MOUNT WILSON AND PALOMAR OBSERVATORIES
CARNEGIE INSTITUTION OF WASHINGTON
CALIFORNIA INSTITUTE OF TECHNOLOGY

813 SANTA BARBARA STREET
PASADENA, CALIFORNIA

March 28, 1962

Mr. Grote Reber
"Dennistoun"
Bothwell, Tasmania
Australia

Dear Mr. Reber:

Thank you for the photographs, which are very satisfactory.

They will be used in connection with my remarks at the annual meeting when they are published. A copy is enclosed. If there are errors, or if you wish something were said differently, please send corrections to me soon. The manuscript need not be returned, if the corrections are indicated by page and line.

Are you still planning to visit the United States this year? We would like to have an ASP dinner in Berkeley at which your medal would be presented with some remarks by you in reply. If this could be in the last weeks of September, everyone would be back from vacation and the University would be in session. If this is not convenient for you, however, some other time would be possible.

Sincerely yours,

Seth B. Nicholson

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AWARD OF THE BRUCE GOLD MEDAL TO GROTE REBER

Seth B. Nicholson
Mount Wilson and Palomar Observatories
Carnegie Institution of Washington
California Institute of Technology

After considering recommendations from the six nominating observatories, the Directors of the Astronomical Society of the Pacific unanimously chose Grote Reber as the Catherine Wolfe Bruce Gold Medalist for 1962. Their decision was influenced by the many contributions he has made in the field of radio astronomy and especially by his pioneering explorations in that field long before its astronomical possibilities were realized by others. His relation to these early developments is well summarized by the editor of the Proceedings of the Institute of Radio Engineers, who wrote, "Although Karl Jansky discovered the existence of radio emissions from outer space as early as 1932, a decade passed before the scientific world began to take interest in it. During that barren period, one man, and one man alone, compelled by a great love of science and research, carried forward Jansky's initial work." That man is our Medalist.

Grote Reber was born in Chicago, Illinois, in 1911 and graduated from the Illinois Institute of Technology in 1933. During the next fourteen years, while developing, building, and using the first radio telescope, he was employed by the Stewart Warner and Belmont Radio Corporations in Chicago.

He tells the story of these early years in an article entitled "Early Radio Astronomy at Wheaton, Illinois", published in the Proceedings of the Institute of Radio Engineers in 1958. His description of the first radio telescope, ever made, is most fascinating. Built mostly of wooden 2 x 4's with a covering of galvanized iron, its overall diameter was 31 feet 5 inches with a focal length of 20 feet. It was mounted in the meridian and could be moved over a large range in declination. The complete structure, which was assembled in four months in the summer of 1937, weighed less than two tons. He remarked about the telescope, "This mirror usually emitted snapping, popping, and banging sounds every morning and evening (due to temperature changes). When parked in a vertical position, great volumes of water poured through the center hole during a rain storm. This caused rumors among the local inhabitants that the machine was for collecting water and for controlling the weather."

The first results from this telescope were disappointing, but Reber kept on experimenting. By the autumn of 1938, it was clear that more sensitivity was required and that the exceedingly high frequency of 910 megacycles, which he was using, was not as efficient as he had thought it would be. The operating frequency of 162 megacycles, which he finally adopted, was determined by the size of a cylindrical cavity resonator that could be made easily from a standard-size sheet of aluminum. This cylinder,

which was 4 feet in diameter and 6 feet long, was mounted, with an improved amplifier attached, on the mirror in the spring of 1939.

During the day no worthwhile results could be obtained because of interference from the multitude of automobiles. After 10 P.M. this disturbance quieted down and observations could be made in earnest. The data was plotted as microammeter readings against time. Early in March, in which month he was then observing, the plane of the galaxy does not cross the meridian until after sunrise and, while the disturbance from automobiles was not really bad until 10 A.M., the amplifier gave trouble when the sun shone on it. On cloudy mornings this trouble was absent and some of the plots on such mornings showed excess energy when the galaxy crossed the meridian. These occasions were few since the cloudy mornings had to come on week ends when our radio astronomer was not at work in Chicago. By April the plane of the galaxy crossed the meridian before sunrise and good reproducible plots were obtained consistently. That summer a number of celestial objects were examined with no definite results except from the Milky Way. In a general way these observations confirmed Jansky's.

This success stimulated Reber's desire to learn more about cosmic radio sources and in 1941 he began planning a sky survey, the results of which were published in 1942. This survey was repeated in 1943 with much improved equipment and in September 1943 his first measurements of radiation

from the sun were made. The sun was then near sunspot minimum and the solar traces, which were all very much alike, showed energies far in excess of that from the galaxy.

In 1943 Reber turned to experiments with a higher frequency of 480 mc., but no significant results were obtained until the summer of 1946 when improved equipment had been designed. Results were then obtained at this frequency from the Milky Way and from the sun. His measurments showed that galactic radiation was much weaker but solar radiation was much stronger than at 160 mc.

By that time, his readings were being made automatically on a recorder with the telescope unattended while the astronomer was at work in Chicago. The solar records indicated that interference, presumably by automobiles, was very strong on some days while the sun was crossing the meridian, which seemed very mysterious. At last, on a week end when he was present, these mysterious signals came again and tests left no doubt that they were short intense bursts of radiation from the sun, which was then near sunspot maximum.

In 1948 Reber's radio telescope was moved to Sterling, Virginia where he worked with it at the National Bureau of Standards. There he studied the fine details of solar radiation bursts and showed that their duration was proportional to wavelength. Motion of material out through the solar corona and back again was also demonstrated.

In 1952 Reber went to Maui, Hawaii, where he observed from the top of Haleakala at an elevation of 10,000 feet with a sea-surface interferometer. The results there were meager partly because of unexpected intense scattering which he attributed to a band of electrified particles around the earth's equator.

In 1955 Reber went to Tasmania where he observed at wavelengths much longer than those he had used before, ranging from 100 to 2000 meters. These observations were made possible by the invention and application of a special circuit between the detector and the recorder, which eliminated terrestrial atmospherics that are so prominent at those wavelengths. In 1959 Reber returned to the United States and spent a year at Green Bank, West Virginia where he reconstructed his first radio telescope and studied new designs for larger ones.

In 1960 he went to Macquarie Island at 55° south latitude, where he investigated a possible site for a radio observatory to utilize the better transmission of cosmic radiation at 1000 m wavelength, which might result from the strong vertical component of the earth's magnetic field there.

At present our Medalist is in Tasmania organizing the construction of a steerable array for observing at 141 meters wavelength.

Grote Reber's contributions to radio astronomy can hardly be over estimated. In those early years when he worked alone with equipment far from as efficient as that now available and in surroundings that would now be considered hopeless, there were many disappointments which he admits were discouraging, but says that they only whetted his appetite because he is (and I quote him) "a rather stubborn Dutchman". It is men with his insight, his spirit, and his courage that make progress on new frontiers. For such distinguished services to astronomy the Directors of the Astronomical Society of the Pacific chose him as the Bruce Gold Medalist for 1962.