a class of 20 or 30. The concentration required of the student at computer-based terminals in the Russian program precludes inattention; thus he achieves a degree of efficiency, it seems to us, that would be difficult to match in even the best-organized classroom. This is not to say that our Russian program is without defects. Van Campen plans a large number of improvements that will further deepen the degree of individualization.

We do feel, however, that, at both the secondary and the college levels, computer-based instruction can take over a good deal of the teaching of a foreign language, especially in languages for which the teaching staff is inadequate. From the standpoint of national interest, we need increasing instruction in Russian, Japanese, and Chinese, and yet the staff for teaching these three languages is not generally sufficient, particularly in secondary schools.

Another example not discussed here, but one that provides clear evidence that the benefits of computer-assisted instruction are not restricted to the deprived or to slower learners, is some of our work in logic and algebra at the elementary- and beginning secondary-school levels. We have not provided a classical evaluation of this program, which was one of our first curriculum efforts and began with demonstrations in December 1963. There is no good direct comparative evaluation of control-group performance, since this body of curriculum material is not offered in ordinary classes. There is no doubt, however, that this program, which is primarily aimed at bright students in grades 4 to 8, has been effective, because a great many mathematical ideas and skills have been learned by students who would not otherwise have been exposed to the material. One of our finest examples (although the evidence is anecdotal) is the rapid progress made in the logic program by students in Mississippi in comparison with students from upper middle-class environments in Palo Alto. We are especially proud of two Mississippi Negro boys in the eighth grade who stood at the top of the first-year logic program during 1967–68. This possibility of bringing enriched programs to students in a variety of environments where such courses cannot reasonably be offered by the teaching staff, either because of lack of time or because of lack of training, is probably one of the most immediately practical aspects of computer-assisted instruction. We want to conclude this article by emphasizing the important role of such enrichment programs, and to stress their importance, in spite of the fact that it is not easy to provide a classical, "hard data" evaluation of such programs.

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NEWS AND COMMENT

DuBridge: Nixon's Science Aide Takes a Swing through Europe

London. The Nixon administration's blend of earnest rhetoric and political catalespy is not visible in detail from this distance. But some sense of the peculiar character of the administration is often conveyed to foreign places by one or another of the official delegations dispatched from Washington. With Nixon himself setting the trend, these come in increasing numbers now, thus raising the possibility that if, as was long ago noted by students of professional behavior, meetings are a substitute for work, then perhaps travel has become a substitute for meetings.

In any case, among the recent Washington-based touring companies was one headed by Nixon's science adviser, Lee A. DuBridge, traveling for the purpose of promoting the new era of European-American scientific and technical cooperation of which Nixon spoke during his own recent European visit. The DuBridge tour, which ended here 8 October after 3 weeks of travel through France, Romania, Yugoslavia, Belgium, and the Netherlands, did not set any new marks on the hokum index. That would have required both tastes and skills far beyond those possessed by DuBridge or his entourage, which included former AEC Commissioner Gerald Tape; Lewis Branscomb, director of the National Bureau of Standards; Herman Pollack, the State Department's director of international scientific and technological affairs; and David Beckler and Norman Neureiter, of the Office of Science and Technology. But it may be inferred that, with research budgets being gutted, DuBridge left Washington with instructions that amounted to, "All praise for cooperation, but don't buy anything expensive."

In Paris, for example, after several days of touring and conferring with French scientific and technical leaders, a press conference was called at which DuBridge and the French Minister of Industrial and Scientific Development, François-Xavier Ortoli, announced in a joint statement that they had held discussions "devoted to a review of the status of existing cooperative projects and the means for developing new areas of scientific exchange. . . . They decided, for instance," the statement continued, "to increase exchanges in disciplines and technologies relating to environmental and urban problems [and] that additional agreements should be concluded between interested agencies or institutes of the two countries as soon as the necessary preparatory discussions are completed." DuBridge then stepped forward to praise what he had seen in France, especially the Concorde supersonic airliner and oceanographic work in the Marseilles region. He said, "Our two countries share many concerns and we intend to establish closer scientific and technical relations in these areas." Among the areas cited

were basic research, space, oceanography, atomic energy, pollution control, and transportation. When questions were invited, DuBridge was asked about the funds the United States was prepared to make available for the various new cooperative ventures that had been mentioned. Looking a bit unhappy about the question, he replied, "That's difficult to say, since the money will be contributed by a variety of agencies and departments." Pressed to cite a figure, he hesitated, and then said, "Perhaps $150,000." After the giggles stopped, a member of his group explained that the first tangible result of the visit would probably be an increase in the exchange of postdoctoral researchers. This would be accomplished under a system that would minimize overseas expenditures for each country. Thus, each government would pay for the transportation of the researchers it sent abroad, and the host country would provide stipends and other costs. When would this start? Which disciplines and how many people would be involved? No one was certain. Ortoli rivaled DuBridge in his praise of cooperation and prediction of a new era, but was similarly short on specifics, possibly being preoccupied with other matters, among them the big financial cuts that his Ministry was preparing in space, atomic energy, and other fields.

