Department heads will need to do more than just refuse to have NIH career fellows in order to ameliorate university teaching and attitudes. Some suggestions are:

1) University salary scales and promotion policies must reward good teaching.

2) Teaching involves more than lecturing. Introduction of graduate (and some undergraduate) students to modern research methods and thought is no less important, and generally it is better done in the laboratory or the seminar room than in the lecture hall.

3) The position and function of the graduate student must be reevaluated. It is largely through the graduate student that current attitudes and abuses will be transmitted to future generations. One way to minimize the manipulation of students would be to adopt the external examiner system, so successfully used at many universities throughout the world, to insure a reasonable standard of performance, and to adopt a rule that dissertation research is published only under the name of the student who did the research.

The real research parasite in the university is the individual who feeds on the research of others who are under him. At least if he has a career award he will have more time to do some of his own research.

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Population Control in Man

Judging by Wynne-Edwards's conclusions ("Self-regulating systems in populations of animals," 26 Mar., p. 1543) and by subsequent letters (14 May, p. 892; 25 June, p. 1669), the greatest interest in population-control mechanisms is their identification in human society. Many of the mechanisms of control in primitive man mentioned by Wynne-Edwards (for example, human sacrifice and deliberate impairment of fertility) appear to be tied in with rituals which had no feedback mechanism—that is, they would continue to operate with the same intensity regardless of whether the population were declining or increasing. Without feedback, such mechanisms cannot be biologically useful. Other factors mentioned, such as "social interaction"—conventional competition, communication, and organization—appear to be peripheral and relatively minor and ineffective as population controls in human society.

Historically, populations of man appear to have been controlled largely by famine, pestilence, and war. Each of these has a built-in feedback mechanism. Famine does not occur when population density is low; pestilence spreads slowly when population density (and resultant social contacts) is low, but rapidly and through a higher percentage of the population when population density is high. In primitive times, war appears to have been waged largely by one tribe against neighboring tribes as a means of expanding (or defending) its hunting or agricultural territory. In primitive times, therefore, war as a population control may be regarded as analogous to fights which occur between songbirds, each trying to establish (or defend) its own "territory." The winning tribe, with its newly won resources, could expand; the losing tribe was killed, enslaved, or driven to less hospitable territory. As tribal units have grown into nations, and as technology has increased the population-supporting potential of most land areas, war has taken on new meaning—it has been waged just as much for ideological reasons as for the acquisition of resources for living.

Modern civilization has largely conquered pestilence. Moral and ethical development has made modern nations more likely to help their neighbors in adversity than to prey on them; war as a method of population control now seems intolerable—especially since it has the potential of destroying civilization itself. Of the three great historical population controls, only famine remains unaltered. Since the recent revolutions in industry and agriculture, the specter of famine has grown dim; it has not disappeared but has been pushed by technology out of sight around a curve in the road ahead. We may yet push famine a little farther beyond the curve, but the world's population appears to be approaching that curve at high speed. Is man to revive war as a means of population control? Or is he destined for a brutal encounter with famine?

Gibson's observation (Letters, 14 May, p. 892) that the rate of population growth of several nations was declining before World War II gives us hope that there is an alternative. Gibson points out that the controls were social—"late marriages and small families were fashionable." He neglects to point out that knowledge of contraceptive methods made this type of social control possible. Among populations that have little knowledge of contraception (for example, India and China), social controls are largely ineffective. Such populations, even now, are limited primarily by pestilence and famine.

Can man use his intelligence and rationality to avoid war and famine by making social control of the world's human population a reality? Or are his collective actions so circumscribed by ignorance, lack of understanding between nations, religious taboos, or blind faith that a loving God will provide, that there is no real alternative to war and famine?

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Metric System

The recent announcement of the British government's decision to abandon the English system of measurements and adopt the metric system should arouse serious thought among American scientists. The admission by the British that their own long-cherished system of weights and measurements is inefficient and unsuited to modern progress and world economy should make Americans consider whether they are going to be the last to hang onto a system of wholly incompatible units, each divided into fractions without common denominators, whereas a fully logical decimal system has been in use in continental Europe and elsewhere for years.

It is considerably to our discredit that U.S. foreign-aid missions have been sending abroad specialists unaccustomed to the metric system. These people have been fostering education, mechanization, agriculture, and so forth, based on the English system, often badly confusing people in new nations, some of which had just adopted the metric system on gaining their independence from Britain, and hampering improvements in other areas where the metric system has been in longer use. . . . Surely a start in the right direction can be made with our people and products going overseas, as well as with education in our country in general. British manufacturers have learned that they have to make products with

metric units to compete on European and other world markets. Some American manufacturers have decided that on the basis of production efficiency alone they would be better off using the metric system.

