Fred Hoyle : Reaching For The Stars

By J.V. NARLIKAR

A YOUNG primary school boy was given the homework of bringing specimens of flowers in the neighbourhood. When he showed the collection to the teacher he pointed out that one particular specimen had six petals and not five as the teacher had said in the class. Instead of explaining the discrepancy, the teacher took it as an act of insubordination and gave the boy a stinging blow on the head.

The boy was shocked by this act of punishment when he was expecting compliments for making an unusual discovery. He left the class and the school, went home and refused to go back until justice was done to him. There was the inevitable enquiry by the local school authorities where the boy put up his case. They allowed him to study at home for the rest of the year and then to change the school.

This was back in the 1920s, in Bingley, Yorkshire, and the boy's name was Fred Hoyle. Now approaching 80, Sir Fred recounts the incident in his very readable autobiography, *Home is Where the Wind Blows* (University Science Books, California). He describes his formative years as being spent in a state of war with the educational system which did its best to stifle the child's spirit of enquiry and questioning.

Personality Indicated

The flower incident in retrospect, however, seems indicative of the personality which was already trying to assert itself at the tender age of nine. Hoyle's life reads like a series of battles against the Establishment, wherein a creative mind is aspiring to propagate originality and adventure against a background that favours conformism and caution.

On the face of it Sir Fred's career reads like that of any highly successful scientist: a scholarship to Cambridge University, followed by fellowship of a Cambridge college, a prestigious professorship at Cambridge, fellowship of the Royal Society and various awards, including a knighthood. His scientific achievements include pioneering contributions to the theory of how atomic nuclei are synthesised in stars, and new ideas in cosmology and on the evolution of stars. The creation of an astronomy institute at Cambridge and the shepherding to completion of the Anglo-Australian Observatory are two instances of institution-building for which generations of astronomers will be beholden to Hoyle. And on top of it, he has left his mark as a science populariser (he is a Kalinga award winner) and a writer of science fiction.

When the young Fred went to Cambridge for the scholarship examination that would decide his admission to that famed university, he found himself in the company of boys who had been extensively coached by their schoolmasters. As he writes, however: 'Every effort was made (by the examiners)... to award scholarships to pupils, not to schoolmasters'. Contrast the situation in India today where the credit for a pupil's name appearing in the merit list (of XII Std or IIT-JEE, NTS or other examinations) is brazenly claimed by the coaching classes. 'Merit' acquired through coaching, of course, does not make good scientists. But then our examinations never claim to be designed for detecting budding Sahas, Boses or Ramans.

Institutions' Decline

Like great empires and cultures, great scientific institutions also have phases when they undergo decline and fall. The Cavendish Laboratory under J.J. Thomson, followed by Rutherford, was no exception as Hoyle discovered in the mid-1930s. Taking a period of ten to 15 years as the typical generation span for a theoretical physicist (that is, the phase when he or she is most creative) he considers his generation to be the unluckiest in terms of inspiring works on the frontiers of fundamental physics. When he entered research, pioneers like Dirac and Heisenberg had done their great work and the next thrusts had to await the post-war years.

Though he was unlucky with fundamental physics, Fred Hoyle had the privilege of living through the period when a major leap in our understanding of stars was taking place, an understanding to which he himself has been a major contributor. To most workers in the field today, Eddington is a textbook name: Hoyle brings it to life with personality touches, anecdotes and an appraisal of his pioneering contributions to stellar physics. The reader will enjoy living through the forties, fifties and the sixties when the subject of stellar evolution was being put together brick by brick on the foundations laid by Sir Arthur Eddington to whose Plumian chair in Cambridge Hoyle himself succeeded in 1957.

Long Interlude

Sir Fred's scientific career, like that of several of his contemporaries, had a long interlude brought upon by World War II when the scientists applied their minds to solve the technical problems of warfare. Sir Fred worked on the newly emerging radar technology. The reader will find hilarious stories of many scientists whose names one associates with fundamental researches. In particular, wartime work brought together the trio of Bondi, Gold and Hoyle who were to become famous for the idea of the steady state model of our universe.

The aftermath of war saw Hoyle resume his astrophysical interests amid the bread-and-butter problems that were no less difficult to tackle. His march to the 'watershed' in 1958 when he succeeded to Eddingtons's chair at Cambridge will be read with interest by astrophysicists, young and old, since in it unfolds the story of how the problem of the origin of chemical elements was solved. The key problem in the chain of element-building in stars was how to make carbon, which is one of the vital elements of our living systems. It was solved in 1953 by Sir Fred by a *tour de force* that shows the theoretician at his best.

Cambridge politics during the sixties shows that even the best of the educational establishments are not immune from petty jealousies, vindictiveness and bureaucratic interventions. Having watched Hoyle's struggles from close at hand I must admire his tenacity in getting the Institute of Theoretical Astronomy established. Even more do I admire him for resigning his directorship of the institute and his Cambridge professorship on a serious issue of future policy. Contrast this with the general situation prevailing (more so in India) where science bosses like to hang on to their power bases well past the stage of their usefulness.

Forthright Style

The other achievement that made Fred Hoyle famous (or notorious?) was in cosmology which he describes towards the end, intermixing science with the sociology of science and with philosophy and religion in his characteristic forthright style. The reader will see a parallel between a nine-year-old confronting the town's educational establishment and a scientific rebel standing up to the current dogma.

Fred Hoyle may be accused of working on unfashionable ideas and he has the reputation of being a controversial figure. But many of his ideas started that way and eventually turned out to make sense. Nobody would deny that he is the most original astrophysicist around today and whatever he has to say is worth listening to. In this book he tells his own story in an entertaining fashion and you feel that he is sitting in front of you narrating it. Often there are diversions from the main theme in anecdotes and philosophising which makes it all the more worth reading, not only by the new generation of scientists but also by the lay reader wanting to catch the flavour of an exciting era in astronomy and the thoughts of an exciting and highly original mind.