The next day, a headline in a major newspaper read: "France and U.S. Reach Accord on New Science Cooperation."

The visit to Romania produced reports of new ventures in scientific and technical cooperation, but a close examination reveals the following. Toward the end of the Johnson administration, a Romanian-American scientific exchange program was announced. This was to involve 40 "man-months" per year of exchanges each way—for example, five researchers each spending 8 months in the other country. The exchange was agreed upon well over a year ago, but apparently very little has happened. According to one report, the program has managed to get up to about 16 man-months a year. It is now hoped that, as a consequence of DuBridge's visit, the original agreement will be carried out. DuBridge said he was pleased that the Romanians understood that many technological matters must be carried out on a "company-to-company" basis. To provide some insights on the American industrial experience, P. E. Haggerty, chairman and chief executive officer of Texas Instruments, joined the tour, taking part, though, in his capacity as a member of the President's Science Advisory Committee. (Later, in London, Haggerty lectured at the American embassy before a group of British scientific and technical leaders. Emphasizing the importance of "a vital private enterprise system," he recounted the growth and operating techniques of Texas Instruments, interspersing many sharp digs at threats to stock options and other rewards.)

DuBridge and his colleagues said they were highly impressed by what they saw in Yugoslavia. Much praise was given for the quality of work in marine biology and artificial limbs, and it was said that cooperation between the two countries would increase. But details were scarce.

In Brussels, the DuBridge tour dropped in on that Cold War mausoleum NATO, which Nixon, in his own visit there, designated a promising focal point for dealing with environmental problems. Between the Nixon and DuBridge visits, Daniel Moynihan, the President's assistant for urban affairs, visited NATO to look after the details. Stopping off in London en route back to Washington, Moynihan held a press conference, at which he was asked, "Why NATO?" He replied, "Because it's there"—which is probably the best case that could be made. In the meantime, various member nations have been invited to submit proposals for consideration by what is known as NATO's Committee on the Challenges of Modern Society. The Belgians said they would like to handle the study on pollution, and, since it is U.S. policy to encourage whatever flicker of NATO interest it detects in its partners, Belgium was designated to head the pollution study, though the project may be some time in getting under way, since the Belgians said they could not possibly have things ready for the mid-October session at which the proposals were to be considered. Britain said it would like to see the committee look into "individual and group motivation." The United States recommended a project on "disaster relief." Also being considered are projects on highway safety and oceanography. But details are few, since most of the relevant papers are classified. (NATO is highly security-conscious; bold print on the menus in its restaurant proclaims, "You are not in a secure area.")

Lunar Samples: Why France Got None

Paris. It has been speculated that Gaullist aloofness prevented French scientists from being among the 40 or so foreign research groups that applied for and received lunar samples from NASA. But apparently the explanation is more mundane: with all good will, but not much speed, the French failed to meet the deadline for applications. And NASA was not about to bend the rules, though there seems to be an ample supply of lunar material for experimentation—a British researcher says he was given ten times as much as he asked for—and President Nixon has been proclaiming a new era of Franco-American cooperation.

In any case, a spokesman for the French space agency acknowledges that the blame belongs on its own premises. Around mid-May 1966, he says, the agency received a notice, dated 3 May, inviting applications for lunar samples and setting 15 June as the deadline. Since the agency has no laboratory of its own and, as the spokesman said, "it seemed to be about geological matters," copies were sent to two scientists who, it was thought, might be interested. The spokesman points out that there was no wider distribution at the time, nor was there any effort to make certain that the two scientists were fully aware of what was involved. One of them got an application off to NASA in mid-July 1966, but failed to abide by the rule that applications must first be approved by the scientist's national space agency. The other sent in his application at least a year after the deadline.

The French space agency says it is now widely publicizing the opportunities and procedures for applying for samples from the next batch of lunar material, and already has forwarded more than a dozen applications to NASA.—D.S.G.

Opposition to War Put on Record

As protests against the war in Vietnam have widened, more universities have taken an official stand on the government's policy concerning the war. Following several weeks of controversy, the Harvard Faculty of Arts and Sciences last week moved to end its traditional position of neutrality on political questions and adopted two antiwar resolutions sponsored by Harvard's department of biochemistry and molecular biology. One resolution recognizes a national war protest scheduled for 15 October and allows faculty members, at their own discretion, to suspend classes for the day. The other calls for the "prompt, rapid and complete withdrawal" of United States forces from Vietnam. In supporting the resolution, the faculty backed away from its traditional hands-off attitude toward officially criticizing government actions and leaned toward the position that the university has a responsibility to take a stand on outside political issues that affect it.

