

What if the “book of life” were pay-for-view?

Thanks to a student at the University of California, Santa Cruz, the working draft of the human genome is posted on the Internet where biomedical researchers and other scientists can download and analyze it for free.

A computer program that Jim Kent developed as a UC Santa Cruz graduate student helped the publicly funded Human Genome Project win the race to sequence the genetic code that controls human health and development.

And Kent's work was supported in part by the UC Biotechnology Research and Education Program. Since 1985, this UC program has been providing grants for cutting

edge research, like genomics, with great promise for better medicines, improved quality and production of food and fiber, and enhancing the quality of the environment.



The UC Biotechnology Research and Education Program:

investing in science for the benefit of us all.



“Without Jim Kent, the assembly of the genome into the golden path wouldn't have happened.”

— Francis Collins, director of the National Human Genome Research Institute, referring to the nickname for the GigAssembler program. (The New York Times, Feb. 13, 2001)



Tomorrow's biotechnology breakthroughs in human and animal medicine, nutrition, agriculture, and environmental stewardship depend on the science—and the scientists—we develop today.

The University of California Biotechnology Research and Education Program helps build that future by providing grants to leading experts and promising young minds working at the frontiers of science and engineering at the 10 UC campuses and three UC-managed national laboratories.

The program also serves as an information resource on all aspects of biotechnology for government policymakers, industry leaders and the public.

Research and Training Grants

Since its foundation, the program has awarded over \$20 million in grants, and supported over 800 graduate students and postdoctoral scholars at UC campuses, the Agriculture Experiment Station, and the Lawrence Berkeley, Lawrence Livermore and Los Alamos national laboratories.

Grants are competitive and awarded to the most promising proposals that involve multidisciplinary teams of scientists and that combine innovative research with training for graduate students and postdoctoral fellows.

Each UC campus and UC-managed national laboratory may submit up to three grant proposals each funding cycle. National laboratory proposals must include collaboration with one or more UC campuses.

Advancing the Frontiers of Science

The UC Biotechnology Research and Education Program funds research in a wide variety of biotechnology-related science and engineering as well as research on the social and ethical issues posed by biotechnology.

Scientists and their students funded by the program conduct research at the forefronts of their fields, much of it in new disciplines emerging where biology engineering and the physical sciences intersect.

Fields of study include:

- Agricultural sciences
- Biochemical engineering
- Biomaterials science
- Biomedicine
- Computer science
- Economics, business and public education
- Engineering
- Environmental sciences
- Nanotechnology

In this way, the program helps apply the latest in scientific techniques, as well as the intellectual resources of the UC

system and national laboratories, for the benefit of California and beyond.

Among funded projects, scientists are seeking to:

Nanotechnology:

- Use magnetic fields and nanoparticles—particles so small that most of the atoms are on the surface—to deliver medicines directly to the parts of the body that need it most, making treatments more effective and patient-friendly. (*Lead investigator: Samir Mitragotri, UC Santa Barbara*)
- Develop ways to use proteins and DNA as scaffolding for assembling nanomaterials. (*Lead investigator: Geoff Strouse, UC Santa Barbara*)

Bioinformatics:

- Mine the vast, complex data from genomics research for potential novel therapies and drug-targets, as well as for biocatalysts for industrial and agricultural applications. (*Lead investigator: Patricia Babbitt, UC San Francisco*)
- Combine genomics and miniature robotic tools to greatly improve the power to study genes and their functions. (*Lead investigator: Suzanne Sandmeyer, UC Irvine*)

When it Comes to Biotechnology, UC Means Business

1 in 3 biotech companies is within 35 miles of a UC campus

1 in 4 California biotech firms was founded by UC scientists

85% of California biotech companies employ UC alumni with graduate degrees

Biotechnology companies give California:

JOBS:
53,000

AVG SALARY:
\$70,000

REVENUES:
\$9.8 billion (52% of US)

R&D:
\$3.6 Billion (52% of US)

Research & Training Program in Nutritional Genomics” Joseph Napoli, UC Berkeley, Department of Nutritional Sciences and Toxicology.



Graduate student Arlo Randall, working with ICS Professor Pierre Baldi, utilizes computer software to identify the structure and function of a smallpox protein.



Therapies:

- Use large-scale determination of protein structures in an effort to fine-tune the drug discovery process, reducing the time and costs in designing better medicines with fewer side effects. (*Lead investigator: Andrew Fisher, UC Davis*)
- Explore ways to inhibit the spread and growth of cancer by blocking the ability of tumor cells to make complex carbohydrates. (*Lead investigator: Jeffrey Esko, UC San Diego*)
- Open new avenues for drug design by unraveling the layers of data in human genes (*Lead investigator: Pierre Baldi, UC Irvine*)

Nutrition:

- Examine interactions between diet and genetics in the new field of nutrigenomics, which could lead to new dietary supplements and medical foods customized to maximize the health of each individual. (*Lead investigator: Joe Napoli, UC Berkeley*)

Environment:

- Use microbes to clean up heavy metals, such as cadmium, mercury and lead, which pose significant health and environmental threats nationwide. (*Lead investigators: Wilfred Chen, UC Riverside; and in a separate study, Doug Clark and Jay Keasling, UC Berkeley*)

Intellectual Capital:

- Develop models that show how UC research coupled with financial capital foster the growth of biotechnology in the United States, particularly in California. (*Lead investigator: Lynne Zucker, UCLA*)

Conference and Outreach Awards

In addition to research grants, the program also awards each quarter small seed grants (up to \$15,000) for scholarly conferences and workshops related to biotechnology and held within California with UC faculty and student support. Proposal deadlines are quarterly. Proposals must be submitted at least three months before the event.

People

An executive committee with representatives from each UC campus, the UC-managed national laboratories and the state Agriculture Experiment Station oversees the program.

Director Martina Newell-McGloughlin is an internationally recognized authority on biotechnology: the science, regulations, public policy issues and societal implications. Prior to her current position she was director of the UC Davis Biotechnology Program, a program she helped to develop over the previous decade as the only stand alone biotechnology program in the entire UC System. She is co-director of an NIH Training Grant in Biomolecular Technology and has an adjunct position in the professorial series in plant pathology at UC Davis. She holds a prestigious D.Sc degree from the National University of Ireland.

Chair C. Fred Fox is a professor and past chair of the Department of Microbiology and Molecular Genetics at UCLA. He is a leading authority on the molecular biology of cell membranes and the recipient of the American Chemical Society Eli Lilly Award in Biochemistry. He is founder and executive editor of the Journal of Cellular Biochemistry and directs the Alfred P. Sloan Foundation's UCLA Professional Masters Program in Computational Biology and Bioinformatics.

For other committee members, please see our Website.

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