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★**Die Entstehung der Knotentheorie. (German. German summary) [The genesis of knot theory]**

Kontexte und Konstruktionen einer modernen mathematischen Theorie. [Contexts and constructions of a modern mathematical theory]

Friedr. Vieweg & Sohn, Braunschweig, 1999. *xvi*+449 *pp. ISBN* 3-528-06787-X

This *Genesis of knot theory* concentrates on mathematical knot theory, starting in the 18th century and stopping at the beginning of the Second World War (with some remarks on practical, religious, aesthetic or mythological appearances of knots in older times, and some hints of developments to come). The first part of the book is concerned with the development of the new branch of mathematics called "analysis situs" by Leibniz and actually called into being by Euler. Vandermonde's contributions are presented as well as Gauß's ideas, including his code for knot diagrams, its characterization (the tract problem, solved eventually by Dehn), the linking integral and some attempts with braids. The scene broadens with W. Thomson's idea of atomic vortex nuclei. A vivid picture is drawn of scientific ideas and intercommunication in the 19th century, with Helmholtz, Thomson, Tait, and Maxwell as main participants. That was the time when the first extensive knot tables (Tait-Little) were produced and the famous Tait conjectures on alternating knots were formulated. In Göttingen, Listing followed up Gauß's ideas which were read and spread by Tait in Edinburgh. A third focus on knots was created by W. Wirtinger in Vienna at the end of the century. Epple gives a new and interesting insight into his rule in knot theory from the viewpoint of singularities of functions with two complex variables.

The second part of the volume is dedicated to the foundation of modern knot theory as an essential part of topology. The main initiator was H. Poincaré. His concepts and contributions as well as their influence and reception throughout the mathematical world are discussed. More and more rigorous proofs were called for and provided. The works of H. Tietze, M. Dehn and P. Heegaard get extensive attention. Finally, K. Reidemeister's work is described, which resulted in building up the special branch of topology, now known as knot theory, by publishing his famous first monograph on knots. It is correlated with J. W. Alexander's results obtained independently in Princeton.

The work under review makes clear that mathematical ideas, attitudes, and developments are not isolated incidences but rather part of the cultural mainstream of the different periods. It gives an exemplary view of a facet of intellectual life in Europe through three centuries. The book can be read with profit and pleasure by anyone interested in mathematics—short sections requiring some specific mathematical knowledge are marked and can be skipped without much loss. However, a well-read knot theorist will also find a wealth of new and enlightening information which the author picked up from original sources at the National Library of Scotland in Edinburgh, the Universitätsbibliothek Göttingen, other university libraries, and from private letters. It is to be hoped that the author will arrange for an English translation.

Reviewed by *G. Burde*