LETTERS

NSF Appointments

Colin Norman's article about management changes at the National Science Foundation (NSF) (News and Comment, 24 Dec., p. 1286) raises questions about the role of the National Science Board (NSB) in the selection of NSF deputy and assistant directors.

The enabling statute explicitly provides that the President appoints the NSF management team. The NSB is given the opportunity to propose candidates to the President. Once appointed and confirmed by the Senate, the deputy and the presidentially appointed assistant directors serve at the pleasure of the President, and by delegation at the pleasure of the director. Thus the director has a duty to the President to supervise the management team and do his or her best to strengthen it.

The NSB is responsible for policy, new program approval, and approval of major grants; the director is responsible for administration. The director and the Board share a responsibility to ensure the highest level of scientific competence, personal integrity, and managerial ability in the individuals recommended to the President for appointment to these positions.

It is in this spirit that the director and the Board are working together to find the most capable leadership the NSF can attract. Ed Knapp is a member of the Board's search committee, which will look for the most capable people. As has been true in the past, the Board's search process is made without inquiry concerning political affiliation. We would expect the final list of recommendations for each position to be forwarded to the President over the signatures of both the Board chairman and the director.

The division of authority between the Board and the director is the result of a compromise between the Congress and President Truman when the NSF was created more than 30 years ago. The original proposal, vetoed by Truman, was a presidentially appointed Board which had full power to select (and remove) the management team. Truman's veto reflected his conviction—shared by other Presidents—that an agency dispensing public funds must be run by an administration accountable to the President. But the President agreed that, in the interest of scientific objectivity, excellent technical judgment, and a focus on the long-term goal of national scientific leadership, the agency should have an elbow's length, if not arm's length, insulation from day-to-day political pressures.

Thus the enabling act provides for the Board's role in the search for new management and the director's role in supervising it and making changes when in his judgment changes are needed. The scientific community can best assure the effectiveness of this arrangement by suggesting well-qualified people to serve, and most especially by being willing to accept the call of public service when asked.

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Extraterrestrial Intelligence: A Skeptical View of Radio Searches

In "Extraterrestrial intelligence: An international petition" (Letters, 29 Oct., p. 426) there appear two assertions that I question. The first is that "The radio search . . . assumes nothing about other civilizations that has not transpired in ours." The second states, "The results [of the proposed radio search]—whether positive or negative—would have profound implications for our view of our universe and ourselves."

If the radio search indeed assumed nothing about other civilizations that has not transpired in ours, it would have to assume that no extraterrestrial civilization intentionally broadcasts radio messages to other civilizations for any significant length of time, because we have not done so. On the basis of this assumption, a search must be conducted for radio leakage from transmitters comparable to ours, not for intentional messages. Furthermore, the leakage sought would be from those transmitters which were sufficiently numerous that their output could be considered omnidirectional. The probability of receiving an unintentional signal from a single powerful unidirectional transmitter is very small.

The 10-year radio search program, as recently described by Wolfe *et al.* (*1*), is not designed to look for such leakage. According to Sullivan *et al.* (*2*) [see also (*1*)], the most powerful, effectively omnidirectional sources of radio leakage from Earth are ultrahigh frequency (UHF) television stations and BMEWS-type defensive radar. Sullivan *et al.* (*2*, p. 384) assert the Arecibo antenna could detect the former out to a distance of 1.8 light-years and the latter out to about 18 light-years. [Similar numbers appear in (*1*).] Thus the proposed experiment could not detect television emission from any civilization around any star, and radar from only a very few nearby stars. Furthermore, both UHF and radar transmission are frequencies less than 1 gigahertz (GHz) (*2*), while the proposed search will concentrate on frequencies between 1 and 10 GHz (*1*, p. 399). An Arecibo transmitter could indeed be detected by an Arecibo receiver over a distance "of many thousands of light years," but this is possible only because such a transmitter is essentially unidirectional, so that a high probability of reception would require intentional beaming, which is ruled out by assumption. Hence the proposed radio search could detect extraterrestrial civilizations (which, by assumption, have radio equipment like ours but no better) only if they were extraordinarily close, and then only if the search frequency were changed. Thus the proposed search is really based, not on the stated assumption, but on the assumption that extraterrestrial civilizations would have been intentionally broadcasting signals for primitive civilizations to receive for centuries or longer at average power levels far above the total radio signal output of Earth. Such civilizations would necessarily be very much in advance of ours, and assuming their existence would depend "on a major extrapolation from the circumstances on Earth, here and now," an extrapolation which the extraterrestrial intelligence petition explicitly claims the radio search does not make. In fact, any search for extraterrestrial civilizations conducted today at reasonable expense must assume that the searched-for civilizations are very much in advance of our civilization. I have argued (*3*) that the space probes of such civilizations would have long ago reached our solar system. Since they are not here, they do not exist.

Because the proposed radio search cannot conclusively rule out the presence of civilizations comparable to ours around a significant number of stars, a negative result is most unlikely to have "profound implications for our view of our universe. . . ." Even if the radio search were drastically upgraded to a capability of detecting Earth-level radio leakage from anywhere in the galaxy, a negative result would probably not convince supporters of the Search for Extraterrestrial Intelligence (SETI) that extraterrestrial civilizations do not exist. They could simply argue, in the face of a negative result, that advanced extraterrestrial civilizations generally abandon inefficient radio transmitters like ours after a short time. In fact, Sagan has already argued that such abandonment is likely (*4*). If scientific theories are char-