of Pompidou remove from key roles three leaders who in different but familiar senses were strong "Europeans." Brandt, perhaps most firmly of the three, retained the vision of a Europe moving steadily toward political union. Under Brandt, Germany functioned as the balance wheel of the Community. West Germany appeared to be the most politically stable of the major member countries, it consistently backed the "European" solution to problems, and the doughty deutsche mark was the strongest of the Community's currencies. And Brandt was viewed as generous in using his country's resources for Community purposes. Brandt's successor, Helmut Schmidt, who was Brandt's finance minister, is expected to take a different stance, to be more keenly aware of Germany's own problems and to take a dimmer view, as many German politicians do of other Europeans constantly "milking the German cow."

In the same way, Valéry Giscard d'Estaing, who was narrowly elected on 19 May to the presidency of the French Fifth Republic, will bring new attitudes to the post. Giscard served as finance minister under Gaullist governments, but he is not a member of the Gaullist party nor does he seem to share de Gaulle's "certain idea" of France and its destiny of leading Europe. Giscard is expected to be just as devoted to French national interests as his predecessors, but to show more flexibility within the Community on such matters as dealing with the United States.

In short, the new leaders are not like the founding fathers of the Community, such as Maurice Schumann and Jean Monnet, nor like Heath, Brandt, and Pompidou, who now look like transitional figures, though Heath and Brandt are by no means necessarily out of the game permanently.

The new men seem to view the expectations of the "Europeans" as exaggerated. More than their predecessors, Schmidt and Giscard seem to be technocrats and nationalists. On the matter of pressing forward on Community policy they seem to accept that the pressures of the times have forced a hiatus. The coming months and years are likely to test the newly created European institutions and to show which are durable and which not. The dream of European unity is not dead, but it is being redefined.

One sector in which the redefinition seems to be going forward is science and technology. This is perhaps surprising since the Community's science program has for years been stymied by the problems of Euratom, the Community's atomic energy organization. If there was a milestone marking a change in the fortunes of science and technology, it was the first Community summit meeting attended by the new member countries in the autumn of 1972. At this meeting the Community prime ministers gave a new high priority to science and technology in the Community context. Last year, Euratom was granted a 4-year budget after stumbling along on stopgap 1-year budgets since 1968, and a reorganization of the agency was decreed. The energy crisis gave impetus to energy R & D within the Community framework. The quest for a Community energy policy, which is complicated by the old bogey of national commercial interests, will be the subject of a later article. What follows is an account of the first small steps toward development of a genuine European science policy.

In a Hard Year in Brussels, Things Look Up for Science

Professor Ralf Dahrendorf of West Germany is the first commissioner of the European Community to head a separate department of research, science, and education. The new department was created when the commission was enlarged and reorganized after Britain, Denmark, and Ireland joined the Community at the beginning of 1973. Dahrendorf's transfer from responsibility for external relations—a major job on the commission—was regarded as an institutional put-down for a maverick. Now it seems generally agreed that Dahrendorf has done a good job with an unpromising portfolio, and there is some concern that the momentum established might not be maintained when Dahrendorf leaves Brussels next autumn to become director of the London School of Economics (LSE).

Dahrendorf has been something of a controversial figure in the Community executive, particularly in the period following his appointment in 1970. In West Germany he combined an academic career, most recently as professor of sociology at the University of Konstanz, with activity in state and national politics as a member of the Free Democrat Party. The FDP is the small, nonsocialist, "reform" party, which provides the parliamentary voting margin in West Germany's governing coalition dominated by the Social Democrats. Dahrendorf had acquired a reputation for outspokenness by the time he became parliamentary undersecretary of the West German foreign minister, and it has been suggested that this quality may have hastened his assignment to Brussels.

