a continuing program. It will provide constructive work for college people, and, as it is work which must be done in any event, the cost will be much lower than during prosperous times. The college will cooperate with all existing agencies, including the University of Michigan, the Michigan State College and the geological division of the Department of Conservation.

The program calls for investigation of mineral resources, methods of exploiting them and means of providing permanent industrial activity in the field. Among the general projects there are thirteen in the mining, metallurgical and geological fields and three in the electrical field. Research on copper and iron ore already in progress at the college will be continued.

In connection with iron ore research, attention is called to the fact that Michigan produces approximately 16,000,000 tons annually and now has a reserve estimated by the state appraiser of mines of about 175,000,000 tons of high-grade, merchantable ore. The reserve, which varies from range to range, will not last much over a decade.

There is, in addition to the merchantable ore, an enormous tonnage, now non-merchantable, of low grade iron formation. This has been estimated by various authorities at from three and a half to five billion tons. It contains enough iron to supply the entire demand for many hundreds of years. Like the "high grade" ore, this ore varies with the district. The problem is to make these non-merchantable iron formations acceptable as ore and thereby to add to the natural resources of the nation.

Low grade iron ores from all the ranges have been investigated, thousands of samples assayed and ores classified. The major portion of the work to date has been done on the ores of the Gogebic range, the development of a routine of practice and the invention and testing of machines. The iron formation of the Gogebic range has proven about 85 per cent. amenable to concentration. A machine has been developed which has definite promise of success on the coarsely crystalline ores.

In the work on copper, in the first two years of the formal research program, which has been carried out under the leadership of Dr. W. O. Hotchkiss, president of the college, a saving of 10,000,000 pounds of copper was effected and the practise outlined continues at this time. The companies themselves have inaugurated research programs.

THE UNIVERSITY OF CALIFORNIA AT LOS ANGELES CHAPTER OF THE SOCIETY OF THE SIGMA XI

DURING the past year, the following Sigma Xi Lectures were given at the University of California at Los Angeles:

"Space and Time in Atomic Theory," by Dr. Niels Bohr, professor of physics in the University of Copenhagen.

"A Demonstration of Liquid Crystals," by Dr. G. van Iterson, professor of technical botany in the Technical High School of Delft.

"Results of Some Recent Researches," by Dr. R. A. Millikan, director of the Norman Bridge Laboratory of Physics and chairman of the Executive Council of the California Institute of Technology.

"The Molecule in Biological Structures," by Dr. O. L. Sponsler, professor of botany in the University of California at Los Angeles.

"The Realm of the Nebula," by Dr. Edwin P. Hubble, astronomer at the Mount Wilson Observatory of the Carnegie Institution of Washington.

"The Program of Earthquake Study in Southern California," by Dr. H. O. Wood, research associate of the Carnegie Institution of Washington and director of the Seismological Laboratory at Annandale, California.

"The Distances of the Stars," by Dr. W. O. Adams, director of the Mount Wilson Observatory of the Carnegie Institution of Washington.

"Greek Tradition in its Relations to Modern Science," by Dr. E. T. Whittaker, professor of mathematics in the University of Edinburgh and Hitchcock Lecturer at the University of California. Dr. Whittaker also delivered a second lecture on "Mechanism *vs.* a Pan-Mathematical Theory of the Universe."

"A Study of Oceanography of the Pacific," by Dr. T. Wayland Vaughan, professor of oceanography in the University of California and director of the Scripps Institution of Oceanography at La Jolla.

"The Causes and Effects of Earthquakes," by Dr. J. P. Buwalda, professor of geology at the California Institute of Technology.

On June 11 the university chapter initiated one new member and twenty-one new associates. The officers of the chapter for the past year were: Dr. S. J. Barnett, *President;* Dr. B. M. Varney, *Vice-president;* Dr. E. K. Soper, *Secretary,* and Dr. H. W. Stone, *Treasurer.* New officers for the coming year were elected as follows: Dr. B. M. Varney, *President;* Dr. G. Ross Robertson, *Vice-president;* Dr. E. K. Soper, *Secretary,* and Dr. H. W. Stone, *Treasurer.*

E. K. SOPER,
Secretary

SCIENTIFIC NOTES AND NEWS

ON his retirement from the directorship of the Department of Genetics of the Carnegie Institution of Washington, Dr. Charles B. Davenport addressed the members of the department on "Reminiscences of Thirty Years." He was given a purse of over $150 to purchase books and fifteen bookplates, each con-

taining seventy signatures of the members of the department. Mrs. Davenport was presented with a bouquet of thirty tea roses.

