disparaging both. We should avoid any such confusion, either to disparage or to exalt a theory.

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A SCIENTIST AT PEACE AND AT WAR FOUR HUNDRED YEARS AGO

THE manner in which one great scientist of the past, Nicolò Tartaglia of Brescia (*c.* 1500–1577), conducted his conscience in the face of the differing requirements of peace and war, may not be without some interest to scientists of the present day who find themselves in a similar situation.

In the "Epistola" to his "Della Nuova Scienza," written at Venice 20 December 1537 (O.S.), and addressed to his Excellency the Duke of Urbino, Tartaglia writes:

> When I was living in the town of Verona, Illustrious Duke, one of my intimates, my cordial friend the master of ordnance at the old castle, (a man of experience and great skill in his art, and endowed with an abundance of good qualities), asked me one day my opinion how to aim a piece of artillery to give it the greatest range. Although I had no practical knowledge whatever of artillery, for in truth, Excellent Duke, I have never in my life shot a single round with firearms, arquebus, bombard or musket, nevertheless, being desirous of serving my friend, I promised shortly to give him a definite answer to his question.[1]

Tartaglia then proceeds to give an account of his attack upon the problem set him by his friend, and then goes on to remark:

> As the result of this I had the intention of writing a treatise on the art of artillery, and to bring it to a degree of perfection capable of directing fire in all circumstances, assisted only by a few particular experiments: for as Aristotle says in the seventh book of the "Physica," Section 20, "particular experiments are the basis of universal science."

But, since then, one day meditating to myself, it had seemed to me that it was a thing blameworthy, shameful and barbarous, worthy of severe punishment before God and man, to wish to bring to perfection an art damageable to one's neighbour and destructive to the human race, and especially Christian men in the wars that they wage on one another. Consequently, not only did I altogether neglect the study of this matter and turned to others, but I even tore up and burnt everything which I had calculated and written on the subject, ashamed and full of remorse for the time I had spent on it, and well decided never to communicate in writing that which against my will had remained in my memory, either to please a friend or in teaching of these matters which are a grave sin and shipwreck to the soul.[2]

In view, however, of the preparations of the Turks to invade Italy, who, as Professor J. D. Bernal has pointed out,[3] were instigated by his Most Christian Majesty the King of France,[4] Tartaglia suffered a change of mind. He writes:

> To-day, however, in the sight of the ferocious wolf preparing to set on our flock, and of our pastors united for the common defence, it does not seem to me any longer proper to hold these things hid, and I have resolved to publish them partly in writing, and partly by word of mouth, for the benefit of Christians so that all should be in a better state either to attack the common enemy or to defend themselves against him. I regret very much at the moment having given up this work, for I am certain that had I persevered I would have found things of the greatest value, as I hope yet to find. . . . I hope that your Lordships will not disdain to receive this work of mine so as better to instruct the artillerymen of your most illustrious government in the theory of their art, and to render them more apt in its practice.[5]

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SCIENTIFIC BOOKS

THE EARTH

Biography of the Earth. By GEORGE GAMOW. 242 pages; 35 plates; 58 figures. New York: Viking Press. 1941. $3.00.

THE barriers between the sciences are now quite generally down, and no geologist will think that even a professor of theoretical physics is poaching on forbidden territory when he writes such a book as this. On the contrary, geologists will thank Dr. Gamow for making the history of the earth so interesting to the layman by his lucid, fluent style, his enthusiasm for the subject, and his wise selection of items to be stressed. Certainly, the truly fascinating story of the origin, infancy and adolescence of an earth, still far from decrepit old age, has seldom been told with such verve and ingenuity of phrase, combined with essen-

[1] "Della Nuova Scienza," in "Questi et Invenzioni Diverse de Nicolo Tartaglia, Di nouo restampati con vna Gionta al sesto libro, nella quale si mostra duoi modi & continentia di tutta l'opera nel seguente foglio si trouara notata." [Venezia, 1550], (p. 1). I have not been able to see an earlier edition of this work, and so translate from the only edition available to me.

[2] *Ibid.*, p. 6.

[3] J. D. Bernal, "The Social Function of Science," p. 169. New York: The Macmillan Co., 1939. The second and third parts of the translations here given from Tartaglia are from the version in Bernal's excellent work. The passages are incorrectly attributed by him, on the basis apparently of a French translation, to a section entitled "L'Art de jecter les bombes."

[4] The modern parallel is, of course, Hitler playing Mephistopheles to Japan's Faust.

[5] Tartaglia, *loc. cit.*, p. 6.

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,