well planned and carefully executed, the results objectively and clearly reported and related to theory, without unnecessary jargon or overgeneralization.

Wangala and Dalena are two villages not far from the town of Mandya in Mysore state, South India. In 1931 water for irrigation began flowing from a big dam in the region. A sugar factory started operation at Mandya in 1933 and encouraged farmers to grow a cash crop, sugar cane, on their newly irrigated land. The traditional subsistence economy of the region began to shift to a money economy. Irrigation came to Wangala's lands in 1939. But Dalena's lands, because of topography, remained nonirrigated. Nevertheless, Dalena's economic opportunities were broadened by the growing prosperity in the region. From 1954 to 1956 Scarlett Epstein, trained at the University of Manchester in both economics and anthropology, lived in and studied these two villages. She chose them because at the beginning of irrigation they were basically similar in their economc characteristics, cultural traditions, social and political organization, and caste composition. But now, for 15 years, one had been "wet," the other "dry." Could the effects of irrigation and the lack of it be seen in different social changes?

The answer was decidedly yes. Dalena, the village without irrigation, had changed very much more than Walanga—perhaps, at first blush, a surprising result. In Walanga, irrigation presented oportunities for increased gain from farming; these could be utilized without much change in the traditional way of living, and traditional ways have persisted in most respects. Dalena residents, on the other hand, without new opportunities on their village lands but adjacent to a region of growing cash incomes, were stimulated to go in for entrepreneurial activities (trucking, public works contracting, grain milling, cane crushing) or to take factory or office jobs in the prospering town (13 percent of Dalena's male population of working age have become "commuters").

Both villages had changed in certain respects; notably, the extended family system had yielded to the natural family unit, confirming the principle that replacing a subsistence economy by a money economy (and thus bringing opportunities for individual gain) breaks down the extended family. But Dalena had become a servicing center for neighboring irrigated villages, while Walanga remained almost purely a farming village. Dalena's economic diversification was associated with, and in Epstein's well-supported view was the chief causal factor in, drastic changes in its economic, political, and social organization. Dalena, compared with Walanga, was found to have more entrepreneurs, greater participation in the wider economy outside the village, about 10 percent higher income and expenditure per consumer unit, a more "modern" physical appearance (electric lights in the main streets), wage rates for casual agricultural labor 20 percent higher than in Walanga. The people of Dalena had also abandoned the system of Untouchable client labor, were much more aware of and alert to modern types of technical development (for example, Dalena's farmers are more progressive, and the people there know more about machines), had displaced ritual sources of prestige by economic sources, and had decreased their expenditures on the traditionally lavish wedding feasts. But they purchased many more watches, clocks, bicycles, and fountain pens (a literacy symbol). The people of Dalena were more concerned with (and had information about) political activities of the region, state, and nation. They were moving from the "hereditary and personal principle" to the "impersonal competitive principle" in economic, political, and social relations (erosion of caste authority, more individualism). The replacement of hereditary village political authority by elected authority was a reality in Dalena but only nominal in Walanga.

These comparisons rest on meticulous observations and analysis. For example, on the economic side, Epstein prepared tables of costs, outputs, and inputs per acre for each type of crop; from a stratified sample of richer, middle, and poorer households she compiled (with excellent and interested cooperation from the villagers) an income-expenditure budget; she even drew up a balance of payments for each village, showing what it bought from outside and how it earned the money. The political and social analyses are almost equally detailed. Woven in with calm, anthropological objectivity are fascinating and illuminating human incidents. We see how a government official from outside, who seeks to implement in Walanga the state government's decision that village councils should be democratically elected, has to make concessions on land rights to village elders before he finally gets a purely nominal conformance that leaves the hereditary power system practically unchanged. We follow in Dalena an epoch-making case in which a washerman struck a member of the socially higher peasant caste in a quarrel over the seduction of the washerman's wife; the attempt of the peasant caste council to discipline the washerman by fine and boycott broke down because (i) the washerman could earn more money anyway by washing for people in the expanding town, and (ii) the village headman, a leader of the "progressive" faction and an energetic entrepreneur-innovator who by now had most of his economic interests outside the village, was able to flout the decision of the conservative-dominated caste council and refused to boycott the washerman.

EUGENE STALEY
Stanford Research Institute, Menlo Park, California

Polyadic Boolean Algebra

Algebraic Logic. Paul R. Halmos. Chelsea, New York, 1962. 271 pp. $3.75.

Hopefully, the fragmentation of science caused by increasing specialization will be counterbalanced by the development of new modes of unification. In the contemporary development of mathematics one such unifying influence is the massive intrusion of algebraic concepts and methods into all mathematical fields. Mathematical logic has been intertwined with algebra from its beginnings, through Boole's discovery that simple laws of logic can be expressed symbolically as algebraic equations. But only in very recent years has the algebraic viewpoint in logic been systematized to the point where an almost complete account of logic can be given in algebraic terms. Alfred Tarski pioneered this enterprise through successive exploration of Boolean, relation, and cylindric algebras. The most detailed contributions are found in the papers of Paul Halmos on polyadic Boolean algebras. In this volume Halmos collects his papers (unchanged) and adds a brief preface, a bibliography, and an index.

