of biology brought up to date year by year and provided with the thoroughly adequate types of indexes so carefully worked out by Dr. J. R. Schramm is a matter which can not be lightly turned aside.

For the sake not only of its value to science, but also of its educational and reference value to students and intelligent citizens generally, it is to be hoped that the future of *Biological Abstracts* may be assured.

FREDERICK V. RAND

WASHINGTON, D. C.

SOCIETIES AND MEETINGS

A SYMPOSIUM ON THE ALGEBRA OF GEOMETRY AND RELATED SUBJECTS

A SYMPOSIUM on the algebra of geometry and related subjects was held at the University of Notre Dame on February 11 and 12. Algebra of geometry, not to be confused with algebraic geometry in the classical sense, is a foundation of geometry starting with one class of elements (points, lines, planes, etc.) and two undefined operations called joining and intersecting of elements. It is based on a few simple formulas about these operations, similar to and partly identical with the formulas about addition and multiplication on which the ordinary abstract algebra is founded. That is why mathematicians in Vienna called the calculus which they developed from these assumptions algebra of geometry. In an algebraic way, one can define when an element is part of another element, and then make precise the famous initial words of Euclid "point is that which has no parts." Lines, planes and n-dimensional elements can be defined and the ordinary axioms of geometry be deduced.

In the first of the four meetings, Dr. Marshall H. Stone, of Harvard University, presented a paper on the applications of Boolean algebra to topology. Boole's algebra of logic can be obtained as a special case of the more general algebra of geometry. Mr. Garrett Birkhoff, of Harvard, who, in this country, discovered and developed the algebra of geometry under the name of theory of lattices, presented new applications of his theory to partly ordered function spaces. Dr. E. W. Chittenden, of the University of Iowa, conducted the discussion.

The second meeting, under the direction of Dr. R. T. Hildebrandt, of the University of Michigan, dealt with applications to the theory of groups. Dr. O. Ore, of Yale University, spoke about what he calls structures of groups, *i.e.*, systems of subgroups of a group, which may be joined and intersected like points, lines and planes in geometry. Dr. Saunders MacLane, of the University of Chicago, presented an application of lattice theory to the structure of fields of numbers. Dr. James K. Senior, of the University of Chicago, mentioned some unsolved problems concerning structures of groups, whose solution would be of importance to organic chemistry.

The following morning, Dr. John von Neumann, of the Institute for Advanced Study, Princeton, presented his continuous geometry, in which there are no points and the dimension of the different objects assumes all values between zero and one. Dr. Karl Menger, of the University of Notre Dame, spoke about the algebra of affine geometry developed by F. Alt and himself. Pointing out the desirability of similar algebraic foundations for non-Euclidean and other geometries. The discussion was directed by Dr. I. A. Barnett of the University of Cincinnati.

The last meeting, conducted by Rev. H. Kenna, C.S.C., of the University of Notre Dame, dealt with algebraic questions. Dr. A. A. Albert, of the University of Chicago, spoke about applications of division algebras to geometry. Canon Lemaître, of Notre Dame and Louvain, presented a paper applying hyper-complex numbers to Eddington's interpretation of the equation of Dirac. Dr. Emil Artin, of Notre Dame, gave new proofs of algebraic theorems containing as a special case the theorem of Wedderburn which, applied to geometry, shows that in a space consisting of a finite number of points the law of Pascal is a consequence of the law of Desargues.

On the first evening, Dr. Edward V. Huntington, of Harvard University, gave a general lecture on the method of postulates, entitled "The Duplicity of Logic."

The meeting was attended by a group of more than fifty visitors from various parts of the country.

KARL MENGER

UNIVERSITY OF NOTRE DAME

REPORTS

INDUSTRIAL RESEARCH INSTITUTE

FOR sometime now the research executives of middle-sized industrial corporations, well known for their advanced position in research in their respective fields of industry, have felt the need of an organization in which they could discuss common problems principally concerned with organization and administration of research laboratories.