The resolution on the national war protest was introduced by Everett I. Mendelsohn, professor of the history of science, and was passed almost unanimously. The resolution calling for complete U.S. withdrawal from Vietnam was introduced by John Edsall, professor of biological chemistry, and met with considerable opposition from some faculty members. After a long debate, it passed 255 to 81, with 150 abstentions. The issue which sharply divided the faculty on this resolution was not the policy toward the war but the question of whether or not the university should take an official position on political issues outside the university. The faculty's liberal caucus argued that the university should take a stand on the war because it "poisons" academic life and helps to cause campus disturbances. Edsall told the faculty members, "The war has damaged the quality of life and work in the universities here and elsewhere. It works against the values of devoted scholarship and independent inquiry for which the university stands; it distracts and impedes us from our proper tasks." All 12 faculty members of the department of biochemistry and molecular biology, including Nobel prize winners Konrad Bloch and James D. Watson, endorsed Edsall's resolution.

Other members of the faculty, many of whom actually oppose the war, argued that the university would be abandoning its traditional position of neutrality if it took a political stand. A statement prepared by 150 professors who held this view argued that a formal faculty vote on the war issue would damage academic freedom within the university, make politics a consideration in faculty appointments, force the minority to accept the right of the majority to speak for them on matters of "politics and conscience," and set a precedent of allowing political matters to come regularly to the attention of the faculty. Signers of the statement included George B. Kistiakowsky, professor of chemistry and former Presidential science adviser, and Harvey Brooks, dean of the division of engineering and applied physics.

At other universities, antiwar protest plans and resolutions have also been approved. The Columbia University Senate, consisting of faculty members, students, and administrators, approved on 26 September a resolution opposing the war in Vietnam and recommending that "the most reasonable plan for peace is the immediate withdrawal of all U.S. troops." The trustees of Massachusetts Institute of Technology have voted to support the antiwar moratorium scheduled for October "as a day when all members of the MIT community are free" to follow "the dictates of their conscience."

On 12 October, university presidents of 79 private colleges sent a letter to President Nixon urging a "stepped-up timetable for withdrawal from Vietnam." They include Morris Abram, president of Brandeis; Andrew Cordier, president of Columbia; Robert Goheen, president of Princeton; Howard Johnson, president of Massachusetts Institute of Technology; Edward Levi, president of the University of Chicago.—MARTI MUELLER

While talk of a new role for NATO is gratifying for its staff, there unfortunately is no money available for any of the new activities, nor is any money in sight. DuBridge said he was "gratified" by NATO's interest in environmental problems, but said little more on the subject. One financial possibility is that funds might be diverted from NATO's fellowship program, which has existed so long that annual national contributions have become an automatic reflex. It is probably a fairly plunderable fund, since rejected fellowship applicants are not a particularly troublesome bunch. However, it remains to be seen whether anything at all will come out of the proposal to give NATO a new job. One problem is that there is another organization that is also there —the Organization for European Cooperation and Development (OECD), which is said to be climbing the walls of its Paris chateau over Nixon's designation of NATO for this plum assignment. (Europe is studded with an assortment of well-staffed organizations that have hung on for years, sometimes decades, in the hope that, if political amalgamation takes place, they will become very important. These organizations watch each other very jealously, especially in such growth-industry fields as oceanography, pollution, and transportation.) DuBridge expressed the hope that NATO and OECD would hold conversations directed toward sorting out the contributions that each could make in the subjects under discussion.

As for the Belgians and the Dutch, DuBridge said they are both doing well industrially, both have sound and well-established scientific and technical relations with the United States, and no new programs seemed necessary.

In London, DuBridge gave half a dozen separate TV and radio interviews, and visited with British scientific, technical, and education leaders. Following his visit to the Minister of State for Education and Science, the British issued a statement which said, in part, "Discussion ranged over such topics as financial growth rates, manpower resources and requirements, development of major science facilities and allocation of funds to particular fields of research. In the talks, the U.K.'s growth rate in real terms in funds allocated to civil science was contrasted with an actual reduction over the last two years in the U.S.A."

