

ASTROPHYSICAL OBSERVATORY  
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UNIVERSITY MICROFILMS  
SERIALS ACQUISITION  
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ANN ARBOR MI 48106

24 July 1956

Professor Donald H. Menzel  
Director  
Harvard College Observatory  
60 Garden Street  
Cambridge 38, Massachusetts

Dear Don:

It is with some hesitation that I send this letter in response to your request after the radio astronomy meeting on July 11, and reiterated on the telephone on Wednesday. It seems to me that the events that we have witnessed seem rather unhappy for the assured future of a strong astronomy, particularly among the institutions in the eastern part of the United States. When you made the original proposal to develop an excellent cooperative facility in radio astronomy that might more effectively bring eastern institutions into astronomy, I had every hope that Associated Universities might contribute its strength and expertise to this end. However, the divisiveness demonstrated at the recent meeting makes it doubtful that any group would enjoy the enthusiastic support that is so essential to real progress in science.

The AUI recommendations were evolved in a form designed to avoid problems or embarrassment to the National Science Foundation in providing a collaborative national facility that could be easily and competently organized and constructed. Details have been given in the AUI Planning Document, drafts of which have been widely distributed.

A national facility to be successful must be more than a collection of buildings and large instruments. It must create, through the work of the permanent and visiting staff, an intellectual environment that stimulates and regenerates thought and action in all branches of astronomy and of related science and engineering. The Facility must provide an observational environment as favorable as can be found in any other similarly situated country to insure for our astronomers an adequate competitive opportunity in their efforts to push out the frontiers of knowledge. Finally, the Facility must provide research tools not available to scientists in their individual institutions; in some cases these

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institutions will have an astronomy program too small to include even the most modest equipment for observational research; but more generally, the very large and complex instruments needed to push their studies to the vanguard of present capabilities will be outside the realm of feasibility for any but a national institution. The national facility should provide encouragement and strength to both.

From the outset the above requirements have been recognized and have dominated the AUI efforts in formulating an organization to facilitate the participation of all qualified scientists, in searching for the best possible site, and in devoting much effort on design studies for the construction and erection of very large precision radio telescopes. This latter is less important for telescopes of the smaller size, but as one progresses to telescopes beyond the diameter of 100 feet, the possibility of failure is very finite and the most competent engineering skill is required to insure success.

We believe that the final technical decisions concerning the construction and operation of the large radio telescopes ought to be made by the director and staff, who will be responsible for the construction and employment of the telescope. Advisory groups certainly must have an opportunity to comment on these matters, but the Foundation should not place itself in the difficult position of finally dictating specifications for the research tools desired by the astronomers who will carry out the work.

It was essential that any proposal for the organization of the Observatory should be in a form that would make it possible for the National Science Foundation to contract with an experienced organization in the extension of existing engineering and scientific knowledge to new and untried structures and research procedures. Clearly, the National Science Foundation must be able to call upon an organization whose access to the necessary skill in civil, mechanical, electrical, and electronic engineering provides a real expectation that new and larger radio telescopes and their associated devices will prove successful. For the operating organization must assume the responsibility for success in the extrapolation of engineering procedures well beyond present practices.

We concluded, therefore, that any recommendation that would not permit the Foundation to contract with the most competent organization to accomplish this end would be an unwise recommendation.

For several other reasons I strongly recommend against a requirement for formation of a new special organization to undertake this job. First, we felt that it would be unreasonable to propose that, for the establishment of any large-scale facility

the Foundation may undertake, it must assume responsibility to solicit a new and separate organization for each purpose. This would put the Foundation in the position of having to organize a new operating group each time an advanced facility was proposed, e.g. Astronomy, Inc. to operate an observatory, Computers, Inc. to operate a computing center, and Reactors, Inc. to operate a research reactor. In so doing, the Foundation would lose a great deal of its freedom to contract with whomever was best qualified to undertake the construction and research. Second, in creating such an organization the Foundation inevitably acquires a part of the responsibility for the successful performance for an organization brought into being specifically for its purposes. This, of course, is contrary to the spirit of the basic National Science Foundation Act, which specifies that the Foundation should not enter into operations. Thirdly, the radio astronomers who have originally proposed the facility have a right to expect that it should proceed promptly and effectively. Any new organization would require a good many years to assemble and integrate the necessary competence into the effective organization needed to construct and operate successfully large, untried machines. Speed and success seem more likely if a competent existing organization can be found whose demonstrated capability can bring the facility to fruition.

Likewise, it would be equally unreasonable to require an existing and successful organization having the necessary competence to reorganize in accordance with some notion of the Foundation or its panels as a prerequisite for the job. An academic institution engaged in successful and significant advanced research involves a delicate combination of human factors that are too easily destroyed by introduction of untried organizational procedures.

Therefore, we concluded that in the interests of all concerned, our proposal should be built around the basic principle of freedom of the Foundation to select the most competent organization to develop the facility in the interests of a virile and progressive science. This seems to be the only tolerable criterion in the national interest. This could be an existing organization, whether it be one or a group of universities, or a private corporation. The organization of a new group where the leadership and competence of this group promised to supply all the necessary skill would not be precluded, but the organization of such a group would not be required, where, in the judgement of the Foundation, a competent organization already existed. But the selection of a newly organized group should be made only where it can demonstrate superior capability to do the job.

