system is lower than it once was." The lower contribution, Evenson believes, could be caused by the type of deficiencies described in the Pound committee report.

One reason for this suggestion is that a similar drop-off in research productivity which occurred in the 1920's seems to have been related to the isolation of agricultural research from basic science. The reintegration with basic science that was effected at that time led to the improvements in the breeding and health of plants and animals that underlay the productivity gains made in subsequent decades. The agricultural sciences "have by and large neglected their ties with the basic sciences," Evenson says. The recent major advances in biology do not seem to have worked their way into agriculture, despite the potential for large gains in efficiency. Evenson doubts if the system is capable of integrating these findings. The time may have come for another reintegration with basic science, similar to that which occurred in the 1920's. Others have expressed the idea that the agricultural research system may need some new source of inspiration. Sterling B. Hendricks, an eminent researcher now retired from the ARS, suggests that the methods which have underwritten the success story of agriculture—chiefly improvements in the control of disease and breeding—may already have yielded their full return, and some other source of payoff must be looked for in the future, maybe from more fundamental kinds of research.

Is the agricultural research establishment likely to recast its endeavors in this way? The short answer is no. Congress is content with the system as it is. The OMB has only eight examiners to monitor the entire USDA and seems in any case to take the general view that further research is of questionable value while the government is doling out subsidies to farmers to keep 60 million acres idle. (The counterargument is that agricultural produce is a major American export whose importance to the balance of trade is likely to increase in the years ahead; more and better research would therefore be justified.)

Within the ARS, all energies for change are still occupied in the recent reorganization which, however, was undertaken for political reasons and was not designed to affect the conduct of research one way or another. (The effect of the reorganization is to decentralize decision-making and to place it on a geographic instead of a disciplinary basis.) The contention of some ARS administrators that the reorganization has dealt with all the problems raised by the Pound committee is unconvincing. For one thing, the reorganization was planned long before the Pound committee reported. Peer review, one of the committee's chief recommendations, is a difficult process to apply to a largely tenured staff. Nonetheless, limited forms of peer review are being tested out in ARS, notably by the ARS deputy administrator for the northeastern region, Steven C. King.

In the years ahead, both the ARS and SAES seem likely to face small or negative growth in their budgets, the SAES especially as the rural power base in state legislatures continues to be eroded. There is already a case to be made for consolidating some of the state stations—all of the New England stations, for example, might be rolled into one, or a single mountain state station set up. There is also a case to be made for consolidating the rival ARS and SAES systems into a single organization that would cater to national, regional, and local needs on a rational instead of an historical-political basis. The integrated system might be subjected to a national peer review process of the type operated by the National Institutes of Health, in order to secure uniform judgments as to priority and scientific merit.

A radical restructuring of this nature is not at all likely to occur tomorrow. The system has in the past served its clients extremely well, and the arguments for change have so far convinced only a few. Too many powerful forces are combined in keeping the system as it is—decentralized, uncoordinated, fragmented, undirected, and easy for special interest groups to manipulate. Things will have to become a lot worse before they get any better.

—NICHOLAS WADE

Higher Education in Britain: A Rein on the Universities

Ten years ago the Conservative government in office in Britain committed itself to a major expansion of higher education. Policy then and in subsequent years closely followed the chief recommendations of a blue-ribbon committee headed by the Oxford economist Lord Robbins. The government accepted not only Robbins's recommendations on enrollments and expenditures but also the principle espoused by the committee that higher education should be available to all who are qualified and wish to pursue it. A strong assumption at the time was that the growth of higher education was crucial to the national interest. As the committee report expressed it, "Unless higher education is speedily reformed, it is argued, there is little hope of this densely populated island maintaining an adequate position in the fiercely competitive world of the future."

Now 10 years later, the numerical goals set forth in the Robbins report have been achieved—notably in a virtual doubling of university enrollment—but things have not worked out quite as expected either for individuals or for the country. The ideal of equality of opportunity in higher education remains elusive, and Britain, by most indices, has lost ground to its economic peers. These disappointments are reflected in a new government white paper titled "Education: A framework for expansion" which sets policy for a new phase of development in British education at every level. For the universities, which have enjoyed special favor during the past decade, the new policy is interpreted as bad news.

The rate of growth of university enrollment would be cut back under the white paper's provisions (see Table

Table 1. British higher education.

Year	18-yr.-olds in higher education (%)	Enrollment			
		Total	University	Postgraduate	Polytechnic
1961–62	7	192,000	113,000	19,500	—
1972–73	15	463,000	236,000	45,000	90,000
1981 (White paper projection)	22	750,000	375,000	52,000	180,000

1) and the proportion of students in other types of higher education institutions would be increased.

