also been given incorrectly in a different form on page 1518. On both pages 1501 and 1611 the paper attributed to G. Veronese (Mathematische Annalen, vol. 24 (1884), p. 313) is an article by C. Segre; the Veronese reference should be Mathematische Annalen, vol. 19 (1881), p. 161. Other types of misprints occur, as on page 1465, line 19 up, C_4 should be C_3; Sekanten should be Bisekanten; on page 1495, line 19 up, Doppel should be Torsal.

With the completion of these two volumes the study of algebraic surfaces will be greatly facilitated. Notwithstanding the omissions, they make a notable addition to the essential literature of the subject. A laborious work has been ably completed.

EVELYN CARROLL-RUSK

Algebraische Transformationen und Korrespondenzen. By L. Berzolari. Band III 2 B, Heft 12. 1933. Pages 1781–2219.

This is the twelfth and last number of the volume on algebraic geometry, and it brings the standard of excellence of the Encyklopädie to a new high level. Berzolari has done an admirable piece of work in this well written, carefully organized discussion of algebraic correspondences and transformations. He has woven the researches of some 960 authors into a harmoniously unified treatment of the subject which will be of immense assistance to algebraic geometers. This book overlaps to some extent Bulletins 63 and 96 of the National Research Council, but to a greater degree it correlates and supplements these bulletins.

The reviewer finds no essential omissions and no errors of fact or typography. The book is divided into eight quite unequal divisions which might be called chapters, and a brief summary of the topics considered will give some idea of the thoroughness of the author's study.

I. *Einleitende Definitionen und Eigenschaften.* This chapter is concerned with such topics as the definitions of algebraic correspondences between algebraic manifolds, reducible and irreducible correspondences, and branch points. Invariant relationships, such as the formulas of Zeuthen and Noether, are discussed.

II. *Algebraische Korrespondenzen und Korrespondenzprinzipien in linearen und nichtlinearen Gebieten.* Algebraic correspondences between two rational curves, (2, 2) correspondences, multi-linear correspondences, and various theorems on correspondences are developed in this chapter.

III. *Algebraische Korrespondenzen und Korrespondenzprinzipien für algebraische Kurven beliebigen Geschlechts.* This is the longest chapter in the book and covers some 125 pages. Among the many topics which are taken up are the Cayley-Brill theorem, systems of several correspondences between the points of a curve, the correspondence theory of A. Hurwitz, Severi's geometrical treatment of the general correspondence theory, and the valence of a correspondence according to Burkhardt and Zeuthen. There is also a discussion of algebraic correspondences between algebraic curves from the point of view of analysis situs, and items such as Zeuthen's rule for the multiplicity of a coincidence point in an algebraic correspondence, grade and genus of a correspondence, symmetric and semisymmetric correspondences. The transcendental theory is brought in by a discussion of the work of C. Rosati and of G. Scorza on Abelian

integrals and the theory of the Riemann matrix, reducible Abelian integrals of the first kind, singular correspondences, Hermitian correspondences, involutions on algebraic curves, Schubert's formula and arithmetic criteria of Castelnuovo and of Severi, the Jacobian manifold V_p of a curve of genus p, and automorphic birational transformations of an irreducible curve are considered in the latter part of the chapter.

IV. *Birationale (oder Cremona-) Transformationen zwischen zwei linearen Räumen von zwei oder mehreren Dimensionen.* The study of transformations is started with a discussion of the plane Cremona transformation and the nature and properties of the fundamental elements. The Cremona group, periodic and involutorial transformations, the types of plane involutions, and the quadratic transformation are taken up in turn. The transformations of ordinary three-space are then considered with emphasis on the quadratic, the bilinear cubic, and the monoidal transformations. The chapter closes with sections devoted to transformations of higher space and to regular groups of Cremona transformations.

V. *Mehrdeutige Korrespondenzen zwischen zwei linearen Räumen von zwei oder mehreren Dimensionen.* This chapter goes into the theory of rational transformations between two planes and between three-spaces. Algebraic correspondences with arbitrary indices between two planes and between two three-spaces are also considered together with higher null transformations and general involutions in spaces of two or more dimensions.

VI. *Anwendungen.* In this short chapter on applications the author writes on mapping, reduction of singularities of curves and surfaces, and the reduction of linear systems of algebraic curves and surfaces to types by means of Cremona transformations.

VII. *Ebene Abbildung von rationalen Flächen.* This short chapter is devoted to the questions of rationality of a surface, real rational surfaces, the work of Comessatti, and mapping on multiple planes.

VIII. *Andere besondere Abbildungen und algebraische Korrespondenzen.* In the last chapter of the book rational manifolds of three dimensions and connexes are considered.

L. A. Dye

General Index. Band III 2, Heft 13. September, 1934. Pages 2221–2331.

The use of an index is not uniform throughout the work. Thus Analysis, Teil I, has neither subject index nor list of names mentioned. All the other parts have a subject index and *Analysis*, Teil 3, has a list of names. At the end of the second volume on geometry appears a 45-page index of subject matter, pertaining to Teil 2 only, and this is followed by a 70-page list of names cited in all of the 5000 pages on geometry. It was a monumental task and may have some use, but if so, in ways other than serving as a finder when applied to a name often cited. The name most frequently appearing in this list is Felix Klein, with over 500 citations; Arthur Cayley is a close second.

Virgil Snyder