It would seem very likely, even if hard to prove, that the great technological successes of Germany, Japan, and the U.S.S.R., and more recently of France and Italy, are attributable in part to their use of the metric system, and that our successes have been *in spite of* using a less efficient system. Steps toward legislation for adopting the metric system in the U.S. should not be allowed to lag because of indifference, reluctance to change, or arguments based on the cost of the change-over. Scientists, already exposed to the benefits of the system, should take the lead in this movement.

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Authors: Call to Arms

Bravo to Page (Letters, 12 Mar., p. 1241)! I agree with him on all points, but I believe that more serious measures for improving the evaluation of papers by referees should be taken.

Authors should organize for self-defense against referees. The organization should publish those remarks of referees that are found to be unjust by an assembly of judges. Credits and demerits of journals (Letters, 28 May, p. 1174) should be publicized. Decisions to boycott journals that behave heedlessly should be taken, and prizes be given to journals that deserve them.

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For solving the problems caused by multiple junior authors, I suggest the typographical version of the Latin *et cetera*—&c. Or the ampersand may be better combined with a natural—&5, &15, and so forth. Ayars's suggestion (Letters, 25 June, p. 1669), that such listing obscures the real author(s) of a paper because a department head or major professor imposed his own name, can be countered by an invitation to workers: Arise!

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More on Berkeley

In their account of the "extremist" conspiracy at Berkeley, Grendon, Jones, and Petersen (Letters, 4 June, p. 1273) make a central point of a Slate "manifesto for revolution on the campus." They say:

> The importance of this revolutionary manifesto is that it was distributed to students at registration time in September, 1964, *before* the occurrence of any of the later incidents which allegedly led to disorders. . . . Thus, Slate announced a revolutionary program in advance of any supposed provocation—a program which it was able to follow almost as a blueprint. . . .

The Byrne Committee, appointed by the Regents, with an appropriation of $75,000, to investigate the recent unrest within the University of California, and particularly the disturbances on the Berkeley campus, issued its report to the Regents on 7 May; the Regents released it to the press shortly thereafter. This is what the report says concerning the foregoing charge:

> Two facts are usually cited by those advancing the "conspiracy" theory. . . . In the SLATE Supplement, Mr. Cleaveland urged "revolt" if the University would not change its system of instruction. . . . He did not, by all accounts, play a significant role in instigating, organizing or executing the disturbances, and we conclude that his plea to "revolt" had only a *coincidental relationship* with the "revolt" which actually took place. (Italics added.)

In general, a comparison between the events as reported by Grendon *et al.* and as reported by the Byrne Committee defies any attempt at reconciliation. The Los Angeles *Times* of 12 May describes the Byrne report as follows: "Thousands of pages of interviews and research have been distilled into a document which is 84 pages long, with an additional 18-page bibliography." The full text of the report appeared in this same edition of the *Times*, and excerpts have appeared widely in other newspapers.

Those who have read Langer's reports in *Science* (News and Comment, 9 Apr., p. 198; 16 Apr., p. 346) cannot help being impressed by how well her individual efforts hold up in the light of the exhaustive Byrne investigation. As one who has read closely most of the reports on the Berkeley events, I find the "totally different view" of Grendon *et al.* to be totally without foundation.

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Grendon, Jones, and Petersen would have us believe that the Berkeley unrest was contrived by a group of conspirators. While this is demonstrably possible under certain conditions, as in the feudal societies of South America, is it a plausible thesis in societies of a more democratic nature? . . . I believe that we may be looking at campus unrest in the wrong context. The alert young people of college age, or at least some of them, feel the necessity to protest certain things. The fact is that they are at colleges; hence if they protest, such protests will be at colleges and will involve college institutions; but they need not be directed against a college unless it attempts to thwart the unrest directed toward society. Did this happen at Berkeley?

It behooves the scientific community to understand the mechanisms of social change. . . . Bob Dylan, Pete Seeger, Phil Ochs, and Joan Baez are speaking to college youth. They have more to tell than their "unorthodox views" on paying taxes, to which Grendon *et al.* refer. Can science give us more insight into this dynamic spirit for change that is appealing to our youth?

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Government Records and the Public

Larrabee's remarks (Letters, 28 May, p. 1772) concerning proposed legislation (H.R. 5583) opening federal records "to any person" evoke mixed reactions. All men of good will must applaud what seems to be the general intent of this bill, maximizing the flow of information from the government to the people; this is good in itself, one of the prime sources of real democracy and, incidentally, the lifeblood of science. On the other hand, the bill as described is obviously a clumsy, self-defeating instrument for attaining its purpose. What is needed is a rule of reason that will balance the need to maximize public information against the need to minimize any incidental disruption of the business of government.

It is all too natural for the bureaucrat to try to narrow or choke off his channels of communication with the public, both incoming and outgoing. If he did not try to do so he would not be playing his social role. It is