inhibitor—"blastokolin"—present in fruit and vegetables[4] and (c) the probable transition of this inhibitor into the natural accelerator (ethylene), a transformation marking the ripening stage in fruit development and expressed chemically by the degradation of maleic acid to ethylene and carbon dioxide—it appears that the substitution of the poison-sprayers by the natural inhibitor may constitute a practical means of assisting the plant's self-protection. As in the case of stored fruit and vegetables spraying with a solution or emulsion of maleic acid in ethereal oil, paraffin, solvent naphtha or some other suitable medium may perhaps be found effective for such plant treatment.

The application of maleic acid may extend not only to bacteria and fungi, but also to insects in the early stages of their metamorphosis. Again the presence of the inhibitor in seeds and its ready diffusion in an aqueous medium[4] suggests the possibility of treating the seeds with maleic acid as an anti-virus measure. It is perceivable that the preferential cultivation of barbless, husk-free, thin-skin, etc., varieties eliminates the hardier types in our crops, as the accelerated elution of the free, or hydrolysis of the combined inhibitor (as in the case of vitamin C[5]) exert a disturbing influence both on the enzymic equilibrium and general metabolism and increases the susceptibility to parasitic attacks.

The controlled use of maleic acid would obviate any appreciable interference with the normal course of metabolism or any ill effect on food values.

MAURICE COPISAROW

RESEARCH LABORATORY
145 ALEXANDRA ROAD
MANCHESTER, 16, ENGLAND

SCIENTIFIC BOOKS

RATIONAL FUNCTIONS

Interpolation and Approximation by Rational Functions in the Complex Domain. By J. L. WALSH. American Mathematical Society Colloquium Publications, Volume XX, 1935.

IN the field of approximation by rational functions in the complex domain the author of this monograph has been among the most active and successful investigators during more than the last half-score of years. His contributions have been widely read, and his authority in the subject is generally recognized. It would be surprising under these circumstances were his book to be found anything but a valuable and significant addition to the mathematical literature. There is no cause for such surprise. Professor Walsh has written here a clear, careful, thorough and scholarly account which will not fail to receive general commendation. The book is a worthy addition to the important series of Colloquium Publications of the American Mathematical Society.

The subjects of interpolation and approximation, if their many aspects and ramifications are included, are too vast by far to admit of detailed treatment in any single volume. The present monograph confines itself, therefore, specifically to sequences of polynomials or general rational functions which are determined in one of the following two ways; *i.e.,* by the fact that they coincide with (interpolate) a given function upon an assigned set of points or by the fact that they lie closest to (approximate) the given function in a certain specific sense. The considerations are made entirely in the complex domain, the given function being usually assumed to be analytic. Topics pertaining immediately to the real variable are given no place here. It will be clear from this that the author has restricted his book to those aspects of the subject which have been centers of his own research. This, of course, is entirely in the tradition of this series of publications.

Of the field considered the book gives a thorough and comprehensive treatment, generally with an ample degree of detail. Many results of the author's which are included here have not heretofore been published. The material, as one would expect, is technical to a high degree and requires, therefore, to be read closely and with care. There is much of it. However, its organization, which could have been no simple problem, has been effectively and skilfully carried out. The work is well documented—the bibliography including some 150 titles.

In point of style and arrangement there is much similarity with that of the author's recent essay, "Approximation by Polynomials in the Complex Domain," Memorial des Sciences Mathematiques, Paris, 1935, wherever that essay and the present monograph deal with the same material. The monograph, however, in distinction from the essay, is a systematic exposition, not an outline, and among other things deals with general rational functions as well as with polynomials.

In brief summary the contents of the twelve chapters of the book may be described somewhat as follows: In the early chapters general function theoretic considerations and the basic theorems on approximation are set forth, and are followed by discussions and theorems on series of interpolating polynomials—Jacobi series—

[4] Kockemann, *Ber. Deut. Bot. Ges.,* 52: 523, 1934; Shuck, SCIENCE, 81: 236, 1935.

