surgery in the University of Glasgow, died on July 23 at the age of sixty-five years.

THE Agricultural Experiment Station at New Haven, Conn., will include brief addresses in memory of the late station botanist, Dr. G. P. Clinton, and the state entomologist, Dr. W. E. Britton, in the Field Day exercises to be held at the station farm at Mount Carmel on August 16. Dr. Clinton died two years ago after thirty-five years of state service, and Dr. Britton, who had served the state since 1893, died last February. Immediately after luncheon Director W. L. Slate, of the station, will open a short program which will include an address by Dr. Henry G. Knight, chief of the Bureau of Chemistry and Soils, Washington, D. C. Mr. David Clarke, of Milford, will say a few words about the work of the late Dr. Clinton, and Mr. Fred S. Baker, of Cheshire, will speak about Dr. Britton. Later the new state entomologist, Dr. Roger B. Friend, and the station botanist, Dr. J. G. Horsfall, appointed early this summer, will be introduced.

To mark the two hundredth anniversary of the founding of the Swedish Royal Academy of Science, the Swedish Post Office issued a set of commemorative stamps on June 2. The designs are: 15 öre brown and 50 öre grey, with a portrait of the naturalist Linnaeus; 10 öre violet and 30 öre blue, with a portrait of the chemist Berzelius.

SCIENTIFIC NOTES AND NEWS

DR. W. L. BRAGG, Cavendish professor of experimental physics in the University of Cambridge, has been elected a corresponding member in the section of mineralogy of the Paris Academy of Sciences.

THE Royal Academy of Sciences at Rome has awarded the Cannizzaro prize for chemistry to Professor Otto Hahn, of the University of Berlin.

THE gold medal of the Society of the Medical and Natural Sciences at Jena has been awarded to Dr. Werner Heisenberg, professor of theoretical physics at the University of Leipzig.

MEDALS of the Royal Scottish Geographical Society for 1939 have been awarded as follows: the Livingstone Gold Medal to the Right Hon. Lord Hailey, for his direction of the African Research Survey under the auspices of the Royal Institute of International Affairs; the Mungo Park Medal to Dr. E. B. Worthington, for his share in the work of the African Research Survey; the Research Medal to Dr. Herbert John Fleure, professor of geography and anthropology in the University of Manchester, "for his many original contributions to geography and anthropology and his furtherance of these sciences in the British Isles."

Nature states that the Royal African Society has awarded a silver medal to the late C. F. Massy Swynnerton, formerly director of tsetse research in Tanganyika Territory.

DAVID G. THOMPSON, senior geologist, and Albert G. Fiedler, senior engineer, of the U. S. Geological Survey, were awarded at the annual convention of the American Water Works Association at Atlantic City the John M. Goodell Prize for their paper entitled "Some Problems Relating to Legal Control of Use of Ground Water." This prize was established by *The Engineering News Record* as a memorial to John M. Goodell, one-time editor of the journal and a former editor of the *Journal* of the American Water Works Association. It is awarded annually for "a notable contribution to the science or practice of water works development."

ESTELLE LACASE, a member of the Junior Academy of Science of New Orleans, has been awarded a prize consisting of a subscription to SCIENCE for one year in a recent contest based upon a written review of the contents of Volume 88 of SCIENCE.

DR. HOWARD I. YOUNG, president of the American Zinc, Lead and Smelting Company and of the American Mining Congress, was awarded the honorary degree of doctor of engineering at the commencement exercises of the School of Mines and Metallurgy of the University of Missouri.

ON commemoration day at the University of Glasgow the doctorate of laws was conferred on Sir Andrew Rae Duncan, chairman of the executive committee of the British Iron and Steel Federation; W. J. Goudie, emeritus professor of the theory and practice of heat engines, University of Glasgow; I. M. Heilbron, professor of organic chemistry, University of London; H. J. Paton, White's professor of moral philosophy, University of Oxford; F. J. M. Stratton, professor of astrophysics, University of Cambridge, and G. G. Turner, professor of surgery, University of London.

DR. GUSTAVUS AUGUSTUS EISEN, from 1893 to 1900 curator of the California Academy of Sciences, later for five years connected with the U. S. Department of Agriculture, known for his work in biology, anthropology and archeology, celebrated his ninety-second birthday on August 2.

DR. CLYDE E. KEELER, instructor in the Bussey Institution of Harvard University, has been elected a fellow of the Wistar Institute of Anatomy and Biology, Philadelphia.

DR. R. RUGGLES GATES, professor of botany at King's College, the University of London, has been appointed president of the section of cytology of the seventh International Botanical Congress for the meeting to be held at Stockholm from July 17 to 25, 1940.

