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 Victoria Museum and
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The 2008 Grote Reber Medal is awarded to Dr Sander Weinreb



*Dr Sander Weinreb,
 winner of the 2008 Grote Reber Medal
 ©Photo: Dr Sander Weinreb*

The 2008 **Grote Reber Medal** for lifetime innovative contributions to radio astronomy has been awarded to **Dr Sander Weinreb** of NASA's Jet Propulsion Laboratory and the California Institute of Technology. Dr Weinreb is being honoured for his pioneering developments of novel techniques and instrumentation over nearly half a century which have helped to define modern radio astronomy.

'Sandy Weinreb's contributions to radio astronomy technology are to be found throughout the radio observatories of the world and have set the foundation for so many amazing astronomical discoveries', said Dr Ken Kellermann of the National Radio Astronomy Observatory in the USA.

Weinreb received his PhD degree in electrical engineering from the Massachusetts Institute of Technology (MIT) in 1963. While he was still a graduate student at MIT, he developed the world's first digital autocorrelation spectrometer which he then used to place a new upper limit to the Galactic deuterium-to-hydrogen ratio. With Barrett, Meeks, and Henry, he detected the hydroxyl molecule (OH); this was the first radio observation of an interstellar molecule. His autocorrelation spectrometer technique is now in use at virtually every major radio observatory throughout the world and has been crucial in the subsequent explosive growth of interstellar molecular spectroscopy.

In 1965 Weinreb went to the U.S. National Radio Astronomy Observatory (NRAO) in Green Bank, West Virginia where he became Head of the Electronics Division and later Assistant Director of NRAO. During his 23 years at NRAO, he pioneered the use of low-noise, cryogenically cooled solid state amplifiers which greatly enhanced the sensitivity of radio telescopes. He was the architect for the electronic systems design for the NRAO Very Large Array (VLA) in New Mexico and led the group which developed the novel receivers and the data transmission, acquisition, and monitor and control systems for the VLA.

Subsequently, Weinreb worked firstly at Lockheed Martin Laboratories and then at the University of Massachusetts where he developed various millimetre wave devices. He has also been a Visiting Professor at the University of Virginia. Most recently he has been a Faculty Associate at Caltech and a Principal Scientist at JPL where he has continued his work on low noise amplifier devices. He played a leading role in the electronics design for a new Deep Space Network (DSN) space tracking array, and he has been active in developing wideband feeds and front ends as well as investigating cost effective designs for modest size antennas, all of which will be important for the next generation of radio telescopes such as the Square Kilometre Array (SKA). In addition he has been working with the Goldstone Apple Valley Radio Telescope (GAVRT) program to develop a 34-metre radio telescope at Goldstone for use with schools around the globe.

'For nearly five decades Sandy's innovative contributions to radio astronomy have paved the way for an amazing array of new and exciting discoveries about the nature and evolution of the Universe', said Dr David Jauncey of the Australia Telescope National Facility in Australia.

The 2008 Reber Medal will be presented to Dr Weinreb at the International Radio Science Union (URSI) radio astronomy commission meeting to be held on 13 August 2008 in Chicago. The Reber Medal was established by the Trustees of the Grote Reber Foundation to honour the achievements of Grote Reber, the world's first radio astronomer, and is administered by the Queen Victoria Museum in Launceston, Tasmania in cooperation with NRAO, the University of Tasmania, and the CSIRO Australia Telescope National Facility.

Nominations for the 2009 Medal may be sent to Martin George, Queen Victoria Museum, Wellington St, Launceston, Tasmania 7250, Australia or by e-mail to martin@qvmag.tas.gov.au. Nominations are to be received no later than November 15, 2008.

About Grote Reber



*Grote Reber in Bothwell in 1995
Martin George, QVMAG*

Grote Reber was born on 22 December 1911. Before he was 30 years of age, he became the world's first radio astronomer. He opened up a whole new window on the Universe through which astronomers can study objects and processes quite different to those that produce ordinary light. These include quasars and pulsars, and the detection of atoms and molecules in the space between the stars.

Before the 1930s, astronomers could study the universe only in visible light—the radiation that our eyes, and ordinary photographic film, can detect. That changed in two major steps. In the early 1930s, Karl Jansky investigated radio interference in transatlantic telephone links and, in the process, discovered radio emissions from our Milky Way Galaxy. It was Grote Reber, however, who decided that this was an important new way of studying the Universe and decided to take some action. "I consulted with myself and decided to build a dish," he said!

To this end, Reber, in 1937, constructed the world's first purpose-built radio telescope. He built it adjacent to his home in Wheaton, Illinois, just west of Chicago, and it was of the now familiar 'dish' design. Reber's telescope was the forerunner of the classic design of the world's famous radio telescopes (including the famous 'dish' at Parkes, in Australia). The same principle is used widely today in many other applications, including satellite dishes in private homes.

Reber used his telescope, which had a diameter of 9.75 metres (32 feet), to map the sky at a frequency of 160 MHz, or a wavelength of 1.9 metres. This was the first detailed radio map of the sky which showed the Milky Way and revealed for the first time the presence of the Galactic Centre and the radio source known as Sagittarius A.



*Reber's Original Radio Telescope
constructed in 1937
Courtesy of Estate of G. Reber*

'His work was a huge step forward for astronomy', said Martin George, President of the International Planetarium Society. 'For the first time, the Universe was being studied at wavelengths other than those visible to our eyes.'



Reber's Antenna Array in Bothwell, 1975
Courtesy of Estate of Grote Reber

After leaving Wheaton in the early 1950s, Reber conducted radio astronomy experiments at the summit of Mount Haleakala, where he was the first astronomer to build a high-altitude observatory in Hawaii. Then, in 1954, he moved to Tasmania, Australia, where he began observing at much longer wavelengths using a quite different type of 'telescope': an array of *dipoles*, which took the form of antennas strung between the tops of poles.

North of his home in Bothwell, in southern central Tasmania, Reber constructed such an array which was supported 20 metres above the ground and operated at a frequency of 2 MHz, a wavelength of 144 metres. This very low frequency radio telescope covered an area of one square kilometre. It was, and still is, the world's largest single radio telescope in terms of collecting area. In the 1960s, he mapped the southern sky with this telescope.

Reber involved himself in many other scientific pursuits. Among his activities, he built an energy-efficient house in Bothwell; he was fascinated by plants, and in particular the direction in which beans entwined themselves around poles; and he was particularly keen on studying energy-efficient transport, being very proud of his electric car called *Pixie*.

Reber was well known for his independent thoughts and activities.

'He had no patience for negotiation or compromise, and was forcefully direct in choosing his words. One always knew what he was thinking about and what he wanted. Grote Reber believed in himself!' said Dr Ken Kellermann of the National Radio Astronomy Observatory in the USA.

Reber's views on various topics, especially his opposition to the widely accepted *Big Bang Theory* of the origin of the Universe. 'Grote and I would often chat about his ideas', recalls Martin George. 'He was often heard to say that *The Big Bang is Bunk!*'.

Although Reber's research and ideas often fell outside the mainstream activities of other astronomers, his contributions, especially in the early days of radio astronomy, were both pioneering and critically important. He was awarded a number of prizes, and an honorary Doctor of Science Degree from Ohio State University in the USA.

Grote Reber died in Tasmania on 20 December 2002, two days before his 91st birthday.

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