[5] Levy, *Nature,* 138: 933, 1936.

lemniscate curves—conformal mapping—the convergence, overconvergence and maximal convergence of sequences of polynomials. There follow in the next chapters discussions of polynomials of approximation best in the sense of Tchebycheff, or in the sense that they minimize suitable integrals—of orthogonal polynomials and their theory—of polynomials of interpolation in uniformly distributed points—and some comparative study of the properties of interpolation and of approximation. The later chapters, finally, deal with formulas for rational functions of interpolation and sequences of such functions—the principle of duality—approximation by means of rational functions—auxiliary conditions—and the existence and uniqueness of rational functions of best approximation.

It was the author's expressed purpose to write a book which would serve both the novice in the subject and the specialist. The beginner, who would necessarily have familiarity with the general theory of functions of a complex variable, will find the book a very readable one which greatly facilitates an introduction to the subject. The specialist will find the book indispensable. Both will thank Professor Walsh for his work.

RUDOLPH E. LANGER

REPORT OF THE ASSOCIATION OF GEODESY

Travaux de l'Association de Géodésie de l'Union Géodésique et Géophysique Internationale, Tome 12, publié par le Secrétaire, Georges Perrier. Rapports généraux établis à l'occasion de la Cinquième Assemblée Générale, Lisbonne, 14–25 Septembre, 1933. vi + 552 pp., 4to. 180 francs. Paris, au Secrétariat de l'Association, 1935.

THIS volume comprises eight different reports, each with its own independent paging, on various aspects of geodesy and in five different languages. It would be impossible to summarize its contents or to comment on them with any profit to the reader, so it seems best to take the space ordinarily occupied by detailed summaries and comments for some explanations about the history of the organization issuing this volume.

Before the world war there was an International Association of Geodesy, devoted to geodesy alone. When it was founded in 1862 by General Baeyer, it included only some of the German states and neighboring countries of Europe, but it soon became international in scope. Its triennial conferences were held at various places in Europe. The last of these was at Hamburg in 1912. The world war broke up this international scientific organization, as it broke up others, although a "Reduced Geodetic Association of Neutral Nations" survived the world war and maintained one of the principal cooperative international enterprises of the old association, the International Latitude Service, established in 1899 to study the variation of latitude.

After the war, however, this reduced association did not expand to the original dimensions of the old association but, after some hesitation, merged its activities with those of a new organization that tried to put in practice the idea that geodesy is but one branch of earth-science and has therefore close relations with other branches of earth-science, all of which are included in the general term "geophysics." The word "geophysics" has also acquired the special meaning of the use of physical methods to determine subsurface structure for strictly commercial purposes; this special meaning does not concern us here.

In 1919 there was organized at Brussels an International Union of Geodesy and Geophysics with several divisions, first termed sections and later associations, of which the Association of Geodesy, which issues this volume, was one. The other associations deal with seismology, physical oceanography, terrestrial magnetism, meteorology, hydrology and volcanology. One purpose of the Union was to emphasize the points of contact between these different branches of earth-science and to facilitate the intercourse among workers in them. Like most other purposes, however, it has been realized only imperfectly.

Another less laudable purpose seemed to be to keep the Germans and their allies in the war out of the organization. The wording of the statutes was such as to discourage their admission. This wording was changed, however, in 1926 with the effect of bringing some of Germany's allies into the Union, but at this writing and as far as the reviewer knows, neither Germany itself nor Austria.

Since its organization the Union and its associations have held general assemblies at Rome (1922), Madrid (1924), Prague (1927), Stockholm (1930), Lisbon (1933) and Edinburgh (1936). The next meeting is scheduled for Washington in 1939.

The Association of Geodesy issues three regular series of publications, the *Bulletin Géodésique* (quarterly), the national reports presented to various general assemblies and special reports on various subjects. The *Bulletin Géodésique* is a journal containing articles of scientific interest, news notes, official announcements, etc. The national reports presented to each assembly cover the activities of the various member nations since the preceding assembly. Each nation speaks for itself and prints its own report in its own way but on pages of uniform size. These separate reports, bound together and supplied with a cover, constitute the volume of national reports. The special reports, of which the volume under review is one, are