HARRY W. CAVE, of the Kansas State College, has been appointed head of the department of dairy husbandry at the Oklahoma Agricultural and Mechanical College. He succeeds Earl Weaver, who resigned some time ago to accept a similar position at the Michigan State College.

DR. IVER JOHNSON, of the University of Minnesota, has been appointed professor of farm crops at the Iowa State College. He will specialize in plant breeding.

DR. ROY S. HANSLICK, of New Haven, Conn., has been appointed assistant professor of chemical engineering at Vanderbilt University.

DR. CARL L. STOTZ, visiting lecturer in geography for the last three years in the summer sessions of the University of Pittsburgh, has been elected assistant professor of geography at the university.

DR. T. V. I. STARKEY, lecturer in physics and mathematics at Rotherham College of Technology, has been appointed head of the physics department of the Technical College, Swansea, in place of Dr. E. Thomas, who has been appointed director of education for Caernarvonshire.

DR. DEAN BURK, associate professor of biochemistry at Cornell University Medical College, New York City, has been appointed senior chemist in the National Cancer Institute of the U. S. Public Health Service. He will be engaged in a study of tissue metabolism fundamental to cancer, under the auspices of a grant from the National Advisory Cancer Council made to the department of biochemistry. Collaborating in the investigations will be Dr. Fritz Lipmann, formerly fellow at the Rockefeller Institute with Dr. P. A. Levene and recently research associate with Dr. Albert Fischer and Dr. Herbert Sprince on a Parker fellowship from Harvard University.

IN the statement in regard to the reorganization of the work in zoology at Cornell University, printed in the issue of SCIENCE for July 28, those doing work in vertebrate taxonomy, ecology and anatomy should have been given as: Professor A. H. Wright, Assistant Professor W. J. Hamilton, Jr., Dr. W. C. Senning and Dr. E. C. Raney, instructors.

DR. VLADIMIR KARAPETOFF, for thirty-five years professor of electrical engineering at Cornell University, who has been made professor emeritus, will reside in Leonia, N. J., where he will engage in research and consulting work. He will next year give a course of lectures on electromagnetic waves in the new evening post-graduate school for metropolitan engineers at the Stevens Institute of Technology, Hoboken, N. J.

THE second International Congress for the Investigation of Biological Rhythm will be held at Utrecht on August 25 and 26.

THE third International Congress of Agricultural Engineering, according to *The Experiment Station Record,* will be held in Rome from September 20 to 23 at the International Institute of Agriculture. The program of the congress has been drawn up by the International Commission on Agricultural Engineering. Irrigation, drainage and land reclamation works, provisions for hygiene and buildings in rural areas, production of motive power by means of new combustible materials, standardization of tests of agricultural machinery, applications of electricity in agriculture, agricultural engineering and its social implications and scientific management in agriculture are the main subjects in the agenda. Additional information may be obtained from the Secretariat, Via Regina Elena, 86, Rome, Italy.

BEFORE the formal conferences of the fifth International Congress of Genetics at Edinburgh, there will be a gathering in London and organized visits to the plant-breeding work at Wisley and to the Galton Laboratory and various parts of the University of London. The next move will be to Cambridge, where the delegates will visit the leading research centers engaged in animal and crop-breeding work. The arrangements have been worked out in such a way as to bring scientific and practical breeders together for discussion and interchange of views. The formal congress will open at the University of Edinburgh on Wednesday, August 23, when the Russian scientist, Professor Vavilov, will deliver his presidential address. He will be followed by well-known American, Dutch and other foreign research workers. Receptions have been arranged for delegates by the City of Edinburgh, by his Majesty's Government and various organizations. The general secretary of the congress is Professor F. E. Crew, of the Institute of Animal Genetics, West Main Road, Edinburgh.

AT the ninth annual meeting of the American Malacological Union, held in the Royal Ontario Museum of Zoology in Toronto from June 20 to 23, the following executive council was elected: *Honorary Presidents:* Mrs. Ida S. Oldroyd, Stanford University; Dr. Henry A. Pilsbry, Academy of Natural Sciences, Philadelphia; and Mrs. Harold R. Robertson, Buffalo Museum of Science; *President,* Dr. H. B. Baker, Zoological Laboratory, University of Pennsylvania; *Vice-president,* Dr. Harald A. Rehder, U. S. National Museum; *Corresponding Secretary,* Norman W. Lermond, Knox

Academy of Arts and Sciences, Thomaston, Me.; *Financial Secretary,* Mrs. Harold R. Robertson, Buffalo Museum of Science; *Councillors at Large,* Dr. Myra Keen, Stanford University; Dr. Henry van der Schalie, University of Michigan Museum; Dr. H. E. Wheeler, Birmingham, Ala.; Aurela LaRocque, Canadian National Museum; *Past Presidents,* Dr. Joshua L. Baily, Jr., San Diego, Cal.; Dr. Paul Bartsch, U. S. National Museum, Washington, D. C.; William J. Clench, Museum of Comparative Zoology, Cambridge; Calvin Goodrich, University of Michigan Museum; Dr. Henry A. Pilsbry, Academy of Natural Sciences, Philadelphia; Maxwell Smith, Lantana, Fla.; Dr. Carlos de la Torre, Museo Poey, Havana. The 1940 meeting will be held in Philadelphia.

