

Herbert Wishnia replied to this letter from Phillip Morrison and mentioned preliminary observations with Copernicus Satellite (see page 3).

CONTAINS REFERENCE
TO COPERNICUS OBS'INGS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DEPARTMENT OF PHYSICS

CAMBRIDGE, MASSACHUSETTS 02139

Room 6-308

August 29, 1975

Dear

About fifteen years ago it first became clear that the normal development of the science of radio and radar astronomy had had an unexpected consequence: we humans found ourselves in actual possession of the means of signalling to an assumed counterpart installation across interstellar distances. To this day no other communications technique is capable of such a reach.

That fact stimulated the proposal to listen - though not to transmit - for such signals from elsewhere. Whatever your estimate of the probability that there exist distant counterparts, possibly much advanced ones, of our technology, it is plain that eventual empirical tests of the conjecture imply interests parallel to the broader concerns of most radio astronomers. I write to draw upon that convergence of interest, to ask your help in hope of mutual advantage.

A scientific working group has been established lately in the USA to examine and to report upon the question of a search for interstellar communications. I am currently Chairman of the group - their names are listed below - which includes participants from a wide range of disciplines, astronomers with a wide variety of specialty, information and communications experts, biologists, experienced engineers.

A somewhat similar effort to ours has lately been reported by a Board of the Academy of Sciences of the USSR (1).

It is premature to announce any decision on optimum channels and procedures, or on the scale of effort which makes sense. But we regard the frequency range from about 1 Ghz to a few tens of Ghz as a major candidate. That forms the basis of our mutual interest.

Within this form of search, two or three distinct modes can be seen. The initial Soviet emphasis seems to be devoted to

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a search with wide-band non-directive means for short pulses, looking to time coincidences at distant receivers (2) to distinguish the signature of an extraterrestrial source. The opposite mode is fully as attractive: seeking a narrow-band signal with highly directive antenna beams, much improving the signal-noise ratio at the price of a search in direction and frequency (3,4). There is a kind of intermediate: a relatively wide beam is directed at an external galaxy which fills it, hoping to search all at once a large number of potential stellar sources, all of them of course very remote (5). There are other possibilities (6).

While pioneer searches have been published, it is clear that the task has been barely begun. We want to ask you and your staff to help us appraise the feasibility of a mutual approach, the use of existing large antennas (with low system temperatures) to establish limits on such signals as a by-product of present scientific research. Narrow-band signals would much reward the use of multichannel spectrum analyzers for simultaneous search over some 10^6 up to 10^9 channels, each of the order of 1 Hz width, in the band from 1.4 to 1.7 Ghz. Carefully chosen target directions would be examined in a plan which included a certain amount of area search in unexpected directions as well.

We ask you to respond to a brief list of questions, whose tendency is clear. Please give us the opinion of your group, for only the present expert users of such instruments can supply realistic answers. It goes without saying that we would be interested in any other expression you wish to send us, beyond the response, brief or more extended, you might wish to make to our questions.

We should appreciate hearing your thoughts by around 15 October 1975. If we can expand or clarify our request in any way, please do not hesitate to ask.

Sincerely,

Philip Morrison

Philip Morrison
Institute Professor

PM/mb

references on separate page

Membership of the Scientific Working Group
on Interstellar Communication:

Bracewell, Ronald	Lederberg, Joshua
Cameron, A.G.W.	Lewis, John S.
Drake, Frank	Morrison, Philip (ch.)
Greenstein, Jesse	Murray, Bruce C.
Herbig, George	Oliver, Bernard M.
Kantrowitz, Arthur	Sagan, Carl
Kellermann, Kenneth	Townes, Charles H.

REFERENCES

- 1) See the report: The CETI Program, by the Scientific Council on the Radio-Astronomy Problem Area, Academy of Sciences of the USSR. *Astron. Zh.*, 51, 1125-32 (September-October 1974). English translation in *Sov. Astron.*, 18, 669-675 (March-April 1975), American Institute of Physics.
- 2) The first account of such a pulse search appears in: Troitsky, V.S., pp. 259-60 in the volume *CETI*, C. Sagan, editor (full citation below). A larger system is proposed in (1).
- 3) One report of a US effort at 1.4 GHz (since the classical Ozma work of 1960): Verschuur, G.L., *Icarus* 19, 329-40 (1973).
- 4) A Soviet narrow-band search (near 0.9 Ghz): Troitsky, V.S., Starodubtser, A.M., Gershtein, L.I. and Rakhlin, V.L., *Astron. Zh.* 48, 645 (1971); English translation in *Sov. Astro.* 15, 508 (1971). One study is proceeding at the Algonquin Radio Observatory in Canada (Bridle and Feldman) using 22 Ghz.
- 5) A first search was made at the Arecibo Radio Observatory in June, 1975, using a multi-channel analyzer and a beam directed at a number of nearby galaxies, including M31 (Drake and Sagan, unpublished).
- 6) An exploratory search was made from the orbiting UV satellite Copernicus for UV laser lines from three nearby stars (Herbert Wishnia, 1974).

We mention two recent general references for orientation:

- i) A semi-popular brief up-to-date review, Drake, F. and Sagan, C., *Scientific American* 232, 80 (May, 1974).
- ii) The report of a small international conference held in September, 1971 at the Byurakan Astrophysical Observatory, Armenian SSR. It is published as the volume: Communication with Extraterrestrial Intelligence (CETI), edited by C. Sagan. The MIT Press, Cambridge, Massachusetts and London, England (1973).

QUESTIONS FOR USERS OF RADIO TELESCOPES

- 1) What is the stability of your local oscillators?
 - a) in typical use
 - b) the best you have available

- 2) Do you now have or are you now planning to obtain a multi-channel spectrum capability (well beyond the usual widths of 0.1 to 10 kHz)?

- 3) Could astronomical research benefit from simultaneous multi-channel analyzers with 10^6 to 10^9 channels of 1 Hz width? Comments?

- 4) Comment on the present state of the art of such systems. What characteristics would you require? How would you proceed to achieve them? What directions of development seem to you to offer most promise?

- 5) If such an analyzer were made available to you would you consider using it, via an IF tap or with spare receivers, to "hitch a ride" for coherent signal search during normal observing time?

- 6) Have you ever engaged in any search for coherent or "intelligent" signals at your facilities? If so, please estimate the total hours used. Have the results been reported? Was the search a by-product of other observations? Explain.

Please respond by 15 October 1975 to:
Philip Morrison
Room 6-308
M.I.T.
Cambridge, Mass. 02139