The shock was heightened for the universities because 1981 enrollment figures in the white paper were lower by some 85,000 university places than figures put forward in government projections in 1970.

In addition, unit expenditures for students in most disciplines will be pared, the student-to-staff ratio increased from 8 : 1 to 10 : 1, and the proportion of graduate students to undergraduate students cut back. The universities will also admit an increased proportion of students in the arts and social sciences and a smaller proportion of students in science and technology.

To understand the dynamics of the new policy it should be recalled that, to the extent that British higher education is a system at all, it is a "binary" system, with two separate and at least until now decidedly unequal segments. On the one hand there are the universities, which are financed almost exclusively by the national government, but remain "independent" in the sense that they control which students they will accept, what and how they will teach, and, to a large degree, how funds will be spent.

Then there are the nonuniversity institutions, which also fall into the vaguely defined category of "further education" (all education beyond the secondary level). These institutions share a tradition quite different from that of the universities, in most cases having been established to give vocational training to meet local needs. They vary widely in size and quality and particularly since World War II have evolved so rapidly that generalizations about them are hazardous. The principal types currently regarded as higher education institutions, all locally administered, are the polytechnics, the colleges of education, which train school teachers, and colleges of further education, which still provide a mixture of degree and nondegree courses.

The key to the next phase of development in higher education, however, is the planned increase in enrollments in the polytechnics. The polytechnics, which emerged relatively recently as degree-granting institutions, have in most cases been formed by combining locally supported schools offering nondegree courses in technical and business subjects, crafts, and art. These fast-growing institutions are scheduled to double in enrollment to 180,000 by 1981.

As for the universities, the strictures of the white paper were not entirely unexpected. It is commonplace even among academics in Britain to acknowledge that the universities are less in favor these days with government and with people generally. At the same time it would be untrue to say that the universities are demoralized or even feel seriously threatened. In many ways, they have never been stronger or more secure, but for the first time, really, they are being examined critically, and this accounts as much as anything for the new mood. The strengths of the British universities are often the obverse of their freshly perceived shortcomings.

Characteristically, British universities are highly selective, admitting about 7 or 8 percent of the relevant age groups compared with much higher percentages in the United States and in the other Common Market countries. The retention rate in British universities, however, has been much higher than elsewhere; perhaps as many as 80 percent of undergraduates complete work for degrees. The ratio of staff to students has generally been more favorable than in the United States and certainly than in Europe. British university students by and large specialize more narrowly than do their American and European counterparts, and the British student who completes the typical 3-year degree course will have concentrated almost exclusively in one field, often in one subject, such as physics, chemistry, mathematics, or a modern language. British universities since the war, and particularly since the Robbins report, have deliberately increased the number of student "places" in science, technology, medicine, and other health-related subjects. In recent years, about 25 percent of university students have studied science, 20 percent technology, and perhaps 10 percent in health fields. Beginning in the middle 1960's there was a shift in the tide described as a "swing away from science," and last year as many as 3000 places in science and technology were vacant, while the competition for places in arts and particularly in social sciences was very heavy.

Critics of the university have made science and technology faculties their main targets. The gist of the criticism is that the universities have stressed basic research and the training of academic scientists and have avoided ties with industry and problems relevant to applied technology. As a result, Britain's record in winning Nobel prizes has been much better than its balance-of-payments record. The critics see a kind of secular scholasticism operating as a result of a surviving aristocratic tradition. This tradition is most evident at Oxford and Cambridge, and the argument is that the Oxbridge ethos has infected the other universities.

British universities are not all alike. They can, in fact, be divided roughly into groups. In the beginning, there were Cambridge, Oxford, and the "ancient" Scottish universities. Next, standing alone, came the University of London in the 1830's. London is really a federation of some 20 colleges, medical schools, and institutes and is the largest British university, with about 40,000 students. Then from the middle 19th century through the interwar period came the so-called "civic" or "redbrick" universities. Established mostly in the cities of the North and Midlands of England, these had close ties with local industry, were more vocationally oriented than Oxbridge, and, for the most part served students who came from the immediate region. Since World War II, the number of universities has increased from 17 to 44 (counting London as a single institution), including 10 universities which are completely new foundations and another 10 that were formed in 1965 by upgrading more narrowly based "colleges of advanced technology" into technical universities. The new universities, particularly the new foundations, which are familiarly called "the plateglass universities" because of their architecture, were expected to be innovative institutions, breaking away from conventional models of organization, course structure, and degrees.

Some innovations were made, particularly in the direction of mitigating extreme specialization, but the critics argue that the image of Oxbridge has been a dominant one and that the other universities tend to revert to type.

