BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 37, Number 1, Pages 80–81
S 0273-0979(99)00807-1
Article electronically published on December 21, 1999

Theory of groups of a finite order, by W. Burnside, M.A., F.R.S., Professor of Mathematics at the Royal Naval College, Greenwich, The University Press, Cambridge, 1897, 8vo., xvi + 388 pp.

This work enjoys the distinction of being the first treatise on the theory of groups which does not consider the applications. As may be inferred from the title, the author has practically confined his attention to the groups of a finite order. The known regions which are bounded by these restrictions are, at the present time, not too extensive to be described in one volume. Happily, our author is so familiar with these regions that he does not confine himself entirely to leading the reader by known roads to the many interesting objective points. He has pointed out many short routes as well as a number of new objects of interest.

The theory of groups of a finite order (under the form of substitution groups) was first developed as a branch of the theory of equations; and the works of Lagrange, Abel, and Galois on the solution of equations have contributed most powerfully towards its early development. In recent years it has been pointed out by Jordan, Klein, Cayley, and others that this subject has extensive geometrical applications. This has led to the study of groups in the abstract; *i.e.*, independent of any particular mode of representation. The work before us aims to treat the subject in this modern spirit.

Nevertheless considerable space is devoted to substitution groups. This may possibly be partly due to the fact that the subject was first developed from the standpoint of substitution groups. The author states in the preface that it is done because, "in the present state of our knowledge, many results in pure theory are arrived at most readily by dealing with properties of substitution groups." The concepts substitutions and group are so closely related that the former seems a natural precursor of the latter; and the study of many of the group properties, such as the group of isomorphisms and the transformation of conjugate subgroups and operators, seems to lead naturally to substitution groups. A knowledge of substitution groups can thus be utilized very frequently in the study of the abstract group properties, even if it is not essential for the study of these properties.

. . .

The student of the theory of groups will find here a rich storehouse of material, and the investigator will find numerous suggestions in regard to problems which await solution and methods of attacking them. The very errors will doubtless serve as a starting point for many investigations, since there are few things that can furnish a stronger impetus to many beginners than the thought of correcting a noted mathematician. It is therefore to be hoped that the book will be a means to arouse "interest among English (speaking) mathematicians in a branch of pure mathematics which becomes the more fascinating the more it is studied," and thus accomplish the author's object.

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March, 1900

Reprinted from Bull. Amer. Math. Soc. **6** (1899–1900), 390–398.