

ion, is a legislative act of abdication to the Secretary of Defense by Congress of the Congress's constitutional obligation to establish basic policy." He went on to say "The fight is far from ended. As a matter of fact, it has begun again."

Prospects for federal support

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Leverage. Koch pointed out the high degree of leverage exerted on physicists by changes in federal funds. In his analysis of manpower dynamics, he noted that physicists are more involved in research and development than are any other group of scientists, and money for that research and development comes largely from the US government. Why is this so? Physics is generally expensive and has a longer-term "pay off" than other sciences, so that most private companies do not care to invest heavily in its support.

At one time, he continued, a teacher shortage in the US gave physicists some alternatives in their choice of jobs. This shortage no longer exists, so that research and development provide essentially the only opportunity for physicists. We see then, continued Koch, that physicists are very dependent on government support. And the physicist population has been growing by about 8-9% each year; in 1970, 1300 new PhD's were added to a total of 14 300. Just to provide salaries for all these new physicists, funds must be increased by

8-9% a year (after correction for inflation). If funds increase by only 4%, then about half of these new physicists will not find jobs. This leverage explains why physics-department chairmen report abrupt 15-40% decreases in manpower, at all levels from the admission of graduate students to the hiring of faculty, at the same time that government reports show, for example, an effective decrease of 5% in support of academic science (see story on page 93).

What is AIP doing? Raymond W. Sears, formerly Director of University Relations at Bell Telephone Laboratories, has been hired as a special placement consultant; financial assistance from APS makes this appointment possible. Sears, a physicist whose research career extends from early development of electron tubes to work on lasers, had been at Bell Labs since 1929. He is scheduled to begin his new job on 1 Jan. Koch also announced a new AIP advisory committee on placement.

Right now, the education and manpower division is conducting two more surveys in an attempt to form a more complete picture of what is happening to physics. The aim of one survey is to get details on the fall 1970 enrollments in physics departments (both graduate and undergraduate), to analyze the degrees awarded in 1970 and to estimate the number of degrees likely to be awarded this year. The aim of the other study is to determine the extent of unemployment; recent graduates (BS, MS and PhD), postdoctoral fellows and those physicists who listed themselves with AIP as job seekers during the past year are included in this second survey. Once all these statistics are collected, says Koch, the effect of funding cuts on the production of physicists and on the job market will be documented, and the need for long-term planning of manpower needs will be clear.

Holding pattern needed. Brode showed how US production of scientists has varied over recent decades and concluded that we have reached a saturation level: A fairly constant proportion of the college-age population, he explained, has been receiving degrees in science and engineering, and this proportion is limited by both motivation and ability. But in the past 15 years or so, the college-age group has grown almost exponentially; the number of age-22 persons was 2.2 million in 1955 and is likely to be 4.4 million in 1985. This great expansion, which is much larger than the growth of the general population and has led to the present excess of scientists, will probably level off with the present leveling of the birth rate, so that the excess of scientists will disappear during the 1980's.

We need a "holding pattern" to retain people already trained; unless such

a program is begun, warned Brode, the number of scientists being produced will drop quickly, and we will again have a severe shortage. Efforts might include additional training as well as special public works or research programs that would both advance science and help scientists maintain their proficiency.

—MSR

NSF supports retraining project for jobless scientists

Fifteen unemployed scientists and engineers, each with at least five years of professional work experience, have recently begun a three-quarter academic program at Stanford University leading to the degree of MS in computer science. Their expenses are being paid out of a National Science Foundation grant totalling \$155 000.

This is the start of an experimental project funded by NSF and organized by a group of engineers and scientists who are interested in using technical skills to solve contemporary social problems. Called the "TASC [Technology and Society Committee] Force for Constructive Alternatives," the Palo Alto, Calif., group is assisting unemployed mid-career technical people to retrain for the jobs that do exist. NSF is taking a continuing interest in the program, and hopes to extend it if it proves successful.

Daddario committee calls for a national science policy

In one of his last major actions as chairman of the House Subcommittee on Science, Research and Development, Emilio Daddario recommended a revamped Federal organization for the planning and management of research and development and the formation of a task force to draft a master plan for a national science policy. A subcommittee report called "Toward a Science Policy for the United States" is a result of three months of science-policy hearings last summer and years of inquiry into the government-science relationship.

