graduate level, the student benefits indirectly from university research because it helps to keep the teacher current in his field and enthusiastic about it. Without the federal research policies which have made possible the present high level of academic research in science, many of the most capable members of the science faculties in our colleges and universities would not be in the universities at all, but would instead be in industrial or governmental research positions, or even in other nations, and American students would be attempting to learn science in a kind of backwater remote from the mainstream of advances in science.

All of us agree that the nation's efforts in higher education and the government's policies in supporting science can probably be improved. Discussion of problems by those of us who responded is not evidence for conflicts between research and higher education. I find the recommendations of the Reuss subcommittee report to be generally very sensible, but I am fearful that real damage can be done to our fine national programs in higher education and in science if individuals or the press accept the picture of "conflicts" which the report seems to me to paint by selecting unrepresentative excerpts from statements made to the subcommittee.

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Exclusive Rights

Recently I received in the mail, as part of a general mailing, a copy of the statement dated 19 August 1965, of Walter A. Munns, president of Smith, Kline and French Laboratories, before the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate. The statement attempts to justify alterations in the current patent policy of government agencies supporting research in the life sciences. Though the justification is inadequate, the statement points up a number of issues which have been developing just below the surface of discussion in other fields of science as well as pharmacy whenever the industrial and academic communities share common interests.

For those of us who have spent parts of our careers in both industry and academe, it is, perhaps, a little easier to recognize some of the absurdities which arise in the so-called "collaboration" of industry and university on some problem of "mutual" interest. The situation is summed up by the highly improbable juxtaposition of ideas in the phrase "reasonable exclusive rights" used in the statement. The main issue arises from the fact that what is "reasonable" from one point of view may not be "exclusive" enough from another. In our ever more market-oriented lives, a confusion has grown up between the proper roles of the university and of the profit-making industrial concern. Collaborations between universities and industries clash (all too inaudibly at the moment) on these differences in purpose—for, though some of us seem to have forgotten, the primary function of the university is to acquire knowledge through research and then disseminate that information to as large an audience as possible, whereas industry's primary function (as honestly stated by a number of distinguished American businessmen) is to maximize profit. The conflict of motives is, therefore, a basic one. Industry must keep "company-confidential" as much of its special knowledge as possible, while universities are obligated to disperse their knowledge to all who are willing to listen.

Usually this conflict of motives is ignored both by university administrators eager for any additional support of research activities and by corporate attorneys trying to safeguard their corporation's investment and potential profit. Often this results in outright restrictions on the publication of experimental results. The acceptance of this censorship by the university should be explicitly and vigorously condemned as an abrogation of its prime responsibility.

Since university collaborators are often supported by additional funds from state or federal grants, the "collaboration" may represent an economical way for the corporation to develop and test new concepts without making the investment required for either the establishment of a permanent industrial laboratory or full support of the academic project through a conventional overhead contract. The president of the drug company is essentially asking to enter the game after the major inventions have been conceived and to obtain exclusive rights for work which is more properly in the public domain.

I am very much in favor of public ownership of patents emerging from university research projects supported by public funds. I am also very much in favor of legislation which will prevent the indirect subsidy of some of our most prosperous corporations through the mechanism of "collaborative" projects which do not fully cover the costs of the projects. I would hope that this would also minimize the extent to which industrial motives can be imposed upon (or accepted by) public academic institutions through restrictive confidential agreements.

The drug industry is not alone in its unreasonable search for "reasonable exclusive rights." A situation is developing with respect to computer teaching machines such that the issue of public control and ownership of educational facilities may actually be opened to serious question during the next few years.

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The Camelot Affair

John Walsh's report on *l'affaire* Camelot (News and Comment, 10 Sept., p. 1211) was an essentially correct account of the facts insofar as they are known. One passage, however, bears closer scrutiny. He writes:

> There is a surprising degree of agreement, in and out of government, that studies with the objectives of Camelot are necessary. At a time when stage-managed "wars of national liberation" are emerging as the number-one foreign policy problem for the United States, the potential contributions of social sciences research abroad can hardly be ignored.
>
> Project Camelot can be viewed as a reaffirmation of the old saw, "It ain't what you do, it's the way you do it." At the lowest level, the name Project Camelot, with its echo of military jargon, its quixotic ring, and its cloak-and-dagger aura, was regrettable in the context of Latin American sensitivities.

I wish to address myself to two issues implicit in this passage. The first is moral, the second technical.

It is perfectly reasonable that practical social scientists should wish to offer their services to their country or, in a less charitable view, should be eager to obtain research grants from any of the numerous government agencies sponsoring research. But a difficulty arises when the purposes which they

would serve in this are morally ambiguous. The social sciences are even less able than the physical sciences to operate in a moral vacuum. Complete objectivity or moral neutrality is impossible in the social sciences. Value propositions and value commitments inevitably influence one's work. This is especially true of social scientists who would apply their trade to the solution of real problems in the world.

