

theory to stellar and radio occultations by planets, of recent interest, is not neglected.

I have a few minor objections: no reference is given to D. Barbier's review paper "Photometry of Lunar Eclipses" in "Planets and Satellites" (edited by Kuiper and Middlehurst, University of Chicago, 1961); much of the discussion could be brought up to date, such as more recent data on the Earth's upper atmosphere (e.g., the phrase "new data" was used to refer to a paper written in 1954); and the lunar luminescence phenomenon is by no means as clearly established as the author would imply.

The third chapter "Infrared Observation of the Eclipsed Moon" by Shorthill and Saari provides a logical bridge between the previous chapter and the following one on "Infrared Emission from the Surface of the Moon" by D. F. Winter. Shorthill and Saari first observed the Moon in the thermal infrared during a lunar eclipse in 1964 and discovered "hot spots," or areas which were considerably more reluctant to cool down after the Moon entered the Earth's shadow. These spots are highly correlated to young lunar craters and to regions of high radar reflectivity and are generally attributed to rocky terrain. The data presented are not new, and I would like to have seen more discussion of the interpretation (although much of that is covered in Winter's chapter). Nevertheless, this chapter is a useful reference to those who wish to study a particular area of the moon for a landing site. The only problem is, the Apollo program is over.

The last chapter by Winter is a very good review of both the observation and theory of infrared emission from the Moon and would be useful to a relatively wide audience. The topics covered are recent observations, heat transfer in evacuated powders, theoretical analysis of surface temperature variations, the effect of surface roughness on apparent temperature, and thermal anomaly data presented in the previous chapter. The discussion of the theory should be of special interest to planetary scientists as more infrared data from Mars and other planets and satellites become available. I only wish the discussion could have been brought up to date by actual measurements of the thermal and electrical properties of the returned lunar samples and by the establishment of a clear correlation between the thermal anomalies and Arecibo radar data, information which became available three years ago.

In summary, then, *Advances in Astronomy and Astrophysics*, Vol. 9, is too spotty and specialized to fulfil the review function for which I presume it is intended. It will not be widely read. I hope

that each future volume would either include more review papers covering more territory, or treat *one* important contemporary topic in detail. Volume 9 does neither. Nevertheless, this book contains some useful reference material for infrared planetary scientists and for theoreticians interested in close stellar binaries.

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**The Moon: International Astronomical Union Symposium**, Edited by S. K. Runcorn and H. C. Urey, D. Reidel, Dordrecht, Holland, 1972. xvi + 471 pp. Price 110 f., about \$37.50.

Symposium 47 of the IAU was held at the University of Newcastle-Upon-Tyne, England, March, 1971. Dealing with the Moon and treating a wide variety of subjects, it was a fruitful attempt by the organizers to mix astronomers with geologists, chemists, physicists, and some engineers for mutual exchange of knowledge.

The proceedings of the Symposium are handsomely bound in a profusely illustrated volume that is divided into two parts; Part I is a short introduction by Gilbert Fielder (Report by the Chairman); and Part II includes the scientific papers which are arranged in nine chapters.

Chapter A (30 pages) contains five papers dealing with Lunar Mechanics. Especially good are two papers by Muller and Sjogren on the Disc Theory of Mascons, and by Runcorn and Hofman on the Shape of the Moon. There are three papers in Chapter B (29 pages) that discuss the Lunar Surface and its Morphology. This chapter leaves much to be desired; it is not comprehensive enough a treatment of the subject about which more was known in 1971 than is conveyed.

Four papers in Chapter C (46 pages) constitute a Progress Report of the Apollo Missions, as well as post-Apollo unmanned missions that were under serious study some years ago. Although the papers are informative, they are certainly outdated, since only Apollo 14 was completed at the time of the meeting. Apollo missions 15, 16 and 17 were then in the planning stages.

The next chapter (62 pages) comprises some Petrological Studies of the Moon. Here, there are five papers, a few of which are too detailed for the audience and should have been presented at Houston's "Rock Festival." Chapter E (59 pages) is entitled Lunar Tectonics and includes five papers, of which some are better than others. An excellent paper by R. G. Strom deals with Lunar Mare Ridges, Rings and Volcanic Ring

Complexes. It provides an up-to-date review of the subject with superb illustrations. There is a paper by N. A. Kozyrev on the interaction of tectonic processes of the Earth and the Moon. Kozyrev found the correlation to be close enough to describe the Moon as Earth's "seventh continent."

A Chapter on the Physical Properties of Lunar Samples (103 pages) contains seven papers. The last three Chapters treat The Lunar Interior (37 pages, four papers), The Evolution of the Moon's Orbit (10 pages, two papers) and finally a Chapter on the Origin and Evolution of the Moon (51 pages, five papers). In this last Chapter there is an interesting paper by A. A. Mills on probable fluidization by gas release of the Moon and planets, and a review paper by Harold Urey on the Origin of the Moon and Solar System.

It is clear that many disciplines were represented at the Symposium. The list of 170 participants given at the beginning of the volume is very impressive. (Although I found my name listed while I was not there.) Two indices, one of names and the other of subjects, are found at the end of the volume. Both indices help in unifying this collection of papers.

As emphasized in Fielder's introduction, "the highest efficiency in the study of the Moon will be achieved only if a suitable forum is created for the exchange of views of scientists from a variety of disciplines bearing on the lunar problem." Symposium 47 was a successful attempt at this. However, it is my opinion that it could have been more successful had there been more review papers. Media for communicating detailed original research in specific areas are numerous. What is required are papers summarizing the salient findings of a given field that could be digested and appreciated by the nonspecialist. Symposium 47 included only a few of these, mostly in fields that are part of astronomers' expertise, and none in such fields as lunar geology and geochemistry.

Editorially, and on the publishers' side, the

volume is beautifully printed with few typographical errors. The illustrations are excellent and photographs are well reproduced. However, some figures are needlessly duplicated in the same chapter, e.g., figures on pages 78 and 79 are duplicates of those on pages 98 and 99. Also, the same scanning electron micrograph appears in two successive papers on pages 299 and 315 with contradicting size scales. On the average, figure captions are very good, although some are given in telegraphic style, such as "Trench," "White rock," or "Descartes." In addition, although according to the title page the volume is edited by "Runcorn and Urey," a footnote for reference purposes on the first page of each paper indicates that the volume is edited by "Urey and Runcorn." This is liable to cause some confusion in citing the articles and could have been easily corrected.

One inevitable characteristic of symposium proceedings is the great variety in the quality and depth of the papers. This volume is no exception; many papers are thorough and provide a complete treatment of the subject, others do not deliver what is promised in the title. The papers also vary widely in length; one paper is a skinny one-half page, only an abstract, and another is 36 pages long.

Finally, this volume is a mixed bag of good and bad. Its positive points, however, outweigh the negative ones, and in it the researcher will find excellent papers dealing with various phases of lunar science. One of its mixed blessings is that it is a good representation of lunar theories as they stood two years ago. It is unfortunate that it could not have been more rapidly published.

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