Therefore, we further concluded that the requirements of the operating organization should be:

- A. Real skill in the management of research affairs;
- B. Enthusiasm;



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- C. Direct access to the wide range of engineering and scientific skill needed to make the facility a success;
- D. Policies and procedures that provide ready access of the scientists and students to the facility, coupled with academic attitudes;
- E. Stability and reliability essential to assembly and retention of a competent staff.

To summarize, the operating organization should have the capability to construct new and novel telescopes which are beyond the range of ordinary engineering experience and to operate these facilities as a cooperative endeavor, so that they become the extension of facilities at each institution and university. Certainly, the proposal of a competent organization that has made a most careful study of the problem over a period of years, and has produced a plan around which the Foundation program has been designed, cannot easily be ignored in making the selection.

The word "national" attached to such an observatory should stem from the philosophy under which the facility is operated. This philosophy must involve equal access of scientists from any locality to the facility to carry on researches that are beyond the capabilities of their own instruments. To insure that the operating organization carries on under a "national" philosophy, we have recommended that there be an advisory board to the National Science Foundation to specify the appropriate philosophy and to measure the performance of the facility in terms of this specification. This board should be of a national character, and it is from the composition and philosophy of such a board and the policies based on its advice and promulgated by the Foundation, particularly with respect to equal access to the facility for all qualified scientists, that the work "national" will attach to any facility of the National Science Foundation.

With such a board to specify the basic operating philosophy and to advise the Foundation concerning the subsequent effectiveness of the facility, the Foundation is then free to contract with the most effective operator that it can find. In our opinion, the Foundation can never escape this responsibility for establishing the philosophy and for the measurement of performance, in the light of its basic responsibilities in accounting to the Congress for its stewardship. This responsibility can never be delegated to an operating organization, no matter how organized nor how widely based. Consequently, since the Foundation itself cannot escape the functions of defining and evaluating the operation, there is no merit and great disadvantage in requiring a special form of organization of the operator.

It seems to us vital to distinguish between the responsibilities of the National Science Foundation, supported by a suitable Advisory Board, and the functions of the management organization. This is necessary since recent proposals to organize a "national corporation" appeared to confuse this issue. The Foundation cannot delegate by implication, or otherwise, its responsibilities related to the expenditure of substantial sums to any corporation, however widely based. Were it to do so, the Foundation would place itself in a position of simply being a provider of funds without sufficient authority or responsibility for the quality of the final product. This position, I am sure, could not stand up before the Congress. Therefore, the operating organization can never be permitted to take the position of itself establishing the basic policies under which it must operate; this is the responsibility of the Foundation. On the other hand, it is the responsibility of the operating corporation to insure that the work carried out under the Foundation's policies is effective and significant in the scientific sense, and successful. It is the operator's responsibility to insure that the facilities are made available to science purely on the basis of competence of scientists from whatever source, and in the interest of the most effective and rapid progress of astronomical science. In following the Foundation's policies, the operation becomes "national". Therefore, the requirement on the operator is not that he be "nationally based", but that he have demonstrated and continuing competence to do his part of the job. The Foundation, in collaborating with its Advisory Board, must be free and prepared to change to another contractor whenever these conditions are not met.

Finally, based on our successful experiment at Brookhaven, we have recommended that the facility be operated under the decentralized control by a director who is appointed by the operating organization. This director and his staff would be supported by an Advisory or Visiting Committee, which would a) review the existing program of research; b) recommend modifications in the program of research; c) advise the contractor of changes in management procedure desirable to make the facility more effective; d) evaluate the significance of the research accomplishments. This Advisory Committee would be composed of scientists drawn from astronomy and in immediately related fields. The relationship of this Committee to the program of research should be the same as with the Visiting Committees at Brookhaven. The members of the Radio Astronomy Advisory Committee would be invited and encouraged to become familiar with all aspects of the National Radio Astronomy Facility, through regularly scheduled meetings of the Committee, and by extended visits of the individual members. In their early stages of the establishment and operation of the facility, the Advisory Committee might find it desirable to hold meetings

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on a monthly or bi-monthly basis. The Advisory Committee would make regular reports to the Board of Trustees of AUI. In the past AUI has always transmitted these reports on to the government.

If AUI were to undertake the management of the National Radio Astronomy Facility, we anticipate that the Board of Trustees would reflect this new responsibility through an evolution of the membership to include individuals with knowledge and experience in astronomy and related domains of science, as is the case of other fields of scientific research in which the Corporation is interested.

In concluding this letter I cannot escape commenting on the fear of dividing astronomical science expressed at the July 11 meeting.

There is nothing in the AUI recommendations that represents a divisiveness in the field of astronomy as the Chairman of the National Science Foundation Advisory Panel on Radio Astronomy has asserted. In such an integrated science as physics, the management of its advanced facilities by diverse groups has never interfered with its great progress. In fact, the diversity of interest in physics has contributed greatly to its success. Certainly the field of astronomy is no different. I believe that astronomers would welcome the closer association with other sciences from collaboration with a great laboratory like Brookhaven that the AUI proposal would bring.

I sincerely hope that this discussion will aid in clarifying the nature of the organization recommended in the AUI report. Were AUI called upon to make a proposal, it would include the features included in our report as amplified above.

Sincerely yours,

L. V. Berkner  
President

cc: C. F. Dunbar  
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