CELEBRATING STANFORD INVENTORS

OFFICE OF TECHNOLOGY LICENSING | ANNUAL REPORT 2003-2004

OTL AT A GLANCE

AVERAGE AGE
39

AVERAGE YEARS AT OTL
7

CUMULATIVE EXPERIENCE
278.5 YEARS

NUMBER OF EMPLOYEES
25

CELEBRATING STANFORD INVENTORS

Swedish inventor Alfred Nobel once wrote: "If I come up with 300 ideas in a year, and only one of them is useful, I am content."

Even then, turning a useful idea into a tangible product can be a long and arduous process. Our mission at the Office of Technology Licensing is to transfer Stanford technology for society's benefit and to generate royalty income to support research and education. Our success depends on the researchers whose passion for their work drives the entire machinery of invention.

Last year, we hosted a celebration recognizing the twenty-seven inventors who have disclosed at least seven inventions that, in the aggregate, have generated more than $500,000 in royalties. By contrast to inventors who may be recognized for a single major invention, these prolific inventors have invented multiple technologies that have been successfully transferred to industry. In these pages we recognize the creativity of these inventors, and thank them for helping us to carry out our mission.

"I'm someone who dreams about making revolutionary changes in the world through science."

Richard Zare describes himself as a frustrated inventor. "I'm a person with all types of ideas and enthusiasms, most of which don't work. But that's the nature of discovery and research," he concedes.

Yet with 83 invention disclosures received at OTL, Professor Zare can claim approximately three invention disclosures a year since his arrival at Stanford in 1977. That's hardly the stuff of failure. Still, he insists, it always comes as a surprise when something works.

An invention that has proven to work perfectly is laser-induced fluorescence detection. Professor Zare first became interested in lasers as a graduate student at UC Berkeley. "People said the laser was a solution in search of a problem," he recalls. But he was keenly interested in the action of light, and he thought if he could use lasers to bring molecules from their unexcited ground state to an excited state, they would fluoresce, revealing their structure. This would also offer a way, he thought, to separate and detect the molecules in a mixture.

His patent for the laser-induced fluorescence detection was licensed by Beckman Coulter, which sponsored the research program and has used the invention in its commercial electrophoresis instruments for more than a decade.

Another of Professor Zare's inventions that allows for extraordinarily sensitive sampling of materials is a means of detection called "cavity ring-down." By placing a sample between two mirrors, he explains, you can create an optical cavity that causes light to bounce back and forth, which amplifies the presence of whatever absorbs in the sample. Using a pulse of light, scientists can observe the rate at which the light inside the optical cavity dies away or "rings down," providing a way to precisely measure the concentration of the components in the sample.

Licensed to Picarro, a company Professor Zare and one of his graduate students started for the purpose of commercializing this invention, this tool could have almost unlimited uses, from health care to agriculture to bioterrorism. Using a simple breath test, for example, we might be able to detect whether a person has a cold or the flu – even before the symptoms are evident. "In the confined quarters of a submarine or a ship, say, it could matter a great deal to know whether someone is going to become sick. I'm someone who dreams about making revolutionary changes in the world through science," he reflects.

Richard Zare is the Marguerite Blake Wilbur Professor in Natural Science with an appointment in the Department of Chemistry and a courtesy appointment in the Department of Physics.

RICHARD ZARE | Income-producing inventions: 13 | Field: Laser chemistry

OUR MOST PROLIFIC INVENTORS

SHINYA AKAMINE
Electrical Engineering
Income-producing inventions: 7
Field: Atomic force microscopy

