was Dahrendorf's first major initiative in the commission since his appointment to the new post, and the action was taken as a sign of his seriousness about tackling this subject.

He rejected any grand effort to harmonize European educational systems and opted for a series of specific actions aimed at increasing the mobility of professionals already trained. One of his first moves was to concentrate on the medical profession as an example of the problem. In an initiative unusual for the commission, he set up a hearing last October and invited exponents of the principal medical viewpoints in the member countries. Considerable progress was made, according to Dahrendorf. The doctors had never talked to each other, and it developed that much was acceptable in the guidelines under discussion. In general, Dahrendorf feels that proper strategy "will not look for directives, but set up advisory boards, support certain principles, use case law techniques."

At the end of the interview Dahrendorf noted reflectively that "formalized consultation means you don't consult. More informal coordination is necessary." Then pausing and smiling at getting the right phrase, he added, "Diversified informality."

Next year at LSE Dahrendorf will no doubt have ample opportunity to try out his ideas on consultation with British students who recently have been acquiring a reputation for intransigence.

The progress made in the past year on Community science policy and professional mobility must be regarded as, at most, small beginnings, but it represents a definite credit for the Community in a year when so much has been entered on the other side of the ledger.

As for Dahrendorf, in his role as commissioner he has consistently expressed a view of the Community and its future which seems to be increasingly, if reluctantly, accepted. And Dahrendorf personally, of course, is a professional who has been able to move back and forth across political, academic, and linguistic boundaries, by attitude and example himself providing a prototype of the new European.

—JOHN WALSH

Scientific Manpower: Demand for Ph.D.'s Up, for Rest Uncertain

The newest National Research Council (NRC) survey of all science and engineering Ph.D.'s in the country has revealed an overall unemployment rate of 1.2 percent—a figure well below that reported only a few years ago. The report could bring the gladdest tidings Ph.D.-holding scientists and engineers have had in years because it signals an end to the traumatic surpluses among this sector of the work force during the 1968–1972 recession in federal R & D spending and shifts in the economy.

The new survey compiled by the NRC Commission on Human Resources was taken in mid-1973, on a population of 272,200 scientists and engineers located through the commission's doctorate records roster.* In-depth questionnaires were returned by 59,086 of the persons who received their Ph.D.'s between 1930 and 1972. The resulting report represents one of the most thorough examinations of this elite segment of the total science work force—and it is already being cited by science spokesmen and administrators as a sign that the scientific manpower market is healthy once again.

In fact, the 1.2 percent unemployment found by NRC could represent the best overall situation for Ph.D.'s across the country. This is because the 2600 unemployed Ph.D.'s could be part of a group no one can do anything about—that portion of the work force which is at any one time in transition from one job to another. Economists call this occurrence "frictional unemployment."

The NRC report does not comment on or interpret its figures very much, but the project director for the survey, Lewis C. Solmon, explains that economists place frictional unemployment at anywhere from less than 1 percent to 3 percent of a given work force. Princeton labor economist Albert Rees, commenting on the NRC findings, noted that frictional unemployment for scientists and engineers is probably relatively low compared to that of, say, construction workers. But he added, "Whether that is 0.5 percent, 1.2 percent, or 1.5 percent, I don't think anyone is in a position to say." Although no one knows for sure, even with 2600 Ph.D.'s unemployed, doctoral scientists and engineers in the United States could in effect be fully employed.

Other information in the NRC report—which limits itself to doctoral recipients and declines to discuss what other groups are doing—supports the notion that the problems of a few years back have been left behind. Broken down geographically, the survey data show that all states, except six, have unemployment rates of less than 1.3 percent. Of these six, the state with the highest unemployment was New Mexico, where the rate was 2.9 percent. States with high technology industries, such as California, Massachusetts, and New York—where Ph.D. unemployment might be expected to persist—reported equally low unemployment rates of 1.6, 1.0, and 1.4 percent, respectively.

Young Ph.D.'s were only a little worse off than the rest of the Ph.D. labor force in mid-1973; those under 30 had an unemployment rate of 1.8 percent, whereas only 1.0 percent of those from 35 to 45 years of age were unemployed.

Even those fields which formerly experienced well-publicized surpluses of doctorate holders—physics, chemistry, psychology—seemed to share the new, healthy pattern. NRC's results for these disciplines closely parallel recent surveys by professional societies of their Ph.D. members. The NRC found that 1.8 percent of Ph.D. physicists were unemployed, while an American Institute of Physics survey found a Ph.D. unemployment rate of 1.5 percent. Chemistry Ph.D.'s were found by NRC to be 2.1 percent unemployed, while the American Chemical Society (ACS) found doctoral unemployment to be 1.8 percent. NRC reported that 1.1 percent of Ph.D.'s in psychology were unemployed, and the American Psychological Association's latest overall survey, arrived at a similar figure.

* *Doctoral Scientists and Engineers in the United States: 1973 Profile* (National Research Council–National Academy of Sciences, Washington, D.C., 1974).

