Cambrian stratigraphy for the department of geology, Columbia University.

DR. CARLOS CHAGAS, of the Institute for Experimental Pathology at Rio de Janeiro, has been invited to conduct a course on tropical medicine at Harvard University.

THE vice-chancellor of Cambridge University has appointed Mr. R. T. Glazebrook, C.B., fellow of Trinity College, director of the National Physical Laboratory, to the office of reader on Sir Robert Rede's foundation for the ensuing year.

AT a recent general meeting of the members of the Royal Institution, Dr. H. E. Armstrong, F.R.S., was elected a manager, in place of the late Professor Sylvanus P. Thompson. A resolution of condolence with the relatives of the late Sir Victor Horsley, a member of the Royal Institution, was passed.

A CORRESPONDENT informs us that Dr. H. B. Fantham, of the Liverpool School of Tropical Medicine, who was appointed to the post of chief protozoologist to the forces of the Allies at Salonika, has been seriously ill with amœbic dysentery and is at present convalescing—but on duty—at Malta.

WE learn from *Nature* that Major T. Edgeworth David, professor of geology in the University of Sydney, has recovered from the effects of serious injuries received while conducting mining operations in northern France, and hopes shortly to rejoin his regiment.

PROFESSOR G. CAREY FOSTER, a past president of the Institution of Electrical Engineers, has been elected by the council an honorary member of the institution.

AFTER forty-five years' service Dr. C. Ritsema, keeper of the entomological collections of the State Museum of Natural History at Leyden, has retired. He is succeeded by R. van Eecke.

DR. WM. H. WESTON has resigned his position as instructor in biology in charge of the botanical work at Western Reserve University to accept a position as a pathological inspector of the Federal Horticultural Board. He will be stationed at Washington, D. C.

DR. ERIC MJOBERG, a Swedish explorer, who arrived in New York on November 22, said, as reported in daily papers, he had come to the United States to study the latest inventions in aviation preparatory to making arrangements for an exploration trip into the interior of New Guinea.

AT the meeting of the Section of Medical History of the College of Physicians of Philadelphia, on November 21, Dr. Arnold C. Klebs, Washington, D. C., read a paper on "Some Recent Results of Paleopathologic Research."

DR. J. PAUL GOODE, professor of geography at the University of Chicago, recently gave a lecture before the Civic and Commerce Association of Minneapolis on the "Geographic and Economic Foundation of the Great War."

AT the two hundred and twenty-sixth meeting of the Elisha Mitchell Scientific Society, held at the University of North Carolina on November 14, the papers were: Dr. W. C. Coker, "Some Problems in Classification"; Mr. T. F. Hickerson, "The Quebec Bridge."

THE municipal and university authorities of Barcelona recently placed a marble memorial

tablet on the house at Castellersol where had been born Dr. M. Fargas Roca, professor of obstetrics and gynecology at the University of Barcelona, and senator of the realm. After this ceremony the procession passed to the city hall, where his portrait was installed.

Dr. Francis J. Keany, trustee of the Boston City Hospital, and professor of dermatology at Tufts Medical School, died on November 23, at the age of fifty years.

Dr. Henry Gunder, formerly professor of mathematics at Findlay College, Ohio, and later at Little Rock University, Arkansas, died on November 20, at the age of seventy-nine years.

James S. Duff, of Toronto, minister of agriculture for Ontario, died on November 17, at the age of sixty years.

Dr. Oskar Backlund, the eminent director of the Imperial Observatory at Pulkova, Russia, died on August 29. He was in his seventy-first year and had been the director of the Pulkova Observatory since 1893.

Emeritus Professor John Ferguson, who last year resigned the regius chair of chemistry in the University of Glasgow, which he had held since 1874, died on November 3, aged seventy-nine years. In addition to his work in chemistry he was a well-known archeologist.

Professor H. M. Waynforth, professor of engineering, King's College, University of London, died on November 5, at the age of forty-nine years.

Professor H. H. W. Pearson, professor of botany in the South African College, died at Mount Royal Hospital, Wynberg, on November 3. The London *Times* says: "His death is a great loss to botanical science, in which he had a European reputation, particularly by his discovery of missing links in evolutionary botany. His death is felt with peculiar intensity in South Africa, where Mr. Pearson's professional enthusiasm and keen perception of scientific possibilities were mainly responsible for the establishment a few years ago of the Kirstenbosch Botanic Gardens, which on the testimony of the director of Kew is likely to become one of the most valuable, economically and scientifically, in the world."

