teorites is obvious. It is probable that this balancing of gravitation and light pressure must be taken into account in the motion of the particles supposed to constitute Saturn's rings.

When we consider the motion of a small particle round the sun, we have, first, the direct pressure lessening gravitation. If it has density equal to that of the earth and diameter one one-thousandth of an inch, the lessened pull at the distance of the earth will imply a lengthening of the year by nearly two days. Secondly, the Doppler emission effect comes into play, for the particle crowds forward on its own waves emitted in front, and draws away from those emitted behind, so that there is increase of pressure in front and a decrease behind. Thus there is a force resisting the motion. The particle will then tend to fall inwards in its orbit, and in the case considered, about 800 miles in the first year. It would probably move in a spiral into the sun, and reach it in less than 100,000 years. A particle one inch in diameter would reach the sun from the earth in less than a hundred million years.

The Doppler reception effect will not come into play in a circular orbit, but in an elliptic orbit it acts as if it were a force resisting change of distance, and therefore it tends to make an elliptic orbit even more circular.

Applying these considerations to a comet regarded as a swarm of small particles coming into our system, a sorting action will at once begin. The smaller particles will have their period of revolution lengthened out more than the larger ones, and they will tend to trail behind. The Doppler emission effect will damp down the motion, and again, more markedly with the smaller particles, and all will tend to spiral into the sun. The Doppler reception effect will tend to destroy the ellipticity of the orbit, more especially with the smaller particles, and ultimately the particles of different sizes may move in orbits so different that they may not appear to belong to the same system. In course of time they should all end in the sun. Perhaps the zodiacal light is due to the dust of long dead comets.

It appears just possible that Saturn's rings may be cometary matter which the planet has captured, and on which these actions have been at play for so long that the orbits have become circular. J. H. POYNTING

SCIENTIFIC APPOINTMENTS AT THE UNIVERSITY OF WISCONSIN

A NUMBER of changes have been made at Wisconsin in the several scientific departments. The board of regents have named Dr. Charles R. Bardeen, at present professor of anatomy, dean of the new college of medicine. The faculty of the new medical college includes, besides Dean Bardeen as professor of anatomy, Dr. Joseph Erlanger, professor of physiology; Dr. H. L. Russell, professor of bacteriology; Dr. M. P. Ravenel, professor of bacteriology; Dr. W. D. Frost, associate professor of bacteriology; E. G. Hastings, assistant professor of bacteriology; Dr. C. A. Fuller, instructor in bacteriology and assistant in the hygienic laboratory; Dr. Harold C. Bradley, assistant professor of physiological chemistry; Dr. J. R. Blackman, assistant in physiology; Dr. Richard Fischer, assistant professor of pharmacy; Dr. Edward Kremers, professor of pharmaceutical chemistry; Dr. Louis Kahlenberg, professor of physical chemistry; Dr. Victor Lenher, associate professor of chemistry; Dean E. A. Birge, Associate Professor W. S. Marshall, and Assistant Professor S. J. Holmes in the department of zoology; Professor R. A. Harper, Associate Professor C. E. Allen and Assistant Professor R. H. Denniston of the department of botany; and Professor B. W. Snow, Professor C. E. Mendenhall, and Assistant Professor A. H. Taylor of the department of physics.

Professor Mazyck Porcher Ravenel takes charge of the Department of Bacteriology, succeeding Dr. Harry L. Russell, who was appointed dean of the College of Agriculture, vice W. A. Henry, resigned. Dr. Ravenel has been assistant medical director of the Henry Phipps Institute for the Study of Tuberculosis in Philadelphia, and was formerly bacteriologist for the State Sanitary Live Stock Board of Pennsylvania, where he carried on research work in connection with treatment of tuberculosis and rabies.

Orville H. Ensign has been appointed to the professorship of electrical engineering, in place of D. C. Jackson, now head of the department of electrical engineering at Massachusetts Institute of Technology. Professor Ensign has been general electrical and mechanical engineer of the United States Geological Survey Reclamation Service, in charge of the work on electrical and pumping problems on the Pacific coast.

A. M. Winchell, who comes from the Montana School of Mines, is assistant professor of mineralogy and petrology. Otis A. Gage, Cornell, is the new assistant professor in the physics department, and James H. Wolton, University of Illinois, is assistant professor of chemistry. Among the lecturers secured for the coming year in various departments are W. A. Richards, chemical engineer, and Charles H. Hawes, anthropologist, of Cambridge University, England.

In the department of chemistry R. K. Brewer, W. G. Wilcox, Edward Wolesensky, C. W. Hill and Charles B. Gates have been made assistants, the latter to take the place of W. H. Doughty, resigned. James T. Bowles is sanitary chemist in the hygienic laboratory, S. K. Susiski is research assistant in agricultural chemistry, and E. V. McCollum is instructor in agricultural chemistry.

John R. Roebuck, who is a graduate of Toronto University and for the past year has been professor of physics at McGill Medical College, Toronto, has been appointed instructor in physics in place of A. L. Colton. Two other instructors appointed in this department are A. W. Smith, Haverford College, and H. C. Heil, and as assistants W. A. Titsworth, of Rutgers College, W. F. Steve, H. J. Plagge, D. S. Dye, O. H. Gaarden, F. W. Forsythe, F. K. Brainard and L. B. Aldrich were named. Raymond Schulz was made assistant in pharmacy in place of Florence Gage, resigned, and C. C. LeFebre is the assistant. The resignation of G. M. Reed as instructor of botany was accepted, and the following assistants in the department were named: E. G. Artzburger, J. M. Brannon, Mary A. Hickman and Hallie D. M. Jolivette. The assistantship made vacant through the resignation of A. B. Clawson is filled by Robert W. Hegner. The new assistant in bacteriology, in place of N. W. Wayson, resigned, is O. O. Nelson, and C. W. Smith is instructor in the department. E. L. Eaton was made instructor in astronomy in the correspondence department. In the mathematics department, George D. Berkhoff and A. L. Underhill are instructors and Bruce Bartholomew, assistant. Edward Steidtman is the new assistant in mineralogy and petrology.

In the College of Engineering the following changes have been made: Ernst Flanner is instructor in electrical engineering, vice John C. Potter, resigned, and H. B. Sanford is assistant in the same subject. W. L. Dobney is instructor in mechanical practise, and J. B. Kommers and A. H. Miller are instructors in mechanics, the latter succeeding H. F. Moore, resigned. W. C. Penn is instructor in topographical engineering, and John C. Wied in steam engineering. E. E. Parker has been made instructor in bridge engineering. Paul Sladky succeeds B. S. Anderson as assistant in machine design. Robert E. Egelhoff is instructor in mechanical drawing, and M. R. Hammar succeeds J. E. Boynton in the same work. Frank W. Warner is instructor in drawing and descriptive geometry. F. W. Lawrence is instructor in hydraulics, with W. A. Gattiker as assistant.

The changes in the College of Agriculture include the appointment of Miss Louise Jahns as instructor in soils, and J. F. Reubensaal as instructor in pasteurizing.

SCIENTIFIC NOTES AND NEWS

Dr. Richard Wettstein, Ritter von Westerheim, professor of systematic botany at Vienna, has been elected president of the Association of German Men of Science and Physicians for the meeting to be held next year at Cologne.

Dr. Emil Fischer, professor of chemistry in the University of Berlin, gave the Faraday lecture before the London Chemical Society on October 18. On the preceding day he received the degree of doctor of science from the University of Cambridge.