In Brussels, Dahrendorf generated a tempest through an article in the German weekly *Die Zeit*, which attracted wide notice in the European press because of its barbed criticism of the "Eurocrats" of Brussels. The article appeared under a pseudonym, but Dahrendorf was soon identified as the writer. Dahrendorf remained cheerfully unrepentant under a sharp reaction that included calls for his resignation and direct attacks on the floor of the European Parliament.

While his characterization of the Community executive of 5000 as a "bureaucratic leviathan" entangled in red tape drew the headlines, it was his questioning of prevailing assumptions about progress toward European political unification which probably accounted for the harshness of the reactions of some of his colleagues in the Brussels establishment.

In essence, Dahrendorf rejected the idea that member governments of the Community in the foreseeable future will agree to give up significant elements of sovereignty to a "federal" European government. He sees political unification in Europe evolving only after the member states of the Community further strengthen the web of relationships already begun, so that national interests eventually converge. He argued that a Europe of the "second generation" must undertake this task.

Dahrendorf has not changed his

mind. In an interview in late April Dahrendorf said the Community has reached "an impasse in its calendar for progress." For a decade before 1972 "people had a notion [that the Community would] proceed from the customs plan through economic and monetary union to something described as political union, a royal way planned in stages," said Dahrendorf.

"When I said impasse, I meant the end of a chapter, a chapter in which a calendar devised by Community institutions was imposed on reality. Well, reality has caught up with us. Reality has told us we are not where we planned to be."

The way to European union, says Dahrendorf, is not by devising a comprehensive calendar, a royal way. Rather he says he is in favor of the Maoist line of "letting a hundred flowers bloom."

"What we have to do, in fact, is to solve a large number of specific problems, build up the materials for European union." He believes that the area he is responsible for is peculiarly suited to this pursuit; it provides "varied leads to real results." And with touches of both the self-confidence and self-inclusive irony that are characteristic of him, he says, "I have constructed for myself a portfolio necessary in the Community."

Dahrendorf, who is in his middle 40's, might himself be described as a European of the second generation with experience and expectations quite different from those of many of his older colleagues in the commission and in the higher reaches of the Community apparatus. For example, Altiero Spinelli, of Italy, who, before expansion of the commission, was the commissioner responsible for many of the programs and policies now in Dahrendorf's province, is a strong advocate of political integration under a federal system. Spinelli spent 16 years in detention in fascist Italy, 10 of them actually in prison after, as a student, he was first arrested for political activity in 1927. He became identified with the European federalist movement almost immediately after he was freed in 1943, and he pursued that interest in parallel with academic and literary and political activity in postwar Italy. He joined the commission in 1970 as commissioner responsible for science, technology, and industry and, since the expansion of the commission, has been responsible for industry and technology. He remains a powerful advocate of common policies in the fields he oversees, regarding them as prerequisites and aids to political unification. The Council of Ministers, which decides on policy proposals made by the commission, largely rejected Spinelli's ideas in this area, although, ironically, many of the proposals included in the science policy program, finally accepted this year, originated with Spinelli.

Ralf Dahrendorf

Dahrendorf, in fact, took over at a time when conditions were favorable for progress in his new province. Euratom had become such an embarrassment to the Community that definitive action was necessary. Euratom was the product of one of the three treaties creating the three original European "communities"—the coal and steel community, the economic community, and the atomic energy community. Although Euratom was launched enthusiastically as a showpiece of European scientific cooperation and a sound joint investment in bringing the benefits of nonmilitary nuclear energy to Europe, the brave beginning proved a false start. Conflicts of national industrial interest among the major member countries were the root of the trouble. By the middle 1960's the agency was in deep difficulty with criticism of the quality of work being done and resistance to paying the costs of the agency both increasing. In recent years there have been proposals to dismantle the research arm of Euratom altogether (Euratom functions as a nuclear materials supply agency, as well) or to convert the Euratom labs to research on other subjects, such as the environment.

