Letters

Economic Recovery and Scientific Research

I believe that we biomedical scientists should join together in an attempt to convince the Administration that stronger support of health-related scientific research (see News and Comment, 23 Oct., p. 420) is synonymous with governmental efforts aimed at economic recovery.

Funded grants provide jobs for faculty and technical staff. They provide funds for purchase of supplies and equipment. The purchase of equipment catalyzes the development of new scientific instrumentation, which is often exported. Overhead provides additional salaries for accounting and administrative staff.

The awarding of grants is done by peer review on the basis of merit and perceived relevance to health or scientific knowledge. The product of research—new basic or applied knowledge—ultimately leads to improved health care, which in turn may lead to increased productivity.

Research and purchases of instruments, for example, are intimately connected. The number of spectrophotometers purchased by the biomedical research community depends on approval by study sections. In my experience, these are frequently excised from the grant request, not because they are unjustified, but rather because the more equipment is purchased, the less funds are available for funding the salary and supply categories of other research grants. Thus, increasing the budgetary allocation for research will increase the purchase (or lease) of scientific instrumentation.

Support of scientific research creates jobs which produce goods of immediate or future value. Expenditure of government funds in these areas makes more sense than attempting to create temporary positions with limited government resources for individuals who cannot obtain positions on the basis of merit in a competitive world.

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The Language Problem

Jean-Claude Pecker's complaint (Letters, 16 Oct., p. 254) of linguistic parochialism (or more correctly, linguistic imperialism) in astronomy is founded on truth, but errors of logic, statistics, and fact appear to mitigate his point. As an astronomer who is widely known as a Francophile on both sides of the Atlantic, I believe his letter will only make matters worse.

It is indeed true that facility in other languages is diminishing to disastrous levels among American scientists. This is not due to active discouragement, as Pecker suggests, but rather to a lack of active encouragement and to a general abandonment of language requirements for advanced degrees here. The continual linguistic exposure endemic to Europe does not exist in the United States, simply due to a homogeneity over distances that most Europeans do not comprehend. It is also true that many, probably most, Americans have a perfect arrogance towards non-Anglophones; sometimes the level of jargon and slang at international meetings is so high that even I have difficulty understanding my fellow countrymen.

But Pecker challenges us on grounds that are testable. First, he applies a Citation Index "impact factor" to three publications. One is American, one English, and one "European," published in both English and non-English editions. The American publication is an annual volume intended to provide lengthy state-of-the-art reviews of a complete subject, while the other two are monthly journals in which each article is only a small fragment of a subject. One would expect the review volume to be referenced more often than the others. The conclusion that this shows "American scientists quote only themselves" does not logically follow from the given data.

Nor does Pecker analyze the data statistically. The impact factor in this case is basically meaningless, and what is needed is some hard tabulation of references by and to Anglophone writers. When one starts to do this, one finds that no scientific publication in the free world is restricted to one nationality or one language group. For example, the U.S. publication *Annual Review of Astronomy and Astrophysics* (*ARAA*) has shown the following distribution of authors over the past 4 years: United States only, 67 percent; Anglophone only, 73 percent; non-Anglophone only, 17 percent; and mixed, 9 percent. The average volume contains 16.5 articles, with authors from five countries.

The non-Anglophone journal most often referenced in ARAA appears on cursory examination to be *Astronomy and Astrophysics* (*A & A*), which has Pecker's number 3 impact factor. How does it stack up? A volume selected at random (vol. 83, 1980) shows the following lineup of authors: United States only, 7 percent; Anglophone only, 17 percent; non-Anglophone, 75 percent; and mixed, 8 percent. That is, the percentage of Anglophone authors in the European journal is the same as the percentage of non-Anglophone authors in *ARAA*. Unsurprisingly, there are 13 countries represented in this volume of *A & A*. An examination of the references is an eye-opener, however. In ten papers selected from the European journal, 75 percent are to Anglophone publications, most of them American. These are not Americans quoting themselves. Finally, two recent articles selected from *ARAA* show the following distribution of references: English-language books and journals, 86 percent; others, 14 percent.

The careful reader will quickly ask, "On what basis were the sampled articles chosen?" My criterion was simple: they all had French authors. The two French authors in *ARAA* cited their own work numerous times; 86 percent were in English-language journals.

The numbers cited are only to be taken as approximates, since I used some arbitrary ground rules, some of which had no likely effect, others of which reduced the English percentages. For example, I used the laboratory to define the language group of an author. Most symposium proceedings were excluded as ambiguous, since they are nearly always published in English. The journals published in the Netherlands by Reidel were counted as English, since the sponsoring impetus has usually come from over here. The hard fact, though, is that the single most cited journal in all groups was the *Astrophysical Journal*. Other ground rules would give different figures, but the qualitative conclusions would not be changed much.

