

Verhandlungen des ersten internationalen Mathematiker-Kongresses in Zürich vom 9 bis 11 August, 1897. Herausgegeben von FERDINAND RUDIO. Leipzig, B. G. Teubner, 1898. 8vo, viii + 306 pp.

THE Zürich congress will always possess an especial interest as the first international congress. The present stately octavo volume is the *official* report of the same, prepared by Professor Rudio, one of the two general secretaries.

The first eighty pages recount in an agreeable manner the events of the congress and are very interesting reading. The address of welcome by the president, Professor Geiser, and the paper by Professor Rudio "On the object and organization of international congresses" are given in full. Professor Geiser made felicitous reference to the great names of Jacob, Daniel, and Johann Bernoulli, and of Euler and Steiner as mathematicians of the past of whom Switzerland was justly proud. Their portraits grace the present volume and form a valuable addition.

The remaining 225 pages are devoted to the scientific addresses and papers read at the congress. The address of Poincaré has already appeared in the *Acta Mathematica*, but is also given here. Those of Klein and Hurwitz, I have not seen in print elsewhere. I wish to call particular attention to Hurwitz's paper. This is without doubt the most careful and broadly conceived sketch at hand of the recent developments, in a certain well defined field, of the general theory of functions. Over 130 references to original sources are given in the course of the memoir.

The volume contains either in full or in abstract about thirty papers read in the various sections. I note only a few of general interest: H. Weber, Genera of algebraic bodies; E. Schröder, Pasigraphy; L. Stickelberger, Discriminants of algebraic numbers; F. Meyer, Algorithms similar to continued fractions; T. Reye, Quadratic complexes; A. Stodola, Relation of technical sciences to mathematics; H. Zeuthen, Barrow's method of inverse tangents; G. Eneström, Mathematical bibliography; G. Loria, Historical sketch of plane curves.

Some of the papers have appeared elsewhere and are given here only as abstracts. All will regret that Picard's paper on algebraic functions of several variables is given only in the briefest form. The first volume of the *Fonctions algébriques de deux Variables* which has since appeared will not console us for the loss of this brilliant aperçu which was listened to with intense interest by almost the whole congress.

Mathematicians will be grateful to Professor Rudio for this very complete and attractive report. The book contains so much of general interest that it will be welcome to all.

JAMES PIERPONT.

The Mathematical Theory of the Top. Lectures delivered on the occasion of the Sesquicentennial Celebration of Princeton University. By FELIX KLEIN, Professor of Mathematics in the University of Göttingen. New York, Charles Scribner's Sons, 1897. 12mo, iv + 74 pp.

THESE lectures "were reported and prepared in manuscript form by Professor H. B. Fine, of Princeton University, and the manuscript was revised by Professor Klein." The twelve figures in the text, some of which required great delicacy in construction, were drawn by Professor H. S. S. Smith. The subject matter of the lectures is divided into four parts: the geometric introduction; the dynamic relations; the general analytic discussion when the independent variable is complex; the toy top with moving point.

First of all, the double system of coördinates used in considering the problem of the rotation of a body about an axis with one point fixed is considered, and the attempt is made "to throw a method already well known into the most convenient form for application to mechanics." As the leading expounder today of the ideas of Riemann it is fitting that Professor Klein should use the transformations of the system derived from the stereographic projection of the points of the sphere, rather than the system employed by Euler, or the system which may be designated as the quaternion system. In the beginning the transformations are expressed much more symmetrically in these latter systems, but the problem is not one which is symmetrical, since the body rotates about one axis. And it would therefore seem (as the result shows) that the system of stereographic projection, which considers one line as distinguished from all others, should be superior, and that the expressions for this movement will have a kind of symmetry in this system. Moreover, such a system has been used with great power by French writers, notably Darboux. It is especially emphasized that, in this system of parameters, the parameters, as well as the magnitude ordinarily called the variable, are functions of the time. Since these parameters are complex numbers, and are functions of t , the analytic problem which