finer structural anomalies and consequent surface irregularities. We therefore made detailed magnetic studies of magnetite and several ferromagnetic iron oxides prepared in different ways. This was done, as is usual in the study of ferromagnetic materials, by taking the magnetization curves for increasing and decreasing magnetizing fields; that is, we determined the hysteresis loops. The four constants characteristic of ferromagnetic materials may be obtained from these curves. They are: the permeability (simply related to susceptibility), which is a measure of the magnetization; the hysteresis loss, which is a measure of the resistance to orientation of the elementary magnets and hence appears as a transformation of electromagnetic energy into heat; the remanence, which is the residual magnetization after the field is removed, since orientation, when once attained, may persist in varying degree; and finally, the coercive force, which is the field that must be applied in the opposite direction to demagnetize the substance. Both remanence and coercive force are secondary features of the hysteresis phenomenon. If the hysteresis loss is large, both the remanence and the coercive force are large. For example, in steel hysteresis loss, remanence and coercive force are large, while in soft iron all three of these quantities are relatively small.

The result of these studies was that while the several oxides differed somewhat as to permeability, they differed enormously as to the constants associated with hysteresis. But after the several differently prepared oxides had been annealed at high temperatures they gave nearly the same values for the hysteresis loss, remanence and coercive force. It is this fact which is the basis for our conclusion that it is the crystal quality (lattice perfection and absence of atomic deformation) which is markedly affected by changing the method of preparation. The magnetic investigation, therefore, gave us a means of tracing the finer structural features which occur in regions of too small dimensions or are for other reasons not accessible to x-ray analysis. In other words, while we can establish the fine structure of ferromagnetic iron oxides by the x-ray, it becomes possible by magnetic analysis to establish the existence of a still finer one—a hyperfine structure.

To these exact physical methods of investigation the biological methods joined themselves naturally and it was found that the latter were not less but rather more sensitive than the magnetic methods to hyperfine structural differences. By combination of these methods one can gain an insight into biological phenomena that would otherwise be quite impossible.

Our investigations, as they have been briefly described in the foregoing, have given rise to a whole array of researches in the field of the metal oxides, especially those of iron. Chemists, physicists, engineers, mineralogists, geologists, pharmacologists and medical men have repeated the experiments and supplemented them in various directions, according to their particular fields of interest.

SCIENTIFIC EVENTS

THE JUNIOR SCIENCE CLUBS OF THE AMERICAN INSTITUTE

THE Junior Science Clubs of the American Institute were the guests, on the morning of March 25, of the Museum of Science and Industry and the American Museum of Natural History.

Museum Day was planned by the American Institute as a new departure in its program of science educational projects for children. Recently the institute, a century old organization, has associated hundreds of science clubs made up of young people all over the city into its new branch, the Junior Science Clubs. The members of these clubs represent some seven or eight thousand children, all under eighteen years of age.

The meeting at the Museum of Science and Industry was open to all member Physical Science Clubs. The group was divided into two sections, one going directly to the main exhibit hall and one to the museum theater. In the main exhibit hall, Robert P. Shaw, of the Museum of Science and Industry, spoke on "The Story of Electricity." The hall was darkened and a spotlight was thrown on the various exhibits as they illustrated Mr. Shaw's talk. In the museum theater, the second group was shown the following series of science motion pictures: "The Romance of Power"; "Dynamic America"; "A. B. C. of Electricity," and "Finding His Voice." The groups then changed places and the program was repeated.

To the American Museum of Natural History meeting members of the Biological Science Clubs were invited.

At the meeting at the museum Paul B. Mann, chairman of the department of biology of Evander Childs High School, spoke on "The Museum's Part in Exploration," illustrated with motion pictures taken by Roy Chapman Andrews.

The group was then broken up into five sections, each of which visited one of the various museum trails. Members of the museum's staff were stationed in the different halls, where they gave short talks on the contents of each. The children then, under the guidance

of these staff members, spent the rest of the morning inspecting the Darwin Hall, Insect Hall, Mammal Hall, Bird Hall and Fish Hall.

