

ing the last several years the Halls have established their mastery of Newton's thoughts concerning the nature of matter. For most scientists and historians, the sections of the book dealing with this question (including the newly published drafts of the preface to the *Principia*, the early suppressed *Conclusio* to that work, and the first versions of the final *Scholium Generale*) will prove of greatest interest. The Halls show that Newton again and again tried to find a place for his theory of matter in his *Principia* as if he felt that "some notice should be given of the microscopic architecture of nature side by side with the majestic system of celestial motions unfolded by mathematical analysis." Most scholars know this theory of matter through the later "Queries" added by Newton to successive editions of his *Opticks*. Now, thanks to the labors of the Halls, Newton's views may be studied, step-by-step, as they were developed. The theory of matter is perhaps the most interesting of all Newton's theories, because it was basically unsuccessful and thus reveals to us the tortuous steps of a profound thinker wrestling with a fundamental problem that proved to be continually beyond his powers.

All scholars, of course, will not agree with the choice of selections the editors have made. For instance, they have included some, but why not *all*, versions of the famous *Scholium Generale*, with which the later editions of the *Principia* conclude. Another source of regret is that the Latin and English versions are not printed on facing pages. Since there are neither paragraph numbers nor cross-reference page numbers, it is quite a chore to find the English translation of a given paragraph, or the original Latin corresponding to an English statement, in a lengthy selection. Although the exposition of Newton's ideas concerning matter, motion, dynamics, and education is continually illuminating, the presentation of Newton's mathematics is less successful. Some mathematical slips make the text meaningless—for example, when the editors suggest an interpretation "Following Newton's assumptions, and making  $\dot{x} = \ddot{x} = 1$ "; clearly both the first and second derivatives cannot be equal to unity since  $\ddot{x} = 1$  implies that  $\dot{x} = 0$ . Certainly all readers will be sorry that the Halls chose to give only introductory essays to the papers they have selected for publication, rather than to provide the

notes and commentaries which make difficult texts understandable. This is all the more regrettable for, in their essays, the editors show us the kind of understanding that they have happily achieved after much profound study.

Such points of criticism are small, however, in comparison to the significant merits of this book. It opens up, for most readers, a set of wholly new dimensions of Newton's scientific thought, and it provides in the editorial introductions a new basis for understanding Newton's ideas concerning matter. Historians and scientists will be grateful to the Halls for having undertaken this labor and for bringing to light these neglected aspects of Newton's creative efforts. They have produced a significant book and have ably demonstrated the importance of supplementing a study of printed works by an examination of manuscript sources.

The new annual, *History of Science*, should be in every scientific library and ought to be consulted by everyone who contemplates a study on any historical aspect of science. The *Unpublished Scientific Papers of Isaac Newton* will have an even wider appeal, since it deals with such basic scientific questions. Under the able tutelage of the Halls, scientists, philosophers, and historians of science will be able to read these documents with profit and pleasure, not only to learn the inner scientific thoughts of one of the greatest of all scientists but also to explore in Newton's terms, basic questions of methodology and scientific philosophy.

I. BERNARD COHEN

*History of Science,*  
*Harvard University*

## Collected Papers

**Applied Geophysics, USSR.** Nicholas Rast, Ed. Pergamon, New York, 1962. 429 pp. Illus. \$15.

*Applied Geophysics, USSR*, is not a textbook; it contains translations of 17 recent and informative papers written by various Russian authors and dealing with a relatively wide range of topics. However, all the work pertains to phases of exploration geophysics related to oil or petroleum engineering. A large portion of the information consists of mathematical developments, but a few noteworthy examples of theory applied to real

problems are presented. One purpose of the book is to present and focus attention on the vigorous scientific research by geophysicists in the U.S.S.R.

The contents are divided into four parts: seismology, gravimetry, electrical sonde methods, and oil geophysics. The first three deal with materials indicated by their titles, but it may surprise some to find that the fourth deals almost exclusively with well-logging procedures. Most American geophysicists consider well logging more closely related to petroleum engineering than to geophysics.

In general the papers, which appear as separate chapters, summarize the ideas of their authors with few direct references to ideas or developments that have originated with others. This fault is tempered somewhat by the excellent bibliographies (containing works in various languages) at the ends of most of the papers. These bibliographies, which contain more than 160 entries, and the approximately 160 well-chosen illustrations greatly strengthen this compendium. Since Russian papers form a large portion of them, the bibliographies are particularly valuable to the student of geophysics.

As a whole the book contains an extraordinary amount of information and ideas expertly presented. Discussions, developments, and illustrative materials are well chosen and clearly presented. Although its format is good, there is some lack of continuity in subject matter among its various chapters, but the translator's smooth style has resulted in an easy transition in reading from paper to paper, not often encountered in translations from the Russian language to the English language. Although much of the information presented is not new to informed geophysicists, some very interesting departures from the usual treatment of geophysical data are illustrated. For example, one 30-page chapter is devoted to the use of stereographic projections in solving spatial problems of the so-called geometrical seismics. I find this particular treatment quite refreshing because the demonstration is instructive and represents a novel manner of deriving and representing seismic information. The communicative modes of approach to problems treated here will undoubtedly result in a wider understanding by geophysics students of certain principles of geophysical exploration and their applications, but the

book is not intended for light reading by laymen.

