inherently sensational and at times the documents read like first-rate detective stories, but the investigators' scientific training also comes through clearly. None of these books, though, should be read without the others.

One annoying feature of the project report is its deliberate obscurity in witnesses' names and exact sight locations in the case studies. It is not clear why this was done, because the report does not do it consistently, and in many other cases these identifications are made. Furthermore some of these cases are classics in UFO literature. This procedure makes it difficult to compare the results of the project's investigation of a UFO report with the descriptions given in the other books. Two of the more difficult examples are case 5 of the report, which appears on page 126 of *"UFO's? Yes!"* and case 42, which appears on page 197. Paul Julian's discussion of orthoteny, that is the straight-line relationship among different UFO sightings, appears in the report (section 6, chapter 10), but is not listed in the index and is relevant to Saunders's discussions.

The point of view of the project report is that all but a small percentage of UFO reports can be reasonably explained, including some that seem very strange. Therefore it is plausible that the residue of unexplained reports could also be explained if more information were available, and that the hypothesis of ETI is unnecessary and unproductive. Saunders, McDonald and others believe that among this residual are cases that are demonstrably not caused by known natural phenomena, and that ETI is the most plausible hypothesis. We now need some reputable journal to recognize this legitimate scientific controversy and to publish analyses of UFO reports with the ETI proponents also stating their results. Who knows? They may just be right.

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Precursors of Galileo and modern science

MECHANICS IN SIXTEENTH-CENTURY ITALY: SELECTIONS FROM TARTAGLIA, BENEDETTI, GUIDO UBALDO & GALILEO. Translated and annotated by Stillman Drake and I. E. Drabkin. 428 pp. The Univ. of Wisconsin Press, Madison, Wisconsin, 1968. $12.50

by ROBERT S. SHANKLAND

This is a work of the very highest scholarship and in the tradition of Stillman Drake's other distinguished works on Galileo and related subjects in the history of science. The book was prepared in collaboration with the late I. E. Drabkin, and includes introductions written by him for his translations. This selection of writings covers a century that was the final transition period leading from medieval to modern science.

The emphasis at that time was almost exclusively on mechanics, hydraulics and the related mathematics, especially algebra, which was recently introduced into Europe. It is also the period when Aristotle's influence steadily declined and Archimedes of Syracuse's, whose works had recently became available in a useful translation, became more and more dominant. There is also evidence of Hero of Alexandria's influence and faint suggestions of ideas from Leonardo da Vinci.

The editors have prepared a splendid introduction that could hardly be improved upon as model writing in the treatment of the history of science as a rigorous intellectual discipline. The excellent translations present the works of Niccolò Tortaglia, Giovanni Benedetti, Guido Ubaldo and an early hitherto unpublished work of Galileo on motion, prepared during his teaching days at Pisa.

Many of the subjects that the physics student usually associates exclusively with the name of Galileo were considered in great detail by some scientists during the 16th century. Examples are the science of weights that led to important applications in the balance and the investigations of levers and pulleys that led to Fontana's success in erecting the Egyptian obelisks in Rome. Many military machines were studied and perfected and also the screw of Archimedes, which to this day plays an important role in the agriculture of Egypt. Ballistics commanded great attention, and also closely studied before Galileo were falling bodies and projectile motion, including air resistance. During that time scientists investigated many simple and complex machines, both for their inherent scientific interest and for their great practicality in architecture, especially as applied by Alberti, and in shipbuilding and maritime equipment, as shown above all in the great arsenal at Venice.

This is a fascinating book that clarifies the earlier scientific developments that made Galileo's great advances possible: It is also history in a broader and deeper sense than simply a record of scientific progress. There is a fine presentation throughout of the groping and progress needed to develop the scientific concepts so essential to Galileo's synthesis of mechanics. The literary style is excellent, and the scholarship is detailed and authoritative. The book is certainly a contribution to our

TRAJECTORY DIAGRAM by Niccolò Tartaglia, superimposed on a landscape, as shown by Walther Ryff in *Der geometrischen Büxenmeisterey*, in *Der Architectür* . . . (Nürnburg, 1558). Photo courtesy of Burndy Library.

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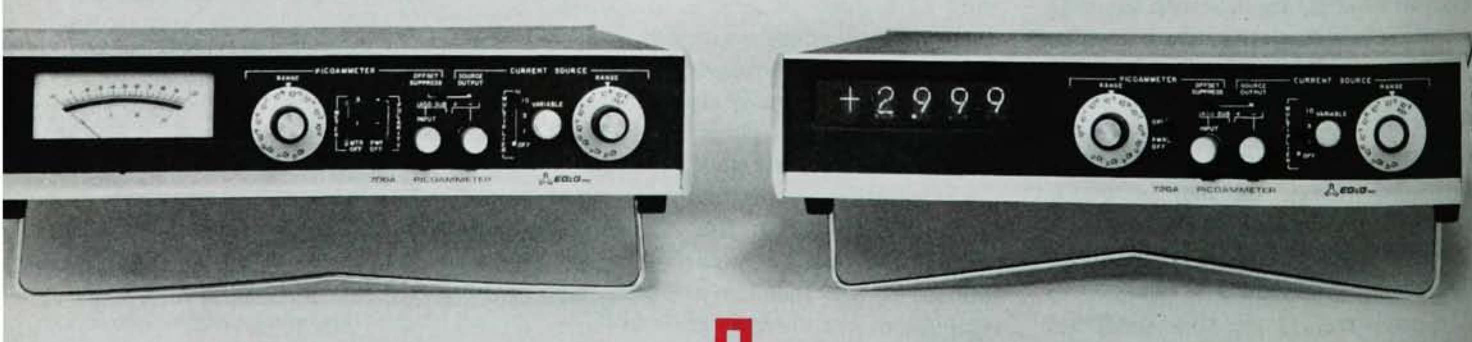

