# Robert Hanbury Brown*

The death of Robert Hanbury Brown on 16 January 2002 was sad news to a number of worlds, within each of which he had left an indelible imprint. In World War II, Hanbury—as everyone knew him—played a vital role in the development of airborne radar. In the field of radio astronomy, the first of several new windows that transformed our view of the universe over the last half century, he was one of the pioneers. Applying ideas borrowed from radio to optical astronomy, Hanbury and his associates made amazing and lasting contributions to our knowledge and understanding of stars. In this process, he incidentally created a wholly new and important branch of fundamental physics now known as quantum optics. Yet another world was India, the land of Hanbury's birth, where physicists and astronomers have lost a much esteemed and beloved friend. Unusual to the end, he contracted no fewer than three primary cancers and died peacefully in his sleep at a hospice in Andover, UK, from an aggressive lymphoma.

Hanbury was born in 31 August 1916 in Aravankadu in the Nilgiri hills of southern India. Sent to England at age 8 to attend a preparatory school where no science was taught, Hanbury was all set to become a classics scholar at Tonbridge, his next school. But his passion—science—was encouraged by his grandfather, Robert Hanbury Brown, who kept his own laboratory.

When a financial crisis in the family precluded attendance at the University of Cambridge, Hanbury switched to Brighton Technical College. There he earned his B Sc degree in electrical engineering in 1935 and subsequently received a scholarship to Imperial College, London, to pursue his Ph D. But this was not to be. In 1936, the rector Henry Tizard, who noticed that Hanbury was keener on flying airplanes than attending lectures, yanked him out of college and sent him to Bawdsey Manor. This fairytale castle was hidden away on the Suffolk coast, where Robert Watson-Watt's team was developing radar in great secrecy. Of this period Hanbury later wrote, 'Nothing which I have done since then has been so exciting, so absorbing, or so worthwhile'. In 1942, he went to Washington DC, to liaise with the US Navy, and remained there until 1947. The expertise gained in the Allied effort to develop radar was applied at the end of the war with great success to the new field of radio astronomy. Hanbury, having spent two years as a consulting engineer with Watson-Watt, was among the last of the radar veterans to join this field. In 1949, Hanbury joined the Jodrell Bank Observatory, which was originally set up by Bernard Lovell—another radar veteran—for the study of cosmic-ray showers. A 218-foot paraboloid that had been con-

structed for this purpose was converted into a first-class radio telescope by Hanbury and his colleague, Cyril Hazard, with considerable effort. Some of the many important discoveries made with this instrument conflicted with the findings of Martin Ryle's group at Cambridge. The conflict established a much needed and healthy opposition to ensure the proper advancement of this rapidly growing science. Hanbury inspired an entire generation of aspiring radio astronomers at Jodrell and elsewhere.

Hanbury is best known for his invention of the intensity interferometer to increase the baseline range of radio interferometry. His brilliant idea of applying this technique to optical astronomy unpredictably changed the course of his professional career. In the radio domain, intensity interferometry meant the comparison of the detected signals from two different radio antennas pointed at the same radio source, and the validity of the correlation was simply understood and easily demonstrated. In the optical domain, however, this correlation translated into comparing the times of arrival of photons from a given star at two different collectors, and that is where the trouble started. Indignant physicists quoting from and brandishing sacred texts such as those by Walter Heitler and Paul Dirac repeatedly told Hanbury and his theoretical collaborator, Richard Twiss, that such a scheme could not work. Such outcries were quelled only after laboratory experiments and observations of Sirius with a pair of searchlight mirrors showed the expected correlations.

If photons obey Bose statistics, there should be a correlation in their arrival times at separated detectors. It is extraordinary, and a tribute to the perception of Hanbury Brown and Twiss (sometimes thought to be three people), that an effect wholly consistent with theory and one that should have been predicted aroused such dramatic reactions at first encounter—and not only from those who could be dismissed as half-baked. I was present at a Caltech colloquium at which Hanbury talked about it, and Richard Feynman jumped up and said 'It can't work!' In his inimitable style, Hanbury responded, 'Yes, I know. We were told so. But we built it anyway, and it did work'. Late that night, Feynman phoned and woke Hanbury up to say 'you are right'. He also wrote a letter in which he magnanimously admitted his mistake and acknowledged the importance of this phenomenon that, at first sight, appears counterintuitive, even to quantum theorists. It is now at the heart of a whole field called quantum optics, with its own sacred texts that can be brandished as needed. I believe that Hanbury Brown is certainly among the omissions in physics that the Nobel committee will never live down.