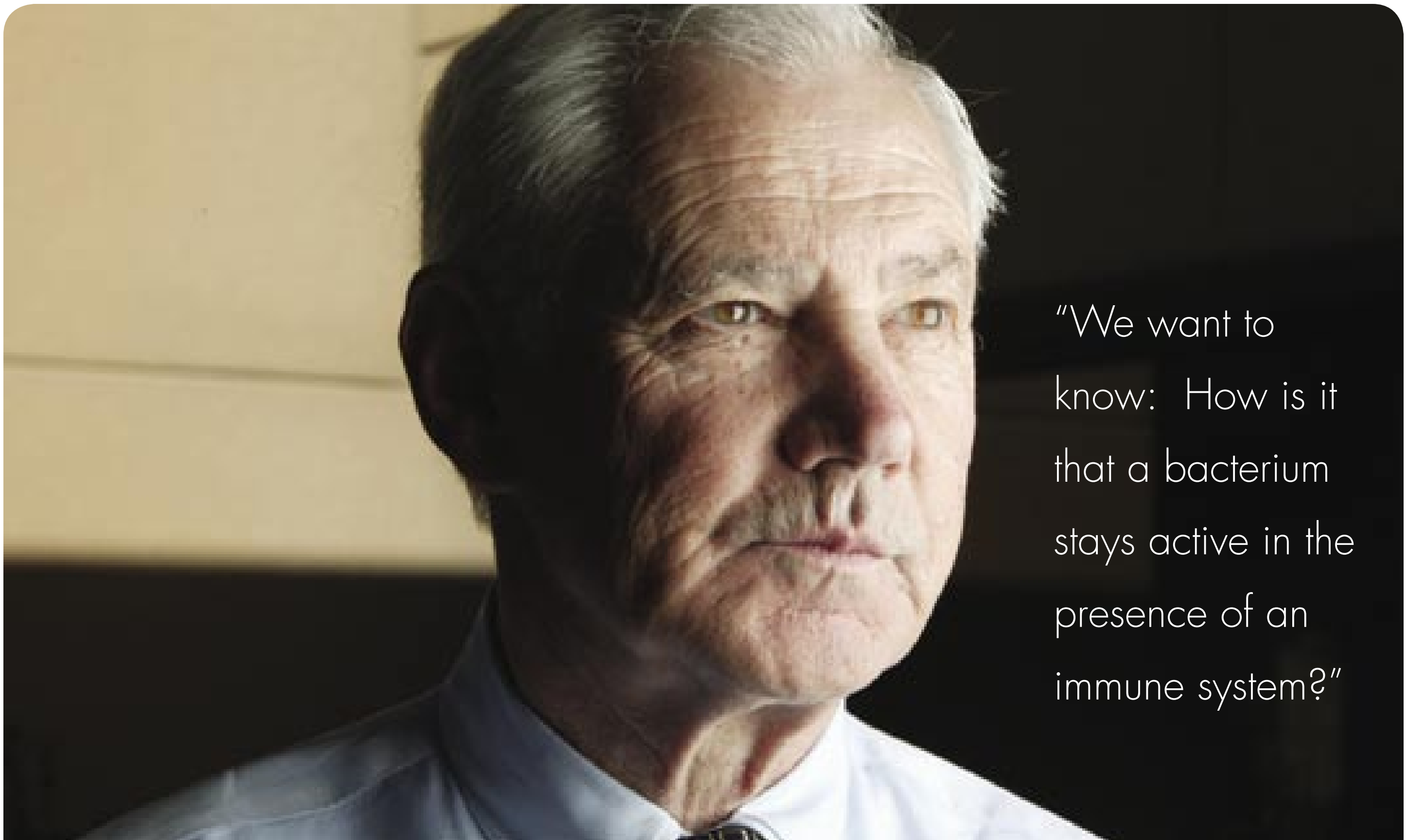
RALPH BERGH
Applied Physics
Income-producing inventions: 8
Field: Fiber optics

DAVID M. BLOOM
Electrical Engineering
Income-producing inventions: 8
Field: High-speed electronics and micro-electromechanical systems

EUGENE BUTCHER
Pathology
Income-producing inventions: 16
Field: Biological research materials

JOHN M. CIOFFI
Electrical Engineering
Income-producing inventions: 15
Field: Communications

STEVEN M. CONOLLY
Electrical Engineering
Income-producing inventions: 13
Field: Medical imaging



STANLEY FALKOW | Income-producing inventions: 8 | Field: Bio research tools and vaccines

Stanley Falkow wants to unravel the mysteries of *Helicobacter pylori*, a tenacious little microbe that has a habit of causing ulcers and, in some people, deadly gastric cancer.

While scientists once thought that nothing could survive the harsh environment of the stomach, it turns out that *Helicobacter pylori* is the exception. In fact, it lives quite happily in the thick layer of mucus that protects the stomach itself from a bath of gastric juices.

