state & society

Report finds US academic research base is endangered

"The scale, vigor, and creativity of American science are outstanding but the signs of trouble for the future are unmistakable." So concludes an NSF-sponsored report, entitled *The State of Academic Science*, on the problems and prospects for the research effort in the nation's universities. According to the report's authors, Bruce L. R. Smith (Columbia University) and Joseph J. Karlesky (Franklin and Marshall College, Lancaster, Pa.), a decline over the last decade in the Federal commitment to supporting university research has contributed to an erosion of the research base and led to manpower problems in all the sciences. In particular, in physics, decreases in Federal project awards and graduate-student support appear to be responsible for growing tendencies in academic research departments to "play it safe" by investigating low-risk areas, to specialize in particular subfields and to turn more to applied-physics research in the effort to attract grant money and students.

The authors explain that the impetus for their study was the widespread unease, despite dramatic successes in most areas of US scientific research, over the underlying health of this enterprise in American universities. Perhaps the best expression of the need for such a report at this time is that of Charles V. Kidd, Executive Secretary of the Association of American Universities: "... both the government and universities are, to a great extent, setting policy on the basis of rumor and anecdotes of undoubted veracity but unknown representativeness." Discussions with Kidd and others in late 1974 led to a grant from the National Science Foundation in June 1975 to study the future research role of the universities. In the course of their study Smith and Karlesky visited 36 universities and consulted with hundreds of scientists and engineers, graduate students and university administrators.

The crucial question to which the report is addressed, according to the authors, is "How can we preserve the intellectual power and social benefits of the research enterprise in our nation's universities?" To this end they report on trends in academic-research support and performance; changing relationships between academic and other performers of R&D; current developments in chemistry, physics, mathematics, the life sciences and engineering, and various emerging issues in academic research as a whole.

With respect to academic science in general, the authors note that over the period 1940–1970 both the quantity and quality of research conducted in the country's laboratories was expanded—due, in large part, to a growing Federal role in R&D support. In 1976 the Federal Government provided 53% of total expenditures in this area, Smith and Karlesky tell us, in contrast to only 20% in 1940. This expansion began to deteriorate in the late 1960's, and a paradox has resulted: Significant scientific findings continue undiminished within American university research, yet the universities themselves are caught in a tightening noose of limited financial resources, obsolete equipment, high proportions of tenured faculty and decreasing availability of fellowships and other assistance for graduate students and postdoctoral

continued on page 62

Physicist describes oppression of Argentine scientists

Máximo Pedro Victoria, an Argentine physicist imprisoned and held without charges for seven months under his country's present military government, got a rare chance recently to tell of the abuses he experienced and witnessed. Four American scientific societies shared the expense of bringing Victoria from his present residence in Belgium to testify in Washington, D.C. His story is one of senseless brutality and repression in the Argentine prison system and of a gloomy twilight for Argentina's scientific community, particularly for those in applications and development. In a press briefing, Victoria told us of other physicists arrested and suppressed by the government and suggested ways Americans could help them.

Victoria earned his PhD in physics from Argentina's National University of Cuyo in 1966; his research interests are in physical metallurgy and materials technology. He served as division head in the Argentine Atomic Energy Commission's (CNEA) metallurgy department from 1969 to 1973 and as director (later vice-president) of the National Institute of Industrial Technology in Buenos Aires from 1973 to 1976. During this period Victoria also held faculty positions as a professor of experimental physics and of physical metallurgy. He was arrested on 1 April 1976 (shortly after the military coup of 24 March that toppled Isabel Peron's government and installed General Jorge Videla as President) and was released on 11 October; Victoria left the country the same day.

The societies that split the bill for Victoria's visit to the US are The American Physical Society, the American Association for the Advancement of Science, the National Academy of Sciences and the Federation of American Scientists. Now employed as a senior research adviser at the Belgian Institute of Welding in Ghent, he testified in Washington before the Organization of American States' Inter-American Commission on Human Rights and also met with State Department officials and Congressional aides.

