

duction to the general theory of Cremona transformations is inserted, but so brief and containing so many statements without proof that its value is much less than could justly be expected. A fairly full discussion of the (2, 2) case is given, also an outline of the (2, 3) and (2, 4) cases, but no claim is made for completeness. A brief statement concerning Segre's work on the resolution of singularities by means of quadratic transformations is misleading. The problem was by no means completely solved by Segre.

With the tremendous amount of new material that has been contributed to this field during the last few decades it is difficult to develop a systematic theory without expanding into several volumes. The editor has endeavored to present these new phases in as near the same degree of completeness as was adopted by the author toward the corresponding field when the last preceding edition was written. This has, on the whole, been accomplished. The same style has been followed and a book has been produced, which "forms, it is hoped, a concise and comprehensive survey of tri-dimensional euclidean geometry, both algebraic and differential."

VIRGIL SNYDER.

*Hermann Grassmanns gesammelte mathematische und physikalische Werke.* Herausgegeben von FRIEDRICH ENGEL. Bd. 3: Teil 1, *Theorie der Ebbe und Flut und Abhandlungen zur mathematischen Physik*, 353 pp., 1911 (herausgegeben von JUSTUS GRASSMANN und FRIEDRICH ENGEL); Teil 2, *Grassmanns Leben*, xiii + 400 pp., 1911 (geschildert von FRIEDRICH ENGEL). Leipzig, B. G. Teubner.

GRASSMANN'S works on mathematics and physics are finished after some twenty years of editorial labor.

Although Grassmann's style was such as to repel readers from the two *Ausdehnungslehren*, those works have slowly penetrated into the mathematical consciousness of at least a few persons, but the first part of Volume III of his works contains material that is now printed for the first time and, though written fifty or seventy-five years ago, has only now an opportunity to be valuable to the world at large. The world of science has meantime moved far on, and about the only interest in this early work must be historical, not for the history of science, merely for the history of Grassmann.

The most striking thing about the memoir *Ebbe und Flut*,