racial policies), ROTC, and various other issues. But Pitzer believes the specific issues were less significant than the fact that "when the campus community, both students and faculty, is 80 percent in support of one position, that generates not more than 20 percent support among the trustees and the older generation of alumni."

The continual conflict meant that Pitzer had to "spend a lot of time trying to reconcile these more or less irreconcilable constituencies of the university." This meant endless talking with groups of students, faculty and alumni in order to ward off "crisis situations." As Pitzer noted in his letter of resignation: "Entirely too much of my effort has been devoted to matters of a purely administrative or even of a police nature. Too little time has been available for the academic matters I most enjoy—the planning and implementing of innovations and improvement in teaching and research."

At the time of his interview with *Science,* Pitzer seemed relaxed and happy and not the least bit shaken up by his experience. He expressed pride in some of the positive accomplishments of his presidency at Stanford, particularly an increase in student and faculty participation in university governance, and improvements in the curriculum. He also professed himself "more than happy to turn over the police chief responsibilities to someone else." Pitzer said he expected to look back on his presidency at Stanford as "an interesting experience." He added that he was "not in any way going to be embarrassed to talk about it."

For the immediate future, Pitzer is planning to take a year's sabbatical, proposed by the trustees. He will spend the time in travel and in "catching up on what is going on in chemistry and related sciences." Beyond that, his plans are vague—possibly a professorship at Stanford or elsewhere, possibly foundation work. But of one thing he's certain. "I'm not interested in another academic administrative post."

—PHILIP M. BOFFEY

Brain Drain: Fewer Scientists Enter U.S., More Seek to Leave

Peter Brommer was, until last May, a research section chief at Hoffmann-La Roche Inc. in Nutley, New Jersey. In May Brommer returned to his native country, Switzerland, for a similar job in the Swiss branch of Hoffmann-La Roche.

Brommer came to the United States in 1963. Like many of his fellow immigrant scientists, he came to this country for a variety of reasons: job opportunities here were better; research funds were more available; an American sojourn would enhance his professional status. Brommer was part of the brain drain.

Yet now Brommer is back in Switzerland, and there are increasing signs that the brain drain of which he was a part has ended and may actually be reversing. Participating in a symposium on the brain drain held in April at Harvard University, sponsored by the European Community, Brommer said, "It seems that we are right now in a transition period, and I have observed in recent months actually a reversal of the brain drain. I have several friends—five or ten—who, a year ago, would have stayed in the United States, and now all of them want to go back. I share their feelings. I find I can now have the same opportunity for jobs in Europe, and everything else being equal, I would prefer to go back."

There are strong indications that Brommer's case is not an isolated incident, that increasing numbers of scientists, both foreign-born and American, are going abroad to work. At the same time, new changes in the immigration laws have stemmed the flow of foreign scientists coming to the United States. The combination of these two trends has produced a drastic slackening of the brain drain.

The height of the brain drain was reached in fiscal year 1967 when, according to a National Science Foundation report based on figures from the U.S. Immigration and Naturalization Service, 12,523 scientists and engineers were granted immigrant status in the United States. This was an increase of 74 percent over the 1966 figure, and 134 percent over the figure for 1965. Then, in 1968 the rate of increase dropped sharply. The NSF report for that year showed that the number of immigrants rose by only 4 percent over the 1967 figure. In 1969, the trend reversed itself dramatically; the number of scientists and engineers granted immigrant status dropped for the first time in 5 years—by 21 percent or from 13,000 in 1968 to 10,300 in 1969. The figures for immigrant physicians followed a similar pattern. In 1967, 3300 were admitted; in 1968, 3100; and in 1969, 2800.

The primary cause of the shifts in the immigration pattern was a series of changes in the immigration laws. The sharp increases between 1965 and 1968 were the result of a 1965 revision of the law which eliminated the old national origins quota and replaced it with a series of preference systems under which persons are admitted on the basis of family relationships or personal skills (*Science*, 19 January 1968). In addition to causing the increase in the total number of immigrant scientists, this change permitted Asia (which had had relatively low quotas under the old system) to replace Europe by 1967 as the regional source of the largest number of immigrant scientists. In 1967, 5200 Asian scientists immigrated, while 5000 came from Europe.

Two further changes which became effective in 1968 caused a dramatic reversal of the trend. These revisions reduced the number of visas available for persons lacking familial preferences and initiated a Western Hemisphere quota which limited the previously unchecked flow of persons from that area. These changes caused a sharp decline in immigration of scientists from all areas except Asia and Africa, which produced slightly larger numbers of immigrants in 1969 than in 1968.

While the new immigration procedures have stemmed the inflow, there are signs that the outflow of scientists, engineers, and physicians (both foreign-born and American) is increasing. No figures are kept on emigration of

scientists from the United States, but talks with science attachés at the Japanese, Canadian, and various European embassies make it clear that the number of foreign-born scientists seeking to return to the countries of their birth is on the rise and that the United States is facing a possible reversal of the brain drain.

