servatory, on "Recent Instrumental Developments in Astronomy"; H. U. Sverdrup, Scripps Institution of Oceanography, on "Recent Advances in our Knowledge of the Oceans"; C. H. Danforth, Stanford University, on "The Sex Hormones," and R. Goldschmidt, University of California, on "Genetics." Numerous symposia organized by participating societies in the fields of biology, chemistry and physics have also been arranged.

Members proposing to present papers before any of the societies are reminded that titles and abstracts of such communications must be in the hands of the secretary of the society before which the paper is to be given by April 27.

SCIENTIFIC NOTES AND NEWS

DR. DONALD D. VAN SLYKE, member of the Rockefeller Institute for Medical Research, New York, was awarded on March 10 the degree of doctor of medicine, *honoris causa,* by the University of Oslo, Norway.

DR. ALEXANDER WETMORE, assistant secretary of the Smithsonian Institution, has been elected an honorary member of the British Ornithologists' Union.

DR. G. H. PARKER, professor of zoology, emeritus, of Harvard University, has been elected an honorary member of the Buffalo Society of Natural History.

PROFESSOR A. KROGH, of Copenhagen, and Professor L. Lapicque, of Paris, were elected on March 12 to honorary membership in the Physiological Society, London.

THE award of the American Association of Teachers of Physics, made at the January meeting of the society, for "notable contributions to the teaching of physics," was presented on March 31 to Dr. Edwin H. Hall, professor emeritus of physics at Harvard University.

THE Agricultural Club of the College of Agriculture of the University of Missouri presented Dean F. B. Mumford with a plaque at its annual banquet in appreciation of his work with students and their organizations during his twenty-nine years as head of the college. Dean Mumford, who retires this summer, was the principal speaker at the banquet.

THE bronze medal for 1938 of the John Burroughs Association was presented to Dr. Robert Cushman Murphy in recognition of his book on "The Oceanic Birds of South America" at the annual memorial birthday celebration held by the association in the American Museum of Natural History on the evening of April 2. Dr. Clyde Fisher presided over the ceremonies and presented the medal to Dr. Murphy.

THE Royal Geographical Society has announced the award of the Royal Medals as follows: The Founder's Medal to John Rymill, for his organization and leadership of the British Graham Land Expedition, 1934–37, and the Patron's Medal to Eric Shipton, for his explorations around Nanda Devi and Mount Everest and his conduct of the Shaksgam Expedition of 1937. The Victoria Medal has been awarded by the council to A. R. Hinks, for his contributions to the study of geodesy and the figure of the earth, map projections and photogrammetric survey; The Murchison Grant to Martin Lindsay, for his journey across Greenland in 1934; The Back Grant to Thomas Hay, for his contributions to the physical geography of the Lake District; The Cuthbert Peek Grant to Bradford Washburn, for his explorations and glacier studies in Alaska, and the Gill Memorial to Ivan Champion, for his explorations and surveys in Papua.

Nature states that the following awards of medals of the British Institute of Patentees have recently been made: Grey-Wilson Memorial Gold Medal to Dr. S. C. Blacktin, for a dust and smoke meter; Yorkshire Gold Medal to W. H. Siddle, for a wire-joining tool; Special Silver Medals to Mrs. F. Peace for a superhet washer, J. R. Churchill for a chair, W. McClelland for a balanced two-stroke engine, and to F. W. Mason for an automatic blind control.

DR. E. V. MCCOLLUM, professor of biochemistry at the Johns Hopkins University, was elected president of the American Institute of Nutrition at its fifth annual banquet on March 30. He succeeds Dr. Mary Swartz Rose, of Teachers College, Columbia University. Other officers elected were: Dr. T. M. Carpenter, of the Carnegie Institution, Boston, *vice-president;* Dr. L. A. Maynard, of Cornell University, *secretary;* Dr. G. R. Cowgill, *treasurer,* and Dr. Helen S. Mitchell, of the Massachusetts State College, *member of the council.*

DR. GLENN E. CULLEN, of the University of Cincinnati, will be chairman of the Federation of American Societies for Experimental Biology during the coming year by virtue of his election at the recent meeting in Baltimore as president of the American Society of Biological Chemists. He succeeds Dr. Walter E. Garrey, of Vanderbilt University. Dr. Garrey was reelected president of the American Physiological Society; Dr. Arthur L. Tatum, of the University of Wisconsin, was elected president of the American Society for Pharmacology and Experimental Therapeutics, and Dr. C. Phillip Miller, University of Chicago, was elected president of the American Society for Experimental Pathology. Secretaries of the societies were

elected as follows: Dr. Andrew C. Ivy, of Chicago, the American Physiological Society; Dr. C. G. King, Pittsburgh, the American Society of Biological Chemists; Dr. Philip Grabfield, Boston, the American Society of Pharmacology and Experimental Therapeutics, and Dr. Paul R. Cannon, of the University of Chicago, the American Society for Experimental Pathology. Next year's convention will be held in March in Toronto.

