Elementary Theory of Finite Groups. By Louis Clark Mathewson, under the editorship of John Wesley Young. Boston, Houghton Mifflin, 1930. x+165 pp.

It is a fortunate fact that as mathematics progresses, large bodies of doctrine once on the outskirts of knowledge become organized in such a way that the ordinary student of college mathematics may procure a working acquaintance with them. This, for instance, has been the case with the calculus, much of the theory of equations, and projective geometry.

The theory of groups had long ago passed the stage of a set of isolated facts. It had become an organized structure. It was both inevitable and desirable that books should be written aiming at the exposition of group theory in a manner suitable for use in undergraduate classes. Dr. Mathewson has sought to do this. He has been faced with many problems, and it is to be expected that in seeking their solution he should not please everyone.

There is the problem of selection and arrangement of material. This has been admirably solved. After a few examples of groups, the elementary theory of permutation groups is given. This is followed by examples of an interesting nature, after which the general theory is renewed. There is then a chapter on abelian groups, one on abstract definitions, and one on isomorphisms and composition-series. Two chapters sketching important further developments conclude the book. The first of these on linear substitutions gives some proofs, the last, chiefly dealing with Galois theory of equations and the Lie theory, through the statements of definitions and theorems, conveys to the reader some idea of the richness of these fields.

The author of such a book must also answer two important questions. How rigorous and general should the proofs be? What type of notation should be used? One should not be dogmatic on these points. It is certainly not harsh criticism; it may even be praise to say that the author's answers to these questions differ widely from those of the reviewer. The reviewer believes that throughout our college texts too little regard for powerful and general notations and too much negligence of rigor are shown. In subjects like algebra and the calculus it may be argued that the manipulative use of the methods involved is so important that questions of rigor may, to a certain extent, be ignored. It would seem, however, that a study of group theory would be largely valuable as showing the student an example of rigorous thought seldom met with before graduate work, and as giving the student an understanding of the value of powerful concentrates in notation. It seems fair to believe that the author does not agree with this point of view. It is true that the proofs are such that a student, seeing the lack of rigor or of generality, is given enough hints to fill in the gap. The student would not, however, be led to note the lack. For instance, in proving that the number of transpositions into which a given permutation can be factored is always even or odd, a Vandermondian determinant is used without establishing the fact that it does not vanish—a point necessary to the argument. In proving that the order of a sub-group is a factor of the order of the group, the inductive step is omitted, though the form it would take has been made obvious. In the notation distinct letters are used where subscripts would seem more powerful; matrices are displayed rather than written in abbreviated form; and similar usages are followed throughout the text.