Another feature of the NRC's thorough examination of the doctoral population was that some young Ph.D.'s are already responding to the demand for jobs resulting from the nation's energy shortage. NRC's study of switching among fields showed that young earth scientists are doing more field switching than anybody else. Solmon speculates that this could be due to the increased demand for their know-how in all sorts of energy-related jobs. But the report's interpretation was more cautious: "An unusually large proportion of them [earth science doctorates] found employment in physics, engineering, and biosciences, which perhaps reflected the availability of new positions in these fields."

This finding for young earth scientists echoes a study reported by American Geological Institute (AGI) manpower expert Bonnie Henderson in the January issue of *Geotimes*. Henderson quoted a spokesman for a giant petroleum company as saying, "We are sitting on the edge of a great boom market for earth scientists." Henderson said that new, top-level graduates in the geosciences are now receiving offers from eight to ten different companies or institutes.

Officials Gleeful

The findings of surveys by NRC, AGI, ACS, and other groups can be said to be luring some science spokesmen into a "Happy Days Are Here Again" syndrome. Examples of this optimism abound, but one that is noteworthy came from an official of the National Academy of Sciences who was familiar with the NRC results. "These numbers are as good as anyone is ever going to get," he said. "We have a shortage, the engineer is in short supply [and demand is going up]. It's like the golden years again. . . ."

However, there are other features of the employment market that put the 1.2 percent unemployment figure —and the bounding optimism of some officials—into perspective. One is that, while the demand for skilled scientists and engineers in many fields has increased, graduate enrollments, on the whole, have been declining. Science manpower experts such as Betty Vetter of the Scientific Manpower Commission in Washington, D.C., has been warning that in a few years the manpower market will be lopsided in the direction of severe shortages. If

Briefing

NAS Membership Refused

Richard Levins, a population geneticist at the University of Chicago, has declined membership in the National Academy of Sciences (NAS), to which he was elected this April. In a letter to the NAS early this month Levins cites "the continuing participation of the Academy in military matters" as a principal reason for his decision.

Resignations from the academy are rare, but Levins is the fourth scientist in the last 3 years to have broken with the academy on the issue of military research. Two resigned (Richard C. Lewontin of Chicago and Bruce Wallace of Cornell) and another, George Field of Harvard, refused membership. Field's refusal was made in 1972 but has only now become known. It was made for "personal reasons which included the academy's military involvement," Field says, but he prefers not to be more specific.

The only specific military issue raised by Levins is the academy's recent report on the effects of herbicides in Vietnam, regarded by him as a compromise that undermines the academy's credibility. Levins refers in his letter to "the efforts of the Academy's president [Philip Handler] to weaken any criticism of the actions of the military, as he did in his covering letter [to the herbicide report] where among other things he dismisses the evidence of damage to human health and of death caused by herbicides."

Lewontin, who is also a population geneticist, resigned over a specific issue, the academy's practice of putting out classified reports in the name of all its members, most of whom are not entitled to read classified materials. Steps taken by the academy to meet this objection were sufficient to make at least one member (Thomas Eisner of Cornell) withdraw his resignation. Levins, however, believes the academy's involvement with military research is inevitable, given its charter. "I cannot hope to remedy this situation," he writes, "by planning with other colleagues to replace Mr. Handler with a more liberal president or by maneuvering to restore the NAS to its true mission: it is performing its true mission, and I find that mission repugnant."

Levins also criticizes the NAS from a sociological standpoint. He describes the atmosphere of the academy as "stodgy, traditionalist, conservative. . . . There is something in the nature of the Academy as an elite honorary body linked to government which turns the creativity of its members into conformity or impotence and makes the NAS behave below the level of its individual members." He portrays the NAS as a victim of the "elitist myth that history is made by the important people who are in the know, which happens to include us."

Before coming to Chicago, Levins was in the biology department at the University of Puerto Rico. The would-be NAS member was denied tenure there on the grounds of incompetence; the true reason, he believes, was a visit to Cuba in 1965 and his political activities in Puerto Rico. A Marxist and active member of Science for the People, Levins has also traveled to North Vietnam. Asked about his criticism of the academy as an elitist institution, as are many scientific structures almost by definition, Levins says his objection is not so much to the elitism as such, but that "a small difference in scientific ability results in a big difference to the person's access to resources." His letter to the academy warns of the "narrow pragmatism [that] is dominating the horizons of our science." As an example he cites the fact that the Department of Agriculture conducts many studies of the individual pests of a crop but few which look at all the insects that inhabit a cornfield, say. "The general view is brushed aside in favor of mission-oriented research," he says.

Levins' refusal of membership poses no political threat to the academy since, short of dissolving itself, there is nothing it could do to meet his objections. Nonetheless, his refusal of one of the higher honors a scientist can receive is an act of conscience which, even if politically empty, is not necessarily worthless.—N.W.

current enrollment patterns persist, demand will outstrip supply. "Enrollments in the physical sciences and engineering have continued to decline through the fall of 1973," she says. "If this pattern doesn't reverse itself, we appear to be heading into shortages a few years from now in some fields such as engineering and physics. . . .

