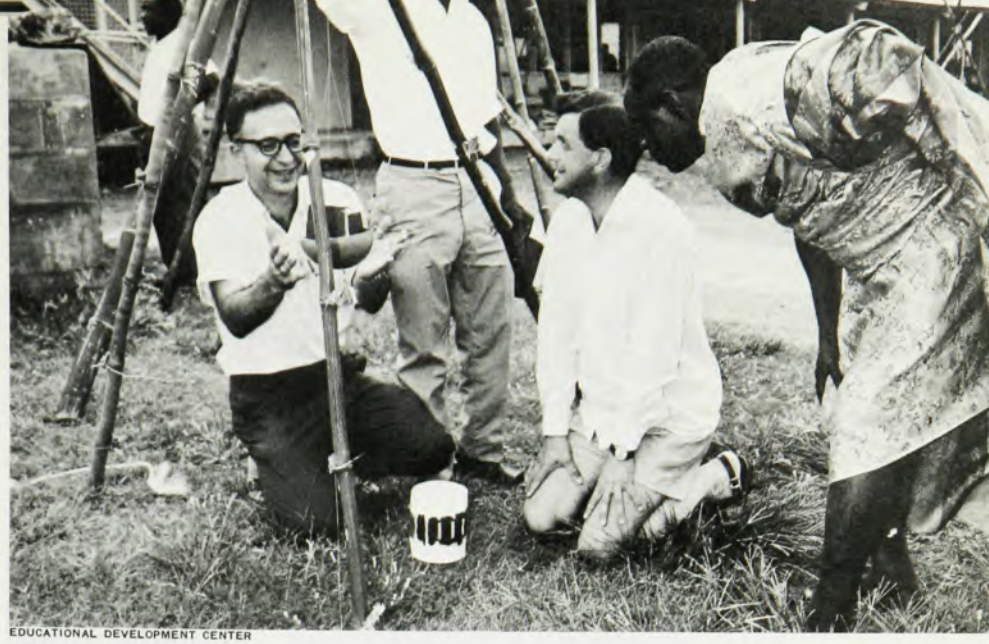


At a Ghanaian science workshop, Brandeis University physicist Jack Goldstein discusses stroboscope with colleagues.

EDUCATIONAL DEVELOPMENT CENTER

International opportunities for physicists

Physicists not too domesticated to consider working abroad can teach or do research while helping to improve international understanding.

Marian S. Rothenberg

"One of the best ways for the US to promote good relations with other countries is to export its science and technology, but, up until very lately, our scientists have been strongly domesticated." William H. Taft III, special assistant in the State Department's Bureau of International Scientific and Technological Affairs, offered this opinion and suggested that if we could somehow link younger scientists with, for example, the Peace Corps and the spirit of adventure, it would be to our advantage.

A variety of programs, whose aims range from aiding developing countries to promoting basic research, provide funds to send US physicists abroad. Some of these programs are US-Government sponsored, others set up by foundations, still others organized by foreign countries or their institutions. A sampling of those programs that use physicists as other than short-term consultants will indicate the kinds of opportunities that exist.

Marian Rothenberg is an associate editor on the staff of PHYSICS TODAY.

Peace Corps

The Peace Corps has been assuming for years that it just couldn't get any physicist-volunteers. But, says Jerry Brady, special assistant to the director for programming, "the Peace Corps' educational program has become increasingly sophisticated over the years . . . We're certainly finding a demand for more and more positions around the world that require a higher-level skill. We think we're just on the edge of what could be done, because the world is hungry for science." Wally Tyner, a chemist and former volunteer, is head of the math-science education skills desk. He states that they've had success recruiting biologists, and somewhat more limited success with mathematicians and chemists, but that "we're having a lot of difficulty filling even bachelor's-degree programs in physics. Most of our programs in physics are curtailed because of our own restrictions, not because of any restrictions from the receiving country. We just don't have them; we just can't fill any of our programs in physics."