Nature reports the death of Lance-Corporal J. W. Hart, who, having volunteered in the early days of the war, was killed on September 15. At the beginning of the war he held the post of horticultural assistant at Bedford College, London, and was in charge of the botanical garden, the successful development of which was largely due to his skill and energy. The death is also reported of Lieutenant John Handyside, who fell in one of the recent advances on the Somme, at the age of thirty-five; he was a distinguished graduate of Edinburgh and Oxford, and since 1912 had been lecturer in philosophy in the University of Liverpool.

A clipping sent us from a Munich newspaper reads: "Dr. Oskar Piloty, professor of chemistry at Munich, son of the distinguished painter, lost his eldest son in battle. In order to avenge his death, the father of his own accord joined the army in France, and he too has now been killed."

After conference with many of the vertebrate and invertebrate paleontologists in different parts of the country it has been deemed wise for the vertebrate paleontologists to meet in the State Museum, Albany, Wednesday, December 27 in company with the geologists and invertebrate paleontologists. On Thursday and Friday, December 28 and 29, an adjourned meeting of the Vertebrate Paleontologists will be held in the American Museum of Natural History, New York, at hours to be announced later. Members are invited to send immediately titles of papers or discussions directly to Dr. W. D. Matthew, acting secretary of the Vertebrate Paleontological Section. Arrangements will be made for a reunion dinner on Friday evening, December 29.

The Association of American Agricultural Colleges and Experiment Stations met at the new Willard Hotel, Washington, D. C., on November 15, 16 and 17.

The fifteenth anniversary of the Ohio Society of Mechanical, Electrical and Steam Engineers was celebrated in its thirty-fourth meeting, which was held on the campus of the

Ohio State University, November 16. Among the speakers were Professor Horace Judd and Professor F. W. Marquis, both of the department of mechanical engineering of this university.

The Electrical World states that this year America's Electrical Week will be inaugurated by the first permanent flood-lighting of the Statue of Liberty on the evening of December 2. President Wilson and a distinguished gathering of diplomats and industrial leaders will officiate at a program of ceremonies starting in lower New York harbor and concluding at a banquet to the nation's executive in the Waldorf-Astoria Hotel. Mayor Mitchel, of New York City, has named a committee of some two hundred representative men in the electrical industry and in business and civic life, who will escort President Wilson and his party during the inaugural. A committee on arrangement has charge of an electric vehicle parade starting from the Battery and passing up Broadway to Lafayette Street, over Fifth Avenue to the Waldorf-Astoria Hotel. The official ceremony of rededicating the statue will take place at the Waldorf-Astoria Hotel. Ambassador Jusserand, who will present a special message from the President of France, and ex-Senator Chauncey M. Depew, who delivered the main oration of the statue thirty years ago on October 28, will deliver orations, to which it is expected the President will reply briefly.

A GOVERNMENT investigation of industrial fatigue by physiologic methods has just been made by Dr. Stanley Kent, the physiologist, and is summarized in the *Journal of the American Medical Association*. The report is divided into three sections. The first deals with fatigue as a result of overtime. It is stated that when the week-end rest is suspended, fatigue will persist; residual fatigue resulting from inadequate rest leads to lowered efficiency and lessened output. Overtime periods worked on consecutive days produce more fatigue than if separated by days of ordinary length. Overtime induces more fatigue late in the week than it does early in the week. Overtime is physiologically and economically extravagant. It frequently fails in achieving its object, as the following case shows: A girl in one of the works frequently did not attend during overtime. She also habitually began work at 8:30 instead of 6 A.M. Thus she usually worked only eight hours a day, instead of twelve. When asked the reason, she replied that the extra rest enabled her to work so much more quickly that she was able easily to make up for the lost time. The second section of the report deals with the influence of fatigue and of overtime on output. The total daily output may be diminished by the introduction of overtime, for the rate of working and total output are limited by fatigue rather than by other conditions. A group of piece workers increased their earnings considerably as a result of a diminution in the length of the working day. In the third section it is stated that the total output of a factory is a question of adjustment of the factors concerned, the principal of these being the actual time worked and the actual rate of working. Reduction of the latter will soon counterbalance increase of the former, and thus overtime frequently leads to a diminution of total output. The health of the worker, on which his rate of working and his endurance depends, is prejudiced by overtime and to a less extent by work in the early morning hours. The suspension of overtime was followed in every case by an improvement in conditions of the worker, and was found to effect a saving of 4.5 per cent. The experiments on which the foregoing conclusions are based were carried out with great care and by means of all kinds of ingenious apparatus for testing attention and working power. Both male and female labor was employed in the factories concerned. Dr. Kent also points out that the evidence is against Sunday labor, which is liable to prove "disastrous." As a result, the minister of munitions has stopped all Sunday work in the factories producing munitions.

