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Obituaries

ANDREW DAVID THACKERAY

David Thackeray was born on 1910 June 19 and was educated at Eton and King's College Cambridge where he read Mathematics. His father, H.St J.Thackeray was a classical scholar and probably the most important authority of his time on Josephus. William Makepeace Thackeray belonged to an earlier generation of the family. David's interest in astronomy must have received stimulation from the fact that the well-known solar physicist John Evershed was an uncle. At any rate he was an active observer for the variable star section of the BAA whilst still at school.

After graduating he began research (1932) at the Solar Physics Observatory Cambridge. From that time, except for a period in World War II when he served in The Friends Ambulance Unit, he was always actively engaged in research and his extensive publications (over 300 items, full bibliography in *Mon. Notes astr. Soc. sth Afr.*, **37**, 49, 1978) continued until the end of his life (in fact, several papers were published posthumously). His early work at Cambridge was concerned with the central intensities of the Fraunhofer lines. This was a puzzling problem of the time. It had been worked on theoretically by Eddington and, no doubt as a result, several well-known astronomers of that period at Cambridge (Woolley, Redman, D.S.Evans as well as Thackeray) worked on the problem. He was led from this work to make quite extensive measurements of equivalent widths in both stars and sunspots and to show that the intensities were anomalous compared with current theory.

During the period 1934–36 he was a Commonwealth Fund Fellow at the Mount Wilson Observatory. Here he continued his interest in solar work. Perhaps the most noteworthy outcome of this was his paper working out the effects of blending of lines on equivalent widths ('Thackeray's rule'). At this period, too, he made an outstanding contribution by resolving, first alone and then in collaboration with P.W.Merrill, a long-standing problem relating to the emission lines in Mira-type variables. At times these emission lines show quite unusual relative intensities within a given multiplet. Bowen had recently published his work on fluorescence in planetary nebulae and Thackeray realized that similar effects could be present in Miras. He and Merrill worked out this explanation in detail. This work also led to predictions regarding lines in the far ultraviolet, which were, of course, at that time completely out of the range of observations. His dual interests in both solar and stellar physics continued on his return to Cambridge where he became Chief Assistant at the Solar Physics Observatory (1937–48). During this period he made a detailed spectroscopic study of the curious variable ρ Cas. He also made an interesting but unsuccessful attempt to detect spectroscopically a magnetic field in a white dwarf. This was done at the suggestion of Blackett

who was at that stage predicting large magnetic fields for white dwarfs as a consequence of the fundamental theory of magnetism he was advocating.

In 1948 he went to South Africa as Chief Assistant at the Radcliffe Observatory, Pretoria. The 1·9-m reflector, the largest in the Southern Hemisphere, was just coming into action and he devoted the rest of his life to the full exploitation of this telescope. He succeeded H.Knox-Shaw as Director in 1950 and remained in that post until the Pretoria site closed in 1974. At that stage the 1·9-m reflector was acquired by the South African Astronomical Observatory for its main Observatory at Sutherland. David became Radcliffe Professor of Astronomy at the University of Cape Town where he remained active in astronomical research until his death. Throughout much of his time in Pretoria he had a very small budget and a very small staff. In the early years there were three astronomers on the staff (including himself) and no technical assistance. Only an agreement in 1951 between the Radcliffe Trustees and the Admiralty, by which one-third of the observing time was made available to the Royal Observatory, Cape, in return for an annual grant, allowed the Observatory to appoint a mechanic and a part-time secretary. This lack of funds at least meant that rather little time could be spent on administrative matters. That the Observatory ran at all with so small a staff was due to the spirit of enthusiasm which David inspired. Notices, forms and rules were practically unknown; it is not clear which side was more puzzled when, after the SRC take-over in 1967, officials began asking questions such as : 'How much time is allowed off in lieu of one night's observing?' – it had never occurred to anyone on the staff to think about such things before.

