Letters

NIH Career Awards

The decision that there will be no new NIH career awards (News and Comment, 25 Dec. 1964, p. 1662) marks the end of one of the few attempts to evolve new fund-granting procedures to replace the present obsolete and ineffective systems. Clearly the decision to kill the program was not based on any yardstick of research production. If, for instance, the number of articles published by the award recipients in a year were divided by the amount spent on the program (or if a more sophisticated yardstick were used), the awards program would rate as one of the best NIH research investments. Nevertheless, the program was killed. The question is: Why?

One answer is that the career awards represented a radical departure from the tradition of "rewarding" research achievement by promotion to an administrative position. The career awards were designed to give the recipient *more* time for his research interests. The conditions of the awards set limits on nonresearch commitments, and recipients often had to divest themselves of administrative, clinical, or teaching responsibilities. For instance, I know of one recipient who flatly refused the teaching and administrative assignments that his chief gave him and had the temerity to point to the award conditions as a legal justification. Such episodes led to pressure on NIH to end this "intolerable" situation where an investigator was able to spend most of his time on the research that *he* wanted to do.

Other effects of the career awards were displeasing to some administrators. The award recipient was at least partly freed from the turmoil that goes with annual submissions or renewals or requests for grants. The award gave him added security, dignity, and independence. It created a more favorable research climate. But sometimes this made the recipient's colleagues envious. They also wanted a less hectic and harried research environment. Again an "intolerable" administrative situation resulted.

In other words, the career awards were stopped not because they were a failure but because their success brought out the inadequacies and inequities of the usual fund-granting procedures. I can only hope that the demise of the awards program will generate a demand for a thoroughgoing and realistic reappraisal of the present methods of allocating money for research. If this reappraisal is made by persons who are more interested in improving the productivity of medical research than in perpetuating the present power structure, I believe it will support the underlying principles of the career awards. These include (i) emphasis on creating a favorable research climate for competent and creative individuals rather than on hardware and other status symbols of research; (ii) allocation on the basis of past performance—on careful evaluation of the contributions of investigators to the understanding and control of the public health problems of our era; and (iii) sustained support, directly to the working scientists, to encourage long-term research on major problems—to stress life-work, not piecework.

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Japanese Zoologists Abroad

Japanese science has been the subject of several recent items in *Science*. These have dealt with observations of travelers, with international congresses, and sometimes with specific evaluations based on accumulated information of various kinds. To these we can now add the results of a survey of one group of Japanese scientists, the zoologists. The data are drawn from 73 responses to questionnaires sent to 90 colleges, universities, and biological research institutes in Japan in late 1963, in which we requested the names of zoologists who had spent three months or more abroad at one place doing research. The names reported totaled 243. Other information requested about these persons was: age, length of stay, places of stay, source of financial support, and titles of publications resulting from scientific collaboration abroad.

The most remarkable trend is in the simple number of Japanese zoologists who have left the country for foreign experience since 1950. This number has doubled approximately every 1.5 years at least up through 1960 (our data thereafter become unreliable). Most of the zoologists were between 28 and 36 years of age at the start of their foreign visits, but ages ranged from 22 to 62. Three percent were women. Only 16 of the 243 were full professors at the time of their foreign work.

About 40 percent of the sojourns were of one year's duration or less, about 30 percent were between one and two years, and about 30 percent were of two to eight years' duration. The countries in which they had worked were as follows:

U.S.	219	Finland	1
Hawaii	3	Holland	1
Canada	6	Australia	4
Germany	12	Ceylon	4
England	10	Thailand	2
France	7	Taiwan	1
Italy	6	India	1
Sweden	6	Egypt	1
Belgium	4		

Of the 250 grants and stipends the 243 zoologists had received for work and study abroad, about 75 percent were from sources in the U.S., and 14 percent were from the Japanese government. The sources named were as follows:

United States, total	192
National Science Foundation	4
National Institutes of Health	10
Rockefeller Foundation	37
Fulbright awards	15
University grants	89
University fellowships	37
Japanese government	36
German government	7
British government	7
French government	5
Italian government	3

It is clear that ready availability of American funds has stimulated travel to and research in the U.S. by Japanese zoologists. However, even when the

source of funds is Japanese, the choice is the U.S. rather than Europe. Thus, the predominating orientation of the Japanese zoologist seeking foreign research experience is toward this country.