A SPECIAL committee has been named from among the trustees of the Johns Hopkins University to make recommendations for a successor to Dr. Joseph S. Ames, retiring president. Dr. Ames was professor of physics from 1899 to 1926. The committee includes Newton D. Baker, chairman; B. Howell Griswold, Jr., Carlyle Barton, Dr. Thomas R. Brown and Walter S. Gifford.

DR. ERNST GELLHORN, professor of physiology at the College of Medicine of the University of Illinois, Chicago, has been awarded the Alvarenga Prize for the year 1934, for a paper entitled "The Influence of Parathormone on the Neuro-muscular System."

THE Division of Medical Science of the University of Chicago has awarded the Howard Taylor Ricketts Prize for 1934 to Drs. Paul E. Steiner and Thomas C. Grubb. Dr. Steiner was given recognition for his work on "The Rôle of the Avian Tubercle Bacillus in the Etiology of Hodgkin's Disease" and Dr. Grubb for his work on "Studies on the Coccus Forms of Corynebacterium Diphtheriæ."

THE Messel Memorial Medal of the British Society of Chemical Industry was presented on July 19 to Sir Harry McGowan, chairman of Imperial Chemical Industries, Limited, at the annual meeting at Cardiff. Sir Harry delivered an address entitled "The Uneven Front of Research."

THE Georges Kohn Prize of the Institute of Oceanography, Paris, has been awarded to M. Le Gall, director of the laboratory at Boulogne, for his work on the biology of the herring. The prize for 1935 will be awarded for work on the origin and relations of the Antarctic fauna.

THE title of doctor hônoris causa has been conferred by the University of Paris on Dr. A. Eiselberg, emeritus professor of surgery in the faculty of medicine of the University of Vienna.

M. PAUL LANGEVIN has been elected a member of the Paris Academy of Sciences in the section of general physics to succeed the late M. P. Villard.

DR. WILLARD COLE RAPPLEYE, dean of the College of Physicians and Surgeons, Columbia University, has been appointed dean of the School of Dental and Oral Surgery. He has been acting dean during the absence of Dr. Alfred Owre, who has now resigned.

DR. ALFRED FRIEDLANDER, professor of medicine, University of Cincinnati College of Medicine, has been appointed dean of the college, to succeed Dr. Arthur C. Bachmeyer, resigned.

IRA E. NEIFERT, of Knox College, has been promoted to the Herbert Griffith professorship of chemistry.

AT Duquesne University, Pittsburgh, Dr. M. A. Rosanoff, sometime graduate professor of chemistry in Clark University, and later Willard Gibbs professor of research in pure chemistry at the Mellon Institute in Pittsburgh, has been appointed dean of the graduate school. Dr. Roland Schaffert, of the University of Cincinnati, will be instructor in physics and Dr. Noel E. Foss, of the University of Maryland, will be instructor in pharmacy and chemistry in the School of Pharmacy.

DR. ARTHUR W. MELTON and Leonard W. Doob have been appointed instructors in psychology at Yale University, and Dr. Frances L. Ilg has been appointed instructor in the Clinic of Child Development.

M. IDRAC, chief of work in physics at the Polytechnic School at Paris, will succeed the late Alphonse Berget, as head of the department of physics at the Institute of Oceanography.

PROFESSOR L. R. WILBERFORCE JONES, professor of physics at the University of Liverpool, will retire from active service on September 30.

AT the University of Leeds, E. R. Flint has been elected to the chair of clinical surgery in succession to the late Professor Alfred Richardson. Mr. Flint will also retain the directorship of surgical research which he has held during recent months. H. W. Thompson, of the advisory staff of University College, Cardiff, has been appointed advisory entomologist on the staff of the department of agriculture.

ANNOUNCEMENT of the following appointments in London is made in *Nature:* Professor H. E. Watson, professor of general chemistry at the Indian Institute of Science, to be Ramsay Memorial professor of chemical engineering, in University College; Dr. A. B. Appleton, lecturer in anatomy in the University of Cambridge, to be professor of anatomy, in St. Thomas's Hospital Medical School; Dr. S. P. Bedson, senior Freedom research fellow at the London Hospital, to be the Goldsmiths' Company's professor of bacteriology, in London Hospital Medical School; Professor F. R. Fraser, university professor of medicine at St. Bartholomew's Hospital Medical College, to be professor of medicine in the British Postgraduate Medical School; Dr. James Young, lecturer in clinical obstetrics and gynecology in the University of Edinburgh, to be professor of obstetrics and gynecology, in the British Postgraduate Medical School; Professor E. H. Kettle, since 1927 university professor of pathology at St. Bartholomew's Hospital

Medical College, to be professor of pathology in the British Postgraduate Medical School.