According to International Astronomical Union (IAU) figures, Anglophone astronomers outnumber the French by six to one. Nearly half of the world's astronomers live and work in English-

speaking countries, where consequently the number density of astronomers is much higher than in most other places. Scientific productivity is a function of number and density, and it is a testable proposition that more than half of the advances in astronomy come from Anglophone institutions. The triennial reports of IAU commissions are a good place to see this. That is neither chauvinist nor imperialist, only observation. Certainly chauvinism and imperialism exist in astronomy, but we do not have a monopoly on at least the former of these.

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Pecker's point is well taken or—as he might say—à propos. Too many American scientists remain ignorant of much important work done in their fields in other countries and published in languages other than English. But I don't think this ignorance is deliberate or stems from a feeling that anything worthwhile would be published in English. It is rather due to the inability of most younger American scientists to understand any language other than English and the unavailability of reliable translations of foreign journals. . . .

Pending a reversal of the present trend, a reemphasis on knowledge of foreign languages as a prerequisite for admission to graduate work and the availability of reliable scientific translation services to personnel at American universities and industrial laboratories would seem to be the only key for unlocking the wealth of useful information available from scientific literature published in French, German, Spanish, Japanese, and other languages. Scientific and technical translation requires multiple skills and a broad technical and cross-cultural background. Some noted scientists have engaged in it at times in their careers, and it would seem to offer a worthwhile occupation for people with the appropriate linguistic knowledge who have retired from active careers in the sciences and engineering.

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. . . The language and citation problem could easily be solved if scientists around the world recognized that English has become not only truly international (and probably more so than any other language in the history of the world) but also irreplaceable, since many modern scientific terms are in it. A true universality of science can be achieved only when all scientists learn to communicate in one language. For the present this language is English.

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Opportunities for the Handicapped

I commend Shirley M. Malcom on her recent editorial (9 Oct., p. 137) voicing protests against cuts in the National Science Foundation programs designed to increase participation of minorities and women in science and technology. As head of the AAAS Office of Opportunities in Science (OOS), Malcom must be well aware of the present deficiencies in such educational programs for these disadvantaged groups. There is an equally serious need for support of programs to increase opportunities in these same areas for handicapped students, who are also included in the OOS programs. Physically handicapped students encounter problems of access into the professions similar to those of minority students, with barriers to quality education in science and mathematics beginning in the early grades. Let us broaden our perspective and recognize the need to protest cuts in programs for developing the capabilities of all disadvantaged groups that are covered by activities of the OOS.

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I would like to add my concerns to those expressed by Malcom in her editorial of 9 October. The unifying theme of the programs for women and minorities at the National Science Foundation has been the belief that there was a great deal of potential talent being overlooked or discarded simply because certain segments of our population are put into cruel and vicious stereotypes. It was thought that perhaps something could be done to devise methods of tapping this scientific resource.

It is not an easy task. Along with investigating and trying to identify the sociological barriers that must be addressed there is the additional burden of developing programs and facilities capable of furnishing quality science education once individuals break out of the stereotype.

The Physically Handicapped in Science (PHIS) program was one of the minority programs at the National Science Foundation from 1977 to 1980. It was a modest program financially, but its purpose was to encourage physically handicapped students to consider science and science education as possible career options. Ultimately, once the attitudinal barriers had been identified and overcome, a small, self-sustaining pool of science as a career would have been created. Students from this pool then could have fit into existing educational programs and facilities with minimum perturbation. The PHIS program taught us that stereotypes could be broken and that "dealing" with handicapped science students was not distasteful or impossible. Unfortunately, it could not survive the recent budget cuts. It is disheartening to consider that the PHIS and other programs for minorities were cut, not because they were not attaining their goals, but rather because priorities have changed. The priorities of this Administration are centered on technology and defense. Programs to further develop the quality and quantity of the scientific work force are not deemed important.

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The NSF programs referred to in my editorial were those created in response to the Equal Opportunities in Science and Technology Title of the fiscal year 1981 NSF Authorization Act. Minorities, defined for these programs, are those racial/ethnic minorities who are underrepresented in science and engineering careers. Other groups have serious problems of access to science, particularly the physically disabled. Addressing the concerns of the physically handicapped in science continues to be a major focus of the Office of Opportunities in Science. I share the concerns of the authors of these letters for the loss of NSF education programs and for its effect on those seeking access to science—handicapped persons and all others who could, given the opportunity, contribute to the advancement of science.

—SHIRLEY MALCOM

Erratum: In his work probing chromatin with DNAse I, Harold Weintraub (Research News, 13 Nov., p. 775) collaborated with Mark Groudine of the Hutchinson Cancer Center. He did his work using S1 nuclease with Alf Larsen of the Hutchinson Cancer Center, and his work on transformed cells in collaboration with Thomas Graf and Hartmut Berg of the German Cancer Research Center in Heidelberg.

Erratum: In the report "Intraventricular calcitonin inhibits gastric acid secretion" by J. E. Morley *et al.* (6 Nov., p. 671), the bars in Fig. 2 were incorrectly labeled. The two largest hatched bars on the right of the figure should have been labeled TRH, the two smaller hatched bars, TRH + cal.