as experiencing a "growing freedom from submissiveness to others and a consequent involvement in the fulfillment of [their] own capabilities." They became more democratic in social attitudes and more concerned with national and international matters. Stein speculates on the Peace Corps experience as a "psychological moratorium" (a concept from E. H. Erikson) in which the volunteers could explore a variety of new roles before settling into adult commitments.

The author is hopeful for the Peace Corps and convinced of its value, yet he disciplines his optimism within the context of objective data. The presentation carries the reader's interest forward. The style is straightforward and free of jargon. The statistical tables are unobtrusive (although the material on time trends might better have been plotted as graphs). Stein shows how the tools of psychological assessment can clarify the task of people-to-people assistance, and at the same time he advances the development of the assessment process itself.

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## Aeronautical Breakthroughs

**Aviation: The Creative Ideas.** OLIVER STEWART. Praeger, New York, 1966. 244 pp., illus. $7.50.

Oliver Stewart argues that of the small creative band who have provided the basic aeronautical ideas, a large percentage have been British. Long the editor of *Aeronautics* (London) and a perennial commentator at the annual Society of British Aircraft (now Aerospace) Constructors show at Farnborough, he writes with familiarity of Sir Alliott Verdon Roe (A. V. Roe), the Short brothers, the Hill brothers, Cierva, Handley Page and Lachmann, A. A. Griffith, and Barnes Wallis. In general the approach is topical, with the development of each aeronautical breakthrough associated with one or more men who worked in Britain. The major exception is the long first chapter on Clement Ader, for whom Stewart claims the laurels for the first powered flight. A very loose chronology is employed which can lead many readers astray and give the impression that events which were a decade apart followed each other in short succession. But the major problem with this useful and provocative work is that it is inaccurate. Its faults stem from journalistic familiarity. There is too great a reliance on memory and upon conversations many years after the vital event. My own acquaintance with the work of Barnes Wallis makes me have considerable doubts about the accuracy of much of the book. Stewart is apparently unaware of Wallis' background. The airship *R 100* was not the first but the last of these machines which Wallis designed and built. He joined Vickers in 1913 and was trained by H. B. Pratt. By 1916 Wallis had become the chief airship designer and had produced the plans for *R 80*, a fully streamlined ship equal to the Zeppelins in conception. When airship work was stopped at the end of the war, he took a doctorate. Sir Dennistoun Burney coöpted him to design *R 100*, on which Nevil Shute (N. S. Norway) also worked. This fully streamlined ship was the forebear of the geodetic system and a major contribution to the whole field of structural engineering. Wallis then carried this work on through the Wellington-Warwick series of twin-engined bombers to the four-engined Windsor, which Stewart does not even mention, though it had several interesting features, including remote-controlled 20-millimeter cannon mounted in the rear of the engine nacelles. Moreover, except for the dam-busting bombs, Wallis' superbombs were developed from the streamlined *R 100*, as comparative photographs of the bombs and the airship clearly show. Whereas in the airship the fins were designed to maintain stability in level flight, in the bombs they were offset in order to provide stability through spinning. In the case of Oswald Short the interest in all-metal stressed-skin construction was a natural development from Short Bros.' work with seaplanes and flying-boats. The Shrimp seaplane of November 1919 was built with steel wing spars and the all-metal Silver Streak followed in July 1920. In an album of photographs which Oswald Short gave me several years ago he made no such claims as Stewart does for him in chapter 3 that the machine was a breakthrough in streamlining. Regretfully it must be concluded that this would have been a much better book if the author had checked his memory against the facts.

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## Nitrogen Compounds

**Developments in Inorganic Nitrogen Chemistry.** Vol. 1. CHARLES B. COBURN, Ed. Elsevier, New York, 1966. 591 pp., illus. $32.50.

"Much of the interest in the resurgence of inorganic chemistry during the past twenty-five years has been directed towards the novel and unusual. . . . However, during this same period the chemistry of even the best known of the elements has undergone tremendous development and change even though it was scarcely noted," Charles B. Colburn writes in his preface to this projected two-volume work, which is intended to "review in considerable detail the chemical status of one of those relatively neglected elements—nitrogen" and "to bring the inorganic chemistry of nitrogen up to date to the mid 60's."

The present volume attains this objective very well. It is not a book to be read to gain a general impression of the field as a whole. Rather, it is a book to be consulted to learn the state of development of particular aspects. The chapters are written by acknowledged authorities on their subjects: "Bonding in nitrogen compounds," by M. Green [these include diatomic species (NH, $NH^+$, $N_2^+$, CN, NO, and $NO^-$), polyatomic species (triatomic molecules, radicals, and ions; HNCO; $CH_3N_2$; and so on) the N-Si bond; oxides; and cyclic compounds]; "The inorganic azides," by A. D. Yoffe; "Compounds containing the sulfur-nitrogen bond," by M. Becke-Goehring and E. Fluck; "Nitrogen ligands," by W. P. Griffith; "Phosphorus-nitrogen compounds," by M. L. Nielsen; "Nitrogen compounds of boron, aluminum, gallium, indium, and thallium," by J. K. Ruff; and "Inorganic reactions in liquid ammonia," by G. W. A. Froles.

The professional associations of the authors reflect the international character of modern chemical investigation. Each of the chapters represents a major effort at compilation and is sufficiently complete to have justified a small book in itself. The authors are to be congratulated on the thoroughness with which they have accomplished their assigned tasks. The book will prove very useful to those working on inorganic nitrogen compounds and to others who require ready access to information about them. Full use is made of figures and tables in presenting the abundance of data.

