October 3rd, 1950
P.O. Box 4868
Cleveland Park Station
Washington, D.C.

Dr. Otto Struve
Berkeley Astronomical Department
University of California
Berkeley 4, California

Dear Dr. Struve:

Yesterday I returned from an eclipse expedition to Attu, Alaska and found your letter of July 31st on my desk. I have filled out the question blank and am returning it with this letter. Please pardon the delay. Perhaps my answers are biased. However they point out the kind of things which I am interested in and believe to be important. Their place in the overal picture will have to be determined by someone with a wide knowledge of all branches of the science. I have left out any mention of meter wave spectroscopy. Since most of the universe is made of hydrogen, this element seems to offer some possibilities. There is one transition in hydrogen near 15cm and another in hydrogen II near 90cm which offer possibilities. Most other long wave transitions occur in elements which are much heavier or in compounds. These are both quite rare in nature but should not be entirely excluded as possibilities. The transitions at 15cm and 90cm have been verified in the laboratory but not in the sky.

The Attu eclipse was probably the first total eclipse of the sun which was successfully observed in a pouring rain during a hurricane. Good results were achieved at 3, 10, 67cm wavelength.

If I can be of further assistance please feel free to write.

Sincerely yours,

Grote Reber

The structure of the Galaxy as interpreted by measurements over the wave length range 10cm to 10meters should give new and independent insight to the distribution of material and energy. The primary problem is resolution. Measurements of the intensity of these radiations, over a million times as long as light waves, is rather meaningless without knowledge of the position of their source. An adequate theory of the origin of these long electromagnetic waves is still lacking. Observations alone, without extensions of the theory, will merely tabulate data. Theory cannot advance without better observations. The two must be persued together if significant information is to be obtained by this avenue. Probably the opportunity is directly proportional to the range of wavelength examined. Since the window in the atmosphere at meter wavelengths is roughly 30 times as wide as the window at optical wavelengths, the rewards appear to be great. Radio Astronomy today appears to be where photographic astronomy was three quarters of a century ago.

This came out on page 18 of Jan 1951 Journal of Franklin Institute.

A large mirror, perhaps 300 feet in diameter, should be located near the equator of the earth in order that most of the sky may be observed. It should be placed upon a high mountain on an island in the middle of the sea in order that the surface of the water may be used as a mirror. A type of interferometry is thus possible, where the base line is twice the height of the mountain. As the object rises from the sea and later sets into the sea, a very precise determination may be obtained of its position in the sky. By this means the great disadvantage of extremely long wavelength may be largely overcome. The mirror must be large, partly to capture substantis energy, but mostly to provide adequate primary resolving power. Without the latter, a multitude of sources will cause overlaping interference patterns and the results will be hopelessly confused.

An adequate survey of the sky could probably be made in five years. At the end of this period the results should be assessed and pehaps the program should be reoriented along new lines.

Not particularly. If the installation is made in the same country supporting the work, no complications should be encountered.

Yes.

Grote Reber

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BERKELEY 4, CALIFORNIA

July 31, 1950

Dear Colleague:

May I ask for a few minutes of your time?

Dr. H. B. Allen, of the Franklin Institute of Philadelphia, has recently asked me to prepare an article on astronomy for the 125th anniversary issue of the Journal of the Franklin Institute. There are to be similar articles on physics, chemistry, etc. Their purpose is to describe "The Things to Come," that is, they are to contain an outline of important problems and achievements that may be expected during the coming years.

This is a difficult assignment and I should hesitate to predict what astronomers may achieve, or even what they, as a group, want to achieve. Hence, I thought it would be interesting to present not the opinions of a single person but rather a cross section of the opinions of many astronomers. It may be valuable for us to make such a joint statement of our plans and hopes. And even if this plan should accomplish nothing more than serve as a guide for future planners, it will probably make interesting reading. Incidentally, it would relieve me of the sole responsibility for having made some bad guesses!

I am, therefore, sending this letter to a number of astronomers with the request that they answer the questions on the sheet attached herewith and return it to me as soon as convenient.

Very sincerely yours,

Otto Struve