Antarctica in the International Geophysical Year. Based on a symposium on the Antarctic. Cosponsored by U.S. National Committee for the IGY; National Science Foundation; American Geophysical Union. Geophysical Monograph No. 1. American Geophysical Union, Washington, 1956. 133 pp. Illus. $6.

The American Geophysical Union and the U.S. National Committee for the International Geophysical Year are to be congratulated for the production of this excellent geophysical monograph. Although it is directed at Antarctic geophysical problems, several chapters have additional interest for other regions, particularly the Arctic.

The enormous impetus of the International Geophysical Year on geophysics, coupled with the remarkable advances in techniques of measurement since the Second International Polar Year, has made necessary a wide distribution of expert surveys of the problems in the many branches of geophysics.

The history of exploration on Antarctica, condensed into three pages, is a welcome introduction to, and serves also to emphasize the large scale of, this imminent assault on the still little-known continent.

It is pleasant to note a reference to the earliest experiments on the ionosphere in the Antarctic by the late Captain Malcohm P. Hanson, USN. These were made in 1929 and not in 1928. It might surprise present-day ionospheric experts, raised in the electronic age, to know that Captain Hanson obtained measurements of the height of the E-layer using a hand-operated mechanical oscillograph.

Photographs of the delay time of reflection of a fixed radio frequency from the E-layer were obtained. These I was privileged to see and discuss with Captain Hanson at the time. It appeared that there existed several very distinct ionospheric layers, but in later years it was realized that these records represented successive reflections from what must have been fairly intense sporadic ionization in the E-layer. At the time the major features of the structure of the ionosphere were not understood and sporadic-E was not known.

Reference is made in the chapter on cosmic rays to a recent rapid survey of cosmic-ray variation at sea level. Part of the survey was made with equipment from the cosmic-ray laboratory at Ottawa. This was taken on a circuit of North America on the Canadian icebreaker HMCS *Labrador* and subsequently, on the icebreaker USS *Atka,* on a circuit of South America and part of the Antarctic. This was a nice bit of international cooperation to which some spice is added by the fact that the cosmic-ray expert who sailed on both ships is a young Tasmanian.

The close relationship of problems in geomagnetism, the ionosphere, the aurora, and cosmic rays is emphasized strongly. It is not possible to solve all the problems of any single one of these interrelated branches of geophysics by the techniques of that branch alone. This has been recognized in the monograph in grouping these subjects together under the title of "Upper atmospheric physics."

There are two omissions in references, both suggested by my colleagues, to which attention might be drawn. These are the important paper in glaciology on the "Morphology and regime of the Maudheim Ice Shelf" by C. W. M. Swithinbank (*Geographic Journal* **121**, pt. I), and R. M. Laws' recent work on seals of the Antarctic.

FRANK T. DAVIES
Department of National Defence, Canada

Topics in Number Theory. vols. 1 and 2. William J. LeVeque. Addison-Wesley, Reading, Mass., 1956. 198 pp.; 270 pp. Illus. $5.50; $6.50.

The first volume of this book is an excellently organized introduction to the elementary theory of numbers. After a proof of the unique decomposition theorem and a short treatment of linear diophantine equations, the author starts with the elementary theory of congruences. The usual topics such as linear congruences, the Chinese remainder theorem, congruences of higher degree, the theorems of Euler, Fermat, and Wilson, theory of primitive roots and indices are presented. This section culminates in a proof of the quadratic residue law and terminates with a discussion of the Jacobi symbol.

The next section of the book deals with the distribution of primes. The author decided to give the proof along classical lines, and the proof of the prime number theorem is therefore postponed to the second volume, and only the order of magnitude of $\pi(x)$ is obtained in the first volume. The tools acquired in order to establish the order of magnitude of $\pi(x)$ are then used to prove the Bertrand postulate, and the zeta function is introduced to derive asymptotic expressions for the average values of the functions ϕ, τ, and σ. The author entitles this section "average order of magnitude" but derives more than just the order of magnitude. Then follows a short but adequate section on the representation of integers by sums of squares and a discussion of Pell's equation. A final section is devoted to the approximation of real numbers by rational numbers.

The first half of the second volume might still be regarded as a continuation of the first volume and begins with the theory of binary quadratic forms. This is followed by a short introduction to the theory of algebraic numbers. The unique decomposition theorem is established as well as the fact that the group of units is finitely generated. The author does not choose to compute the number of independent generators, however. There follows a discussion of cyclotomic fields with main emphasis on the units. The laws of factorization of rational primes in cyclotomic fields are not discussed. As an application the author gives a proof of Fermat's conjecture for regular primes in the "easier" case and quotes Kummers Lemma to give an exposition of the proof for the "harder" case.

This section of the book is too scanty. Apart from its general interest a somewhat more extensive treatment of the theory of algebraic numbers would have paid off in Chapter 6, where the author proves the Dirichlet theorem on arithmetic progressions.

The second part of the second volume presents a selection of topics in analytic number theory. It starts with an excellent and very readable account of the Thue, Siegel, Roth theorem with various applications. A chapter on transcendental numbers follows with a proof of Lindemann's theorem and culminates in the proof of the theorem of Gelfond and Schneider. Chapter 6 has already been mentioned, and in Chapter 7 a proof of the prime number theorem and its extension to arithmetic progressions is given along classical lines.

The first part of the book is eminently suitable for a graduate or advanced undergraduate course in the theory of numbers. It is also equally well suited to introduce a reader with an adequate background to the subject. The second volume gives a stimulating selection of more advanced topics with an unmistakable preference for analytic, rather than algebraic and combinatorial, methods.

H. B. MANN
Ohio State University

Begegnungen mit dem Vormenschen. G. H. R. von Koenigswald. Eugen Diederichs, Düsseldorf/Köln, 1955. 230 pp. Illus. + plates. DM. 13.80.

The author of this book, well known for his brilliant discoveries of the pithecanthropoids at Modjokerto and Sangiran in Java, as well as the enigmatic teeth of *Gigantopithecus* from South China, has visited many of the Old World localities that have yielded remains of fossil man. Here he treats