THE Museums Association of Great Britain celebrated its jubilee at the annual conference which was held at Cheltenham during the week beginning on July 2. In addition to Lord Bledisloe, who delivered the presidential address, speakers from related organizations included Lord Balniel, representing the Standing Commission on Museums and Galleries, Lord Amulree, president of the Royal Society of Arts, Dr. Arundell Esdaile, president of the Library Association, and Sir Robert Witt, chairman of the National Art-Collections Fund. Papers read during the conference included those of Lord De La Warr on "Museums and Education," and of Don Salvador de Madariaga, chairman of the International Museums Office, Paris, on "Museums and World Peace."

THE John Burroughs Association desires to get in touch with all organizations in the United States and elsewhere that have been established in honor of John Burroughs, to learn whether such groups would be interested in a yearly publication containing reports from these various units, as well as articles about John Burroughs. Communications should be addressed to Dr. Clyde Fisher, president of the association, at the American Museum of Natural History, New York City.

IT is announced by the London *Times* that the general council of the Trades Union Congress has appointed J. Hallsworth, the chairman, H. H. Elvin, E. Bevin and Sir Walter Citrine to meet representatives of the British Association to discuss the procedure of the Scientific Advisory Council which is to be jointly established. J. Marchbank has been appointed a deputy representative. The *Times* states that it is more than eighteen months since the first steps were taken to bring together members of the British Association and the Trades Union Congress. There have been informal talks, but the work of the advisory council has not yet taken shape.

THE William R. Warner and Company, Inc., New York City, announces the establishment of the following research fellowships under the Warner Institute for Therapeutic Research, for the year beginning July 1, 1939: At Columbia University, College of Physicians and Surgeons; under Professor James W. Jobling, department of pathology: a post-doctorate fellowship to Dr. Henry S. Simms, for the continuation of his work on arteriosclerosis; at the University of Maryland, School of Pharmacy; under Professor Walter H. Hartung, department of pharmaceutical chemistry: (1) a post-doctorate fellowship to Dr. Melvin F. W. Dunker, for work in organic synthesis; (2) a post-graduate fellowship to George P. Hager, for work in organic synthesis; (4) a post-graduate fellowship to Kenneth E. Hamlin, for work in organic synthesis; at the Warner Institute for Therapeutic Research, under Dr. Marvin R. Thompson, director: (1) a post-doctorate fellowship to Dr. P. P. Zapponi, for studies in physical chemistry.

A COLLECTION of 8,257 herbarium sheets, consisting of plants from England, Western Continental Europe, northeastern United States and adjacent sections of Canada, has been presented to the New York Botanical Garden by Mrs. T. W. Edmondson. They are the collections made by her husband during vacations over many years. Dr. Edmondson was professor of mathematics and physics and, before his death last autumn, professor emeritus at New York University. The garden has also acquired about a hundred volumes of botanical books from Dr. Edmondson's library.

L. J. BRASS, botanist of the Archbold Expedition to Dutch New Guinea, returned to Brisbane by the flying boat *Coogee* on June 28. The expedition was led and sponsored by Richard Archbold in the scientific interests of the American Museum of Natural History. The principal method of transport was by the flying boat *Guba.* The personnel, equipment and stores of the expedition were flown from sea level to Lake Habbema at 11,000 feet in the mountains. The botanical collections made by Mr. Brass include over 5,000 numbers. These were mostly obtained from regions above 3,000 feet. It is understood that these specimens will be allocated for determination to various American and European specialists by Professor E. D. Merrill, administrator of the botanical collections of Harvard University. Another result of the work is a collection of a hundred and fifty 10×8-inch negatives of landscapes typical of the regions worked over by the expedition. Mr. Brass is leaving Brisbane this month for New York, where he will complete his work upon some of the collections.

THE first International Exhibition for Polar Exploration will be held at Bergen in 1940. Dr. Grau Bögh has been appointed Commissioner-General by the Norwegian Government. In connection with the exhibition an international conference of Polar explorers is being arranged.