In his testimony before the human-rights commission, Victoria said that after the March 1976 coup he was asked to resign his post at the industrial-technology institute by the military authorities in charge. When he returned to the CNEA he was sent to the personnel office, where "I was told by the Personnel Manager, a Navy Captain, that I was under arrest. No reason was given to me for my detention." Seven months later, when Victoria was released, there still had been no reason given. He told us that he "had a lot to do with the technology policies of Argentina" as NIIT vice-president and that a group of the CNEA's scientists and technologists had disagreed with the

government's handling of Argentina's nuclear-power program. "If there were any other political reasons," he said, "they are unknown to me."

After his arrest, testified Victoria, he was taken at gunpoint to a Navy ship where he was beaten repeatedly. He was interrogated on his political and religious beliefs and on his connections with fellow scientists and other persons. Also during this time, he learned that nine other CNEA members were being held in detention in the same facility.

Victoria and the others were taken to Villa Devoto prison in Buenos Aires and held "at the disposal of the Executive," a condition he says allows the indefinitely prolonged incarceration of prisoners without accusations being brought against them. Victoria was confined with the political prisoners in a high-security ward where the average occupancy was five prisoners per 2 × 3-meter cell. He characterized the food at Villa Devoto as "extremely poor" and medical attention as "almost nonexistent." (A medical check-up in Belgium afterward showed Victoria to be suffering from extreme malnutrition.)

In September Victoria was transferred to the Sierra Chica prison, a process accompanied by more beatings; he sustained the loss of his front teeth as well as two broken toes. "Two days later," he said, "we were asked to sign a paper saying that the wounds had been self-inflicted, or we would not be allowed visitors." Victoria also stated that while he himself was not put to torture, he witnessed its results in others, some of whom became psychologically disturbed while another—subjected to electric shocks—lost the use of an arm. On being released, he was told his life and his family's security were in danger.

Victoria estimates that since the coup 100 to 150 of the more than 1000 engineers and scientists at CNEA have left or been dismissed. He also told us that the Institute for Mathematics, Astronomy and Physics at the National University of Córdoba has been almost entirely dismantled, and that about 20 physicists have been removed—as have biologists and chemists, too—from the National Research Council. Such dismissals of Argentine scientists are in line with an estimate by members of the Argentine Physical Society that one-fourth of its members have lost their jobs since the coup. (This account appears in "Argentina Today," published by the Argentine Information Service Center, a national organization set up to work for preservation of human rights in Argentina and having chapters in New York City, Los Angeles and Berkeley.) Victoria also indicated that the basic-science laboratories, left unrestricted in their research fields, have not been so hard-hit by repression under the Videla government as have applied-research personnel and those in development activities. He could not account for the disparity in treatment.

Victoria told us that Americans can best aid suppressed and imprisoned scientists in Argentina by urging Congress to help support political refugees by diverting funds from US aid to the country; by helping to obtain visas and working permits abroad for the refugees, and by making on-site visits.

Other Argentine physicists arrested or abducted since the military take-over, as mentioned by Victoria or listed by the AISC, include the following: Juan Carlos Gaillardo, formerly director of the Institute for Mathematics, Astronomy and Physics (see PHYSICS TODAY, June 1976, page 72), now being held in Sierra Chica prison, with no charges (according to a spokesman for the AAAS Committee on Scientific Freedom and Responsibility); Antonio Misetich (CNEA), now presumed dead, according to Victoria; Federico Alvarez Rojas (CNEA), abducted with his wife Hilda Leikis, a computer programmer, in October 1976 and still missing; Adriana L. Calvo de Laborde (University of La Plata), seized in February 1976, when she was eight months pregnant; Federico Luden (La Plata), missing since November–December 1976, and Manuel M. Tarchytzky, a nuclear physicist abducted in September 1976 and reported by the AISC to have died under torture. According to Kurt Gottfried (Cornell University), Elena H. Sevilla, a young physicist who taught at the Universidad de Sur in Bariloche, was arrested and dragged from a hospital ward just five days after Caesarean childbirth. Since November 1975 she has been transferred from prison to prison, all without formal charges, and is now reported to be held in Villa Devoto. —FCB