THE SIXTH ANNUAL SUMMER SYMPOSIUM IN THEORETICAL PHYSICS AT THE UNIVERSITY OF MICHIGAN

IN the summer of 1923, the University of Michigan invited Professor Karl T. Compton of Princeton University and Professor F. A. Saunders of Harvard University to give special lectures during the summer session. These lectures initiated a policy which has been maintained ever since. For the first five years the subjects covered by the lecturers were primarily in the field of experimental physics, but beginning with the session of 1928, a symposium in theoretical physics was inaugurated, and since that date the visiting lecturers have treated theoretical subjects exclusively. An examination of the list of lecturers discloses the fact that many of the foremost physicists of America and Europe have appeared on these summer programs. Particularly in recent years these meetings have attracted not only advanced students but also members of other university and college faculties, and research physicists from governmental and industrial laboratories. The summer is apparently the only time that such men can attend, and the course of eight weeks is sufficiently long to give a very adequate treatment either of an introductory course in modern theoretical physics or of a very advanced one covering perhaps material receiving its first public presentation. In addition to the regular lecture courses there are numerous informal meetings of groups limited to those interested in special problems.

The sixth symposium will be held between the dates June 26 and August 18. In the first or second week of this period Professor Niels Bohr of Copenhagen will give several lectures on "The Foundations of Atomic Mechanics." Professor Enrico Fermi of Rome will lecture throughout the eight weeks of the session on "The Structure of the Atomic Nucleus." Following Professor Bohr's lectures Professor J. H. Van Vleck of Wisconsin will lecture for four weeks on "The Recent Developments in the Theory of Magnetism." Professor G. E. Uhlenbeck of Michigan will give a course on "Quantum Mechanics" and Professor D. M. Dennison of Michigan a course on "The Theory of Band Spectra." Both of these last courses will be given throughout the summer. The informal seminars which meet several times weekly will be under the general supervision of Professors Fermi and Van Vleck. Holders of doctors degrees may attend all lectures, courses and seminars as guests of the university.

In addition to the symposium lectures the department of physics offers its regular advanced courses. Facilities for experimental research are available, particularly in spectroscopy in the fields of x-rays, ultra violet, visible, near and far infra-red, in sound, in electronics and in vacuum tube phenomena.

CONFERENCE ON RECENT DEVELOPMENTS IN CHEMISTRY AT THE JOHNS HOPKINS UNIVERSITY

THE Johns Hopkins University will this summer conduct a second conference on recent developments in chemistry in conjunction with the regular summer session at the institution.

The conference will be divided into five consecutive sessions of one week each. Each week will be devoted to one phase of chemical progress, and will include lectures by men known in that particular field.

"Organic Chemistry Related to Medicine" will be the subject of discussion during the week of June 26, and speakers from the Johns Hopkins School of Medicine and from outside institutions will present various phases of the work. E. Emmet Reid and G. H. Corwin will have charge of the week's program. On June 26, Hugh Young, Justina Hill, Fitzgerald Dunning, Edwin C. White and W. C. Harden will deal with the general subject of "Antiseptics." On June 27, "Oxidation and Reduction" will be discussed by E. Emmet Reid, Leslie Hellerman and G. H. Corwin.

Gordon M. Dean and Hans Jensen will be the speakers on June 28, presenting phases of the topic, "Insulin and Proteins." A sound film, "Some Biochemical, Pharmacological and Medical Experiences as Told to Chemists," by Dr. John J. Abel, will be shown in the evening of that day. On June 29 Joseph C. Bloodgood will preside over a program devoted to "Chemistry and Physics in Cancer." The speakers will include Dr. Bloodgood, Charles F. Geschickter, E. A. Peterson, Dudley Jackson, Curtis Burnam, M. A. Tuve, Carl Voegtlin, Warren H. Lewis, Margaret Lewis and George Otto Gey. Motion pictures related to the subject of cancer will be presented in the evening. June 30 will be devoted to "Chemotherapy," aspects of which will be discussed by Hugh Young, Justina Hill and David I. Macht.

During the week of July 3, Joseph E. Mayer will preside over a program devoted to "Physical Treatment of Molecular Binding." The speakers for the week, in the order in which they will present their discusisons, are Dr. Mayer, Maurice L. Huggins, Hugh M. Smallwood, Henry Eyring and Saul Dushman. "X-rays and Structure of Matter" will be the general topic for the week of July 10. Emil Ott will preside, and speakers for the week will include Ralph W. G. Wyckoff, Maurice L. Huggins and Dr. Ott. For the week of July 17, a topic of especial