The Newcastle School of Physics acted as hosts for the Symposium, and appropriately their work is well represented. They have concerned themselves with the dynamo theory of the Earth’s magnetic field, with the secular variation of the field, and with rock magnetism. Geomagnetism provides the major topic of the book, but it is most valuable to compare this work with related topics in solar and stellar theory and observation. The variety of situations, from a field of less than $10^{-3}\text{G}$ on Mars to a reversing field of $10^3\text{G}$ on some stars, should serve as a warning that no one simple theory can account for the magnetism of all large bodies.

Planetary magnetic fields may become accessible first through radio observations, if Jupiter’s example is followed. Here the radio emission from Jovian van Allen Belts has led to a determination of the dipole axis within a degree, and to a fair estimate of its strength. What the satellite Io does to upset it, and trigger off the decameter radio waves, is another matter yet unsolved.

In the solar system the interplanetary medium is fast being explored by probes and by radio scintillation. Here a 1965 conference is already looking old-fashioned. The values of these reviews lies more in the solid theory, and in the solid geophysics contained herein. The editors have saved the reviews from undue heaviness by encouraging conciseness; they are also to be congratulated in making the volume so coherent a whole.

F. G. Smith

The Craters of the Moon: an Observational Approach

Patrick Moore and Peter Cattermole

(Lutterworth Press, 160 pp., 16 plates and 45 text illustrations, 35s.)

This short book is a happy collaboration of a telescopic observer and a geologist on the problems of the Moon’s surface condition. Both authors favour endogenic formation as against impact hypotheses. The book forms a useful corrective to the too easy assumption that impacts explain everything; too many recent writers, however well based their theories and however sound their calculations, betray unfamiliarity with observational considerations and with the features which cause most difficulty to telescope users. Whatever criticisms follow, this book should not be ignored.

The reason why it will not carry conviction is that it is almost entirely descriptive. Students of meteoroid impact base their convictions on computations of the frequency and total numbers of impacts. They will not be satisfied with statements that ‘the agreement is very poor indeed’ (p. 48) and again ‘in hopeless disagreement’ on the same page. This is the reason why J. E. Spurr’s thoughtful books have exercised less influence than they should. The authors discuss crater alignments. We possess good three-dimensional co-ordinates of 12000 craters; and at least a numerical test seems called for. Marcus has discussed mathematically the loss of craters by covering and in-filling; in some cases his results do not agree with the impact hypothesis; but his work is not mentioned.

There are in fact many lunar features which the impact theory has not been able to explain, and sometimes has not tried to explain. For example, in several instances ‘ghost’ craters are poised on the outer slopes of large formations, occasionally right up to the rim. The present reviewer does not see how they could have survived either an explosive impact or an explosive vulcanism. They seem to plead for a gentler endogenic origin.

Z. Kopal seems to agree that craters with a common wall (Ptolemaeus, Alphonsus) cannot be produced by impact, as also Clavius and Wargentin. He considers the
number of such cases too few to affect the statistics seriously. It seems that the fundamental problem is to distinguish between the two origins. If Clavius is produced internally, why not Regiomontanus, Purbach? Unfortunately the present authors are not clear as to the role they allot to impacts, saying only that ‘many small impact pits must certainly exist’ (p. 151).

The chapter on geological principles is useful, but is exceedingly condensed; it may lead to misunderstanding by general readers. The summary of the history of selenography has been abridged to the omission of important contributions and may give an exaggerated impression of the British share.

Several pages of Chapter 10 are devoted to older reports of changes on the Moon. Most of these are far from well founded. One may perhaps accept the evidence for the floor craterlets in Plato. In general these matters might well be separated from the study of transient lunar phenomena. More might have been said about the photometric evidence, which is scarcely mentioned.

In dealing with theories other than volcanic or meteoritic, the authors seem to have enjoyed putting extreme cases. The universal ice theory has left little behind it. W. H. Pickering, who is not mentioned in this context, may have indulged in a little leg-pulling, but did stimulate observation. The ideas of Bonnef and Tazieff are outlined but Professor Runcorn only mentioned in a virtual footnote. Expansion and contraction theories are dismissed in a sentence. Yet Professor Graff, in the Handbuch der Astrophysik, summed up by saying that wherever stresses showed, it was as indications of expansion and not contraction, in contrast to the Earth. There is no treatment of moderate endogenic theories. And in general the authors do not detail the mechanism of endogenic action.

As there is no general map, it is worth noting that any name which is not in the I.A.U. list of 1932 is fully explained in a footnote, a precaution which should always be followed.

T. L. MacDonalD