

## THREE BOOKS ON TOPOLOGY

*Einfachste Grundbegriffe der Topologie.* By Paul Alexandroff, with an introduction by David Hilbert. Berlin, Julius Springer, 1932. 48 pp.

*Einführung in die kombinatorische Topologie.* By Kurt Reidemeister. Braunschweig, Vieweg, 1932. xii + 209 pp.

*Knotentheorie* (vol. 1 of the *Ergebnisse der Mathematik und ihrer Grenzgebiete*). By K. Reidemeister. Berlin, Julius Springer, 1932. vi + 114 pp. and 114 figures.

To the uninitiate in matters of combinatorial analysis situs the first two of these books on topology will seem hardly to deal with the same subject, so completely do they complement each other. The little book of Alexandroff is an admirable and simple exposition of the ideas centering around homology and dimension, while Reidemeister's book, more complete and more important scientifically, is concerned with the study of abstract discrete groups and their topological applications.

Alexandroff has written particularly for those who do not care to undertake a systematic study of topology, and his enthusiasm in exhibiting the beauties of the subject will not escape the reader. There are many simple examples and the accompanying drawings are so skillfully made that one can not fail to see how the homology group operates, or to appreciate its intuitive meaning. The author does not allow the proofs of important matters to depend on the reader's intuition; on the contrary, it is remarkable how much he has treated in complete scientific detail. There is for example a very readable proof of the invariance of the Betti numbers (modeled after an elegant proof by Alexander) and a proof of the author's own important deformation theorem, with a corollary in the theory of dimensionality. The reader who wishes to learn more about these subjects will know where to begin from the numerous references to other authors; but for those who do not intend to consult the original papers, the references will not always give a complete nor accurate impression of the history of the subject. For example, the first formulation of the very important "Pflastersatz" was by Lebesgue in 1911, a fact that might well have been mentioned, despite the incompleteness of Lebesgue's proof. And again, what the author presumably means by the Lefschetz-Hopf fixed-point formula is surely due to Lefschetz, and should be named, we believe, accordingly.

For the purposes of his book, the author was undoubtedly wise in limiting himself to the homology theory; as for its importance, the author points out that it is this part of topology which will tend more and more to govern the development of the whole subject. This is undoubtedly true in the *unified* theory of general spaces, to which the author has made distinguished contributions. On the other hand there remains the fundamental problem of classifying manifolds, before which the homology apparatus, by itself, seems powerless; and even in the transformation theory which the author mentions, these methods seem to yield only broad variations of one special type of result. In these and other questions, one encounters not only the homology groups, which are