PHOTO, J. FAUST

Exuberance at ground-breaking ceremony for PEP storage ring, held on 2 June, obscures faces of Robert Thorne (ERDA) and Paul Gilbert (Parsons Brinckerhoff Quade and Douglas). Visible shovel-wielders are (from left): Andrew Sessler (Lawrence Berkeley Laboratory director), California Senator Alan Cranston, Donald Beattie (ERDA) and Wolfgang Panofsky (SLAC director). The joint project of LBL and SLAC is scheduled for completion at SLAC in 1980 and is expected to cost $78 million. It will produce 18-GeV positrons and 18-GeV electrons.

Research base endangered

continued from page 61

researchers. Three developments of particular importance for the future course of academic science, according to the report, are an emerging movement toward stratification that narrows the base of universities capable of carrying on the highest quality research, a weakening of the link between research and teaching activities, and shifting authority relationships within the universities.

Trends in physics. Smith and Karlesky provide the results of statistical studies and reports by the NSF, the National Academy of Sciences and other organizations to document yet again the validity of claims of ailing health made over the last decade by academic physics researchers. One reads that the mix of Federal support among agency sponsors has changed (NASA and the Pentagon now contribute proportionately less, NSF and ERDA proportionately more). Funding for Fermilab has increased, but there is declining support for other facilities for high-energy physics. Funds awarded by ERDA's Division of Physical Research for new research projects totalled $6.1 million in 1965; the corresponding figure for 1975 was $2.4 million. And so it goes, with a drop of fulltime graduate-student enrollments from 11 163 in 1969 to 7743 in 1975 at 146 matched physics departments and a cor-

continued on page 64

Research base endangered

continued from page 62

responding dwindling (in the period 1968–1975) in the total number of fellowships and traineeships from 2700 to 900.

But the real meat of the authors' observations on the state of academic physics is not these statistics, but rather their observations based on on-site inspections of university research departments of assorted types and strengths. In general, the report says, physics departments in the highest ("distinguished") range "have maintained their traditional high-quality research efforts." They have not, however, been unaffected by the changing climate in research. Preserving the flow of young talent into such top-flight institutions is an oft-cited concern, but the "play it safe" tendency—according to those interviewed by the authors—may represent the most serious potential danger for the long term. Many physics graduate students, for instance, "prefer a safe thesis topic that will be more likely to lead to a certain job." Other threats to the research efforts in the highest ranking institutions are inflation, less flexible funding, fewer high-caliber graduate students, tenure saturation and rising indirect-cost rates.

Much the same problems face the lower-ranked departments, but there is greater strain on their research efforts. Departments rated as "strong" do not appear to have suffered drastic cutbacks in project support, but there is a perceptible loss of "momentum"; the merely "good" institutions are described as threatened, and those falling below even that level have had to resort, with varying success, to fundamental changes in their approach to research in order to stay afloat. Several departments in the lowest category now describe their research efforts as substantially applied in orientation, so that "not much difference remains between the engineering and physics departments." Others among the less prominent departments have found that their success is tied to selectivity and specialization; rather than attempt to cover the whole physics spectrum as was common practice in the 1960's, they now emphasize particular subfields—such as solid-state or atmospheric physics—and concentrate all efforts on them to lure Federal grant money.