At a press conference held on his last evening in London, DuBridge briefly stepped out of his role of adminis-

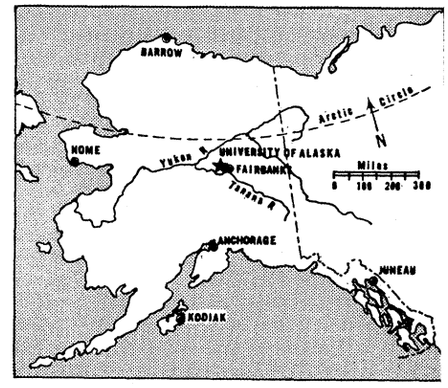
tration representative and spoke candidly on the financial plight of American science. After years of rapid growth, he said, federal support for science suddenly leveled off in 1966. "The results have been painful," he said. "It has been terribly harmful in certain fields." He added, "It is not a catastrophic situation. It isn't that funds have been cut in half. But there has been a decrease in real effort." For example, he pointed out, the 200-Gev accelerator at Batavia, Illinois, is now entering a costly construction stage and, as a result, "other projects have had to be shut down to meet these costs." DuBridge said he would like to see federal support for science return to an annual growth level of about 10 to 12 percent for several years, so as to make up for the drop-off in recent years, and then grow annually in step with the increase of gross national product. To this he added, "I think our basic science has been hurt most, and I'd like to make up for lost ground there first."

What about the cooperative efforts that he discussed during his trip?

Oh, yes, they looked very promising.

—D. S. GREENBERG

University of Alaska: Academe's Outpost in the Subarctic



College, Alaska. The University of Alaska, situated less than 120 miles below the Arctic Circle in the nation's most sparsely populated state, might be expected to be a small, struggling institution on the academic world's outer fringes. And, in fact, the university is in some respects scarcely more than that. Yet in others it is quite something else—it is an institution with a thriving and relatively large research establishment that is making a very good thing indeed of its location in the far and frigid north.

The university campus, located here at College, 4 miles northwest of Fairbanks, is on a forested rise that overlooks the broad Tanana River valley. The high peaks of the Alaska Range, far to the south, are visible from the campus on clear days. The university and the Fairbanks area are in Alaska's central plateau region, where the winters are bitterly cold—colder even than those on the Arctic slope—and where, by late December, there is almost constant darkness (dawn coming at 10 a.m. and sunset at 1:30 p.m.).

In this rather forbidding interior region of Alaska, the university, with facilities now valued at $75 million and an annual operating budget of nearly $24 million, represents what is clearly the single most important nonmilitary activity. The university has prospered, despite the fact that it has lacked a substantial population base on which to build. Alaska's population of 282,000 (the U.S. Bureau of the Census' 1969 estimate) is small and, from the university's standpoint, awkwardly distributed over the state's huge territory.

The Fairbanks area is now booming from the air traffic and other activities generated by the North Slope oil rush (*Science*, 3 October), but it still has fewer than 50,000 inhabitants, even counting personnel of nearby Army and Air Force installations. More than a third of the population of Alaska lives in and around Anchorage, which is 265 miles from here by air and more than 400 miles by road. And, for Juneau, Ketchikan, and other towns of the southeast Alaska panhandle, the university is anywhere from 600 to 800 air miles distant, or as far away as institutions in Washington State, where many Alaskans do, in fact, attend school.

This fall the university has some 2000 full-time students enrolled here (the university also has seven community colleges, three in the Anchorage area, three in the southeast panhandle, and one at Kodiak), and of that number almost three fifths are freshmen and sophomores. Most who enter as freshmen remain only a year or so; one reason many depart is that the university does not have enough professors—or at least not enough teaching professors—to offer an appropriate selection of courses at the junior- and senior-year levels. The low junior and senior enrollment, in turn, makes it harder for the university to obtain the larger legislative appropriations that are necessary if more courses are to be offered.

The university can in reality be regarded as made up of two rather distinct institutions. One of these is a small, uneven undergraduate school supported largely by the state. The other consists of an array of research institutes which receive some state support but which depend largely on grants and contracts from outside Alaska. Principally, of course, this outside support has come from federal agencies, though to some extent it has come from foundations and industry, now especially the oil industry. This year the institutes will spend about $10.5 million—an extraordinary amount of research activity for a small institution in an out-of-the-way place. But it is precisely because the university is located in Alaska that it has found rich opportunities for research in such fields as auroral studies, seismology, volcanology, glaciology, mammalian physiology (under conditions of extreme cold), ecology of the tundra and taiga (the swampy coniferous forests that begin where the tundra ends), arctic engineering, and the social and economic development of the Alaskan natives.

The university's beginnings go back to 1917, 5 years after a territorial government was created but some 4 decades before Alaska became a state. In that year the Alaska legislature enacted a measure to establish the Alaska Agricultural College and School of Mines here. This truly was an act of faith, for the gold rush that brought thousands of new people to Alaska around the turn of the century had waned, the territory's population was