The Peace Corps' need for physicists is largely in science workshops, which train teachers and develop curricula. Tyner points out that often a country requests a physicist and has to settle for a volunteer with a science minor. Bihar, an Indian state, recently requested a physicist for such a workshop and was told by the Peace Corps that none were available. "It's sort of sad if the physicists *were* available and just didn't know that they were needed."

Some developing countries are, of course, degree conscious and "over-

WILLIAM GRAHAM

TAFT

request." "They ask for a PhD when they could very well get by with a BA," says Brady. The Peace Corps is trying hard to ensure that these overrequests do not yield disappointment for the volunteer along with poor results for the program to which he is assigned. Tyner will soon become a "program evaluator;" he will talk with the foreign teachers and scientists who are closest to a new program and determine whether or not a PhD volunteer is really needed. But there are, of course, genuine programs now that absolutely need PhD's. And, more commonly, he says, requesting countries "rein themselves in because they know what our supply of physicists is. We were in a cycle—countries wouldn't request physicists or other specialists because we didn't have a very good record of providing them. We're breaking away from that by accepting more requests for such help, and, if our record of filling them is good, then we'll continue to get more requests."

Policy now permits a volunteer's family to accompany him, provided that the requesting country agrees. The Peace Corps tries to help the family make adequate arrangements for its stay abroad. It may, for example, find part-time work for a volunteer wife, or give the family the name of a bank to help solve mortgage and car-payment problems. A head of household also receives an allowance supplement. The Peace Corps can not, however, give the extensive financial assistance that the US Agency for International Development gives. The cost of sending a US family on a Peace Corps mission is still, however, relatively low.

"That's because people live as they do," says Brady. "They receive an allowance sufficient to maintain them in the style of their counterpart . . . to fit the rather humble existence at the level. Now this varies considerably, and the austerity thing is probably way overplayed; most PhD's are going to live the way PhD's in that country live." The Peace Corps, he stresses, should not become simply a pipeline for professionals to do the same professional jobs they would do at home. "We are trying to find jobs that have a social content to them—if it's in physics, it's creative in the sense that it works in education, in a way that will bring it to the masses of the people. But, in addition, the heart of the Peace Corps is going to remain the way the volunteers live . . . they stay away from the US colony and don't just satisfy themselves professionally. They do something after work too, a community-development job such as starting a library."

Peace Corps programs that need scientists are going to grow substantially over the years, particularly as there become fewer and fewer sources of such people. (That is, as the higher-budget agencies' funds are cut.) "I can't foresee the time, in the near future, when we're going to have an excess of physicists," says Tyner.

Fulbright–Hays

PhD physicists are eligible for grants given under the senior Fulbright–Hays program; they may apply for the grants offered in physics as well as for awards in unspecified fields. The 1971–72 program (for which applications were due 31 July) includes about 15 requests for physicists. Some countries request only tenure faculty members; others will accept new PhD's.

Programs under the Fulbright–Hays Act are planned around projects of mutual interest to the US and the host country. An Australian university, for example, requested a specialist in solid-state or surface quantum mechanics. The Committee on International Exchange of Persons of the Conference Board of Associated Research Councils, Washington, D. C., announces the openings each year and selects the grant recipients. The grant includes round-trip travel costs (travel costs for dependents are generally not included) as well as allowances for living expenses.

The exact degree to which any cuts in funds will affect the physics awards is, of course, not known. The 1971–72 program, however, will be larger than the 1970–71 program because some funds have been restored. In most of the wealthier countries, for example in western Europe, the host country pays at least some of the expenses.

Academy exchanges

Among the best known of the US government-sponsored programs are the scientist-exchange programs. Academy-to-academy exchanges, for example, exist between the US National Academy

PEACE

TYNER

of Sciences and the academies of science of most eastern European countries. NAS selects the US scientists from among all qualified applicants, but the host country must agree to accept the candidate. The agreement with the Soviet academy limits visits to institutes of the academy itself; the "memoranda of understanding" with the academies of the other eastern-European countries do not share this limitation.