Part of the explanation of the almost exclusive orientation of Japanese zoology toward the U.S. is probably historical. Before 1868 the Tokugawa government had for 250 years virtually sealed the country from contact with outside cultures, and Japanese sciences remained rudimentary while rapid advances were being made elsewhere. When the first university was formed in Japan in 1877, there was no qualified Japanese to accept the first professorship of zoology. Two Americans (E. S. Morse, of Massachusetts, and C. O. Whitman, later the first professor of zoology at Chicago) served in this capacity, successively, until 1881. In 1882 K. Mitzukuri, who had just received his Ph.D. at Johns Hopkins, became the first permanent professor of zoology at Tokyo University. Undoubtedly, the two Americans, the American-trained Mitzukuri, and their students who succeeded them laid the foundation for a strong relationship with the United States. Except in a brief period during the war years, this relationship has flourished. The ready acceptance of Japanese as scientific collaborators by American research workers, evidenced by the rapid growth of the number of such Japanese in this country, must be based on such features as good training, disciplined and energetic work habits, and general effectiveness in production of successful research.

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Oceanography at Inland Universities

William J. Hargis' letter (27 Nov. 1964, p. 1113) setting forth several objections to Spilhaus' proposal for "sea-grant" colleges seems to be taking aim not only at this imaginative idea but also at the idea that any land-bound university might dare make a serious attempt to get into the business of oceanography. When one considers that about 90 percent of the photosynthetic production of our planet occurs in the sea and that man extracts only about 1 percent of his food supply from the sea, while at the same time more than half the population of the earth is suffering from protein starvation, it is disturbing to read that a plan for a substantial increase in marine research and teaching raises fears of an "inevitable dilution of effort."

Hargis also advises against a "bandwagon leap by institutions whose locations, faculties, and facilities make them more suitable for terrestrial- or space-oriented work." There is no doubt that the marine institutes and laboratories along the Atlantic coast as well as on other coasts could effectively use additional support for their work. However, the argument that noncoastal institutions are automatically disqualified for marine research no longer holds. No university in the country is more than a few hours from a coast by air. There are other ways of carrying on marine research than by ship, for example, by remote sensing from aircraft, analysis of the great quantities of unprocessed ship data, numerical modeling, and laboratory experiments of all sorts. If ships are required, then the investigator can either arrange to "piggy-back" aboard one of the ships of the affluent oceanographic institutions or use one of the ships set aside for the community as a whole, such as Duke's *Eastward* and NSF's *Eltanin* and *Anton Bruun*. Access to the sea is no longer limited to those living on tidewater.

What facilities are peculiar to marine science? Aside from ships and circulating sea-water systems, it is difficult to point to a single facility which does not or could not exist just as well at an inland university: computers, engineering facilities, instrumented aircraft, wave tanks, dishpan models of the ocean or atmosphere, libraries all exist far from the sea.

It is always risky to generalize about university faculties, especially with regard to what they are or are not suited for. Many of our finest science faculties are located far from the sea, and in some of these there are foci of intense interest in marine science. Some of these institutions represent potential centers of excellence in the marine sciences. They have the talent, the interest, and the decided advantage of a fresh point of view. I do not believe that given substantial support they would in any way dilute the present effort. There is a continuing shortage of high-grade talent in marine science. The number of oceanographic problems and the need for their solution is rising much faster than our ability to meet them. I submit that ignoring the potential of the noncoastal institutions is shortsighted and will result in our falling farther behind in our efforts to understand the marine environment.

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Eyesight of Astronauts

I understand that one of the physical qualifications required of astronaut-scientists is perfect eyesight. This is something of a puzzle to me. No one available for the program has a skin that will withstand high vacuum, ultraviolet light, or background radiation. Indeed, considerable effort has been expended to make such a hide superfluous. Since more than 500 kilograms must be carried to correct for skin and respiratory deficiencies, what difference can the few ounces of glass or plastic needed to correct optical deficiencies make?

At one time, it was necessary for soldiers to have teeth that occluded precisely, so that they could tear open the tops of ammunition loads. Even in World War II some draftees were classified 4F because of a deficiency in this respect, before this particular anachronism was eliminated. Pilots, and astronauts in particular, do not now look for landmarks while sitting in an airstream which might blow their glasses off. Color vision may be very important, and might reasonably be made a prerequisite, but it seems quite inappropriate that eye defects which can be corrected with ordinary eyeglasses should be cause for exclusion.

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Antibiotics: The Duplication Problem

The New York *Times* of 18 January carried a story from Moscow entitled, "Russian takes to task discoverers who aren't." This story, quoting *Izvestia*, deals with the competition for a high intellectual prize in the Soviet Union