Since gastric cancer is the third most common cancer worldwide – and the second most common cause of cancer death – understanding its causes isn't simply an academic exercise. Here's the real mystery, Professor Falkow points out: In regions of the world with poor sanitation, almost everyone is infected with *Helicobacter pylori*. While many people can live with it, one in five people will get gastric ulcers. And one in 100 will get gastric cancer, though it can take twenty years or more to develop.

"So we're trying to learn how this cancer develops and why. It turns out that not all *Helicobacter* cause cancer or even ulcers. But we've learned that those that do cause disease have an extra gene that synthesizes a protein called CagA." *Helicobacter* injects CagA into cells, and in some people it leads to illness.

To track these events in the cell, Professor Falkow and his team are using one of their earlier discoveries – green fluorescent proteins, or GFPs, which are proteins naturally occurring in jellyfish that emit a bright green light. When they first began studying GFPs, Professor Falkow recalls, their luminescent properties were already known. But it was his group's modifications of the protein that made it a much more useful tool, and turned out to be patentable. Today GFPs are widely licensed and used by scientists around the world to peer into cells and track their inner workings.

"We want to know: How is it that a bacterium stays active in the presence of an immune system? It turns out that the organism knows how to press the right molecular buttons to manipulate the immune system. If we can learn more about those buttons, the answers will have important implications for human health."

Stanley Falkow is the Robert W. and Vivian K. Cahill Professor in Cancer Research and Professor of Microbiology and Immunology.

"We've learned how to make our lasers as low noise as possible," he explains, "which allows us to make very difficult, very precise measurements."

ROBERT BYER | Income-producing inventions: 23 | Field: Lasers and nonlinear optics

Bob Byer is using a laser he invented to detect gravitational waves in the universe.

"We've learned how to make our lasers as low noise as possible," he explains, "which allows us to make very difficult, very precise measurements." And while his research is motivated by fundamental questions, it often turns out to have wide-ranging applications.

"I received a call from a friend at a large corporation one day," he recalls. "Their lasers were too noisy for the measurements they required, and he wondered whether we could help. He was impressed by our demonstration, so we loaned them an optical component from our lab that, when attached to the end of a laser, reduced the noise by an order of magnitude."

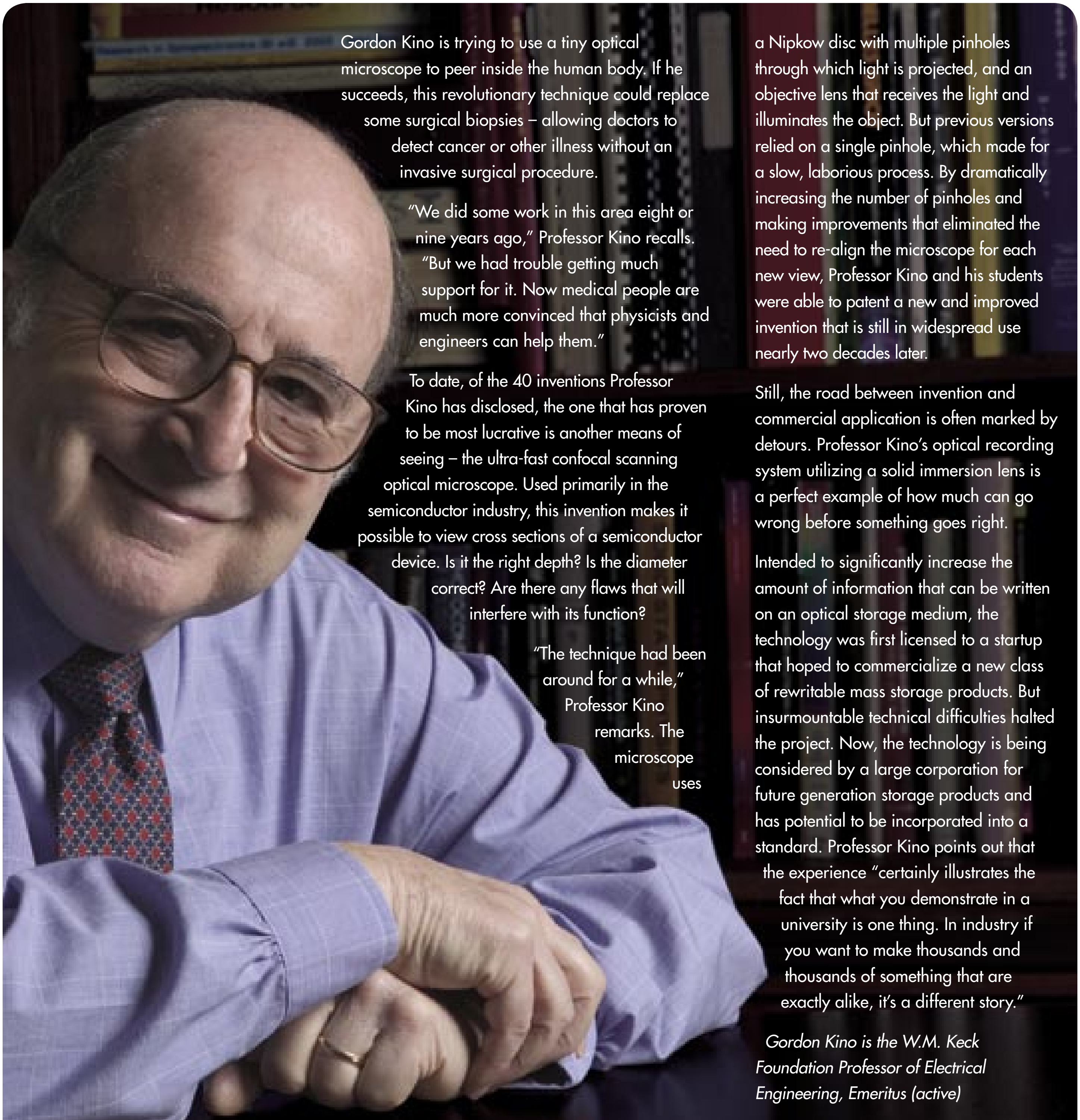
The application? Measuring the composite panels on a military joint strike fighter aircraft wing to make sure they are not delaminated or fractured. The laser that was being used was so noisy it masked the sound waves needed to observe the defects in the panels.

