Planetary atmospheres

Theory of Planetary Atmospheres: An Introduction to their Physics and Chemistry. By J. W. Chamberlain. Pp. 330. (Academic: New York, San Francisco and London, 1978.) £19.15.

IT is a brave person who considers writing a textbook on planetary atmospheres at this time when there are so many space missions to the planets rapidly advancing our knowledge of these bodies. One procedure is to concentrate on basic processes and then use the current planetary observations to illustrate the mechanisms involved. Basically, this is the approach adopted by Professor Chamberlain whose valuable textbook is primarily concerned with the physical and chemical properties of planetary atmospheres. The author has made good of our effluent society, which in the past few years has produced detailed investigations of photochemical processes related to the potential climatic impact of variations in the Earth's ozone layers. This has allowed the discussions to be placed on a moderately firm foundation before their application to the planets.

The book covers approximately 300 pages of text supplemented by some useful appendices. Each of the seven chapters has a valuable list of references, that may be used to extract more detailed analyses of the work presented. In addition, there are problems at the end of chapters that make the text useful as a teaching aid for the rapidly increasing number of courses in planetary studies at universities throughout the world.

The introductory chapter discusses the basic physical concepts and provides the reader with a good background to the vertical structure of the Earth's atmosphere, together with an indication of the differences of structures of the other planetary atmospheres. I thought that the comments on p40 regarding the initial interpretation of the Pioneer 10/11 results for the structure of the upper atmosphere were unnecessary. The problem first identified when reducing these measurements has been resolved. Furthermore, the Voyager observations had now added further important information that indicates interesting structure in the upper Jovian atmosphere which now means that part of Figure 1.19 is out of date. I had hoped that Professor Chamberlain would not have introduced the term "dust" on p38 when discussing the ultraviolet absorbing layer created from photochemical products thought to reside above the visible clouds. This is an unfortunate term, misused for too long.

The introduction to atmospheric motions is well presented, although some aspects of the planetary examples are a little sketchy. In particular the reader still would have no idea why Jupiter (and Saturn too) have cloud bands from the discussions presented here. With many aspects of the Jovian dynamics still to be resolved, it would probably have been better to have shown how spacecraft measurements that could help resolve the controversial issues that currently exist.

The next two chapters are concerned with the chemistry and dynamics of the Earth's stratosphere and planetary astronomy where the basic concepts of radiative transfer are discussed. Professor Chamberlain is well known for his work in these areas, and the work is well presented. I still maintain, from a personal viewpoint, that the classical Chandrasekhar approach to radiative transfer is not the easiest way to introduce the subject to the reader. However, the references at the end of the chapter contain papers with other approaches, so the reader can decide this matter for himself.

The remaining chapters are concerned with ionospheres, airglows and aeronomy and the stability of planetary atmospheres. This indicates the breath of the discussions which with a good mathematical description form the basis of a useful book. I personally consider this volume a valuable addition to the subject. I sincerely hope, therefore, that the publishers will have the wisdom to produce an inexpensive paperback version so that students attending courses in this rapidly growing subject will be able to purchase a copy of their own.

Garry E. Hunt

Garry E. Hunt is Head of the Laboratory for Planetary Atmospheres, Department of Physics and Astronomy, University College, London, UK.

Guide for Darwin scholars

Charles Darwin: A Companion. By R. B. Freeman. Pp. 309. (Dawson: Folkestone, UK; Archon Books/Shoe String Press: Hamden, Connecticut, 1979.) £12.50; $27.50.

RICHARD FREEMAN is rightly held in high regard for his meticulous labours on the bibliography of Charles Darwin's writings. His equally significant work *Charles Darwin: A Companion* is likely to prove indispensible to Darwin scholars. Interest in Darwin continues to grow, as continued exposure on the media attests and the steady flow of learned publications sustains. Recent discoveries are deftly and economically incorporated with notable conciseness.

There is a clear need for an enumeration of securely determined facts about Darwin: about his family from the sixteenth century record in Lincolnshire to his grandchildren; about the servants, dogs and horses as well as those of their close friends; about the names and ever baffling nicknames of their ramifying and closely intermarrying relatives; and about the Hookers, Huxleys, Henslows and Wedgwoods.

The *Companion* is an alphabetical list of names; wives are listed under their maiden name with a cross reference to their husband. All cross-references are cunningly devised to encourage wandering as should always be the case in a good work of reference. Quotations from Darwin enliven the identity and relevance of each name so that the book becomes a truly fascinating anthology of quotations as well as a detailed guide to the formidable bibliography. The forty-one pages of material devoted to Charles Darwin required 25 sub-headings listed on page 71. The sub-headings are set in an insufficiently bold type and it would have been helpful to the reader to carry the sub-heading at the top of the relevant page. Particularly worthy of note are the "few quotations to give indications of CD's character" (pages 71–2) which include new discoveries amongst old friends. In his introduction Freeman quotes Darwin's letter to Huxley from Ilkley in November 1859 (LLii281): "The difficulty is to know what to trust." when making a compilation from various sources. Richard Freeman, an accurate compiler with a discerning eye for the unusual, is sadly let down by careless transcriptions in the printed texts. Both Francis Darwin and his sister Henrietta placed unjustified faith in the transcriptions they published. Hence, we read instead of Moscheles as teacher of pianoforte to their mother the name Maschelas, and Henrietta transcribes the name of Darwin's amanuensis and companion Syms Covington as Conington (Emma Darwin ii 19). It was a more recent misreading by a dealer in manuscript letters which resulted in the entry or page 167 for Hoskins an untraceable botanist. The original of this letter to Henslow has since come to light and reveals that CD wrote Hooker, indeed a botanist and in 1845 an unsuccessful candidate for the Chair of Botany at Edinburgh.

Sydney Smith

Sydney Smith is Emeritus Fellow of St. Catharine's College, Cambridge, UK.