Pentagon Admits to Weather War

The Department of Defense (DOD) has finally admitted to having seeded clouds over Laos, North Vietnam, and South Vietnam during the Vietnam war, according to the transcript of a Senate briefing released on 19 May. At a 20 March briefing, high military officials told members of the Senate Foreign Relations Committee the full details of the classified weather modification program which was conducted by the U.S. Air Force in Southeast Asia from 1966 until 1972 (*Science*, 5 April 1974). The briefing constituted the first admission by the military that such a program indeed took place. The DOD officials gave out figures on the number of cloud-seeding sorties and their locations, the number of inches of rainfall claimed to have been induced by the seeding, and a list of officials in the DOD chain of command and in civilian agencies who knew about the top-secret program. The military officers at the briefing maintained that the program had succeeded in reducing North Vietnamese infiltration down the Ho Chi Minh Trail, particularly in June 1971—but denied prior allegations that their cloud-seeding operations in any way caused the heavy flooding which devastated parts of North Vietnam in the fall of 1971.

The use of weather modification as a weapon in Vietnam is an unprecedented military application of this civilian technology. Significant portions of the text of the briefing will appear in *Science* next week.

—D.S.

A key event in the improvement of prospects for science and technology seems to have been the Community summit meeting in Paris in October 1972. Out of this meeting came instructions to the commission to give a higher priority to science and technology and to come up with specific plans for doing so.

Within a few months, Euratom had been given its first "pluriannual" budget in 5 years and put on notice that it was in for a major reorganization. Some observers attribute this development in part to the arrival in Brussels of France's François- X. Ortoli to take over as president of the commission at a time when his country wished to be constructive and amenable and to counter the reputation for negativism in the field of community scientific af-

Academy Says Energy Self-Sufficiency Unlikely

Getting a piece of the action in the national energy debate is becoming almost mandatory for every scientific and technical organization in Washington; even this journal has come out with a special issue devoted to the subject. Now the National Academy of Engineers has weighed in with its contribution, a 140-page report outlining what W. Kenneth Davis of the Bechtel Power Corporation, chairman of the academy's energy task force, describes as a "survival kit" to get the nation through the period from now to 1985.*

The report addresses the problem of eliminating or substantially reducing energy imports in the coming decade. It estimates the effect of conservation measures on energy demand and the extent to which domestic supplies can be expanded, and finds that, just possibly, independence could be achieved by 1985. It proposes programs (in addition to the energy R & D efforts already being set in motion) to accomplish this goal and comments on the proper roles for industry and government. The report's most notable contribution, however, lies not so much in its generally conventional view of how to scale down imports but in its enumeration of the mind-boggling logistics and costs such an effort would entail. Among the problems considered are capital costs, manpower needs, transportation of fuels, and the availability of water, any of which could prove a bottleneck on the road to energy independence.

The academy task force included some prominent spokesmen for the U.S. energy industry, and indeed a majority of the group had industry ties. Conflict of interest charges may be beside the point (the academy forthrightly says that the report relies more on the experience of the panel members than on any new analytical research), but the report is nonetheless open to criticism as reflecting an industry viewpoint of how to achieve energy independence. The report assumes, for example, no direct government involvement in the production of energy or the management of the energy industry. Instead, the task force urges the government to take prompt action to clear away red tape, provide incentives, and solve environmental problems, leaving industry free to get on with the job. In essence, the philosophy espoused is to push the existing energy system harder and to avoid creating any new institutional arrangements in the interests of getting things done quickly. Alternatives, such as wartime-like mobilization of the industry or expanded roles for federal agencies, are not considered.

The United States used the equivalent of 37.2 million barrels of oil per day (MBPD) in 1973. With higher prices and serious conservation efforts, the report finds, total energy use might rise in 1985 to 50 MBPD instead of the 58 MBPD otherwise forecast, The report thus lends credence to the notion that the growth rate in the demand for energy can be held closer to 2 percent annually than to the 4 percent of recent years. To supply this demand, the report proposes twofold expansion in the use of coal, construction of nuclear power plants at more than twice the present rate, and a 25 percent increase in domestic oil and gas production, largely from offshore fields. Synthetic gas from coal could amount to the equivalent of 0.8 MBPD and synthetic liquids (methanol and oil) to 0.6 MBPD in 1985. The report is particularly enthusiastic about coal liquefaction and pessimistic about the prospects for large quantities of oil from shale. Imports of oil would rise in the next few years, but could begin to taper off after 1978.

