Fred Hoyle: A Scientist of Multi-Faceted Talents

Fred Hoyle was born on June 24, 1915, in a little village called Bingley in Yorkshire. (Fred is not a shortened version of Frederick; in Yorkshire it is a complete name.) His father used to trade in cloth and his mother was an expert in music, especially in playing the piano. Fred developed an interest in playing the piano as well as in mathematics when he was young. His power of analytical reasoning was demonstrated at the age of three, when he had worked out the way to read and tell the time from a clock, all by himself (*Box* 1).

Fred got interested in astronomy at a young age. The Hoyles, father and son, would walk eight miles to the house of a friend who had a telescope, and would return in the early morning after a night of sky watching.

Considered a bright student at school, Fred entered the University of Cambridge with two scholarships, to do the mathematical Tripos. He distinguished himself by winning the Mayhew Prize.

When the second World War began, like many other scientists, Fred too worked on wartime projects and helped develop research on the radar system. After the war was over, Fred came back to Cambridge and started work on his favourite subject – Astronomy. This was a new era in his life. His various contributions in this field are described in an article in this issue.

In 1948, together with Hermann Bondi and Tommy Gold, Fred proposed the steady-state theory of the universe. At that time, the established opinion was that the universe was created in a huge explosion, the so-called 'Big Bang'; and most of the scientists opposed this new theory. But Hoyle was firm in his conviction about the untenability of the big-bang cosmology and was always ready to argue with other scientists. In fact, the popular name 'Big Bang' was given by Hoyle in a cynical description of that mythical primeval event.

Fred also became well known as a populariser of science and a writer of science fiction, starting with a best-seller called *The Black Cloud.* In 1969, he was awarded the Kalinga Prize by UNESCO, for popularizing science.

In 1958, Hoyle became the Plumian Professor of Astronomy and Experimental Philosophy in the University of Cambridge. This Chair was earlier occupied by Sir Arthur Eddington and Sir Harold Jeffreys, who were stalwarts in their respective fields. Normally, professors in the University of Cambridge are considered to be well known and well established. But, though very well known and distinguished, Hoyle was never a part of the Establishment. Because, to

Box 1. Fred Hoyle and Time*

My parents told me in later years that I discovered how to tell the time when coming up to the age of four. Here I have to be careful not to confuse the later information from my parents with the impression I have of the actual moment of discovery itself. There is a detail, however, in my apparent memory that only I would have known. So probably there is some substance to the memory. Since the incident was my first bit of research there would also be a reason for it to have stuck. It happened like this.

One of the things my father did immediately after being demobilized early in 1919 was to fix an old grandfather clock which ticked away boldly for years thereafter in a corner of our 'sitting room', as we called it in unashamedly middle-class terminology. For a while the grandfather clock was a talking point between my parents and between my father and others who came into the house to help him with it. I became more and more intrigued, and frustrated I suppose, by this thing which everybody around me called 'time'. Where *was* 'time', I asked myself. I hunted around trying to find it. Eventually, when the clock began to work, the mystery partially resolved itself. 'Time' had to do with the hands of the clock, which being a grandfather clock were quite obvious to the eye. Yet as one mystery became a little clearer others took its place. 'Time' was never the same twice running – which made you think a bit, didn't it?

Whatever 'time' was, it had to do with the motion of the hands. I knew this to be true, an easy deduction, because one of my parents would ask, 'What's the time?' Then the other would look at the hands of the clock and give the answer. Not to be outdone, I got into the way of asking, 'What's the time?' My repeating of the question must have seemed inane, and it is to my parents' credit that they kept on answering it, for if they hadn't I would never have made my little discovery.

I'd been put to bed one night, but even then I contrived to shout downstairs, audibly in our house: 'What's the time?' One of my parents answered: 'Twenty past seven, and that's the last time.' If it was to be the last question for the day, there was nothing left but to think a bit before I went off to sleep. An idea suddenly occurred to me. Could it be that 'time', instead of being a mysterious number unknown to me called twenty past seven, was really two separate numbers, twenty and seven? Discoveries mostly need two steps, just as a tune needs an answering refrain. A second idea hit me almost immediately. There were two hands on the clock. Perhaps one number belonged to one hand and the other number belonged to the other hand. A few more repetitions of the question 'What's the time?' the following day showed that this was indeed so. Because the numbers on the clock face were big and clear, it was easy now to see there were two sets of them. One hand went with one set and the other hand went with the other set. Refinements remained, like the meaning of 'past' and 'to', but to all intents and purposes the problem was solved and I could turn to other puzzling things, like what made the wind blow.

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* Extract from Hoyle's autobiography *The Small World of Fred Hoyle* (Michael Joseph, London)

be established, one requires a conformist attitude. Hoyle, by nature had the stubbornness associated with his native county of Yorkshire. A Yorkshireman is outspoken and cannot be intimidated into conformism.

So, even though Hoyle worked on different committees, he kept aloof from the Establishment. The Institute of Theoretical Astronomy of Cambridge was established by him in 1966, after a lot of effort, but he did not stay as its director beyond one term. In 1972, he left it as also his Chair of Plumian Professor and went to live in a small village in the Lake District. Living like a recluse and without any formal day-to-day connection with any institution, he still kept his research going. He had headed the project of the Science Research Council of the UK to establish the important Anglo-Australian Observatory in 1973. But, thereafter, he did not have links with governmental committees. In 1972, he was knighted, but though 'Sir Fred' now, he always remained a rebel, till his demise in August 2001.

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Fred Hoyle planting a tree on the IUCAA premises during his visit in February 1994.