The nonmathematician is virtually

excluded by the conceptual framework presupposed. All others will be attracted to the opening paper, "The basic concepts of algebraic logic" (reprinted from the *American Mathematical Monthly*), in which the author's facility for mathematical exposition is well illustrated. Only those who have worked with Boolean algebras are likely to penetrate beyond this essay, and none but serious logicians can be expected to work through the entire volume. They will be rewarded by a thorough algebraic account of classical predicate logic and by a consideration of the difficulties inherent in algebraizing that part of logic, such as Gödel's incompleteness theory, which rests on the notion of recursive functions. Largely untouched are higher-order logic, intuitionistic logic, and various extensions of classical logic, such as extensions to systems with infinitely long formulas, which arise naturally in the algebraic context.

Clearly workers in the area covered will be greatly convenienced by this collection, which is reprinted from eight journals published in four countries. Of course one may wonder why the author chose to scatter such closely connected papers originally. Beyond the case at hand, one is also led to speculate about the desirability of replacing general mathematical journals by more specialized ones.

LEON HENKIN
Department of Mathematics,
University of California, Berkeley

Theory and Interpretation

Advanced Inorganic Chemistry. F. Albert Cotton and G. Wilkinson. Interscience (Wiley), New York, 1962. xv + 959 pp. Illus. $14.50.

This text is an attempt to incorporate into descriptive inorganic chemistry the modern physical and theoretical foundations upon which chemical and physical behavior are based. Along with this ambitious design, the authors include brief treatments of most of the material currently found in all other inorganic texts on the market, all the way down to such items as the commercial decovery of familiar elements from nature. Only those who have studied chemistry can comprehend the book but, in many places, the authors seem to forget that the book's readers will have some chemical education. Perhaps the most striking illustration of this is the first sentence of part 1, chapter 1, section 1-1: "Every atom consists of a nucleus surrounded by electrons." The reader is then given definitions of atomic mass units, nucleons, mass number, atomic number, isotopes and the like, and before a dozen pages have been turned, he sees the wave equation for the hydrogen atom and a table of its solutions.

After the usual treatment of atomic structure and ionic crystals, covalent bonding is described, as well as the notions of ionic character, bond radii, electronegativities, and so forth, and there is a description of the empirical relations that are often used to systematize structural properties.

Part 2 deals with nontransitional elements and thoroughly illustrates the ideological and theoretical concepts that were treated in part 1. This is a strong section in which a lot of good descriptive chemistry is explained, in most cases as adequately as current models will permit. The choice of topics is decidedly modern, and most, if not all, of the results of interest in inorganic chemical spheres today are mentioned.

The third part of the book, comprising 50 percent of its pages, is devoted to transition elements. A very brief review of certain topics in classical physical chemistry is followed by a descriptive introduction to crystal and ligand field theories. This, and the subsequent application to the understanding of the chemical and physical properties of this important class of elements and their compounds, is the best feature of the book. The extensive discussion from a chemist's point of view is, in its scope, original with these authors, and it should attract and influence young readers as well as chemists who have not followed the current literature. This section also includes a compact, up-to-date exposé of the chemistry of relatively rare and unfamiliar elements, which is not found in previous treatises of this size and purpose.

There are no references to the literature, but there is a bibliography at the end of each chapter.

D. W. ROBINSON
Department of Chemistry,
Johns Hopkins University

Meteoritics

Meteorites. Brian Mason. Wiley, New York, 1962. xii + 274 pp. Illus. $7.95.

A sufficient body of knowledge has been accumulated in the field of meteoritics so that it is practical and useful to offer a university course in the subject. This book admirably fulfills the requirements of a textbook for such a course; in addition, it should be a valuable compendium of data, ideas, and theories from the various disciplines that make up the integrated field, and, as such, it should be most useful to research workers.

The science of meteoritics is, as Mason states, a "borderline field par excellence." Other fields which are concerned with at least some particular aspect of the science are (in alphabetical order) astronomy and astrophysics, ballistics, geology, inorganic and organic chemistry (and, perhaps, biochemistry), metallography, meteorology, mineralogy, and nuclear and cosmic ray physics. Workers in these various fields should have a readable, decently indexed reference volume about meteorites per se. Until recently, none was available. Krinov's *Principles of Meteoritics* was the first reasonable attempt to fill this need. Mason's volume contains fewer details but is more readable and probably would be the better choice for a textbook. Insofar as the needs of researchers are concerned, Krinov's book is notably poor in its survey of current work by American and Western European scientists, but Mason is fairly thorough in this respect. Thus, the books complement each other rather well.

Meteorological aspects of meteorite fall are discussed in only a preliminary way. The complicated gallimaufry of meteorite classification systems is then set in order quite clearly, and this is followed by an alphabetically arranged description of extraterrestrial minerals. The various types of meteorites and the elements of their structural composition are described concisely but in sufficient detail. The chapter on meteorite ages, on the other hand, is rather sparse; the reader is referred instead to the recent article by Anders in the *Reviews of Modern Physics*, which gives a complete and detailed review of the subject. Theories of the origin of meteorites are briefly described, and a