Dr. Brode: Hard times for chemists.

passed demand. I have already been given 750 resumes and I expect the total will hit 2,000 before the week is out."

However bad the current situation may be, Dr. Brode foresees a time when it will be just the opposite. In the 1990's, severe shortages, not just of chemists but of scientists in all fields are expected.

"By the 1990's," says Dr. Brode, "the size of our college-age graduating group will be the same size as it is today, yet the total larger national population and expanded economy will undoubtedly require additional scientific and technical personnel. We will probably have quite a shortage."

Until then he expects a fairly tight job market in scientific fields, although certainly not anywhere near as bad as it is this year in chemistry.

ENGINEERING MANPOWER

Hard times and a union

A large group of California engineers and scientists ushered in a new era for themselves and possibly for their peers across the nation last week when they voted to affiliate with the AFL-CIO. It was believed to be the first time so large a group has ever chosen to enter the giant union's fold en masse.

The 1,140-member Engineers and Scientists of California (ESC) voted overwhelmingly to link up with the professional, office and industrial union part of the AFL-CIO affiliated Marine Engineers Beneficial Association.

"Engineers haven't kept up with the times on salaries or fringe benefits," says Laurence Rodgers, ESC executive director. "In some cases they make less money designing a tool than those tradesmen who eventually use it. We wanted an organization that had some real strength in negotiations and could give us assistance in organizing."

Most of ESC members are electrical and mechanical engineers employed by the Pacific Gas and Electric Co. The rest comprise a range of scientists and engineers including chemists and physicists from San Francisco Bay area testing laboratories, civil engineers, architectural engineers and surveyors from throughout the northern part of the state.

"Engineers make up the largest group of professional craftsmen in the country," Rodgers points out. "And after its initial taste of success the union has set its sights on organizing this group across the country."

But why did the ESC pick this time to join hands with the AFL-CIO? Why not last year or the year before?

One of the main reasons could be the reverberations from large manpower cutbacks in the aerospace and defense-oriented industries over the past year. While surplus isn't evident in every field, it has hit certain areas and the prospect for the future isn't bright.

"Most companies that traditionally hire a lot of engineers are cutting back and tightening the belt," says Marshall Harris, who runs a large San Francisco engineering employment service. "Companies are no longer interested in the engineer with a couple of years of general experience. The jobs they are filling now are tightly specified and if the man they want isn't around, they just won't hire anyone."

Design engineers have been hardest hit in the slowing market, and the personnel manager from a large West Coast aerospace company tells why:

"Since the end of 1967 we have dropped about 6,500 employees, and about 1,200 were engineers. Most of these were dropped from the hardware and production end of the operation, and only a few from the analytical side. We need the idea men, because in a period like this, it is where your strength lies. It's rather obvious that production is going to lag in the next year, so it's time to really get moving on concepts. With Federal spending cuts, the competition for Government contracts is even keener."

This personnel director said his company's overall manpower forecast for the next year "looks just about like a flat line."

But while there are other instances of large-scale layoffs, they are the exception rather than the rule. Most companies are cutting back through attrition. When an engineer leaves, he simply is not replaced. So instead of engineers dumped into the job market in bucketsfull, it has become a steady trickle.

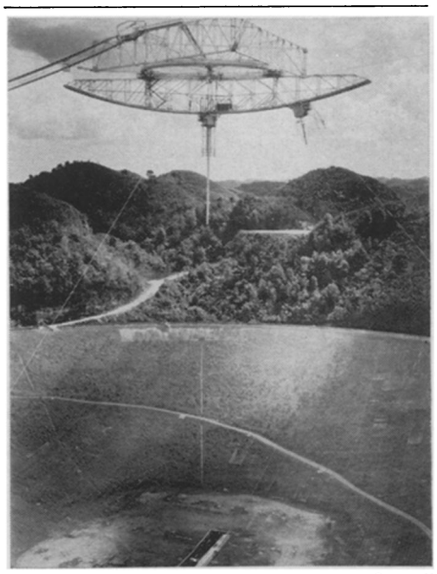
Another bitter pill for engineers to swallow is the dropping salary. "A lot of companies who relied heavily on Government contracts are now trying to find some commercial spinoff from their products," says Harris.

"But since the profit on the commercial market doesn't match that made from a Government contract, the engineer is usually hired for a lower salary."

"I have always thought unions were something for the other guy," said one ESC member, "but then I got tossed around hard and had no comeback. Now we'll have some bargaining power."

RADIO ASTRONOMY

Two years and no action



Cornell

Arecibo: Still in need of a facelift.

The idea that neutron stars might exist had been around theoretical astrophysics for a couple of decades, but it was not until radio astronomers discovered and studied pulsars that there were known objects that could seriously be considered to be neutron stars.

"The presently accepted proof of the neutron star state of matter is a fantastic confirmation of the exhilarating reach of theoretical science," says the Ad Hoc Advisory Panel for Large Radio Astronomy Facilities, known as the Dicke panel after its chairman, Dr. Robert H. Dicke of Princeton University.

The Dicke panel cites pulsars, and other successful work by radio astronomers, in its latest plea to the National Science Foundation for money for the construction of new radio telescopes.