What to do? Smith and Karlesky are general in their recommendations, as well as cautious. "No single or simple solutions are available," they say. They include among needed items to restore the basic vitality of university research the recovery of indirect costs, tax-law changes to encourage philanthropy, institutional funding beyond the dominant project form of research support and strong action by the universities to "strengthen their financial management and priority-setting capacities." An essential part of the academic research enterprise in the past has been pluralism, say the authors, and this must continue to hold true in the future. "American science remains strong," they conclude, "but now is the time to take prudent measures to protect that strength." —FCB

NSF weighs options for neutron lab

Small-angle neutron scattering is the subject of the National Science Foundation's current review of proposals for the design, construction and operation of a new national research facility. The NSF issued project announcements for the undertaking in April to selected existing reactor sites. Estimated costs for the facility—intended for use in such research areas as solid-state physics, metallurgy, polymers and biology—are expected to be $500 000 initially, with annual budget allotments of about $250 000 for at least four years.

Numerous communications from chemists, condensed-matter and polymer researchers, physicists and others prompted the Foundation to seek proposals for such a facility, according to Lewis H. Nosanow of NSF's Division of Materials Research. Nosanow told us that project announcements were sent to three universities (Missouri State University, MIT and Georgia Tech), four ERDA labs (Brookhaven National Laboratory, Argonne National Laboratory, Oak Ridge National Laboratory and the Ames Laboratory at Iowa State University) and the National Bureau of Standards. "In our judgment," he said, "these were the only facilities operating in the US that had the right combination of reactor configuration and staff." However Donald Stevens, director of the Materials-Sciences Program at ERDA, regretfully informed the ERDA laboratories that the agency's policy prohibits competition with universities or the private sector on such a project. But if no academic competitor is selected, NSF can then choose an ERDA facility on a so-called "sole-source" basis.

The criteria for selecting the proposal, Nosanow told us, are the ability to design, build and operate the facility, and the capability to make the facility available to scientists from diverse fields and institutions and to help them use it.

The Foundation's plans at this time call for a single national resource, according to Nosanow, but this limitation may not be permanent. He pointed out that in Europe there are "half a dozen" such facilities, at various levels of power, for small-angle neutron scattering (such as the Laue–Langevin D-11 at Grenoble, France, to which the US facility may be comparable); such a mix could be appropriate in this country as well, he said. The NSF's current projections of required funding are described as guidelines for planning purposes; a proposal for more or less than the estimated cost could well win acceptance. Nosanow hopes for a decision in the fall. —FCB

Golden is site for SERI headquarters

The Energy Research and Development Administration has selected Golden, Colorado, as the initial site for the Solar Energy Research Institute. The contract for the facility has been negotiated with the Midwest Research Institute (Kansas City, Mo.), in cooperation with the State of Colorado, and funds for the first year of operation are estimated to be $4–6 million. ERDA has revised its conception of the SERI project so that it will be a national network, composed of four regions and eventually involving all states. Golden is the national SERI site, which will also coordinate regional activities. According to Donald Kornreich of ERDA's Office of Solar, Geothermal and Advanced Energy Systems, planning grants will be offered in the near future to groups representing the North Central, West and Southeast regions of the US. A $498 000 contract has recently been awarded to the Northern Energy Corp (Cambridge, Mass.) for planning New England-region programs.

SERI was originally envisioned as a major new government laboratory, with a projected budget of $50 million by 1980. From the time the facility was first called for in the Solar Energy Research, Development and Demonstration Act of 1974, SERI has been a case of declining expectations and diminishing funds. Therefore, the plan for regional centers will come as welcome news to the 18 other groups who competed with the Midwest Research Institute for the SERI contract. The network would be responsible for R&D projects, technology transfer and information dissemination.

At the Golden site, SERI's initial role will include analyses, assessment and information functions, educational and research activities and consultation. The primary mission is aimed at fostering widespread use of all aspects of solar technology: direct solar conversion, solar heating and cooling and solar-thermal power generation, among others. The staff of SERI will consist of some 75 professionals and will be headed by the recently appointed director, Paul Rappaport. He has been the director of RCA Research Laboratory's process and materials research and an adviser to NASA and the US Air Force. —BCC□