The power of optical intensity interferometry is that it overcomes both the need for extreme mechanical stability and the effects of atmospheric scintillation, which together are so severe that the instrument Albert Michelson and his collaborator Francis Pease built in the

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1920s at Mount Wilson could measure the diameters of only six supergiant stars. Some 40 years later, Australian support enabled the building of the Narrabri Stellar Intensity Interferometer in New South Wales. With this unique instrument, Hanbury and colleagues made the first measurements of the angular diameters of 32 main sequence stars and established the first wholly empirical temperature scale for hot stars, a major contribution to fundamental astronomy. Hanbury initiated the next step of building an instrument with even greater resolution after the closing of the Narrabri Observatory; and the Sydney University Stellar Interferometer (SVSI) went into operation in 1991.

What was intended in 1961 to be a two-year sojourn in Australia turned out to be a 27-year saga, during which Hanbury grew to love the country. He received its highest honor, the Companion of the Order of Australia, in 1986. Meanwhile, he made several visits to India, another country he loved. As an honorary fellow and the first Raman Visiting Professor of the Indian Academy of Sciences, he spent time at the Raman Research Institute in Bangalore in 1974 and also toured the country, enthralling audiences wherever he went. In 1985, Hanbury presided over the 19th general assembly of the International Astronomical Union in Delhi. His wit and style made the public sessions memorable and enlivened boring administrative sessions.

Hanbury had a delightful way with the written and spoken word, and his books, both technical and popular, are as full of his humor as were his lectures, conversations, and scintillating after-dinner speeches. *Boffin* (Adam Hilger, 1991), a brief autobiography, is recommended reading for anyone who would like a glimpse of Hanbury's interesting, fulfilling, and action-packed life.

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# MEETINGS/SYMPOSIA/SEMINARS

**Hands-on Training course on Molecular Markers: Tools for Genetic Variability Analysis**

Date: 18–31 October 2002
Place: Lucknow

Contact: Kuldeep Kumar Lal
Canal Ring Road
P.O. Dilkusha
Lucknow 226 002
Tel: (0522) 442440, 442441, 441735
Fax: (0522) 442403
E-mail: nbfgr@sancharnet.in

**National Seminar on 'Teaching Chemistry'**

Date: 14 December 2002
Place: Kolkata

A one-day National Seminar on 'Teaching Chemistry' has been arranged with emphasis on 'course contents', 'method of teaching' and 'evaluation'.

Contact: Dr Sanjib Ghosh
Department of Chemistry
Presidency College
86/1 College Street
Kolkata 700 073
E-mail: sanjibg@cal2.vsnl.net.in

**Chautauqua on Popper and Philosophical Perspectives for Reliable Scientific Knowledge**

Date: 27 November 2002
Place: Bangalore

This will be an assembly for education on Popper and his contribution to the definition of reliable scientific knowledge. Sir Karl Raimund Popper is regarded as one of the great philosophers of science, and arguably, the greatest philosopher of science that has ever been. Philosophy of Science is very broad in scope. It dates back to the earliest thinkers who paid attention to the process of acquiring reliable knowledge – the rules of inference, for example, as understood by the Stoics, and the tradition continued by Socrates, Plato and Aristotle. This educational meeting will have a narrower focus – mainly on Popper's critical rationalism. The meeting will try to examine from a more practical viewpoint to what extent philosophical underpinnings must support our scientific investigations. Here, Popper's vision is the most illuminating.

*Registration*: Participation will be by invitation or by expression of interest. Please register for participation in the Chautauqua. As no registration fees will be charged, participation will be restricted to about 25 delegates.

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