"We invented this laser to allow us to do fundamental research. Yet when applied to the production line of the joint strike fighter aircraft, it allowed very precise measurements and doubled the production rate, saving $250 million over the production run of the aircraft. The National Science Foundation was thrilled that fundamental research made a significant contribution in the real world," he says.

As Professor Byer surveys his other 40-plus inventions, he notes that he would never have guessed that the most lucrative invention to come out of his lab would be the "diode end pumped laser and harmonic generator." A way of improving the efficiency and changing the output color of a laser, it uses a semiconductor to "pump" the laser and a nonlinear element to generate visible light.

From laser light shows to semiconductor manufacturing and more, Professor Byer's laser and non-linear optical material inventions have found an enormous variety of applications. Now, a laser he invented 20 years ago is slated to be part of LISA – Laser in Space Antenna – when it launches in 2012 on a mission designed to measure the gravitational waves of massive black holes in the universe. What will the next discovery lead to? "I don't know," he says. "That's the fun part."

Robert Byer is the William R. Kenan, Jr. Professor and Professor of Applied Physics.



Gordon Kino is trying to use a tiny optical microscope to peer inside the human body. If he succeeds, this revolutionary technique could replace some surgical biopsies – allowing doctors to detect cancer or other illness without an invasive surgical procedure.

"We did some work in this area eight or nine years ago," Professor Kino recalls. "But we had trouble getting much support for it. Now medical people are much more convinced that physicists and engineers can help them."

To date, of the 40 inventions Professor Kino has disclosed, the one that has proven to be most lucrative is another means of seeing – the ultra-fast confocal scanning optical microscope. Used primarily in the semiconductor industry, this invention makes it possible to view cross sections of a semiconductor device. Is it the right depth? Is the diameter correct? Are there any flaws that will interfere with its function?

"The technique had been around for a while," Professor Kino remarks. The microscope uses a Nipkow disc with multiple pinholes through which light is projected, and an objective lens that receives the light and illuminates the object. But previous versions relied on a single pinhole, which made for a slow, laborious process. By dramatically increasing the number of pinholes and making improvements that eliminated the need to re-align the microscope for each new view, Professor Kino and his students were able to patent a new and improved invention that is still in widespread use nearly two decades later.

Still, the road between invention and commercial application is often marked by detours. Professor Kino's optical recording system utilizing a solid immersion lens is a perfect example of how much can go wrong before something goes right.