JAMES E. RICE, professor emeritus of poultry husbandry at Cornell University, will be general chairman of the seventh World's Poultry Congress and Exposition, to be held in Cleveland, Ohio, from July 28 to August 7. This congress has as its principal purpose "a stimulation of interest in world poultry affairs and a promotion of friendly international relations by bringing together those interested in various phases of the industry from all parts of the world."

DR. FREDERIC S. LEE, research professor of physiology, and Dr. Wendell T. Bush, professor of philosophy, will retire from the faculty of Columbia University on June 30.

WILLARD P. GERRISH, assistant professor of mechanical engineering since 1892 on the staff of the Harvard College Observatory, will retire at the end of the academic year with the title emeritus.

PROFESSOR CHARLES H. SMILEY has been made chairman of the newly established department of astronomy at Brown University and director of the Ladd Observatory. The department will offer courses in descriptive and practical astronomy and selected topics in the field. Instruction will include demonstrations and the use of astronomical equipment at the observatory, work which has been conducted by the department of mathematics since 1914.

DR. WILLIAM DUNCAN STRONG, associate professor of anthropology at Columbia University, formerly anthropologist in the Bureau of American Ethnology of the Smithsonian Institution, has been appointed director of the newly established archeological laboratory at Columbia University. It is planned to initiate an extensive program of research, which will include archeological expeditions by graduate students to North Dakota and to Central and South America.

DR. JOSEPH SLEPIAN, consulting research engineer of the Westinghouse Electric and Manufacturing Company, has been appointed associate director of the laboratories of the company at East Pittsburgh.

THE council of the University of Liverpool has appointed Dr. Rupert Montgomery Gordon, director of the Sir Alfred Lewis Jones Research Laboratory, Freetown, Sierra Leone, to the Dutton Memorial Chair of Entomology, in succession to Emeritus Professor W. S. Patton, who retired in December.

DR. BURGESS BARNETT, who was curator of reptiles under the Zoological Society of London from 1930 to 1937, has been appointed superintendent of the Rangoon Zoological Gardens. He will take up his new work in June. Dr. Barnett intends to continue his research work on snake venom and its applications to medical practice.

A UNITED PRESS dispatch dated March 28 states that among those taken into so-called "protective custody" by the Nazis in Austria are Dr. Otto Loewi, professor of physiology at the University of Graz, Nobel laureate, and Ernst Straeussler, professor of criminal psychology. Dr. Erwin Schrödinger, professor of theoretical physics at the University of Vienna, has been dismissed.

DR. KNUT LUNDMARK, professor of astronomy at the University of Lund, Sweden, gave an evening lecture before the Franklin Institute, Philadelphia, on March 24. He spoke on "Exploding Stars."

DR. RAYMOND PEARL, professor of biology at the School of Hygiene and Public Health of the Johns Hopkins University, on April 15 will deliver a public lecture on "Long Life and Living," under the auspices of the Institute of Medicine of Chicago.

PROFESSOR W. H. TWENHOFEL, of the University of Wisconsin, addressed the Geological Society of Tulsa, Oklahoma, on the evening of March 11, and the Geological Society of Oklahoma City on the following evening. His subject was "The Rate and Continuity of Deposition of Sediments."

DR. CHARLES E. FRILEY, president of the Iowa State College, will deliver the main evening address at the meeting of the Iowa Academy of Science at Sioux City on April 15. He will speak on "Science and Society."

DR. GUSTAV EGLOFF, director of research of the Universal Oil Products Company, has been appointed a delegate of the National Research Council and the National Academy of Sciences to the tenth International Congress of Chemistry and the thirteenth conference of the International Union of Chemistry in Rome, to be held from May 15 to 21. He will address the congress on "Petroleum—Its Chemical and Industrial Significance." He has also been appointed chairman of a meeting on the cracking of shale oils during the Conference on Shale and Cannel Coal to be held in Glasgow from June 6 to 11.