Any book compiled in sections by

a number of authors will show some lack of uniformity in treatment. The present book would have been improved by more vigorous editing to insure uniform nomenclature practices, to make certain that critical experimental details are not omitted at times, to insure that the basis on which yields are reported is stated, to follow conventional usage of physical chemical symbols, and to avoid a few definite errors in names, formulas, and usage of terms. Yet these items are minor compared to the overall usefulness of the book.

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## Physics for the General Reader

**The Nature of Matter**. Physical Theory from Thales to Fermi. GINESTRA AMALDI. Translated from the Italian edition (1961) by Peter Astbury. University of Chicago Press, Chicago, 1966. 332 pp., illus. $5.95.

Enrico Fermi had unusual ability in attracting first-rate men as co-workers. His group, moreover, seems to have had the ability to attract talented women as their wives. Laura Fermi's biography of her husband and her books on Galileo and Mussolini are well known. Now the wife of Edoardo Amaldi, herself a former physics student in Rome, has written a popular account of particle physics in the 20th century.

As the subtitle indicates, her story begins with the ancient Greek philosophers. The entire period up to the mid-1890's, however, is disposed of quickly in the first chapter. The meat of the book consists of the topics of radioactivity, atomic physics, nuclear physics, and quantum theory. These the author discusses in a manner intended, according to the book jacket, to attract the "cultivated general reader without an understanding of advanced mathematics."

The book is clearly written and reasonably accurate, but not distinctive. There is no theme, argument, quality, or feature that distinguishes it from the many such works which attempt to make modern science comprehensible to the nonscientist. When I first saw the subtitle I hoped that perhaps we might be treated to a discussion of the significance of Fermi's contributions to an understanding of matter. But the author does not thus justify the use of his name; nor, in fact, does it serve as an end-point, since she includes more recent topics (fusion experiments, fundamental particles, and so on).

The book cannot be considered a history, for no attempt is made to uncover causes, trace trends, and fill in background information. The text tells us nothing about personalities, and the plates are only of cloud chamber tracks and accelerating machines (not even one of Fermi!). The illustration captions, incidentally, merely identify the tracks or machines, without explaining the characteristics or pointing out individual pieces of apparatus. If the layman needs a good-sized text to explain modern physics to him, why is it assumed that he can view technical photographs intelligently without extensive captions?

The book is, in effect, a catalog of discoveries. The "intelligent layman" who reads it must be a determined individual indeed, for it is no mean task to digest such a concentrated dose of information about science. A large part of the market for such a book may, however, consist of scientifically trained people who desire a synthesis or overview of this very important subject, hoping to see the forest instead of the trees. They will be disappointed.

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## An Innovator within Bounds

**Revolutionary Doctor: Benjamin Rush, 1746–1813**. CARL BINGER. Norton, New York, 1966. 326 pp. $7.95.

Charles Caldwell was no doubt right when he said that the great ambition of his teacher Benjamin Rush was to be an "original." This signified the will to establish in theory and in practice a new, distinctive, individual system, upheld and propagated by a band of loyal pupils but reaching out beyond the profession to the judgment of the enlightened citizenry—the yearning to be a Sydenham, a Cullen, or a Brown. There was also to be a national element in the new medicine; Rush's system was to be the "American System." His success and his failure were intimately bound together. As an apostle of nationalism, as a Signer, as America's first great medical celebrity, he was indeed a "revolutionary doctor." A case can be made out for him also as an "original" in the more modern sense, particularly in psychiatry. But as the ultimate heir of the 18th-century systematists, as the leading American disciple of those aptly termed by Binger the "metaphysical Scottish physicians," he had turned his face to the past. He was not really behind the times unless one looks to the very greatest or most singular of his contemporaries. He was rather an innovator within the bounds of strict tradition, bounds which he could never transcend, not even in the psychiatric realm. Like the humblest of inventors, he tinkered (although on a large scale) with other men's notions. To many of his countrymen, however, he appeared to be a major prophet, and his influence did not die with him. Nevertheless he was the last of his larger-than-real-life kind. Carrying similar ambitions to the middle of the 19th century, Caldwell became a mere figure of fun.

Binger's very readable biography ("telling comments" from the "glowing mind" of Catherine Drinker Bowen helped to teach him the biographer's art) is an advance over Goodman's hitherto standard work, thanks in part to the aid of Corner and Butterfield with sources, and to the perceptions of Shryock and Carlson in interpreting Rush's many-sided endeavor. It is not the definitive biography, for which we must look to a professional scholar. (One would hardly guess from reading this overall assessment that Rush has for years attracted the special notice of graduate students, and some senior scholars as well, to particular aspects of his work.) Neither is it "psychohistory" or "psychobiography" to the degree that might have been expected. Rush had the misfortune to lose his father when he was eight; as a grown man he had the temerity to write down a little of what he dreamed about at night. Binger bears down on these rather meager materials but has the good sense not to make too much of them. On the whole he succeeds as nobody else has succeeded in making a believable human being of a not very promising candidate. In this achievement there is at least as much of Bowen as of Freud. There remains, however, a flavor to the whole book of the words which conclude the chapters on Rush and diseases of the mind: "he needs no further apology." The setting—in terms of antecedent and contemporary ideas—might well elicit some complaint in detail. Broadly speaking, it is sound but unsurprising. It has the