William Silvert was in the Soviet Union for ten months during 1966–67. Now assistant professor at the University of Kansas, he worked primarily at the Institute for Physical Problems in Moscow. Some of the most outstanding theorists in superconductivity, Silvert's field, are in the Soviet Union—Aleksei A. Abrikosov and Lev P. Gor'kov to name two. He went there, he says, "not for a particular collaboration on a particular problem, but largely to have an opportunity to work with these people; it's the research group closest to my own interests." Silvert found the experience worthwhile from points of view in addition to that of research. "It's certainly a great way to see the Soviet Union; it's vastly superior to going as a tourist."

Lawrence Mitchell, who heads the USSR–eastern Europe exchanges for NAS, notes that, although all arrangements are officially made through the academy, quite frequently previous contacts exist between the US scientist and colleagues in the Soviet Union. "If the foreign side has said 'I'd be glad to receive you if you could come under this program' this helps, but is not a prerequisite."

The number of applicants for the exchange program increased significantly last September, notes Mitchell, and there was a larger proportion of physicists applying than there had been in previous years. But, Mitchell added, this increase in qualified applicants does not mean that only more established people will be selected. "We still have brand-new PhD's in the group . . . but a new PhD would perhaps have to have a little more on the ball for his level than the established person; it's just in the nature of things."

The program was developed by NAS because it is a natural partner to the academies of the Soviet Union and eastern Europe. The National Science Foundation has the responsibility for exchanges with other countries. The US and France, for example, on 20 July signed an agreement that provides for exchange of young postdoctoral fellows; this academic year five postdocs will travel each way, and the number will probably double in subsequent years. The NSF Office of International Programs also administers exchanges with Japan, Australia, Italy, the Republic of China, Romania and India, but most of these exchange programs emphasize short-term visits.

William Silvert at Moscow polling place. Silvert, who went to Soviet Union to work with superconductivity theorists, enjoyed traveling around as well.

NSF in India

A rather special relation exists between Indian and US science. In addition to the exchange provided for by the bilateral agreement, there is an AID-financed program to improve Indian science education. Under this program, NSF keeps a staff of about seven scientists in New Delhi to advise the Indian government and AID. The program started with summer institutes for Indian science teachers. These institutes were begun by the Indian government, which later arranged for AID to help by finding US scientists to contribute to the staffs of these institutes. AID first contracted this job to four US universities. In 1966 NSF took over the job from the universities and incorporated the institute program into a broader science-education improvement program.

Daniel Detwiler, a solid-state physicist, first went over to India in the summer of 1966 as supervisor of the Ohio State University college-physics program. "I was teaching at Wilkes College in Pennsylvania, and I ran across some people connected with the program." While Detwiler was in India, NSF took over the program from Ohio State. He volunteered his services to NSF for the physics-adviser's job, and was hired. After a brief trip home to the US, he returned to India to begin his two-year assignment.

A high-energy physicist, William A. Blanpied, is Detwiler's successor in Delhi. Blanpied too first visited India as a consultant to a summer science institute. In July 1969 he took a two-year leave from Case Institute (now Case–Western Reserve University), where he was an associate professor, to become an NSF Staff Scientist with the liaison staff in Delhi.

"Until about a year ago, the summer-institute program was our most conspicuous effort" says Blanpied. "These institutes are organized by the Indians; we bring in, at their request, US high-school and college science teachers as consultants . . . For me, this year's cycle started in September 1969, when I met with a panel of top-ranking Indian physicists to consider proposals for 1970.

"The regular institute program," he continues, "is now firmly established and, after this year, we shall send no consultants except for special, *ad hoc* institutes." Now, says Blanpied, he will bring in advisers only for specialized long-term curriculum- and laboratory-development projects.

