

STANFORD UNIVERSITY MEDICAL CENTER

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Embargoed for release until 9:30 a.m. Pacific Standard Time on Friday, Feb. 14, to correspond with presentation at the annual meeting of the American Association for the Advancement of Science (AAAS), held in Seattle at the Washington State Convention and Trade Center and the Sheraton Seattle Hotel.

SILICON CHIPS SCAN THOUSANDS OF GENES AT ONCE, SPEEDING GENETIC STUDIES

STANFORD — Stanford researchers are using two new techniques in which silicon chips allow them to gather clues about the functions of thousands of different genes all at once.

The techniques will enable researchers to dramatically speed the pace of genetic discovery by making efficient use of valuable, newly available data — the sequences of thousands of genes in several well-studied organisms, said Daniel Shoemaker, a biochemistry graduate student at Stanford University School of Medicine.

Both techniques use thumbnail-size silicon chips carrying DNA fragments arranged in a neat array. Researchers created the chips by joining two powerful technologies: photolithography methods routinely used in the semiconductor industry to layer microscopic structures on silicon chips; and standard DNA-making techniques perfected by genetic researchers.

"We now know a great deal about the genetic sequences of many important organisms," said Stanford professor of biochemistry Ronald Davis, Shoemaker's academic adviser. "We have the blueprints for building a lot of the proteins that make the organisms run. But we don't know what these thousands of individual genes do, or how the proteins they make work together. That's what we have to figure out now — and that's what these chips can help us do."

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"One way to speed things up is to analyze clues about the genes' functions in parallel, thousands at a time," Shoemaker said.

Shoemaker, lead author of a December *Nature Genetics* paper demonstrating the potential of one of these chip-based techniques, will give the details Friday, Feb. 14, at the annual meeting of the American Association for the Advancement of Science, in Seattle. He'll speak at the morning session, "Technologies for a Comprehensive Biology in the Post-Genome Era" (9:30 a.m. to 12:30 p.m.).

One technique he plans to discuss uses a chip developed by Affymetrix, a biotechnology company in Santa Clara, Calif. The chip allows researchers to figure out which genes are important for survival under particular environmental conditions or at a given moment in an organism's life.

Another technique, developed in the Stanford laboratory of Dr. Patrick O. Brown, tells researchers which of the thousands of genes present in a cell are switched on at any given time. Brown is a Howard Hughes Medical Institute assistant investigator at the Stanford University School of Medicine.

Both of these chip-based technologies will markedly increase the pace and reduce the cost of several important pursuits, including disease diagnosis, basic biological research and the search for new drugs to fight infections, Davis said.

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