57) may populate the dream-world of the scientist, but in the cold light of day they are linguistic monstrosities. The only scientific faulting to be recorded relates to Fig. 32. There, some isotopes of elements 100-102 are shown which are not referred to at all in the text, and for the production of which it would appear that, at present, there is no reasonable likelihood. But these are matters of minute detail, indeed.

Variation Methods for the Study of Nonlinear Operations. By M. M. Vainberg. With a Chapter on Newton's Method, by L. V. Kantorovich and G. P. Akilov. Transl. from Russian by Amiel Feinstein. 323 pp. Holden-Day, San Francisco, 1964. $12.95.
Reviewed by T. Teichmann, General Dynamics Corporation.

Nonlinear operators have been receiving an increasing amount of attention in the pure and applied mathematical literature, because of their vastly greater (potential) generality, and, in many cases, because of some highly desirable practical characteristics. Unfortunately general techniques for dealing with them are rare, and expositions of those that exist even rarer. Vainberg's book fills an important gap by providing a precise but readable description of the mathematical framework needed to treat nonlinear operators in a general way, as well as a relatively extended discussion of the most general method (Newton's) available for such problems.

After a description of some of the basic ideas of functional analysis (supplemented by an appendix on Banach spaces), the author gives an illuminating discussion of the notions of Gateaux and Frechet differentials of operators, and the corresponding derivatives. The Gateaux (or weak) differential of an operator F is defined as

$$VF(x,h) = \lim_{\epsilon \to 0} \frac{1}{\epsilon} [F(x+\epsilon h) - F(x)],$$

where x, h belong to E, the domain of F, provided of course the quantity cited exists. The Frechet differential is slightly stronger. The properties of these operators are discussed, and on them are built the notions of potential vector fields in infinitely dimensional spaces, extreme and critical points of functionals, and proper functions and branch points of nonlinear operators. A number of special operators and functionals are introduced (in particular relating to square roots of operators), which are then applied to variational proof of the existence and uniqueness of solutions of various nonlinear integral equations. In the final chapter (due to L. Kantorovich and G. Akilov) many of the concepts introduced are applied to the solution of nonlinear operator equations using the analog of Newton's method. This is done both in general and in a number of special cases.

Although there is, of necessity, much abstract discussion, the language, notation, and logical presentation tend to follow that of ordinary vector spaces, and as a result it is relatively easy to follow and illuminates the underlying concepts very well.

Progress in Solid Mechanics, Volume 3. I. N. Sneddon and R. Hill, eds. 256 pp. (North-Holland, Amsterdam) Interscience Publishers, Inc., New York, 1963.
Reviewed by E. H. Dill, University of Washington.

This volume contains one article, "Dynamical Problems in Elasticity", by V. D. Kupradze of the USSR. The intellectual level is of a monograph for the research specialist, and it is a very important work. It is not only a rigorous mathematical treatment of great interest to the theorist but, in view of the current advances in digital computers, the basis for numerical calculations will prove of great practical value.

The equations of the classical linear theory of elasticity are considered: In the case of the static equilibrium and steady-state harmonic motion, the equations of motion subject to certain boundary conditions form a boundary-value problem. The author shows how the problem can be treated by the method of potentials, based on the theory of singular integral equations. Uniqueness and existence theorems, and methods of solution by reduction to sets of linear algebraic equations are treated in a rigorous mathematical manner. New re-