

# BOOK REVIEWS

## Eclipsing Variables

*Vistas in Astronomy*. Vol. 12. Edited by Arthur Beer. (The Henry Norris Russell Memorial Volume.) Pp. viii + 426. (Pergamon: Oxford and New York, November 1970.) 200s; \$27.

THIS volume is subtitled the "Henry Norris Russell Memorial Volume" and contains twenty papers covering some of the many subjects to which he contributed. Russell's chief research interest was the study of eclipsing variables, and fifteen papers, constituting about two thirds of the book, are devoted to this subject, mostly from an observational viewpoint. Szafraniec gives an account of Russell's contributions to the study of eclipsing systems, and this is followed by a detailed account by Koch of the Russell method for obtaining the orbital elements. A long paper by Binnendijk summarizes the observed properties and peculiarities of W Ursa Majoris systems and discusses general methods of orbit solution with special application to these stars. This theory is developed in considerable detail by Merrill.

The advent of fast computers has revolutionized the analysis of eclipsing variables as it has other branches of astrophysics. Jurkevich discusses the computer implementation of some existing methods used to derive binary star elements in considerable detail, and in conclusion suggests that more effort should be put into developing computer simulations to test current hypotheses, such as gas streaming, which are used to explain peculiarities in light curves. Among other papers concerned with specific types of eclipsing stars, Sahade and Ringuelet strike a cautionary note in pointing out the sensitivity of the masses derived for Algol systems to the conventional assumption that the secondary exactly fills its inner Roche surface.

In a review of current ideas about the compositions of old stars, Pagel starts by recognizing the pioneering work of Russell on the spectroscopic determination of stellar abundances. He then gives the arguments for and against the cosmological origin of stellar helium, and discusses the evidence for a correlation between the abundance of certain heavy elements and the ages of very old stars. Westerlund and Eggen review, respectively, current ideas about the composition of the Magellanic Clouds, and the interaction between stellar kinematics and evolutionary theory. Finally, a paper by Sitterley is devoted to comments on the varying interpretations of the Hertzsprung-Russell diagram from the time

when theories of stellar evolution were purely speculative until about 1940, when the main sequence at least was understood. It is a pity this paper stops here. It would have been fitting in a book dedicated to Russell if this account had been extended to include the growth of our knowledge of pre and post main sequence evolution.

The papers which constitute this volume are uniformly well written and presented. The emphasis on the study of eclipsing variables is rather overwhelming, however, and it is concentrated almost entirely on the observational material and its reduction. Some mention of the evolutionary status and interpretation of the various types of systems would have been welcome. The place of some of the very detailed treatment of the reduction of the observations (including in one instance a complete computer program) in such a volume as this is also questionable. This degree of specialization must reduce the value of the book for many readers.

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## African Geology

*African Magmatism and Tectonics*. Edited by T. N. Clifford and I. G. Gass. (A Volume in honour of W. Q. Kennedy, FRS.) Pp. xv + 461. (Oliver and Boyd: Edinburgh, 1970.) 200s.

W. Q. KENNEDY, FRS, was professor of geology in the University of Leeds from 1945 to 1967. In 1955, Kennedy founded the Research Institute for African Geology at Leeds with funds from the Anglo-American Corporation. This volume in Kennedy's honour opens with an appreciation by the present professor of geology at Leeds, R. M. Shackleton. Professor Shackleton notes that Kennedy took his first degree (in agriculture) at Glasgow during the time when J. W. Gregory was professor of geology. Gregory had made his reputation with a brilliant and daring expedition to the great Rift in East Africa in 1892-93. A remarkable book entitled *The Rift Valleys and Geology of East Africa* by Gregory was published in 1921, and it remains to this day an authoritative work. Gregory must have greatly inspired Kennedy, who has maintained an interest in Africa ever since his student days in Glasgow.

This book contains eighteen papers on Africa by Kennedy's students, friends and colleagues. Topics covered are the structural framework of Africa (T. N.

Clifford), Archaean volcanicity and continental evolution in the Transvaal (M. J. and R. P. Viljoen), the evolution and structural setting of the Great Dyke, Rhodesia (R. Bichan), the volcanic rocks of the Witwatersrand Triad (H. C. M. Whiteside), the anorthosite of southern Angola (E. S. W. Simpson), igneous activity and mineralization in the Kibaride and Katangide orogenic belts of central Africa (L. Cahen), orogenic plutonism in Malawi (K. Bloomfield), mineralogical and geochemical aspects of pegmatites from equatorial and southern Africa (O. Von Knorring), late Palaeozoic to Recent igneous activity in west Africa (R. Black and M. Girod), tectonics and volcanism of the Karroo period and their bearing on the postulated fragmentation of Gondwanaland (K. G. Cox), petrochemical and tectonic relationship of the Malawi carbonatite-alkaline province and the Lupata-Lebombo volcanics (A. R. Woolley and M. S. Garson), volcanicity and rift tectonics in East Africa (B. C. King), tectonic and magmatic evolution of the Afro-Arabian dome (I. G. Gass), the evolution of the Tibesti volcanic province (P. M. Vincent), the structural setting of African Kimberlite magmatism (J. B. Dawson), tectonic control of dykes and related eruptive rocks in eastern Africa (J. R. Vail), geochemical variations in African granitic rocks (J. M. Rooke) and convection and magmatism with reference to the African continent (P. G. Harris).

Most of the papers are of a factual nature and few are thought-provoking. Notable exceptions include the stimulating contributions by Cox, Gass, Dawson and Harris. Cox, using plate tectonics, considers the structures to be due to a general subcrustal flow; a view not shared by the others who prefer localized regions of uprising convection to explain local structures. Cox also expounds the idea that the dominance of normal faulting is associated with crustal attenuation or necking, the necking preceding the faulting, this process being a consequence of the sub-crustal flow. Gass also invokes the process of necking to explain some of the geological features of Afar. It is clear that much attention will be paid to the possibility of this process in the next few years. Dawson, in a fascinating article on kimberlites and diamonds, pursues the idea of a series of convection cells beneath the African continent, an uprising cell existing under each area of maximum vertical uplift. The book concludes with an excellent review article on many aspects of convection by P. G. Harris.