DR. RAPHAEL ZON, director of the Lake States Forest Experiment Station, has been assigned to forest service to take charge of technical phases of the great plains tree shelter project. He will collaborate with Fred W. Morrell, recently appointed administrator of the project. Dr. Zon will develop technical methods to be used in raising nursery stock and in planting trees over an area 100 miles wide and 1,300 long.

PROFESSOR L. F. MAREK, formerly acting director of the research laboratory of applied chemistry at the Massachusetts Institute of Technology, has joined the staff of Arthur D. Little, Inc., chemists and engineers, of Cambridge, Mass.

DR. A. O. BOWDEN, president of the New Mexico State Teachers College, has been appointed director of the California Branch of the School of American Research of the Archeological Institute of America, which has its headquarters at the University of Southern California. Dr. Edgar L. Hewett, president of the institute, will continue to direct the field work.

DR. ALLEN E. SEDGWICK, professor of geology at the University of Southern California, has been elected president of the Board of Education of the Los Angeles city schools.

E. BARNARD has been appointed director of food investigation in the British Department of Scientific and Industrial Research, and Dr. F. Kidd to be superintendent of the Low Temperature Research Station, Cambridge. Both these posts were previously held by the late Sir William Hardy. Mr. Barnard has been assistant director of food investigation since 1931 and Dr. Kidd has been on the staff of the Low Temperature Research Station since its establishment in 1922.

DR. HENRY FAIRFIELD OSBORN, honorary president of the American Museum of Natural History, sailed for Europe on August 1.

DR. KLADIM VLADIKOFF, of the Biological Board of Canada, is investigating this summer the relationship between the temperature of the water and the catch of fish.

ROGER REVELLE, of the Scripps Institution of Oceanography, has gone to Bremerton, Wash., for a trip to the Aleutian Islands, where he will collect water samples at different depths, ranging as low as 2,000 fathoms, and make records of sub-surface temperatures.

The British Medical Journal reports that the council of the Royal Society of Arts attended at Clarence House on July 11, when the president, the Duke of Connaught, presented the Albert Medal for 1934 to Sir Frederick Gowland Hopkins, "for his researches in biochemistry and the constituents of foods." In making the presentation the Duke of Connaught said: "Your work has largely lain in the domain of pure biochemistry. Your discoveries have not only enriched this science, but have done much to make it a distinctive subject for study, attracting a large and enthusiastic body of research workers. Actually the discovery that foodstuffs contained certain factors now called vitamins, and that life could not be maintained on a synthetic diet alone, gave a new impetus to work on nutrition and to the study of deficiency diseases, in which work you have continued to take an active part. In consequence the world has acquired a clear conception of the vitamins, of the part they play in health and disease, and their distribution in various foods. As a further result, nutrition, the feeding of a nation, is becoming a more exact science, to the benefit of the health of everyone. Of no less consequence to the general advance of science has been your personal willingness at no small sacrifice of comfort and leisure to give help at all times and in every way to scientific workers and associations with scientific aims. I have the greatest pleasure in handing you this medal, which was founded as a memorial to my dear father in 1862."

ACCORDING to *Nature*, a preliminary program is now available of the General Discussion on Colloidal Electrolytes to be held by the Faraday Society at University College, London, on September 27, 28 and 29. Professor H. Freundlich will deliver an introductory paper, and papers in the remaining sessions will be grouped according as they deal with theory, experimental technique or special subjects (soaps, dyestuffs, silicates, proteins, and so on). The papers, which will be available in advance, will be taken as read; each author will indicate a few points of special interest, after which the subject will be open for discussion. Among those outside Great Britain who are contributing papers are Dr. E. J. Bigwood, Brussels; Professor P. Debye, Leipzig; Professor E. Elod, Karlsruhe; Professor A. Frumkin, Dr. Proskarnin and Professor A. J. Rabinovith, Moscow; Professor E. Hammarsten, Stockholm; Professor H. R. Kruyt, Utrecht; Professor Linderstrom-Lang, Copenhagen; Professor A. Lottermoser, Dresden; Professor J. W. McBain, Mrs. M. E. Laing McBain and Margaret M. Barker, Stanford University; Professor W. Pauli, Vienna; Professor M. Sameč, Ljubljana; Professor A. Treadwell, Zurich, and Dr. F. Valko, Ludwigshafen a/Rh.

