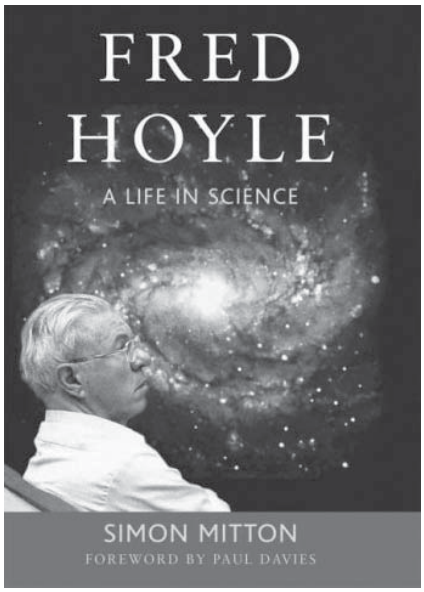
Fred Hoyle – a life in science



by Simon Mitton

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Simon Mitton was astronomy publisher at Cambridge University Press for 20 years, but before that he was a research astronomer, and studied under Hoyle in Cambridge.

Starting with the subject's early life, the treatment is traditional until we get to the Second World War. Suddenly, we cover and recover the same periods, seeing Hoyle in different roles: for instance, as a scientist involved in the development of radar and, more importantly, its use in action. Simon supports the idea that Hoyle would have received far greater recognition for building a new radar set than for what he actually did, which was to make the available one useful to detect not merely the approach, but the height, of an enemy aeroplane.

Hoyle originally espoused accretion to explain why some stars are giants and others not. It took an effort of stepping back to see this in context. The continuous creation theory and its parallel (the steady state theory of Bondi and Gold) came before the work on stellar evolution.

Hoyle's great rival, Martin Ryle, began investigating solar radio emissions after two German battlecruisers and a heavy cruiser dashed up the Channel in broad daylight past radar jammed by those emissions. Simon is illuminating on the differences and similarities between Hoyle and Ryle. Although I enjoyed the 'Clash of the Titans', it was something of a relief to get away from that frankly unedifying story to the astrophysics and B^{2}FH – the famous collaboration of Margaret and Geoffrey Burbage, Willy Fowler and Fred Hoyle which developed the theory of stellar nucleosynthesis. Circa 1950 there was a ban on women observers at Mount Wilson and Margaret Burbidge could only use the telescope if Geoffrey was there to chaperone her. They kept a low profile, took their own food and lived secluded in the Kapteyn Cottage, but they got the data they wanted. The hydrogen bomb test of 1952 November 1 provided more data by showing that heavy elements were synthesised in the explosion. Hoyle seized on the analogy between a thermonuclear explosion and a supernova. Hoyle was the first named author of the famous 108-page B^{2}FH paper. It remains a classic.

Whilst collaborating with Fowler, Hoyle 'dabbled' with Big Bang nucleosynthesis. Ways to make hydrogen and helium, of course, but also deuterium, helium-3 and lithium-7, all came out of this. Back on astrophysics, Hoyle and Fowler showed that a massive star's core would run out of sustaining thermonuclear reactions and collapse catastrophically. The catastrophe comes when the core is 'burned to iron'. Fowler got the Nobel Prize for this work and was embarrassed that Hoyle did not.

I found the story of the creation of the Institute of Theoretical Astronomy at Cambridge fascinating, as was the tale of the Anglo-Australian Telescope, another of Hoyle's projects that is still doing grand work today.

One suspects that Hoyle's combative nature led him into some unnecessary fights. Stating that the Archaeopteryx in the Natural History Museum was a fake was one. By contrast, his careful analysis of Stonehenge was badly needed. He lived into the 21st century, revered by many, hated by some, baffling to others. He was a great broadcaster, and a man who could write the most abstruse theoretical paper or a brilliant popular book. He remains an enigma – a giant figure of a small assertive Yorkshireman.

Roger O'Brien

Roger is a lecturer and writer on astronomy and a would-be science fiction author. He says he is also old enough to know better.