tial accuracy and fidelity to technical lore, as that which characterize this book.

After all, geology is in the nature of the case an application of the principles of physics, chemistry and biology to the study of the earth and its inhabitants. Whereas, analysis—the learning of more and more about less and less—is essential to the discovery of knowledge, it is equally true that synthesis—the assembling of the jigsaw puzzle into a unified and comprehensive picture—is essential to the dissemination of knowledge. Many scientists, fortunately, are now accepting responsibility for the second as well as the first of these two tasks. None is fulfilling that duty more satisfactorily than Dr. Gamow. The book now in hand, together with its predecessor, "The Birth and Death of the Sun," will give the general reader an accurate perception of the vast sweep of cosmic history and a true perspective of man's place in the universal scheme of things.

There are of course a few details of geologic fact and theory, as set forth by Dr. Gamow, that could be questioned, but with one exception these are minor matters and detract little from the general merit of his work. One serious flaw ought to be called to his attention. It involves the great unsolved geological problem for the solution of which the assistance of the physicist is essential. Dr. Gamow ascribes mountain-making to earth shrinkage, although he correctly computes as extremely small the amount of such shrinkage that could be attributed to decrease in internal temperature during the last few hundred million years. This, he asserts, is nevertheless adequate to explain the height of mountain systems above adjacent lowlands or sea floors. That is doubtless true, but the problem of mountain-making processes is a vexing one, not because of the height of mountains but because so many of them are composed of tangentially compressed and overthrust rocks that indicate scores of miles of circumferential shortening of the earth's crust. Radial shrinkage as a result of decrease in the earth's body temperature is woefully inadequate to cause the observed amount of horizontal compression. Therein lies the real perplexity of the problem of mountain-making. Geologists have not yet found a satisfactory escape from this dilemma; perhaps Dr. Gamow will pursue the subject farther.

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BANCKES'S HERBAL

An herbal [*1525*]. Edited by SANFORD V. LARKEY and THOMAS PYLES. New York: New York Botanical Garden. 1941. $3.50.

THE early literature of plants was closely associated with that of drugs. Most of the prescriptions, although fearfully and wonderfully compounded, were based primarily upon plants or their derivatives. The student of plants was almost always a physician, and unless he knew of some supposed virtue in a plant or could discover (or imagine) one on his own account, that plant was beneath his notice.

Various compilations relating to plants and their medicinal uses existed in manuscript form long before the invention of printing, and it is not at all strange that the practitioners of the new art should seek to embalm the accumulated wisdom of these manuscripts in the printed page. The resulting volumes, called "herbals," were very popular, and often went through various editions. But they were usually printed in Latin, and it was not until many years had passed that one appeared in English.

At last two English herbals made their appearance, and were so popular that they were both reissued repeatedly, with slight changes, within fifty years. One was a folio called the "Grete herball," the other a small volume, of which the earliest known edition is now reprinted. Both were anonymous compilations; the present one, dated March 25th, 1525 (the first day of the year, according to the calendar then in use), is known as "Banckes's Herbal," from the name of the printer, Richard Banckes.

It came to the notice of the management of the New York Botanical Garden that the "Scholars' Facsimiles and Reprints" of New York were planning to issue this reprint, and arrangements were made by which it has appeared as a publication of the Garden. The editing and transcription into modern English are by Dr. Sanford Vincent Larkey, of the Johns Hopkins University, and Professor Thomas Pyles, of the University of Maryland, who also prepared the scholarly introduction. The original black-letter book, of 72 unnumbered pages, is reproduced in facsimile, and this is followed by a much more readable transcription, with numerous corrections of spelling, punctuation and capitalization, and the occasional substitution of a word that will make the author's intent more intelligible to a modern reader. The corrections, however, have been made sparingly and judiciously, so as not to interfere with the quaintness of the original text.

The facsimile reproduction is from a copy in the library of the British Museum; the only other known copy is in the Henry E. Huntington Library in California. The New York Botanical Garden is to be congratulated upon placing this little classic, so well printed and edited, in the hands of the medical, botanical and horticultural public.