"We could have a situation where there are unemployed physicists, but the demand for fresh graduates in physics would be very great. . . . We shouldn't be driving young people out of physics just because some older physicists were fired a few years ago and are very angry."

Another element of the situation is data on Ph.D.'s are being used to say something about the total technical work force, which is like gazing at the horizon to determine whether the earth is round or flat. The NRC survey, its predecessor surveys made by the National Science Foundation's National Register of Scientific and Technical Personnel, and professional society surveys have all examined roughly the same small segment of the total national science and engineering work force: the graduate degree holder and the professional society member. These can be characterized as the elite of the national work force: the NRC survey, for example, accounted for 272,200 Ph.D. holders, but the federal Bureau of Labor Statistics has estimated that "2.7 million people . . . were engineers, scientists and technicians in 1972. . ." —or ten times as many as the NRC survey included.

What about the Non-Elite?

What no one knows, or has bothered to determine, is how the non-elite segments of the technical work force are faring. These include the engineers and technicians in industry who do not have graduate degrees but have years of experience and seniority on the job. They include an unknown number of Ph.D.'s who accept postdoctoral fellowships in universities because they cannot find permanent jobs. They also include the older scientists and engineers, some of whom retired prematurely during the recession, while others have been laid off in favor of younger employees. Vetter says that very little is known about these subgroups on a systematic basis. "Most of the information we have on these groups is apocryphal," she says. "Everyone knows someone who is in a disadvantaged situation—but we don't know how representative that someone is."

Even women and minority group members can be counted among these non-elite subgroups. The NRC survey looked at women and minority group member Ph.D. holders and found their situation to be different from the norm. Even after exempting housewives from its population base because "they are not in the labor force," NRC surveyors found the unemployment rate among women scientists and engineers to be disproportionately high. Breaking down the 1.2 percent unemployment rate by sex revealed that 0.9 percent of male Ph.D.'s was unemployed but 3.9 percent of the female Ph.D.'s were unemployed. Women under 35 had an unemployment rate of 6 percent. These last numbers, Vetter says, give the lie to industry and university employers who are trying to meet federal equal hiring requirements, but who say they cannot find enough qualified applicants.

NRC found that 13,300, or 5 percent, of all doctoral scientists and engineers are minority group members—black, American Indian, or Asian. Engineering led all other fields with an 8.9 percent minority membership, whereas psychology trailed with only a 2.0 percent minority membership. NRC reported on salary differences between men and women, but did not include data on salary differences between racial nonminority group Ph.D.'s.

Ephraim Weiss, of the Association of Technical Professionals, Inc., (ATP), a Boston-area self-help organization for scientists and engineers, is critical of both the NRC surveys and those taken by professional societies. Weiss charges that the surveyors neglect to try to discover some of the most common forms of underemployment and misemployment which he sees around him in the Boston area. "The survey's don't include: (i) people who aren't looking for a job because they have given up looking. They have just disappeared from the numbers; . . . (ii) people . . . who are employed in jobs below their capabilities; and (iii) those who are fully employed, but in fields other than where their skills could best be used."

NRC did not ask questions which would identify these types of problems. They did find, however, that 2.9 percent of the doctorate holders were employed part time, that 2.4 percent are in postdoctoral positions, and that 2.6 percent are retired. Another 3.2 percent reported "other" or did not report any employment status at all; and this group could conceivably fall into Weiss's category of skilled people who have "disappeared" from the technical labor market.

The habit of polling the membership of technical societies is criticized by another Boston activist, Arthur S. Obermayer, president of Moleculon Research Corp. Obermayer, who has worked with state government agencies and with ATP, notes that most surveys do not query the people most likely to be in trouble. "A guy who joins a professional society has a little broader perspective on his job. A guy who doesn't is a little more narrow. The guy in the professional society is more enterprising about getting another job if he gets fired: he has more contacts; he has attended more meetings."

Aerospace Layoffs Continue

Obviously there are few numerical estimates that would satisfy Weiss's and Obermayer's criticisms. However, a dramatic example of how the employment outlook for Ph.D.'s can contradict the prevailing pattern for the technical work force as a whole came in mid-1973, at the time the NRC study was finding Ph.D. engineers unemployed at a record low of 0.8 percent. At the same time, the Aerospace Industries Association, a trade group, estimated that total employment in the aerospace business stood at 946,000. By December 1973, this figure dropped to 935,000—a contrast to the peak figure, in 1967, of 1.5 million aerospace employees. Thus, while employment in the industry as a whole was declining in 1973, the top echelon of the engineering profession was finding itself more and more in demand.

What the NRC survey shows is that those in the upper levels of the science and engineering community are emerging from the recession in employment in their fields and are now in the enviable position of being sought after. With a projected, new "shortage" of Ph.D.'s in the works it won't be long before science administrators start going to Congress and asking for more funds for research and development, and for manpower training, to meet the demand. As for the less privileged members of the technical labor force—be they senior people who are "disappearing" or highly trained scientists who are subemployed—it seems likely that the science establishment will pay them far less heed.—DEBORAH SHAPLEY