opposition is considerable. The AMA officially holds a hands-off policy toward prepaid group practice but certainly could not be described as a champion of the idea, and the government remains ambivalent. There is a deep philosophical split between two groups. The first, composed of a large proportion of health care planners and economists and a smaller proportion of physicians, criticizes medicine for being a "cottage industry." The second group, composed of a smaller proportion of the planners and a larger proportion of the doctors, would agree with Dr. Michael Halberstam of Washington, D.C., that "of course, medicine is primarily a cottage industry. So is the Catholic confessional and so is the process of human reproduction." (Dr. Halberstam explains his position in an article in the *New York Times Magazine*, 9 November.)

In the end, however, the greatest roadblock to restructuring health care may come not from doctors, since an increasing number of young doctors now coming out of medical school seem to favor group settings, but from the public. "You can get the doctors," says Dr. W. Palmer Dearing, executive secretary of the Group Health Association of America, "for they make quite a competitive salary in group practice. It's the consumer who must accept it; that's the crucial point." Dearing admits that consumers have "some fear" that prepaid group practice will treat them like outpatient clinics treat the poor. Regardless of the actual merits of prepaid group practice, in structure it does resemble care for the poor more than it resembles care now provided for those who can afford to pay their own way.

Proponents of group health plans say they are embarking on an ambitious program to educate the consumer about the benefits of group health plans. What may be the greatest educator, however —now beginning to overshadow the philosophical debate about the relative merits of two different modes of delivering care—is the cost spiral, which threatens to price medical care out of the range of most American families within the next few years.

—JOEL R. KRAMER

Postdoctoral Education: Report Emphasizes Recognition Problem

Postdoctoral scholars, by any test, form an academic elite but, at the same time, play an anomalous role in American universities. They have won the laurel of the Ph.D., but they are not quite faculty. They make important contributions to research, but they can seldom promote substantial support for their own projects. None of the ready generic titles—fellow or docent, for example—really fits all of them; they are left with the inelegant "postdoc."

Because of the peculiarities of their terms of employment, the postdoctorals have tended to be shadowy figures statistically. But a new National Academy of Sciences study, *The Invisible University: Postdoctoral Education in the United States*,* does a good deal to rescue them from limbo. The study, begun in 1966, was first suggested by Sanborn C. Brown of M.I.T., who became chairman of an advisory committee on the project.† That a need for such a study was felt is indicated by the financial support given by five federal agencies and the Alfred P. Sloan Foundation. Now, however, publication of the report has a particular timeliness, since the reductions in federal research support and the cuts in fellowships and training grants fall heavily on the postdoctorals. (The report estimates there are 16,000 of them.)

The report's primary conclusion is that the institution of postdoctoral study is a sound one. The key relationship, of course, is the one between the postdoctoral and his mentor, and if the survey and interviews undertaken for the study reflect reality, the relationship in a majority of cases is a mutually satisfactory one. The faculty mentor finds in the good postdoctoral an able apprentice who can manage research in the laboratory and who often brings with him good research ideas and techniques from another laboratory.

The authors of the report found that recent Ph.D.'s bent on pursuing university careers view a postdoctoral term as desirable, since they have spent several years in highly specialized work and do not feel ready to take on graduate students until they have broadened their scientific horizons. In the most practical terms, postdoctoral experience has become a virtual requirement—in the natural and life sciences, at least—for researchers who aspire to careers at universities that put heavy emphasis on research.

The authors regard postdoctoral education as a natural growth which accompanied the expansion of graduate education. They suggest that the ambiguity of the postdoctoral's position is determined not by their value in graduate education and research but by their status. Postdoctorals are academic birds of passage. They come to a lab-

Number of Ph.D.'s and percentage taking immediate postdoctoral appointment, by field of doctorate.*

Field of doctorate	Number of Ph.D.'s and percentage taking postdoctoral by year of Ph.D.					
	1963 Ph.D.'s	Taking postdoc	1965 Ph.D.'s	Taking postdoc	1967 Ph.D.'s	Taking postdoc
	No.	Percentage	No.	Percentage	No.	Percentage
Mathematics	484	8.4	684	7.0	828	6.9
Physics and astronomy	818	19.0	1,046	21.6	1,295	26.1
Earth sciences	322	9.6	374	10.2	419	12.3
Chemistry	1,288	30.4	1,439	33.2	1,764	32.6
Engineering	1,357	6.4	2,068	6.8	2,581	4.8
Agricultural sciences	373	9.7	480	10.6	517	8.1
Biochemistry	300	49.6	391	53.9	495	58.1
Other basic medical sciences	488	29.1	688	34.8	814	35.7
Biology	808	20.5	975	23.6	1,114	25.7
Psychology	892	11.1	955	14.0	1,293	12.5
Social sciences	1,575	2.8	2,028	2.7	2,597	2.4
Arts and humanities	1,274	2.2	1,718	1.5	2,126	1.3
Education	2,130	0.6	2,727	0.9	3,442	1.0
Other fields	611	3.1	729	2.2	1,010	2.6
Total	12,720	10.9	16,302	11.6	20,295	11.6

* Source: NRC, Office of Scientific Personnel, Doctorate Records File.

* Available at $10 a copy from Printing and Publishing Office, 2101 Constitution Avenue, NW, Washington, D.C. 20418.

† The study director was Richard B. Curtis of Indiana University; he succeeded Robert M. Alberty of M.I.T., who served in the post for the first half year. Robert K. Weatherall of M.I.T. was associate director for institutional studies.

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.