

oratory for a year or so and then usually migrate to more permanent employment. Because they are temporary and because their pay almost always comes from research grants, traineeships, or fellowships rather than from regular university funds, they are odd men out when money and space are allocated. The trouble with postdoctoral education, the report really suggests, is that the university administrators and the patrons of research—from state legislators to officials in federal granting agencies—don't recognize the contributions of the postdocs and don't provide for them fairly.

The report covers postdoctorals in all fields, but support for postdoctorals in the humanities and social sciences is considerably leaner than in the sciences and engineering (see table). Postdoctorals are found not only in universities but also in hospitals, nonprofit research institutions, government laboratories, and industry. About 80 percent of postdoctorals, however, gravitate to universities and teaching hospitals.

Postdocs come in several varieties besides the familiar bearer of a fresh Ph.D. Some are "intermediate" or "senior," who come to productive laboratories to retread themselves as researchers, to change course in their careers, or simply to get out of the administrative rut in their home laboratories. Some postdoctorals don't have Ph.D.'s at all, being in the all-but-thesis purgatory or being regarded as having the equivalent of a doctorate.

The statistical profile of the postdoctorals gives a not unexpected picture. Perhaps two-thirds of the group hold recent Ph.D.'s or M.D.'s. Half hold appointments at 17 institutions (there were more postdoctorals at Harvard Medical School than medical students in 1967-68), although 200 institutions offer postdoctoral education.

The concentration of postdoctorals is generally greatest in the universities ranked highest in Alan Cartter's 1966 *Assessment of Quality in Higher Education*. Not surprisingly, the size of the postdoctoral population at an institution tends to correlate closely with the size of its output of Ph.D.'s and the amount of federal research money it attracts.

The data in the report most likely to startle are those on foreign postdoctorals in the United States. Among the postdoctorals an estimated 55 percent of post Ph.D.'s and 40 percent of post professionals are not U.S. citizens.

The percentages of foreigners in what the survey tactfully calls "developing" institutions here is higher than in the more illustrious institutions, and a higher percentage of foreigners than American citizens are paid through research grants—an estimated 81 percent of foreigners in the physical sciences. The authors of the report ask but cannot answer such questions as whether significant numbers of foreign postdoctorals are being exploited on low salaries and whether they are performing research without getting much training.

Half of the postdoctorals from abroad came from five countries: the United Kingdom, India, Japan, West Germany, and Canada. Data on the brain drain problem are inexact, but it appears that the earlier in his education a foreign postdoctoral comes here and the lower the gross national product of his home country, the likelier he is to remain in the United States.

Postdoctoral traffic runs two ways, of course. Eight percent of all American postdocs (35 percent of senior postdoctorals) are abroad. The trek of American postdoctorals to Europe after World War II provided one of the unevaluated boosts to European scientific recovery, particularly in such frontier fields as particle physics and molecular biology. (In his *Double Helix*, James Watson has left the most notable memoir of a postwar postdoc.)

In their conclusions and recommendations the authors of the new report assume that postdoctoral education will continue in something very like its present form. They refrain from the hard sell and do not, for example, prescribe postdoctoral experience for all Ph.D.'s. They do warn against endangering the "essentially American atmosphere of our graduate schools" through "excessive concentration on foreign scientists." But they balance this warning with a call for continued two-way postdoctoral traffic. Their main theme and paramount recommendation, however, is that ways be found to recognize the importance of postdoctorals when funds and space are allocated.

During the two decades of an expanding market in research, indirect financing of postdoctoral education has been an acceptable working principle. In a period of retrenchment, however, postdoctorals are proving to be especially vulnerable. There is a data lag, but the report carries figures showing a decline between 1967 and 1968 in the number of postdoctorals in chemistry

and physics in the top ten institutions. And the study director Richard B. Curtis comments that the trend has become even more pronounced and more serious.

Traineeships and fellowships have been trimmed, but the most serious problem for postdoctoral education is that so much of it is financed out of research funds. Funding agencies, particularly mission-oriented agencies, are largely limited by law to buying research, and the financing of a major part of postdoctoral education has been a byproduct of the research process. Now that across-the-board cuts in project grants and contracts are in fashion, it is frequently the postdoctorals who are being left without means of support, visible or invisible.—JOHN WALSH

RECENT DEATHS

Cecil E. Boord, 85; professor emeritus and research chemist, Ohio State University; 3 November.

Charles A. Dambach, 57; director, School of Natural Resources, Ohio State University; 30 October.

Albert C. Furstenburg, 79; dean emeritus of the University of Michigan Medical School; 22 October.

James A. Goodier, 64; professor of applied mechanics, Stanford University; 5 November.

Valentin Kargin, 72; Soviet scientist at the Academy of Science's Institute of Physical Chemistry, Moscow; 22 October.

Harry Katz, 75; specialist in internal medicine and gastroenterology and a fellow of the American College of Cardiology; 18 October.

Henri Marcus, 84; structural engineer and research consultant, Naval Research Laboratory, Washington, D.C.; 19 October.

Meyer A. Perlstein, 67; former professor of pediatric neurology, Northwestern University Medical School; 29 October.

Louis L. Shapiro, 76; former adjunct professor of gastroenterology, New York Polyclinic Hospital Medical College; 2 November.

Francis J. Smith, 47; associate professor of physics and former assistant dean of the Graduate School of Drexel Institute of Technology; 25 October.

Harvey A. Uber, 76; professor emeritus of geography, University of Wisconsin, Milwaukee; 21 October.