Disenchantment with the universities, however, seems to have mixed causes. For one thing, a sizable number of university graduates in recent years have been unable to find jobs for which they had prepared. The public at large reacted to the spectacle of student protests in recent years without much sympathy. The government has evidently grown impatient with faculty demands for better salaries and increased research funds at a time when the university record on increasing "productivity" or responding to national problems has been less than brilliant. Furthermore, it is generally recognized that the university policy of selective admissions based on academic performance in practice means that the universities tend to draw their students mainly from the middle class, so that the percentage of children of manual workers in universities has not grown appreciably in the past decade. As a result, the university finds itself stuck with the elitist label.

What is happening, not surprisingly, is that the old question of what a university is for is being asked in less abstract terms than usual. The Robbins report stated the multiple aims of higher education as instruction in skills, promotion of the general powers of the mind, the advancement of learning, and the transmission of a common culture and of common standards of citizenship. Rather pointedly, the Robbins committee declined to put these in any particular order.

These unexceptionable aims are being challenged from several directions. The government white paper, while not rejecting the Robbins view, puts new emphasis on reconciling national needs with resources and notes that employers' requirements for university trained people "in the forms of employment they traditionally enter are, in the aggregate, largely being met." The white paper goes on to say that "the continuously changing relationship between higher education and subsequent employment should be reflected both in the institutions and in individuals' choices." This applies, of course, to all types of institutions of higher education, but the implication for universities is particularly clear.

The white paper itself has been the target for criticism. There have been suggestions from university people that the policy is prompted more by cost-cutting motives than by sound educational policy. Spokesmen for the students have been suspicious of the white paper, particularly of the reduction in the number of new places. But the students have been distracted in recent months by a campaign to improve government grants to students.

The most direct public attack has come in the form of a critical "green paper" from a Labour party study group. As might have been anticipated, the Labour group calls for creation of a total of 1 million places in higher education by 1981 rather than the 750,000 projected in the white paper. Probably more significant, the Labour critics suggest that all of higher education should be placed under a single policy making body. Such a move would inevitably infringe on the powers of the University Grants Committee, the semiautonomous agency through which policy is made and government funds are distributed to the university. This presumably would result in a curb on the traditional independence of the universities and the nascent independence of the polytechnics.

Certainly the decline and fall of British universities is not in prospect. The universities, particularly some universities, still command great prestige and the power to defend themselves. But the white paper, which sets policy for the whole of British education, signals a reordering of priorities. Funds for programs for preschool children and for reconstruction of outdated schools will figure prominently in future budgets, and the Conservatives seem to be in earnest about a real diversification effort in higher education. So it appears that the government —and probably any future British government—will use its financial control of higher education in the next decade to move faster than in the last from class higher education toward mass higher education.—JOHN WALSH

NSF Promotes Ex-SE Asia Expert

The National Science Foundation (NSF), in an attempt to respond to the "mounting interest throughout our society in the ethical and human value implications of science and technology," has appointed the one-time counterinsurgency task force chief for Southeast Asia under the Kennedy and Johnson Administrations, Charles Maechling, Jr., to head up a new program in ethics.

Maechling, a lawyer, served as the State Department's director for internal defense from 1961 until 1963 and was the chairman of a National Security Council task force on counterinsurgency from 1961 until 1966. Since then he has dealt with international matters in the general counsel's office at NSF, and represented the foundation at Law of the Sea meetings. Most recently he was appointed special assistant to the director.

The Ethical and Human Value Implications of Science and Technology program, which will be run jointly with the National Endowment for the Humanities, will have access to various kitties held by the Director. The amount of these monies varies during the year, but this year they totaled the considerable sum of $2 million. From its location in the Director's office, the committee will fund some proposals directly; the committee will also make reviews and recommendations on proposals being considered by the various, independent, NSF directorates.

Hence the science foundation is starting an innovative experiment: both in terms of substance, by getting into some moral problems posed by science, and in terms of personnel, since Maechling's background is atypical of science foundation officials. Unusual, as well, is the administrative mechanism of a supercommittee with red- or green-light funding powers and located right in the Director's office. Maechling said that the committee's mandate, which cuts across all parts of the foundation, is bound to stir things up. But so far, he added, the consensus on which proposals are worthwhile and which fall wide of the mark has been remarkable.—D.S.

Erratum: In the 18 May issue of *Science* (p. 719, Don Paarlberg was identified as "former director of Agricultural Economics, U.S. Department of Agriculture." The attribution should have read: "Don Paarlberg, 1968, Purdue University, now Director of Agricultural Economics, U.S. Department of Agriculture."