Blanpied considers himself a link between the US and Indian physics communities. His work is not limited to finding consultants for existing Indo–US programs. "I also spend a great deal of time acting as an informal consultant, and I have traveled a considera-

ble amount in India. Frequently, a director of a state department of education or the chairman of a university department asks me to look over a program and comment critically *vis à vis* the US experience. He may want more extensive US cooperation, in which case I keep my eye on the project until it is ready for a long-term US consultant."

Blanpied feels that the experience is one he will always treasure, although he is frustrated at times by the size of his task. There is, as well as "the superficial pleasure of being an official American in Delhi," the easy access to highly placed Indian government officials, all of whom care about improving science education.

"I have come to feel" he concludes, "that our program is a model of what foreign technical assistance should be . . . We are helping the Indians develop something in their own terms. The gap in understanding between US and Indian science educators is almost nonexistent, because we have had similar training, we share the belief that science of the right kind will ultimately benefit both of our peoples, and we know that we do not have all the answers to how science education can best be used to attain these ends."

Pakistan

The Institute of International Education in New York has an AID contract to develop science education in Pakistan; since 1967 IIE has been sending US scientists to work in summer institutes for teachers in Pakistani colleges, universities and polytechnic institutes. The project office, in Dacca, is now headed by a physicist, H. Tom Hudson. Hudson is a solid-state physicist who had been associate professor at the University of Houston before coming to Dacca.

A job specifically in physics has been created for someone who will help develop physics education in East Pakistan and will be a consultant to the new East Pakistani Institute for the Advancement of Science and Technology Teaching. There is a chance that IIE may further expand its role in science in other parts of the world.

Latin America

Many US physicists have worked at Latin American universities. Joel Gordon, professor at Amherst College, Amherst, Mass., spent a year at the Universidad del Valle in Cali, Colombia. The Colombian university revised its entire science curriculum about ten years ago, and, although no formal arrangement between Amherst and Valle exists, Gordon is the third Amherst physicist to help with the revision.

When Gordon arrived at Valle, the physics department had its first group of junior-year majors. (He was pleased to hear recently that they have just started offering masters' degrees in physics, in cooperation with the Universidad Nacional in Bogota.) "I was helping them set up their junior–senior laboratory courses, which they had just started. I was also helping them to select equipment and to plan research activities." In some ways, Gordon recalls, he enjoyed teaching at Valle more than teaching at Amherst. "The students at Valle are not as well prepared, and it was easier to observe the effect of one's endeavors . . . The best of the students are very good." He found his teaching load to be heavier than at Amherst, but not as heavy as at some US universities.

His experience at the Universidad del Valle may not be typical, Gordon stresses. "Some of the Latin American universities are still quite bad; a few are quite good and, at this moment, better than Valle." Opportunity for research on a modest scale does exist at Valle. "They've got modern buildings, they're getting equipment, and they're offering teaching loads that make research possible."