"I have been watching the scene for 10 years now, and I can say that in the last 6 months I have had a surprisingly large number of calls from scientists investigating the possibility of returning to Germany," reported the German science attaché in Washington. Similar situations have been reported by the science advisers at the Canadian, French, Swiss, and Dutch embassies. The situation, of course, varies from country to country. In Italy, where recent political developments have left science policy just short of chaotic, scientists are still lining up to come to the United States. But for most Europeans, Canadians, and Japanese, tranquility and steady growth can best be found back home.

Two main factors are cited by scientists and science attachés in explaining the desire of foreign scientists to return to their native countries: the improvement of foreign (especially European and Japanese) scientific facilities and the deterioration of conditions in the United States.

In December of this year a report will be issued by Michael Boretsky, of the Science and Technology division of the Commerce Department, which, he says, will show "that in the research and development areas the European and Japanese efforts are increasing at a much faster rate than ours." This is an indication of a narrowing of the technology gap between the United States and Europe and Japan.

When polled about their views on the opportunities for scientists in Europe, the 16 scientists at the Harvard symposium also seemed to be aware of appealing developments abroad. Asked whether they expected Europe to have something interesting to offer scientists in the near future, symposium participants' answers were generally affirmative. Comments included: "Space research is finally starting to grow in Europe while it is leveling off in the United States. Attempts to improve science, university structure, and the like are beginning to bring results. Europe has been on the verge of a scientific boom for 10 years without ever having had one. Europe today is a very dynamic and different place from what it was 10 years ago."

The attractiveness of Europe is enhanced by what many scientists see as a deterioration of conditions in the United States. A February report of the NSF showed that the growth rate of research and development expenditures by American universities and colleges has slowed down. Such expenditures by institutions of higher learning grew at an annual rate of 17 percent during the years 1958–1966 and at an annual rate of only 11.6 percent from 1966–1968. "The chief cause of the relative decline is the leveling off of federal obligations for research and development, a trend which began in the late 1960's and appears to be continuing," the report said.

The leveling off of the U.S. economic boom of the late 1960's and the cuts in funds for scientific projects in industry, especially in aerospace industry, have spurred the desire of foreign-born scientists to go back.

Social Considerations

In addition to these scientific and economic factors, certain social considerations appear to have a role in foreign scientists' decisions to return. Most of those who came to the United States during the boom years of the brain drain (the mid-1960's) were young. Of the 12,523 immigrant scientists in 1967, 5,569 were under 30 years of age and only 830 were over 44. Many now have children who are reaching school age, and the parents must decide whether to bring up and educate their children as Americans. For many families this appears to be a major factor in a decision to return to the native country.

Many scientists also feel that the political situation in the United States has grown less desirable. Those at the symposium cited the problems of living in the city, American inflation, doubts about accepting money from a government which is carrying on the war in Indochina, and the question of whether the United States is facing a major political upheaval, as factors in their decision to stay or leave. "I have my doubts about whether the United States will continue to be the leader of the West for the rest of the century," said Guido Pizzella, an Italian-born research associate in space physics at the University of Iowa.

Figures are scarce on how many American scientists are also moved by these considerations to seek jobs abroad. It has always been popular for American scientists to go abroad for short periods of time, especially for postdoctoral work or study, but it is difficut to determine whether this pattern is now shifting in favor of longer or even permanent stays overseas. The State Department began only last year to keep statistics on the number of people who apply for passports to go abroad for "scientific purposes." In general, the government has little idea of how many and what kinds of American scientists have found foreign positions, where they are going, and whether they intend to stay for long periods.

One problem in judging how significant the trend toward a reversal of the brain drain may be is that it is a relatively new phenomenon, beginning, according to most observers, only in the last year. On Capitol Hill, committees concerned with scientific manpower are keeping an eye on the situation. Last month the subcommittee on Science, Research and Development of the House committee on Science and Astronautics began a series of hearings on whether the United States needs a uniform national science policy. Guild Nichols, staff consultant to the subcommittee, said that the hearings, which will continue until late August, will study the shift in the brain drain. "We are concerned in two areas," Nichols said. "There are indications that large numbers of foreign-born scientists are leaving the country because of declining resources here and that the market for young scientists in foreign institutions has increased." Nichols cited the Weizmann Institute in Israel as an example of an institution which is attracting large numbers of young American scientists. "We are not sure if the attraction is to Israel or to the resources, but this is one of the things our hearing will touch on," Nichols said.

Whatever the outcome of the congressional investigation—if they discover that the brain drain is slowing or actually reversing—Peter Brommer and many of his foreign-born colleagues have already left the United States and probably will not return. If this trend represents simply a leveling off of an unnatural imbalance of scientists which came about in the mid-1960's, Congress may find that there is no cause for alarm. But, if it finds that the trend indicates a significant loss of scientific manpower for the United States, Congress indeed will have cause for concern.—THOMAS P. SOUTHWICK