In operations of the Camelot type, what is the moral basis of their cooperation? From the standpoint of the countries in which the research will be done, the purposes of Project Camelot can have only two meanings: (i) ultimate intervention by the United States in their internal affairs by means not sanctioned by any law or international agreement, and (ii) support of counterrevolutionary forces in these countries, that is to say, of the traditional oligarchy whose economic and social views are contrary to the advanced ideals and practices of America's socially progressive democracy. If the government of the United States believes it must resist "stage-managed wars of liberation" wherever they occur regardless of other consequences, that is a matter for public policy determination. The individual scientist, however, must resolve in his own conscience whether he wishes to cooperate with such a policy or not.

The second issue is technical. Project Camelot, insofar as it reached public knowledge, consisted principally of an extensive interview survey of public attitudes and opinions. The question is whether valid interpretations and policy determinations can be made from data so obtained. I believe not. Cross-section surveys of opinions and attitudes have their uses, but they are likely to lead to totally distorted conclusions where they are not closely related to an intimate knowledge of the history, culture, structure, and social processes in each of the countries surveyed. In the absence of information of this kind, such surveys are potentially dangerous, because they may lead to wrong and even disastrous decisions. Camelot consultants designed what was to all appearances a superbly engineered questionnaire. But they failed to speculate about its uses in decision-making and simply assumed, one is forced to conclude, that someone else would somehow take care of the contextual information.

There is much cross-cultural research that the government could sponsor which would deepen our understanding of different national societies without being a poorly disguised effort at social espionage. Such research, pursued for purely scientific ends, would be legitimate. Ultimately, it might even be helpful in the formulation of realistic foreign policies.

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Monod and His Cello

I was delighted by the information, in Stent's article about this year's Nobel laureates in medicine or physiology (22 Oct., p. 462), that Monod is a serious musician who plays the cello with professional competence. . . . Whenever we talk of the scientist's responsibility to society we think primarily, if not exclusively, of theoretical physicists burdened by the possibility of worldwide nuclear disaster. But recent advances in genetics, immunology, and biochemistry, for example, the breaking of the genetic code, have tremendous possibilities of influencing the lives and fortunes of entire civilizations, possibilities that must sound an equally clear call to the conscience of modern biologists. It is my belief that a person who not only has had sound scientific training, but whose mind and *Weltanschauung* have been tempered by the love of art, music, and philosophy, is better able to cope with the implications of scientific progress than his colleague who is culturally arid outside the laboratory. The sad truth is that it is increasingly difficult to accomplish the basic training of a scientist and to educate him in an "intellectual" sense as well. So three big cheers for Monod and his cello and for anybody who is as well acquainted with Bach, Brahms, and Beethoven as with DNA, RNA, and protein.

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Ages of Experimental Animals

The resolution of the Board of Directors of the AAAS (8 Oct., p. 147) brings to mind another problem in animal research. There is a great need to know as exactly as possible the ages of the animals used, because biological forms change radically with age, especially in the early periods of life. I refer not only to mammals but to all biologic forms. In particular, research in aging would be greatly aided if investigators in all fields were to state, among the other definitions of methods and conditions of experimentation, the ages of the animals or animal tissues used.

So far as feasible, experiments ought to be done on animals of different ages. It is ideal, for example, to use animals of ages related in an exponential fashion, such that whatever the youngest unit age (A), others would be A^2, A^3, A^4, and so on.

Moreover, animal suppliers would do a great service if they could give the exact dates of birth of all their animals and if they could supply older animals for the many researchers now interested in aging. So far we have not been able to locate on the American market animals of exactly known ages beyond the first few weeks.

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The Inner Calm

I do not believe that the letters by D. R. Weidman (3 Sept., p. 1048) and G. E. Morse (15 Oct., p. 292) concerning the "emotional perils" of science reflect the feelings of the majority of scientists, whatever their fields or age. Pavlov said of science that it demands from a man the whole of his life. Indeed, it is a matter of experience that in science one can hardly manage with less. It is from the awareness of this uncompromising truth that one derives an inner calm against disturbances from the outside. Measured against the faith implied in the simple words of Pavlov, most of the frustrations plaguing the scientists, such as slowness of progress in his own field, unsatisfactory working conditions, the cynicism of some administrators, the contempt of the successful, or the envy of the less pure, amount to little. It is only when we build expectations that have nothing to do with science and measure against these our own achievements that the frustrations may be painfully felt. But when this happens we should realize that in this situation we have as good as ceased to be scientists.

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