sion of a circular cylindrical tube and of a spherical shell, and torsion of a circular cylinder, no mention is made of the general solutions valid for arbitrary strain energy which have recently appeared in the literature [R. S. Rivlin, Philos. Trans. Roy. Soc. London. ser. A vol. 241 (1948) pp. 379–397, and other papers]. New, however, is the calculation of the second order change of dimensions in a state of simple shearing stress, as distinct from a simple shear displacement, and of the similar change of dimensions of a circular cylinder in torsion.

The only historical references in the book tell us that Jacobians are named after Jacobi, the Lamé constants after Lamé, besides giving the dates and nationalities of these two persons. Apart from a single reference to some experimental data, the only literature citations are to the author's other texts. While this practice has become the rule in volumes intended for the pedagogical and undergraduate market, its extension to serious works does not seem altogether commendable to this reviewer. The publishers present this book as an "authoritative exposition." Inclusion of the recent results in finite strain theory obtained by Signorini, Reiner, Rivlin, and Green and Shield, which seem deep and significant to the reviewer, would not have been unwelcome.

In the preface the author states: "If the mathematical treatment given here serves to stimulate the procurement of experimental knowledge of these phenomena we shall have attained our aim." Abundant and detailed experiments on the very large strain of rubber have been reported by Rivlin from 1947 onwards. In the reviewer's opinion, the results of these experiments fully confirm the predictions of the general theory of elasticity, while showing that the second order approximation employed by the author is insufficient.

C. TRUESDELL

Lectures in abstract algebra. Vol. I. *Basic concepts*. By N. Jacobson. New York, Van Nostrand, 1951. 12+217 pp. $5.00.

This is the first volume of a projected three volume work designed to give a general treatment of abstract algebra. This volume gives a comprehensive introduction to abstract algebra and its basic concepts. The next two volumes will be more specialized in nature. The second one will deal with the theory of vector spaces and the final volume with field theory and Galois theory.

The present volume is well organized and excellently written. A considerable number of exercises are given that vary greatly in difficulty.

After a short introduction on set theory and the system of rational integers the author begins with a preliminary treatment of semi-groups and groups. Non-associative binary compositions are discussed briefly. This is followed by a fairly orthodox treatment of rings, integral domains, and fields. The third chapter deals with various types of extensions of rings and fields, such as the field of fractions of an integral domain, polynomial rings, and simple field extensions.

The next chapter contains a discussion of factorization theory for commutative semi-groups and integral domains. It is shown that the unique factorization theorem holds for principal ideal domains and for Euclidean domains. Unique factorization is also discussed for polynomial rings over rings which have unique factorization.

In Chapter V the author discusses groups with operators, generalizing many of the earlier results on groups and group homomorphisms. The isomorphism theorems are proved and this leads up to a proof of the Jordan-Hölder theorem. This is followed by a discussion of the concept of direct product and a proof of the Krull-Schmidt theorem. Infinite direct products are discussed briefly.

The first part of the sixth chapter deals with the theory of modules. Ascending and descending chain conditions are discussed and a proof is given of the Hilbert basis theorem. The second half of this chapter contains a discussion of ideal theory in Noetherian rings. It is shown that every ideal can be represented as the intersection of primary ideals and two uniqueness theorems are proved about this intersection.

In the final chapter an introduction to the theory of lattices is given. Modular lattices, complemented lattices, and Boolean algebras are treated briefly. A number of results proved earlier in the book are discussed here from a lattice-theoretic point of view—the Jordan-Hölder theorem being proved for modular lattices.

With this volume the author has made an excellent beginning. The completed work should be one of the best general treatments of abstract algebra available.

W. H. MILLS

Introduction to number theory. By T. Nagell. New York, Wiley, 1951. 309 pp. $5.00.

This is essentially a revised edition of a book published in Swedish in 1950. The present edition contains more problems and an additional chapter on the prime number theorem but unfortunately replaces the useful two line biographies of some 63 mathematicians