The scope of what is involved is indicated by the estimates the task force produced. In the next decade, for example, 100 new strip mines would be opened in the western states and 140 (smaller) deep mines in the East. Hundreds of oil rigs capable of drilling in water deeper than 300 feet must be built (there are 11 such rigs in the Gulf Coast now). Between two and three nuclear power plants must be started every month. Nearly 60,000 oil and gas wells must be drilled every year.

Such a vast expansion of domestic energy production would raise a number of subsidiary problems, according to the report:

► Capital costs—$600 billion in direct costs for energy production equipment must be raised; of the total, about half would be for electric power. Financing costs and subsidiary activities would be extra.

► Manpower—30,000 additional engineers, 190,000 more industrial construction workers, 240,000 new equipment operators, and 125,000 additional coal miners will be needed. The report anticipates shortages in many categories unless special efforts are undertaken.

► Water availability—shortages, particularly in the eastern states, may require the development of new underground sources and the transporting of coal to other areas for processing.

► Energy transport—moving massive amounts of coal will require major increases in rail-barge and pipeline capacity, including manufacture of 8,000 new locomotives and 150,000 additional hopper cars.

All in all, the academy report is not optimistic that all the problems can be solved on the time scale it proposes. We may yet have to buy a lot more Arab oil.—ALLEN L. HAMMOND

* *U.S. Energy Prospects, An Engineering Viewpoint* (National Academy of Engineering, Washington, D.C., in press).

fairs which France had earned for itself.

In practical terms, Euratom's problems had loomed so large that other Community scientific programs had been largely ignored. These other programs have traditionally been small scale and scattered. Community activities are restricted to those prescribed in the three basic treaties, and these treaties reflect the atmosphere and the perceptions of the 1950's. It is possible to initiate new activities—research on environmental matters, for example—but each new program requires that the Council be consulted in detail and give approval, and this is inhibiting.

In January, the Council finally approved a "Common European Community Research and Technology Policy." This was based on commission recommendations which followed a document reflecting Dahrendorf's own views made public in the spring of 1973 which in turn included some ideas developed from proposals made by Spinelli.

Under the policy, two new entities were to be created, a Committee for Scientific and Technological Research (CREST) and a European Science Foundation (ESF). The stated purposes of these two organizations exceed the power and resources currently accorded them. CREST is charged with coordinating all aspects of national research policy where military secrecy is not involved. Dahrendorf's own description of his hopes for CREST in a lecture at the University of Southampton in Britain last November reflects his modest immediate expectations for CREST.

> Co-ordination of national policies is an important element of European progress. CREST, in its early stages, will in fact not even try to create a unified position on the basis of the information it assembles, let alone suggest decisions which would be binding for member states. But by putting information about national subsidies for certain areas of research on the table, asking questions, trying to get a picture of the real situation of science budgets and their developments, listening to arguments brought forward in member states and the like, CREST will add some colours to the horizon of information in which decisions are taken in the member states. In doing so it may well create gradually a common horizon of information and thus a common atmospheric condition for science policy decisions. Indeed, the point may come at which it is only a small step from the exchange of information to the voluntary co-ordination of action, and it would not be the first time that in the European Community voluntary co-ordination becames the forerunner of a general readiness to make common decisions.

What NIH Needs Is a Party

The NIH needs a shot in the arm, something to revitalize its dampened spirits, according to its friends who, for many months, have been worried about rumors that NIH is going downhill.