The statement in the introduction that this "was the first book devoted exclusively to herbs to be printed in England" is certainly open to question,

unless modified by the words "of which a copy is now known to exist." It is true that the earliest copies of the "Grete herball" now known are dated July 26, 1526, but this was certainly not the first edition, and good evidence exists that in its first form it was dated June 20, 1516—nearly nine years earlier than Banckes's Herbal.

JOHN HENDLEY BARNHART

REPORTS

SCIENTIFIC WORK OF THE CARNEGIE INSTITUTION OF WASHINGTON[1]

A REVIEW of all the activities of the institution would make interesting reading, but it will have to wait until the time comes when the full story can be told. It is now impossible to mention fine work being done by many of the staff members of the institution, since it remains in a confidential category.

The normal research activities of the staff, in view of the interruptions and distractions now present, are not inconsiderable. The full Year Book gives the record, again with an interpretive statement by each director of a department or division. Here a few high lights will be noted, in the hope that this will lead to further perusal.

In spite of preoccupation of most of the staff members of the Department of Terrestrial Magnetism with defense research, the fundamental program of this department still continues significantly. Unless further delays accrue in procuring materials for which priorities are sought, the cyclotron will shortly be completed and made available for cooperative studies in which the Department of Embryology and the Department of Genetics will have a part. Searchlight studies of the electrical and chemical conditions of the air at great heights are also progressing, as well as coordination of magnetic, solar and upper-air studies as related particularly to problems of radio transmission.

Dr. Adams reports from Mount Wilson a number of interesting results. To seize upon one of these, he tells of the first definite evidence of the presence of iron in interstellar space, the density being such that there is present roughly one atom in a cubic meter. This is a very low density. The best vacuum man has produced artificially still contains gas many million times as dense. Yet interstellar space is so enormous that the mass of material represented in these gases is large, and the significance of the discovery may be great. Continued study of atomic and molecular spectral lines from this vast area may in time give us not only the composition but also the distribution and motions of the clouds of cosmic dust and gas that inhabit it, and provide much knowledge of the physical state of its matter. Another item relates to the discovery of the remains of Kepler's Nova of 1604 through the use of red-sensitive plates, and its recognition as the third supernova to appear in the observable region of the galactic system within the last 900 years. Finally, the vexed question of the direction of rotation of the great universes of stars represented by the spiral nebulae seems to have received a definite answer. The evidence shows clearly that in each of the objects investigated the spiral arms are trailing as the nebula rotates. This result is of fundamental importance in theories of the origin and dynamics of stellar systems.

Completion of construction of the 200-inch telescope at California Institute of Technology has been somewhat retarded by pressure of defense research activities, but we continue to cooperate closely in this program, and in consideration of plans for future operation of the giant telescope. In accordance with agreement reached in 1936, tapering financial support which the institution has provided for the seismological program at California Institute will terminate this year.

The Geophysical Laboratory has been concerned with investigation of the radioactive content of rocks as a vital factor in many geophysical problems, and as a part of this undertaking determination of radioactive elements in deep-sea cores obtained by Piggot from the Caribbean Sea has developed new and fundamental relationships. In this connection also a special study of radioactive elements in sea water has been carried out during the past year. Ultrabasic, deep-seated rocks make up the fundamental material of the earth's structure, and the whole problem of the thermal conditions of the earth depends largely on the radioactive content of certain of these rocks. It has now been possible to initiate a cooperative study concerning determination of age and heat production relating to rock formation. The equipment for studying silicate minerals in the presence of water at high temperatures and pressures such as prevail deep within the earth has produced a variety of interesting results. This apparatus is essentially an electric furnace within a strong closed chamber in which materials can be exposed to the action of steam at pressures of several thousand pounds and at temperatures far above a red heat. In the course of some experiments on solubility and melting point the formation of clear quartz crystals at a fairly rapid rate was observed.

[1] From the annual report of Dr. Vannevar Bush, president of the Carnegie Institution of Washington.