'ADT' covered many aspects of astronomy in his work in Pretoria, and only a few can be mentioned. Perhaps his most important single piece of research was his discovery with A.J.Wesselink of RR Lyrae variables in the Magellanic Clouds. These were much fainter than expected and indicated that the distance of the Magellanic Clouds was twice the then accepted value. Thackeray announced this result at the 1952 Rome IAU meeting. At the same meeting Walter Baade announced a similar result for M31 (and NGC 205). This was based on less certain grounds, namely the absence of RR Lyrae stars to the limit of 200-in plates and the assumed identity of resolved red giants with those in (galactic) metal-poor globular clusters. These results doubled the then accepted age of the Universe and resolved the paradox that the current age of the Universe was smaller than the age of the Earth (as determined by means of radioactive decay). The discovery of RR Lyrae variables had the further important repercussion that it showed the existence of an old population in the Clouds. This clearly disproved the then current view (e.g. W.Baade, *Publ. Mich. Obs.*, **10**, 7, 1951) that the LMC was a 'pure population I system'. Curiously a major reason for Baade adopting this view (apart from the failure of Shapley and his collaborators to find RR Lyrae variables) was another of ADT's discoveries. He had shown that the cluster NGC 1866 in the LMC, although globular in form was not a normal globular cluster. The relative brightness of the brightest red and blue stars in the cluster was different from a typical globular cluster, the integrated spectrum was A3 and the variable stars were classical Cepheids.

Thackeray's discovery that this globular cluster was, in fact, young was of great importance at the time and has led to much subsequent work.

Thackeray and his collaborators made extensive spectroscopic and photometric studies of the young population in the Magellanic Clouds. They established that the upper limit of stellar stability was near 10^6 times the solar luminosity. Equally important was the fact that near this limit the stars showed (spectroscopically) signs of instability. Thus what had been established was the general upper limit to stability, not a cut-off due to some other process (e.g. connected with initial mass function in the Clouds). Again with his collaborators he studied the kinematics of the Clouds from radial velocities.

From the beginning it had been planned that the Radcliffe Observatory would take up as a major programme the determination of radial velocities of southern OB stars to complement the northern work by the Dominion Astrophysical Observatory, Victoria, and thus to improve our understanding of differential galactic rotation. For many years Thackeray and his colleagues devoted a major part of their time to this project. In all this ADT took his full share in the observing, measuring and reductions (for many years there was no computational or other help). Work on the radial velocities of early-type stars continued practically to the closing of the Pretoria site, although in later years it occupied a less prominent part in the work. The 1950s proved to have been an opportune time for this project since in the analysis of the data it was possible to make use of the extensive photoelectric photometry and MK types then becoming available. Not only were OB star velocities now available all round the Milky Way but much better absolute magnitudes and estimates of interstellar absorption could be obtained. It was therefore possible to obtain galactic rotation constants with considerably improved accuracy. It was also possible for the first time to make some estimate of the distance to the Galactic Centre from the displacement of the galactic rotation nodes for distant stars.

At the time of the Admiralty agreement (1951) there was an arrangement between the Royal Observatory, Cape, and the Radcliffe Observatory that the latter should concentrate on galactic structure problems and the Magellanic Clouds while the Cape worked on nearby stars and extragalactic objects, except the Clouds. This somewhat curious arrangement worked well in practice. However, ADT had earlier carried out important work on the Sculptor system. Some years before, Baade and Hubble had found a number of variables in this dwarf spheroidal system. It seemed likely that these were RR Lyraes but this was not certain. Thackeray greatly increased the number of known variables and derived light curves for many, showing conclusively that they were RR Lyraes. This was the piece of evidence lacking to show clearly that this was a pure type II system. Thackeray entrusted the full exploitation of his Sculptor plates to others and for a variety of reasons this has led to a delay of nearly 30 years in finishing the work. It is expected that the full details will soon be published by Dr S.van Agt.

Although active in many fields David regarded himself primarily as a stellar spectroscopist and his knowledge of this field was encyclopaedic. He

was particularly interested in objects with unusual spectra and the significance of this work is only slowly being realized. Thus his investigations over many years of the eclipsing symbiotic star AR Pav is a major clue to the understanding of symbiotic stars. His main legacy in this field is his studies extending over nearly 30 years of the enigmatic object Eta Carinae and the slow nova-symbiotic star RR Tel. In these objects he was able to identify, for the first time, forbidden emission lines not yet produced in the laboratory and his detailed studies must form the basis of any theory of these puzzling objects. His discovery of strong polarization in the halo around Eta Carinae is of particular importance. He was remarkably observant and rarely failed to notice an interesting feature in a spectrum even on brief examination, often in the darkroom when the plate was still washing. In 1949 he noted visually, with the 1·9-m telescope, variations of VV Pup on a time-scale of seconds. This seemed hardly credible at the time but 20 years later the result was fully confirmed with high-speed photometers and is an important property of cataclysmic variables.