There are reports that the intramural program is being financially starved. There are stories that many of NIH's brightest scientists are thinking of leaving because they are not able to recruit new people under the federal government's stringent hiring freeze.

And there are indications that some of the country's highest-ranking scientists and politicians are wondering whether it might not be perfectly all right to allow NIH to diminish in scope and stature. There are those who believe that the money that goes to the intramural program should be spent in private institutions (their own), and that there is no necessity for the government to maintain NIH as a research center of intellectual excellence when there are places on the outside competing for funds. There are those who might be content to see NIH become simply an administrative center, a body without a mind.

It is no surprise that scientists who treasure the special intellectual and research qualities of NIH are outraged by the mere hint of such heresy. It drives them to NIH's defense. "The intramural program sets the scientific tone of the entire extramural program. . . . Should the intramural program in Bethesda be allowed to deteriorate, the whole NIH effort will suffer," declares Sidney Udenfriend, one of NIH's most stalwart supporters.

Udenfriend is director of the Roche Institute of Molecular Biology in Nutley, New Jersey, and an alumnus of NIH where, for many years, he was head of clinical biochemistry at the National Heart Institute. He has decided that what NIH needs is a party. What he has in mind is a homecoming to which the thousands of men and women who have studied and worked at NIH over the years would be invited to honor their alma mater.

Udenfriend has taken steps to arrange such a reunion. With the consent of NIH director Robert Stone and DeWitt Stetten, the deputy director for science, Udenfriend has sent letters to more than 25 NIH alumni asking them to serve on the reunion committee. "I think you will realize how important this event can be to the future of the NIH," he wrote. "The type of homecoming I have in mind will include widespread publicity and participation of leaders in Congress and the press. It should contribute to an improvement in the morale of the staff in Bethesda and emphasize to our national leaders and to the American public the significant training role of this great Institute." No one turned him down.

The homecoming is scheduled for next spring, 19 and 20 April. "We chose that weekend," Udenfriend says, "because it comes at the close of the federation meetings in Atlantic City. We don't intend to make this an expensive affair so we decided to pick a time when a lot of our alumni will be in the area anyway."

The exact format of the reunion has not been decided—Udenfriend welcomes suggestions—but it is likely to emphasize NIH's past scientific accomplishments. [Many of them were catalogued recently by NIH scientists trying to explain to Health, Education, and Welfare Secretary Caspar Weinberger why it would be a bad idea to charge Clinical Center patients, each of whom is a research subject, for hospitalization (*Science*, 23 November 1973)].

Another likely feature of the reunion, designed to save money and promote friendship, is a "take an alumnus home to dinner" program in which present NIH scientists would be encouraged to offer some modest hospitality to their visitors.

As yet, no decision has been made about whether there will be a homecoming king and queen but, if there are, you can bet they will be chosen by peer review.—B.J.C.

This is music of the future, although it would seem that there are a number of subjects of science policy which make it likely and desirable to co-ordinate national policies rather closely. Even here, however, the notion of co-ordination should not be misunderstood. In some fields, such as, probably, experimental reactors, it may lead to the creation of common instruments of research and thus the abandonment of useless competition. In other fields, such as energy research, it may lead to a co-operative division of labour. Again in other fields, such as urban planning, exchange of information gained on a decentralized and competitive basis may be indicated. And there are probably other types of effects of co-ordination, all of which serve to emphasize the flexibility of an approach which begins by setting up a machinery of voluntary concertation, with an effective membership and an experimental spirit.

Dahrendorf sees another important role for CREST besides coordination, and this is providing independent scientific advice to the commission. "It is almost impossible to develop such expertise in the present system," says Dahrendorf. "It will now be possible with CREST." The commission has lacked a mechanism which made it possible to get the opinion of highly qualified outside experts on scientific and technical matters. A lack of "built-in quality control" was one of the troubles with Euratom, says Dahrendorf. Dahrendorf hopes that CREST, which is to be made up of university and industry scientists and engineers, will fill the bill.

