

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 Tehebycheff, 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 main-

tained 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

prepared by specially designated reporters for various subjects. These reports try (*try* is the proper word, as the reviewer knows and as may be read in so many words or between the lines in the reports themselves) to cover the progress in the designated subject for the three years preceding. The present volume contains the following reports intended for the Lisbon meeting and covers the calendar years 1931-1933, inclusive:

- "Precise Leveling," J. Vignal and R. Taton (France). 155 pages.
- "Latitude, Longitude and Azimuth and Geodetic Applications of Wireless Telegraphy," H. L. P. Jolly (Great Britain). 144 pages.
- "Deflections of the Vertical," K. Wold (Norway). 27 pages.
- "Gravity on Land," E. Soler (Italy). 107 pages.
- "Gravity at Sea," F. A. Vening Meinesz (Netherlands). 11 pages.
- "Isostasy," W. Heiskanen (Finland). 51 pages.
- "Projections," H. Roussilhe (France). 38 pages.
- "Earth Tides," W. D. Lambert (U. S. A.). 19 pages.

Triangulation and base measurement seem obvious omissions, for they are the backbone of geodesy, but

there were difficulties in completing reports on these subjects and a full report is promised for a later date, to include the data submitted for the General Assembly at Edinburgh in 1936. The report by Kimura on the variation of latitude is included in the national report of Japan.

There is much of interest and value in these reports, but detailed comment would take much space and would require the concentration of an unusual amount of specialized knowledge in one reviewer. The manner of treatment is as varied as the subjects and the nationality of the reporters. Two general comments suggest themselves:

(1) One purpose of the Association is to attain some degree of uniformity in notation, nomenclature and methods of procedure. It might be feared that this desired uniformity would in time be overdone, but these reports afford no indication that this fear is justified.

(2) Geodesy is an old science, dating, let us say, from the time of Eratosthenes (200 B.C.), but it is far from being a finished body of doctrine. There are plenty of problems still awaiting solution.

WALTER D. LAMBERT

SPECIAL ARTICLES

STIMULATED ACTIVITY OF NATURAL ENEMIES OF NEMATODES¹

SOROKIN,² Zopf³ and others long ago recorded the destruction of nematodes by fungal parasites or by fungi which trap nematodes with specialized organs of capture, then penetrate and consume them. Recently, Drechsler^{4,5,6} has added greatly to the list of nema-capturing fungi and to an understanding of their means of capture.

Many of the nema-capturing fungi grow freely as saprophytes, most of them produce aerial conidia, and several are also disseminated by the movement of nematodes carrying detached fragments of fungus. Most of them appear relatively non-specific, capturing nematodes of several genera apparently with equal ease. Likewise, at least some of the non-trapping parasites are non-specific, but others may attack only certain genera or related genera of nematodes.

¹ Published with the approval of the director as Technical Paper No. 94 of the Pineapple Experiment Station, University of Hawaii.

² N. Sorokin, *Ann. d. Sci. Nat. Bot.*, Ser. 6, 4; 62-71, 1876.

³ W. Zopf, *Nova Acta Ksl. Leop.-Carol. Deutschen Akad. Naturforscher*, 47 (4): 167-168, 1884; 52 (7): 314-341, 1888.

⁴ C. Drechsler, *Jour. Washington Acad. Sci.*, 23: 138-141, 267-270, 355-357, 1933.

⁵ C. Drechsler, *Mycologia*, 26 (2): 135-144, 1934.

⁶ C. Drechsler, *Mycologia*, 27 (2): 206-215, 1935.

Most of the fungi reported by Drechsler have thus far been reported only from the vicinity of Washington, D. C. *Arthrobotrys oligospora* Fresenius and several parasites, however, have been recorded from various parts of Europe. The lack of more numerous reports probably results from lack of adequate search with appropriate techniques.

Since October, 1935, the writer and associates have recognized over 20 nema-destroying fungi, including simple parasites and trappers in Hawaiian field, garden and forest soils. Many of them destroy larvae of *Heterodera marioni* (Cornu) Goodey as readily as they do nematodes formerly reported to be attacked. A very superficial survey has shown certain of them to be wide-spread in the Hawaiian Islands. One or more has been found in every old pineapple field thus far sampled adequately, while a plot of approximately two acres which has been sampled more intensively has yielded 15 distinct forms. Several of these fungi appear identical with forms described elsewhere, including *Arthrobotrys oligospora* Fresenius, *Catenaria anguillulae* Sorokin, *Harposporium anguillulae* Lohde, *Stylopaga hadra* Drechsler and forms similar to or identical with Drechsler's⁷ numbers, 4, 5, 7, 12, 13 and 15. Several others appear to be undescribed.

Even in the plot in which 15 such fungi have been

⁷ See footnote 4.