Daddario, commenting on the report, particularly urged establishment of a special task force to submit a draft national science policy by the end of 1971 for consideration by Congress.

A key set of recommendations concern the Office of Science and Technology. It should be strengthened through additional staffing and legislative backing, and it should be separated from direct administrative connections with the President's science adviser and the President's Science Advisory Com-



BRODE

mittee. OST should annually review US research and development and recommend a program for the coming year. It should develop criteria for the support of basic research by mission-oriented agencies. The report noted that because OST frequently handles immediate crises it does not fulfill even its few existing statutory obligations. It said that OST has the legal duty to formulate basic Government science policy within a continuing framework and to evaluate and report on overall Government research efforts and activities but that "OST does not perform

either function in an adequate fashion. Indeed, under existing circumstances, it cannot."

Commenting on the report, Robert Barlow of OST told PHYSICS TODAY that science adviser Edward David Jr wants to take a stronger role in sorting out what the mission agencies should be doing so that the President and the Congress can better make their decisions. Other report recommendations include:

► The proposal to form National Institutes of Research and Advanced Studies from parts of a number of ex-

isting agencies ought to be implemented.

► The Senate should emulate the House's Science and Astronautics Committee and establish its own science focal point.

► An Office of Technology Assessment should be established in Congress.

► The Office of Management and Budget ought to develop a "stable funding" procedure for basic research to avoid seriously disruptive funding fluctuations.

► The institutional grants program of NSF should be upgraded.

UNESCO: helping physics for twenty-five years

After trying to promote and improve science for the past 25 years, UNESCO has made major contributions to international physics. It has helped establish two major centers for physics in Europe and recently in Latin America has initiated a third physics center and has begun a pilot project for teaching physics.

In the eight Latin American countries involved in the teaching project, UNESCO is trying to develop and test a new approach to physics. UNESCO's program was formulated by Pär Bergvall of Sweden and Nahum Joel of Chile, both physicists, who worked with a team that dealt with the psychology of learning, films, television, programmed instruction and mathematics. Although based on the style of PSSC, the program also considers the problems of large

classes, remote schools, poor teacher preparation, limited funding and the socio-cultural differences of Latin America.

The Latin American Center for Physics (CLAF) is part of UNESCO's effort to develop regional centers in the lesser developed countries. Although officially created in 1962, CLAF had its constitution ratified only recently by some leading Latin American states. During 1969 it supported 134 student fellowships and 59 visiting professorships, sponsored 10 regional courses or seminars, published directories of Latin American physicists, institutions, research programs and physics courses and began its monthly periodical *Noticia*.

CLAF is the third physics center to be initially sponsored by UNESCO. In

1954, the European Center for Nuclear Research, CERN, was established when its twelve founding states ratified the convention sponsored by UNESCO. CERN is now completely autonomous and receives its support and direction from its member states. Ten years later, UNESCO took part in the formation of the International Centre for Theoretical Physics in Trieste, Italy. This center, which was proposed and is directed by Abdus Salam, was designed to provide research facilities for physicists who retain close ties with their respective countries. It is now supported by UNESCO, the International Atomic Energy Agency and the Italian government.

Most of UNESCO's activities are coordinated at its headquarters in Paris, which employs 1800 persons, in addition to a field staff. Physicists are broadly distributed within the field staff: a Swiss is assigned to a secondary-school teaching institute in Burundi, a Czech is doing research in Cameroon, a Dane is senior lecturer in Ethiopia and a Russian is teaching methods of physics in India. Among the 1025 field posts, 32 are in some way concerned with physics. These are situated in 24 different countries and held by physicists with 20 different nationalities.

Academic science support down 5-10% since 1968

Although total funding for science in academic institutions has increased in the last two years, it comes as no surprise to learn that no one feels any better off than before; inflationary factors and increased enrollments have resulted in a net decrease in effective support of some 5-10% since 1968. National Science Foundation data from a sample of 100 PhD-granting institutions show that academic science expenditures increased by 7% and 8.5% during 1968-69 and 1969-70 respec-



Part of UNESCO's pilot project on teaching physics is practical work in filming. Photograph was taken at the Audio-Visual Center at the University of Sao Paulo, Brazil.