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Emphasis on hard facts

PHYSICS OF PLANETS. (NASA-TT-F-515). By V. I. Moroz. 412 pp. NASA, Washington, DC, 1968. $3.00

by ROMAN SMOLUCHOWSKI

There are few, if any, sciences that stir the imagination more than astrophysics. Even the length of articles in the *New York Times,* which actually is acquiring an enviable reputation as a "science journal," shows that the only peers of astrophysics in this respect are genetics and other biosciences. For the last ten years or so we have been bombarded with spectacular discoveries concerning either remote parts of the universe, which are populated by such mysterious objects as quasars, pulsars and John Wheeler's "black holes," or concerning our own familiar and much more easily identifiable solar system and its planets.

Unfortunately there are no recent books in English written on a reasonably advanced level dealing with physics of all planets. Some do exist on the popular side, such as the otherwise excellent series published by the National Aeronautics and Space Administration and edited by C. M. Michaux. Others encompass several volumes each written by many authors, which precludes continuity and uniformity of level, and there are also books that deal only with a few planets, like the recent (1968) and very good *Introduction to Planetary Physics* by W. M. Kaula.

The author of *Physics of Planets,* V. I. Moroz from the P. K. Sternberg Astronomical Institute in Moscow, has contributed widely to spectroscopic observations of nearly all planets. His present book is an excellent and compact introduction to the whole field of planetary physics. It starts with a good summary of basic concepts, tools and pertinent measurements, followed by chapters dealing with Mars, Venus, Mercury and the giant planets. There are a large number of illustrations, diagrams and over 600 references.

MT WILSON AND PALOMAR OBSERVATORIES

JUPITER with red spot and shadow of the satellite Ganymede above.

The tone of the book would appeal to a skeptical observer; that is, the primary effort is placed on facts and on their evaluation, and only the most acceptable theories are expounded in some detail. This is a very welcome feature in a field where the ratio of hard facts to theories and hypotheses is probably even lower than in biosciences.

The main drawback is that the references do not go beyond 1965, and thus the book does not cover such exciting observations as F. J. Low's measurements of the thermal emission of Jupiter, newer data on the nature of the polar caps of Mars and of its surface composition and the recent controversy concerning the surface temperature of Venus. On the other hand, the results obtained by Mariner 4 and the complex decametric- and decimetric-radiation patterns of Jupiter are discussed in considerable detail. I was particularly impressed by the space devoted to Jupiter's red spot, to the famous "south tropical disturbance" and to the atmospheres of Jupiter and Mars. Many numerical data in the book are more up to date than those in C. W. Allen's *Astrophysical Quantities,* which was last revised in 1962.

On the negative side, one has to mention first the poor translation and careless proofreading. For instance "oblateness" is translated as "compression," and a column in table 97 is titled "Ratio of Planet Mass to Satellite Mass" when it should be "Ratio of the Mean Radius of the Satellite Orbit to Planet Radius." As a result the reader is told that Jupiter is 2.5 times as heavy as its famous fifth satellite. But a very valuable feature of the book is that besides references to Western literature there are numerous references to Soviet literature, which is so often unknown to us. Altogether the book is useful and should find a wide audience.

* * *

R. Smoluchowski is professor of solid state sciences at Princeton University and has been active in the part of astrophysics that deals with properties of condensed matter, especially the surfaces and the interior of the moon, Mars and Jupiter.

A partisan view

QUANTUM THEORY OF MATTER. (2nd edition) By John C. Slater. 763 pp. McGraw-Hill, New York, 1968. $15.00

by PHILIP L. TAYLOR

It is probably true to say that the quantum theory of matter is a subject that has broadened rather than deepened in the 18 years since the first edition of this text was published. Our current view of a crystal as a bestiary of elementary excitations has led to an understanding of many previously puzzling phenomena. On the other hand, our present knowledge of atoms and molecules, as well as of energy bands in solids, owes more to large digital computers that helped us develop concepts formulated in the early days of quantum mechanics.

In this new edition of his book, John Slater has chosen not to follow the path of diversification, but has instead concentrated on enlarging his treatment of the topics covered in the first edition. Thus the first half of the book represents an introduction to quantum mechanics in the wave-mechanical-cum-historical tradition, and the second half discusses the application of the one- and two-electron Schrödinger equation to a large variety of molecules and solids. The discussion of molecular orbitals is particularly clear and extensive and includes descriptions of the ammonia, ethylene and benzene molecules. There are ample instructive problems at the end of each chapter.

Some readers may fault this text for its failure to mention any aspect of collective behavior or of those most ex-