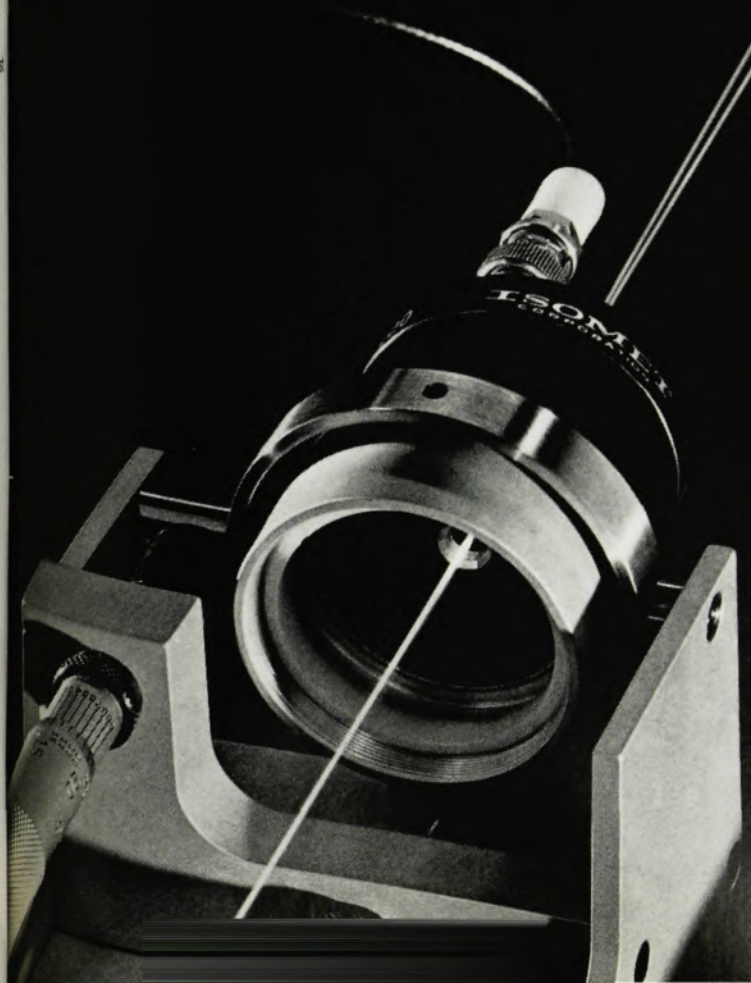
Gordon went to Colombia as a special staff member of the Rockefeller Foundation and was paid by the Foundation, which helps support the Valle science program. (He has also made short visits to Valle under Ford Foundation sponsorship.) "They make it pretty easy for a family to go down there;

INSTITUTE OF INTERNATIONAL EDUCATION

H. Tom Hudson (left) consults with S. M. M. Hague, principal of Dacca Polytechnic Institute, and chemist John Southern.

Laser Beam Deflectors are here

See a dynamic demonstration at Booth 141 EOSD Show September 22-24 N.Y. Coliseum



Isomet introduces another technological breakthrough.

Using the latest elasto-optic crystals and high coupling single crystal piezoelectric transducers, we have developed the only commercially available line of Bragg angle laser beam deflectors for display, optical memory and laser printing applications.

Our electronic beam deflection addressing circuits can be used for either random access or scanning applications.

We have achieved resolutions of up to 100 spots and are in the process of developing 400 spot systems. Present devices exhibit deflection efficiencies of 40% or greater across the bandwidth.

Our engineering department can meet your most critical requirements with custom units for a variety of optical wavelengths from 488 nm to 1060 nm, with access or flyback times ranging from 0.25 to 10 usec.

For state-of-the-art Laser Beam Deflection and Scanning systems, look to the leader . . . Isomet.

For additional information, call or write:

Isomet Corporation
103 Bauer Drive
Oakland, New Jersey 07436
(201) 944-4100

ISOMET

ROCKEFELLER FOUNDATION

GORDON

they help remove the difficulties connected with such a trip.

The Valle program is now the only one in physics supported by the Rockefeller Foundation. But Gordon is optimistic about opportunities through the Latin American universities themselves; many of these universities need help in strengthening their physics departments. Salaries, of course, would probably be less than foundation-sponsored salaries.

Marcelo Alonso, the physicist who is deputy director of the Organization of American States Department of Scientific Affairs, agrees that there are places for US physicists at Latin American universities. The OAS Regional Program for Scientific and Technological Development is scheduled to spend $7.5 million, exclusive of administrative expenses, during 1970–71. These funds will go to a select group of strong Latin American university departments, which will then offer advanced training to the faculty of other universities. Among the institutions selected in physics are the National University of Mexico, the National Polytechnic Institute of Mexico, the University of La Plata (Argentina), Balseiro Institute (Argentina), the University of Chile, the University of Sao Paolo (Brazil) and the University of Rio Grande del Sul (Brazil).