The panel first met in 1967 (SN: 9/2/67, p. 225), when it issued a series of recommendations for new radio astronomy construction. It met again this summer and now says: "Two years have passed without the implementation of any of the 1967 recommendations of this panel for the construction of major new radio astronomical telescopes. . . . The facilities for radio astronomy in the

United States are essentially the same today as they were five years ago."

Meanwhile new discoveries have come at an explosive rate. The panel lists a few: "pulsars (SN: 3/6/68, p. 281), atomic and molecular lines, organic molecules (SN: 5/12, p. 351), measurements of the galactic magnetic fields (SN: 9/21/68, p. 282), and even a new test of general relativity (SN: 3/9/68, p. 229)."

"While our country stood still, Great Britain, The Netherlands, Germany and India have started new large radio telescopes (SN: 5/3, p. 434) and several are essentially complete and ready for operation," says the panel. It goes on to reiterate its recommendations of two years ago: The resurfacing of the Arecibo radio telescope in Puerto Rico so that it will be useful at short wavelengths and the construction of an interferometric array of radio telescopes at Owens Valley, Calif.

The panel adds two new recommendations for capital construction, the so-called Very Large Array planned by the National Radio Astronomy Observatory, and a 440-foot single telescope that has been planned by a consortium of universities (SN: 5/3, p. 434).

New, more sensitive receiving equipment should be added to existing telescopes, says the panel: "Continued operation with antiquated electronics is a poor use of the capital investment of earlier years in the existing radio telescopes."

The panel feels that its program is extremely urgent, but whether the Government will respond and how fast is not yet clear. Spokesmen for the NSF say it is too early to comment on the agency's response. Money for resurfacing Arecibo was in the foundation's budget but the House of Representatives appears about to defer it.

The need for resurfacing has been evident for at least three years.

One telescope of the array at Owens Valley exists, but it was already under construction in 1967. Since it was completed, there has been no further construction.

The Smithsonian Institution has taken the 440-foot telescope under its wing and is seeking $2 million to complete design studies and evaluate prospective sites. A house bill to authorize the money is to be the subject of hearings in mid-September; a similar Senate bill is less far along.

The radio astronomers' earlier report was one of a series of requests by most of the scientific disciplines with which Washington has been bombarded in the last five years. Some efforts have been made to accommodate the sciences, but most long-range requests, like those of the astronomers, have fallen on budget-plugged ears.

SOCIAL SCIENCE

More research, more relevance

A massive survey of the social sciences was prompted three years ago by the growing demand of social scientists for more applied research, to enable society to use them more effectively.

The survey is now complete. Its results—the sciences are coming into their own, but have massive needs—come at a time when concern for social science research is at a peak.

On July 11 President Nixon announced the creation of a National Goals Research Staff to develop a system of social indicators and to prepare annual reports on the directions of society. On Aug. 3 the National Science Foundation released a report by its Special Commission on the Social Sciences, begun in 1968. Among its recommendations were increased use of the social sciences to aid in solving problems of society, inclusion of social scientists in key Presidential advisory groups, a $10 million appropriation to the NSF to establish research institutes devoted to particular social problems, and combinations of the social sciences and other disciplines for a broader gauged approach to problems.

The present survey represents the combined efforts of the National Academy of Sciences and the Social Science Research Council, and is supported by the National Science Foundation, National Institutes of Health, National Institute of Mental Health and the Russell Sage Foundation. It was conducted among all universities that granted doctorates in social science between 1960 and 1966.

Ten separate panels totaling 76 members were set up to investigate specific sciences—anthropology, economics, geography, history, linguistics, political science, psychiatry, psychology, sociology and a special panel on statistics, mathematics and computation.

Summing up the preliminary recommendations of the survey committee, its chairman, Dr. Ernest R. Hilgard of Stanford University, asked that:

- Social scientists from the private sector address themselves to the problems of basic vs. applied research.
- Eventually a council of social advisers to the President be established. "We now are satisfied," says Dr. Hilgard, "to urge a full participation of social scientists within the Office of Science and Technology and within the President's Scientific Advisory Committee."
- A new type of organization for research in universities be established, similar to a school of engineering or business administration or medicine, but devoted to analysis of social problems. The committee suggests a graduate school of applied behavioral sciences to start out as a Ph.D.-granting institution with high standards. Dr. Hilgard cites the Institute of Social Science at Yale and the Public Policy Research Organization at the University of California as models.

Stanford University

Hilgard: Support for social research.

The survey committee's recommendations were augmented by the proposals of its psychology panel, chaired by Dr. Kenneth E. Clark of the University of Rochester and Dr. George A. Miller of the Rockefeller University.

Psychology's problem so far, as was evident at the annual American Psychological Association convention (SN: 9/6, p. 177), is that psychology has not delivered in social problem solving. Scientists can enrich the environment of a barnyard animal, says Dr. Clark, but cannot help young children from inadequate backgrounds to learn.

In an effort to inspire better use of the nation's psychology resources, Dr. Clark's panel:

- Endorsed the committee's proposal for a new type of graduate school, but proposed that students should get more financial support over a four- or five-year period.
- Proposed strengthening of the National Science Foundation support of basic research in the social and behavioral sciences as well as the National Institutes of Health support of basic research in psychology.

"Our tools are now sharp, our manpower still small but rising, and with continued support our returns to society should soon be many times the investment made in our researches," Dr. Hilgard concluded.

Publication of the final recommendations of the overall survey and the separate panel reports is planned for November. ◇