David Thackeray was an enthusiastic observer of all natural phenomena and published a number of notes on them. The last of these on 'Dust Devils and Spray Devils' was published in 1977 October. It was, in fact, a violent dust devil that overturned the vehicle in which he was a passenger on 1978 February 21. He had completed a successful week's observing with the 1·9-m telescope at Sutherland and was returning to Cape Town. He was killed instantly. Typically of him, he was engrossed in a crossword puzzle at the time of the accident. He was interested in puzzles of all sorts and his enthusiasm for crosswords is illustrated by the fact that he once borrowed and read the writer's copy of Joyce's 'Ulysses', on the off-chance that it would help him with a difficult clue.

He, more than any other single person, opened up the southern hemisphere to modern astrophysics. His work was done quietly and without publicity. His papers were written for the specialists and their significance was probably often lost on those not actively engaged in research, but although he never dramatized his work and, after his early work at Cambridge, made only sparing references to theory, he was, in fact, well aware of the significance of his research for the progress of astronomy. In these circumstances the main recognition he received for his work was the admiration and more importantly the real friendship of a wide circle of active research astronomers throughout the world.

Astronomers will remember David's kindness, courtesy and humour. Many were privileged to enjoy the hospitality of David and Mary (*née* Rowlands, whom he married in 1944) and their children, in a home where astronomy blended naturally with music. He particularly welcomed and helped the many young British astronomers who came to work in Pretoria. In this way he made an important contribution to the development of astronomy in the United Kingdom even if, as rather frequently happened, the visitors became dissatisfied with astronomical opportunities on return to the UK and moved to the USA or elsewhere.

David Thackeray was elected a Fellow of the Society on 1933 April 12 and was Secretary during the years 1941–43 and 1947–48. He was also an Editor of the *Observatory* Magazine 1938–42. A few days before his death the Society elected him an Associate, the first British subject to be so honoured. The news was waiting his return to Cape Town.

MICHAEL FEAST, SAAO

CARLOS CRUZ-GONZÁLEZ

Dr Carlos Cruz-González was born in Mexico City on 1941 June 17. He enrolled at the Faculty of Sciences of the National University of Mexico to study physics and mathematics in 1959 and in 1961 entered as a research assistant to the Observatorio Astronómico Nacional (now Institute of Astronomy of the National University of Mexico), a position that he held for four years. Very soon he became a computer expert and assisted Dr A. Poveda on the study of stellar motions in spherical galaxies and on a derivation of a mass estimate of the local group. In 1965 under the supervision of Dr Poveda he prepared a BSc thesis on the origin and evolution of comets.

From 1965 to 1968 Cruz-González was a graduate student of the Astronomy Department at Harvard University. Based on a thesis on encounters and escapes in stellar systems directed by Dr M.Lecar he obtained a MSc degree. He came back to the Institute of Astronomy of the University of Mexico and during 1968–1970 in collaboration with Drs Lecar and Poveda published a series of papers on numerical experiments in stellar dynamics.

In 1970 Cruz-González decided to continue his graduate work and obtained a scholarship from the British Council to study at the Astronomy Centre of the University of Sussex. Cruz-González was supervised by Sir Richard Woolley during his first year at Sussex, he also came in contact with Professor D.Lynden-Bell who directed him on the general field of dynamics and galactic structure. In 1972 Cruz-González moved to Cambridge to continue his association with Lynden-Bell. He returned to Mexico in 1973 and late in 1974 went back to Sussex to defend his doctoral thesis on kinematical parameters and the spiral structure of the Galaxy. Lynden-Bell provided a very stimulating guidance throughout the development of this thesis.

Results derived by Cruz-González in his doctoral thesis include: (a) the density gradient in the solar neighbourhood and together with an exponential model for the density of the galactic disk, some of the basic kinematical parameters of the galaxy, (b) a model of the spiral pattern of the Galaxy that explains, for the first time, the well-known fact discovered by Kerr that for a wide range of galactic longitudes the terminal velocities determined from the southern hemisphere are systematically smaller than the northern ones.

His last years in the Institute of Astronomy of the University of Mexico were very profitable. Cruz-González invested a considerable amount of his time in teaching with excellent results, he thought that this activity was fundamental in our environment. His generosity, gentle nature and sense of