THE trustees of the Beit Fellowships for Scientific Research have awarded the following fellowships for research at the Imperial College of Science and Tech-

nology during the academic year 1934–35: H. I. Stonehill, Central Foundation School, 1922–29, and East London College, 1929–34, for research into the applicability of the modern theories of strong electrolytes due to Debye, La Mer, Bjerrum, Davies, etc., the experimental work taking the form of measurement of the E.M.F. of certain cells, under Professor J. C. Philip; J. R. Tillman, Gillingham County School, 1923–30, and the Imperial College, 1930–33, for research on electron diffraction, both from the point of view of studying crystal forms and the mechanism of diffraction, under Professor G. P. Thomson; J. Bell, Whitehaven Secondary County School, 1919–27, and the Imperial College, 1927–34, for a spectrographic investigation of hydrocarbon combustion, under Professor W. A. Bone.

ABOUT 350 men, supported and controlled by the Federal Government, through the Wisconsin Emergency Relief Administration and its state transient bureau, began work recently on fifteen or more projects designed to develop the arboretum of the University of Wisconsin, which was established two years ago, into an out-of-door laboratory for wild game conservation experimentation in the Middle West. The government is constructing barracks, providing equipment and materials, and supporting the men, no state or university funds being expended. Establishment of the camp on the arboretum grounds necessitates the expenditure by the government of upwards of $50,000 for equipment and materials and approximately $100,000 for labor. The work is under the direction of the arboretum committee, Professor Aldo Leopold, research director, and Professor G. W. Longenecker, executive director.

ACCORDING to a correspondent of the *Journal* of the American Medical Association, in 1933 the number of living births in Europe showed a further decline. According to a preliminary report, the greatest decrease occurred in the east European countries, which still have a comparatively high birth rate. In Roumania, in the first six months of 1933, there were 42,000 (12.4 per cent.); in Poland, 35,400 (7.5 per cent.), and in Czechoslovakia, 12,800 (7.9 per cent.) fewer children born than in the first half of 1932. In Hungary the number of births for the first nine months of 1933 was 8.8 per cent., and in Lithuania 7.7 per cent. lower than for the corresponding period of the previous year. The decline in the number of births was very marked in Austria (6.2 per cent.) and in Bulgaria (6.0 per cent.). In France, which has had, since the war, a comparatively steady birth rate, 33,110, or 6.0 per cent. fewer living births were recorded for the first nine months of 1933 than in the corresponding months of 1932, whereas the decline in births for the previous year in France was less than 8,000. For the period of nine months Great Britain reports a decrease in the number of living births amounting to 26,450, or 4.7 per cent., and the Netherlands a decline of 4.4 per cent. In the German Reich, however, in consequence of the slight increase of births in the third quarter, the total number of living births for the corresponding nine-month period was only 21,100, or 2.8 per cent., fewer than for the same period of the previous year. Thus, in 1933, the German Reich stood, for the first time in many years, among the countries with a relatively slight decline in the birth rate, by the side of Spain, Portugal, Switzerland and Italy.

DISCUSSION

TRANSFORMATION OF BACTERIA

DR. W. H. MANWARING'S extremely interesting discussion printed in SCIENCE of May 25 ends with a question concerning the possibility of harmonizing the "apparent Lamarckian world of bacteriology and the presumptive Darwinian world of higher biological science."

Assuming that all the facts related by him are correctly stated, it does not seem probable to me that there is any fundamental difference between the vital processes of bacteria and those of other organisms. Among the Coccidae or scale insects, the sexes are extremely different, so that if we did not know the life history, they might be placed in different orders or families. Some species reproduce parthenogenetically, and the males are never seen, or in certain cases are seen very rarely. Locked in the germ plasm of the female coccid is the potentiality of a being far more different from the female than any of the new types of bacteria arising as described by Dr. Manwaring are from their progenitors. If all coccids became parthenogenetic, no one would suspect this to be the case, yet under certain circumstances one of the extraordinary males might suddenly appear. No one would consider this a case of mutation; it would be recognized as an example of the bringing to light of hidden germinal potentialities. In my recent studies of bees, I have been struck by the sporadic appearance of complex structures, and without going into details, it may be said that the evidence strongly indicates the functioning of latent genes, rather than the appearance of new mutations.[1]

It seems probable that among the bacteria organization is comparatively loose, so that the germinal

[1] Cockerell and Ireland, *Proc. Nat. Acad. Sci.*, p. 972, November, 1933.