DR. WILLIAM BOYD, professor of pathology in the School of Medicine of the University of Toronto, will deliver the 1938 Porter lectures of the School of Medicine of the University of Kansas. On April 19 he will speak at Kansas City on "Bronchial Carcinoma" and on April 20 at Lawrence on "Growth, Normal and Abnormal"; on April 20 he will speak on "Nephritis"

at Kansas City. The Porter lectureships are provided through a gift from the late Dr. J. L. Porter, of Paola, to be used for the promotion of scholarship and research. The fund provides for a scholarship, and the balance of the income is devoted to the lectures.

THE last lectures in the De Lamar series at the School of Hygiene and Public Health of the Johns Hopkins University will be given on April 12, "The Immunology of Epidemic Influenza" by Dr. Thomas Francis, Jr., member of the staff of the International Health Division of the Rockefeller Foundation; on April 19, "Cellular Changes in Leprosy," by Dr. E. V. Cowdry, professor of cytology at Washington University; and at a date to be announced, "Sinanthropus pekinensis and Its Significance for the Problem of Human Evolution," by Dr. Franz Weidenreich, honorary director of the Cenozoic Research Laboratory of the National Geological Survey of China.

THE seventh International Botanical Congress will be held at Stockholm from July 17 to 25, 1940. The secretary of the congress, Rudorf Florin, writes: "As it is highly desirable that the Stockholm Congress should be truly international, your cooperation in deciding the places and dates of other botanical conferences and meetings, with a view to avoid any clashing, would be much appreciated. It would be of great advantage if the time between July 17 and September 1, 1940, could be kept free from other conferences, in order to enable botanists to attend the International Congress and participate in its excursions."

AN appropriation of $220,000 has been approved by the regents of the University of California for the construction of the first of a group of life science buildings at Los Angeles. The money was made available through the sale of the Vermont Avenue campus to the Los Angeles Junior College. The first building in the new group will be an office and classroom structure. Other units will include a laboratory building and an animal house, for which no provision has as yet been made.

DISCUSSION

THE DENSEST POSITION OF HOMOLOGOUS BODIES

THE article on "The Shape of Compressed Spheres,"[1] by Professor Frederic T. Lewis, is of much interest. In the first place it seems to show that the physical laws in the microscopic world are identical with those of the world in which we live. There seems to be an economic striving in many of the phenomena of nature which are explained by means of the mathematical theory of maxima and minima. In the second place, it is pleasing to see that the most abstruse theories in pure mathematics have immediate practical applications in such subjects as anatomy, botany and biology. The intelligent layman can understand these subjects, even if he finds little interest in mathematics.

Professor Lewis writes: "After years of patient reconstruction, cells were found to be 14-hedral, so that bubbles, liquid drops, and semi-fluid bodies in aggregates which fill space could all be said to be of that one form. Yet there remained the anomalous conclusion that compressed solids are dodecahedral."

If the anatomists will allow us, we shall assume that there is a law of nature according to which the cells in space strive to take such positions that the gaps between them occupy as little space as possible. In other words, the cells strive to occupy as much space as possible, leaving the minimum amount of space unoccupied. It is then seen that the results of Professor Lewis's observations are interesting checks on the mathematical theory. To give a detailed account of

[1] SCIENCE, 86: 2244, December 31, 1937.

this theory would require here more space than we have at our command. I may outline the method of procedure, however, and cite the mathematical results that have been found.

The general problem may be headed as follows: *Analytic formulation of the condition for the densest lattice-formed position of congruent homologous bodies in space.* I shall in the sequel make references to two works by the great mathematician, Hermann Minkowski, the one *Diophantische Approximationen* (= D.A.), the other *Gesammelte Abhandlungen* (= G.A.). The problem (D.A., p. 83) is: *A convex body K with center at the origin 0 is given. The body is supposed to be symmetric with regard to the origin. Determine a lattice in x, y, z with 0 as origin which besides 0 has no other lattice point in the interior of K, and at the same time offers a fundamental paralellopiped of least volume.*

For the body K we take here a sphere. It may be shown that by expressing x, y, z as linear forms in ξ, η, ζ with integral coefficients and determinant = ± 1 and then using the substitutions

$$\xi = \lambda X + \lambda'Y + \lambda''Z,$$
$$\eta = \mu X + \mu'Y + \mu''Z,$$
$$\zeta = \nu X + \nu'Y + \nu''Z,$$

we may so choose, x, y, z that six lattice points in X, Y, Z appear on the surface of the sphere, the problem being to determine the nine elements of the deter-

$$\Delta = \begin{vmatrix} \lambda, & \lambda', & \lambda'' \\ \mu, & \mu', & \mu'' \\ \nu, & \nu', & \nu'' \end{vmatrix},$$