In recent years the increasing importance of geophysics to modern society has stimulated wide interest in this discipline. In this context there is hardly a more worthy or timely enterprise than the publishing of collected papers of noteworthy Russian geophysicists. The book is excellently printed, well bound, and indexed.

JOSHUA L. SOSKE

*Department of Geophysics,  
Stanford University*

## Man in the New World

### **Lost Tribes and Sunken Continents.**

Myth and method in the study of American Indians. Robert Wauchope. University of Chicago Press, Chicago, 1962. 155 pp. Illus. \$3.95.

Ever since his particular field of study emerged as a science, the professional anthropologist has been plagued by a constant stream of incompetent publications purporting to present the results of serious research on the always interesting subject of the origin and pre-Columbian history of the American Indian. What often has been annoying to the anthropologist is the wide acceptance by the public of what, to him, are the wildest and most absurd theories. He is frustrated by the realization that, while his own sober writings are as a rule read by only a handful besides his professional colleagues, these phrenetical productions all too frequently become best sellers, to the economic benefit of their authors and the distortion of the general reader's historical perspective.

Anthropologists have spent more time than they feel is justified in trying to argue with converts to these theories, generally with completely negative results. They will welcome Robert Wauchope's book if for no other reason than that it will give them something to which they can refer rather than attempt to provide their inquisitors with a beginning course in anthropology.

At the present time the great majority of professional anthropologists are agreed that all evidence indicates the Americas of pre-Columbian time were populated from Asia by way of the Bering Strait area through a series of infiltrations made over a long period of time, probably in excess of 20,000

years. There is not such complete agreement about whether many of the cultural traits, particularly those of the civilized areas of Middle America and Northwest South America, were of indigenous development or were the result of direct transfer from the Old World.

For a century or more anthropological scholars have been divided into two schools of thought—those who attribute the cultural traits of the Indians to diffusion and those who consider them the result of independent invention. No professional anthropologist would argue that the civilizational traits of Mexico and Peru were carried across the Bering Strait and overland to their present location. Therefore, if not of independent invention, they must be the result of direct voyages from some Old World center. The most impressive list of cultural parallels are with Southeast Asia.

The literature resulting from this controversy has grown to huge proportions. Much of it consists of serious studies by qualified writers, but the intellectual waters have been muddied by a flood of publications produced by improperly informed writers, religious propagandists, mystics, romanticists, and plain crackpots. They have their own method of presenting their accounts, most of which are highly colored by emotionalism or romanticism, a fact which contributes greatly to their popularity. Although the real story of the peopling of America, as far as it is known, is just as sensational as these imagined exploits, the typical professional anthropologist avoids putting this type of appeal into his presentations—hence his lack of contact with the general reader.

Wauchope reviews the origin and history of the favorite schools of "thought" and the ways in which they have been presented by different writers through the centuries. Among the favorite ancestral locations are the legendary lost continents of Atlantis and Mu as well as Egypt, Phoenicia, China, and India, to mention just a few. Actually, few localities, real or imagined, have failed to be mentioned, at one time or another. In most instances various combinations of these sources are used, and frequently it is suggested that they stem from Atlantis or Mu. There is no end to the variations on this theme, but a number of writers have reversed the procedure: they have man originating in the New World and spreading his anciently developed civilizations to the Old.

The scope of these presentations varies widely; some of the more ambitious ones attempt to account for the Indian and his culture *in toto*, while others picture an already existing primitive population invaded by the more civilized newcomers in pre-Columbian times. Usually these voyages account for the advanced cultures of Middle and South America, but others attempt to prove contacts made, with more moderate results, among the less advanced North American tribes, as a result of visits by such people as the Norse, the Welsh, and the Irish.

Having a lost continent in each of the oceans that border on the Americas gives the theorists a convenient stepping stone for either transatlantic or transpacific migrations—or both. It is not to be supposed, however, that all or even a majority of the off-beat theorists make use of, or even admit the existence of, Atlantis or Mu. Such writings when clothed in a scholarly dress, probably do more to mislead than the out-and-out crackpot articles.

Early in the 16th century when it was learned that America was not the Indies but a new continent, curiosity immediately developed about the origin of the inhabitants. As was customary at the time, biblical explanations were first sought, and the favorite theory was that the Americans were descendants of the Lost Tribes of Israel. To bolster this theory, a long series of comparisons were made of what, to the Europeans of that time, seemed to be exotic ethnological parallels: linguistic similarities, traits of material culture, physical resemblances, and the like. Most of the presentations were uncritical, of the "special pleading" type, with selected evidence and unsound premises. Frequently these theories were tied in with actual or legendary movements in the Old World.

One thing most of these writers have in common is a protective contempt for what they consider to be the narrow-minded and prejudiced attitude of the "fuddy-duddies," the anthropologists who have a Ph.D.

As a result of its readability, this instructive and entertaining little book could do much to orient the lay reader who is interested in such matters, and there is little doubt that it will be welcomed by the professional anthropologist and the historian.

MATTHEW W. STIRLING  
*Smithsonian Institution,  
Washington, D.C.*