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Plant Gene Expression Center

An important experiment in the support of plant research is being conducted in Albany, California, not far from the University at Berkeley. The Plant Gene Expression Center (PGEC) effectively began operations in 1987 as a cooperative venture of the Agricultural Research Service (ARS) of the U.S.Department of Agriculture (USDA) and the University of California. The staff of PGEC now includes six very creative principal investigators (PIs) supplemented by postdoctoral fellows and by graduate and other students from Berkeley. The total staff numbers about 100. The USDA provides annual core support of $3 million, which covers salaries of PIs and other items. Through the university, PIs can apply for grants to support additional activities. The success rate has been good. The core support has been supplemented by about 50%, largely to provide stipends for postdoctoral fellows and others.

Impetus for creation of PGEC was provided by Gerald G. Still, now director of PGEC. During the early 1980s, he was on the staff of ARS in Washington, D.C. He noted that the USDA was being criticized by scientists because of its slow approach to exploiting recombinant DNA techniques in agricultural research.

The criticism was justified. Enormous progress had been made in advancing the fundamental biology relevant to biomedical problems. New tools, new techniques, and new concepts had been created which if applied to plants would renew the vigor of basic agricultural research. Some biotechnology firms were active in plant research but their efforts were mainly directed toward a quick pay-off.

Still noted that the Bay Region was a vital center of recombinant research and resolved to establish an activity there. His efforts were implemented slowly, but by 1987 facilities had been established and PIs had begun research activities. Still had a major role in wise selection of the PIs. He recruited Peter H. Quail to be director of research. Quail also was named professor of plant biology at Berkeley. Quail maintains an active research program at PGEC. The other PIs are among the best of America's young investigators: Barbara J. Baker, Sarah C. Hake, Sheila M. McCormick, David W. Ow, and Athanacios Theologis. Michael F. Fromm, one of the original PIs, has gone to Monsanto. In 1988, Still wrote as follows:

> Every stage in the life of a plant is controlled by genes. At the Plant Gene Expression Center in Albany, California, our research is designed to provide new, precise, and much-needed information on exactly how these genes are expressed (turned on or turned off) within crop plants.
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> We want to know—in as much detail as possible—how instructions contained within the gene are executed by the plant. With this information, and the tools of modern biotechnology, plant geneticists will be better able to isolate and transfer the genes that control agriculturally important traits.

Scientists at PGEC have made remarkable progress. They have identified a number of genes, isolated them, and inserted them into the same and other species of plants. Often genes from one species are effective in others. Among the genes cloned have been those for 2-4-D resistance, phytochrome, and for a homeobox that controls development in corn leafs. Important traits being investigated include fungal and viral resistance, male sterility, and heavy metal sequestering. Research is under way on tomato, tobacco, rice, corn, oat, cotton, brassica, yeast, and *Arabidopsis*. Production of transgenic monocotyledonous plants was a useful contribution.

In only 4 years, accomplishments at PGEC have led to a world-class reputation for excellence. A large number of papers have been published in peer-reviewed journals, including *Nature* and *Science*. PIs have been invited on many occasions to speak at universities, industrial laboratories, and international symposia. A stream of investigators have received training at PGEC. Techniques and biological materials developed at the center have been made available to many investigators worldwide. Faculty members at the University of California are pleased with the collaborative arrangements. Interaction with other USDA laboratories has begun.

One of the hazards now faced by PGEC is pressure for immediate practical results. In research, such an attitude often leads to unimaginative plodding activities. Good scientists strive much more diligently and creatively to implement their own initiatives than to follow the dictates of others. Perhaps the pressure on PGEC may be lessened when news of a result having important intellectual and practical significance is highlighted in the 18 October issue of *Science*.—PHILIP H. ABELSON