A LARGE new exhibition hall, devoted to comprehensive archeological and ethnological collections from the lands of Budda and other Oriental countries, has been opened at the Field Museum of Natural History. The museum already had important collections of Chinese and Tibetan material. The opening of the new hall, which is devoted to Korea, Siam, Siberia, India, Burma, Ceylon, the Ainu of Yezo, and the Andaman and Nicobar groups of islands in the Pacific, rounds out the representation of life in the Far East. The hall contains hundreds of objects, large and small, varied in character, including pieces remarkable for their beauty, for their ingenuity and for their extreme oddity. They have been gathered over a period of many years and come from various sources. One of the most striking features in the hall represents the ancient Siamese ancestors of the modern motion pictures—that is, the figures used in shadow plays. Mounted on glass and illuminated from behind, these are displayed much as they would appear in performances given in their place of origin.

ACCORDING to the Paris correspondent of the *Journal* of the American Medical Association, the drop in the birth rate in France as compared with the increase in the number of deaths is causing much anxiety. A committee was appointed several months ago by the Académie de médecine of Paris to study methods of checking the drop in birth rate. At the April 26, 1938, meeting Professor Lereboullet submitted the report of the committee. The chief causes of the decline in the birth rate were found to be contraceptive methods and the wide-spread use of abortifacients or induced abortion. There were only 630,000 births in 1937 as compared to a little over a million in 1876. From 1935 to 1937, inclusive, there were 57,117 more deaths than births in France, as compared to an excess of 950,000 births over deaths in Germany and of 775,000 in Italy during 1936 and 1937. The committee believed that the causes of the denatality in France were chiefly moral and economic. It made the following recommendations: (1) That the gravity of the denatality question be made known to the public by every possible method. (2) That an appeal be made to the moral and spiritual forces of the country to encourage the raising of large families by granting large subsidies which increase proportionately to the number of children. (3) That the danger of induced abortions be impressed on the women of the country and that the laws already in existence which entail imprisonment and heavy fines for abortionists be rigorously applied.

DISCUSSION

THE CORRELATION BETWEEN IONIZATION IN THE IONOSPHERE AND SUN-SPOT NUMBERS

STUDIES of the ionosphere over a period of years have indicated a close correlation between the ionization in the ionosphere and the Wolf sun-spot numbers. A detailed analysis of the National Bureau of Standards data by Smith, Gilliland and Kirby[1] shows that the relation is particularly striking when 12-month running averages of critical frequencies and sun-spot numbers are compared. In the period of 1934 to 1937, the average sun-spot number increased from 5 to 110, while the average f°_{F2} critical frequency at noon increased from 6.3 Mc/sec to 11.5 Mc/sec, corresponding to a range of electron concentrations from 0.38×10^6/cm^3 to 1.42×10^6/cm^3. Since noon values of electron concentration are nearly equilibrium values, the intensity of the ionizing radiation is proportional to the square of the electron concentration. Hence the intensity has increased about 14-fold, with an increase of 22-fold in the sun-spot number. In the same period the radiation producing ionization in the E layer and F_1 layer has increased by factors of 2.4 and 3, respectively. The correlation between sun-spot numbers and monthly averages of F_2 values is not so close, and Goodall[2] has shown that the solar characteristic giving the best correlation is the character figure for central zone calcium flocculi given in bulletins of the International Astronomical Union.

It is the purpose of this note to point out a possible reason for this correlation in the case of F_2 ionization. This ionization is variously ascribed to atomic oxygen, atomic nitrogen and molecular nitrogen,[3] but in all these cases the threshold wave-length for ionization is equal to or less than 910A. This is the Lyman series limit of hydrogen, and because the solar atmosphere is largely hydrogen in the normal state, its atmosphere will be extremely opaque for wave-lengths less than 910A. The light of a given wave-length comes from a depth in the solar atmosphere which varies inversely as the opacity at that wave-length, the average depth being such that the radiation is reduced to 1/e. Taking the atomic absorption coefficient as 0.6×10^{-17} it follows that the radiation occurs at a level where the hydrogen pressure is 3×10^{-3} dynes. The pressure at the photosphere[4] for visible radiation is roughly 300 dynes/cm^2 so the ionizing radiation comes from a level of the chromosphere several thousand kilometers above the photosphere.

[1] *Jour. Research*, NBS 21: 835, RP-1159, 1938.

[2] "The Solar Cycle and the F_2 Region of the Ionosphere." In press.

[3] Hulburt, *Phys. Rev.*, 53: 344, 1938; Wulf and Deming, *Terr. Mag. and Atmos. Elec.*, 43: 283, 1938.

[4] Unsöld, "Physik der Sternatumosphären," Julius Springer, 1938.