The new foundation will also have a modest start in life. Comparisons of the ESF with the National Science Foundation (NSF) in the United States are misleading, since ESF will start out with a budget of perhaps a half million dollars a year compared to NSF's half billion. (The Community R & D budget amounts to about $100 million a year; this is only about 2 percent of the total spending for R & D of the Community countries.)

The ESF, it should be noted, is not to be exclusively a community organization. Eighteen countries belonged when the foundation was formally established at a meeting in Stockholm in early May. The relation of the commission to the foundation is still nebulous, although the commission is providing the bulk of the first-year funds. Location of ESF headquarters and details of its operations are still under discussion. Dahrendorf is one who hopes that the foundation will maintain independence of action and feels this can best be accomplished if funding comes primarily through academic institutions and research councils. This would mean that money would come originally from governments, but that its use would be influenced strongly by the scientific community. Since a prime objective of the ESF is to foster basic research, the influence of scientists is thought to be essential.

Another point in the new science policy is regarded as a pet project of Dahrendorf's. This is the "Europe Plus 30" program aimed at preparing the Community for the year 2000 and beyond. The first step is to be a 1-year study to report to the commission on whether it should undertake a "comprehensive prospective study" which could be developed into a forecasting instrument susceptible to constant updating. The preliminary study is to be headed by Britain's Lord Kennett. One question that seems likely to be taken up when the report is made is whether the Community should have its own office of technology assessment. Dahrendorf has been regarded as a strong advocate of a think tank for the Community, and in Brussels the future of the Europe Plus 30 program is assumed to depend on the interest and dynamism that Dahrendorf's successor brings to the subject.

Dahrendorf is a self-proclaimed pragmatist and nowhere has this disposition been more evident than in his handling of the question of mutual recognition of professional qualifications among the member countries of the Community. As in most sectors of education, the treaties are relatively restrictive. The Treaty of Rome provides for the abolition of restrictions on the freedom of establishment of nationals of one member state in the territory of another member state and on the freedom to provide services within the Community. Meager progress was made during the 1960's, however, on the sensitive issue of increasing the mobility of professionals.

In the spring of 1973, Dahrendorf went to the commission with a lengthy set of recommended guidelines. There was not much new in his plan, but it

Department of Flexible Statistics

From a 21 November 1973 press statement issued by Dixy Lee Ray, chairman of the Atomic Energy Commission (AEC), in response to criticism that nuclear reactors are unreliable and unsafe:

Ralph Nader and the "Union of Concerned Scientists" have issued another of their scare statements on the safety and reliability of nuclear power plants and the handling of wastes from these plants. This is yet one more attempt to frighten the American people into believing that nuclear power cannot be depended upon. . . .

Mr. Nader and the "UCS" have chosen to ignore the following facts:

Nuclear power plants have an excellent record of reliability. . . . A survey of nuclear reactor availability for the January–April period of 1973 showed that, of 24 utility-owned generating units of 100,000 kilowatts or larger capacity, 14 nuclear steam units were available 80 percent of the time and 8 were available 90 percent of the time. This compares with an average of about 73 percent availability for fossil plants of 600 electrical megawatts or larger over the 1960–1971 period.

From an 8 May 1974 speech to the Atomic Industrial Forum by AEC director of regulation L. Manning Muntzing:

A further disturbing finding has been that the availability of nuclear power plants has fallen short of what was expected and has in fact not exceeded the availability of comparably sized fossil fueled plants.

We have just completed our analyses of nuclear plant availability for 1973. The data show an average plant availability factor of 70 percent for 27 light-water cooled plants which were in commercial operation for at least 3 months of the year. This is a decline from the 1972 average of 73.4 percent. . . .

Numerous forced outages, due primarily to equipment malfunctions, have been responsible for the disappointing performance we have had. . . . Our analysis indicates that many of these occurrences would have been prevented had strong quality assurance programs been in effect.

—R.G.

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).