IN a lecture before the Royal Society of Arts on November 3, Professor William Stirling, of the University of Manchester, said that the insatiable demand for shells, guns and other munitions of war had made the problem of industrial fatigue suddenly acute. The problem to be solved, and it was being solved,

was to ensure the maximum of output with the minimum of fatigue. Overtime was an elastic term, and not only imposed a severe strain on the worker, but it curtailed unduly the periods for rest and repose; it was uneconomical, physiologically extravagant, and frequently resulted in lost time and diminished output.

UNIVERSITY AND EDUCATIONAL NEWS

The University of Chicago has received from Mr. Frederick H. Rawson a gift of $300,000 for the construction of a laboratory building in connection with the plans for the medical school.

A provisional gift of $100,000 to the University of Vermont has been given by General Rush C. Hawkins, of New York. The money is given on condition that the university raise an additional $200,000.

Tulane University has received a bequest of $60,000 for the School of Tropical Medicine, available after the decease of the wife of the late Colonel W. G. Vincent.

The new gymnasium of the Stevens Institute of Technology was dedicated with appropriate ceremonies on November 18. The building, which was erected at a cost of over $125,000, is the gift of Mr. William Hall Walker, of New York.

Dr. L. V. Heilbrun has been appointed instructor in microscopic anatomy at the College of Medicine at the University of Illinois.

The School of Medicine of the University of Alabama announces that two new all-time professors have been appointed to the faculty. Dr. Joseph M. Thüringer, of the Harvard Medical School, becomes head of the department of anatomy, and Dr. Claude W. Mitchell, Ph.D. (Nebraska, '13), M.D. (Chicago, '15), head of the department of physiology and pharmacology.

Mr. William George Palmer, B.A., formerly scholar, has been elected to a fellowship at St. John's College, Cambridge. Mr. Palmer, who came up from Guildford Grammar School, took a first in each part of the Natural Science Tripos, 1913–14, with distinction in chemistry, and was awarded the Hutchinson studentship.

DISCUSSION AND CORRESPONDENCE

SYNCHRONISM IN THE RHYTHMIC ACTIVITIES OF ANIMALS

Two men walking together keep step so easily that the keeping step seems automatic. With a similar feeling of its naturalness we keep time in various ways, as in marching or dancing to music. Although these actions seem so automatic, they all or nearly all were learned by conceptual awareness of the relations between one's own actions and the actions of others, and purposive imitation of the latter. Such awareness of relations and purposeful imitation have not been found in animals (with the possible exception of the Primates). Certainly in most of the behavior of animals the tendency to keep time with an external rhythm is conspicuously absent. When two horses are driven abreast, each trots in his own rhythm in sublime disregard of his team-mate. Every circus has its so-called dancing animals, but I never saw one that really kept time with the music except as the trainer prompted it. Some birds have wonderful musical powers, but I never knew of a case of two birds singing in unison, nor of a bird singing synchronously with any external rhythm.

Nevertheless, although an animal can not have a concept of the relation between two coinciding rhythms, it is supposable that some animals might have an innate mechanism that would bring them into synchronism with an external rhythm, just as two pendulums or two dynamos, if properly adjusted, maintain a perfect synchronism. Let us review the observations that might substantiate such a supposition.

Many animals are provided with lock and key reflexes which produce an admirable synchronism. Two cocks fighting jump at each other at almost the same moment. Many birds, notably some of the Limicolæ, fly in close flocks and the whole flock turn apparently at the same moment in their rapid evolutions. But it is important to notice that these actions are not rhythmical. To maintain such admirable synchronism and at the