The OAS has in the past brought over hundreds of US scientists to advise Latin American universities, and Alonso frequently receives requests from these universities for particular specialists. The universities know how much money they have available (the Interamerican Development Bank, or BID, is an additional major source of funds for technical assistance) and what they can pay. If a young physicist, aware that his salary will be low, wants to help a Latin American university, Alonso's office would be pleased to circulate his name among the physics departments. Alternatively, physicists can write to the various national research councils or to individual universities.

One source of fellowships for scientists who wish to work in Latin America had a lack of physicist applicants last year. The Foreign Area Fellowship Program, sponsored by the Ford Foundation, offers 40 awards to scientists; their aim is to increase awareness of Latin American needs, and in science to encourage study of Latin American science policy. The program will, however, support other research as well.

European countries

As might be expected, some of the most highly developed countries offer research and university fellowships funded through either government or private sources; these sources generally offer more money that do those in the developing countries. In Germany the Alexander von Humboldt Foundation and the Deutsche Forschungs Gemeinschaft offer grants to PhD physicists for particular research projects.

France has several programs. The new "chercheurs associés" program the Centre National de la Recherche Scientifique is an experimental attempt at making it easier for foreign scientists to visit France. CNRS offers appointments at four levels, ranging from graduate student on up. Interested physicists should apply to CNRS, whose board of directors will review applications at frequent intervals to avoid the delay that has often occurred with foreign applications. Maurice Levy, the physicist who is Scientific Counselor at the French Embassy in Washington, stresses that a young scientist who has previously contacted a French colleague (to assure his welcome at a particular laboratory) has an excellent chance of winning an award. Although the apments are for 12 months at most and can not be renewed for at least three years, the associates may ask for appointments as regular CNRS scientists.

The French Ministry of Foreign Affairs also sponsors exchanges; these exchanges have traditionally been in the humanities, but are being extended to include more scientists. Both German and French universities offer appointments to foreign scientists, and inquiries about these appointments should be made to the university or to an individual professor directly.

International organizations

International organizations sometimes need physicists. Responsibility for recruitment of US citizens for these organizations is shared by several government offices; none of the offices actually hire people—they simply receive requests from international organizations and recommend qualified US citizens to the organization.

The State Department Bureau of International Organization recruits staff for the United Nations Educational, Scientific and Cultural Organization headquarters in Paris, which has only a very limited need for physicists. The Department of Health, Education and Welfare's Office of Education handles UNESCO's requests for "field position" openings, that is, for people to work in member countries. Most countries want people with five to ten years teaching experience. Physicists who are hired by UNESCO will generally get one- to three-year contracts to train secondary-school teachers, develop secondary-school or university curricula, or to teach in a university.

The placement process is lengthy; the Office of Education is now considering people for 1971–72 academic-year positions. UNESCO salaries are tax free, so that pay is fairly good. The Office of Education would welcome applications from physicists; because it no longer has sufficient funds to visit campuses, it must rely on the initiative of interested persons.

The US Atomic Energy Commission is the US link with the International Atomic Energy Agency, and handles requests for staff at IAEA Vienna headquarters as well as for technical-assistance assignments in member countries. Most assignments involve application of radioisotopes, but some countries request nuclear or theoretical physicists. Most countries want physicists with several years postdoctoral experience.

The number of IAEA projects has been increasing, and with it the number of requests for staff has grown. IAEA can not meet all these requests, but funds have increased slightly and may increase further. Only a small number of requests are for appointments as long as a year; for these appointments, however, there are dependent allowances.

The International Organization for Standardization, the World Health Organization and the Food and Agriculture Organization (among others) have a somewhat more limited need for physicists; the National Bureau of Standards, the HEW Office of International Health and the Department of Agriculture respectively handle requests from these organizations.

The extent to which US physicists are used in international programs will be determined, to a large extent, by the ability of physicists themselves to indicate how they can be helpful. The National Academy of Sciences, the Agency for International Development, the National Science Foundation, the State Department and the Office of Science and Technology are all in some way committed to international science; the strength of their programs depends on scientists who are similarly committed and who are willing to make their voices heard. □