Intended to significantly increase the amount of information that can be written on an optical storage medium, the technology was first licensed to a startup that hoped to commercialize a new class of rewritable mass storage products. But insurmountable technical difficulties halted the project. Now, the technology is being considered by a large corporation for future generation storage products and has potential to be incorporated into a standard. Professor Kino points out that the experience "certainly illustrates the fact that what you demonstrate in a university is one thing. In industry if you want to make thousands and thousands of something that are exactly alike, it's a different story."

Gordon Kino is the W.M. Keck Foundation Professor of Electrical Engineering, Emeritus (active)

GORDON KINO | Income-producing inventions: 11 | Field: Optical microscopy

GERALD R. CRABTREE
Pathology
Income-producing inventions: 7
Field: Biological research tools

MARK DAVIS
Microbiology & Immunology
Income-producing inventions: 7
Field: T-cell assay

RON W. DAVIS
Biochemistry
Income-producing inventions: 10
Field: Biological research tools

MICHEL DIGONNET
Applied Physics
Income-producing inventions: 16
Field: Fiber optics

EDGAR G. ENGLEMAN
Pathology and Medicine
Income-producing inventions: 13
Field: Biological research tools and therapeutics

MARTIN FEJER
Applied Physics
Income-producing inventions: 15
Field: Nonlinear optics

BUTRUS KHURI-YAKUB
Electrical Engineering
Income-producing inventions: 14
Field: Acoustic transducers

ALAN M. KRENSKY
Pediatrics
Income-producing inventions: 9
Field: Biological research materials and therapeutic components

"We'd like to define what types of cells might give rise to recurrence."

Leonard Herzenberg is searching for breast cancer cells in the blood using a tool invented in his laboratory nearly forty years ago.

"We know they're there," he confirms. Together with his team, he is looking for subsets of the cancer cells, possibly stem cells, whose presence correlates with recurring breast cancers. "After the primary tumor is removed, recurrence is a major problem," he points out. "So we'd like to define what types of cells might give rise to recurrence."

The tool he is using is the Fluorescence-activated Cell Sorter, or FACS, a technology that allows scientists to quickly characterize, count, and sort thousands of individual cells per second. In the 1960s, Professor Herzenberg and his team were interested in the role of lymphocytes and other blood cells in the immune response, and in the genetics and biology of lymphomas and leukemias. They needed a way to isolate certain lymphocytes, which differ from other lymphocytes in very subtle ways.

Working with their engineering colleagues in the Genetics Department, they designed a prototype model of the FACS, which separates cells according to fluorescent-tagged antibodies that mark each cell type.

Commercially produced by Becton Dickinson and later by other companies, the FACS is now used around the world in a variety of applications ranging from cancer detection, to treatments for autoimmune and infectious diseases, to stem cell research. Its first major clinical application was counting the number of T-cells in patients with AIDS, which allowed physicians to monitor the progression of the illness in their patients.

Working with Dr. Vernon Oi and Professor Sherie Morrison, Professor Herzenberg also used the FACS for a later invention: a process for generating functional antibodies. This process, invented in the early 1980s, is currently OTL's highest royalty producer.

Today, functional antibody products and other chimeric antibodies are used to treat a wide variety of diseases, including Remicade™ (from Johnson & Johnson) for rheumatoid arthritis and Crohn's Disease, and Synagis for respiratory syncytial virus – a major cause of respiratory illness in young children. And, giving new hope to people with multiple sclerosis, the FDA has just approved a new chimeric antibody drug for the disease: Tysabri™ from Biogen-Idec and Elan.

Leonard Herzenberg is Professor of Genetics, Emeritus (active).

LEONARD HERZENBERG | Income-producing inventions: 13 | Field: Therapeutics and bio research tools

RONALD LEVY
Medicine
Income-producing inventions: 10
Field: Biological research tools and immunotherapy

ALBERT MACOVSKI
Electrical Engineering
Income-producing inventions: 16
Field: Medical imaging

GARRY P. NOLAN
Microbiology & Immunology
Income-producing inventions: 11
Field: Biological research materials and platforms

JOHN M. PAULY
Electrical Engineering
Income-producing inventions: 34
Field: Medical imaging

CALVIN F. QUATE
Electrical Engineering and Applied Physics
Income-producing inventions: 13
Field: Acoustic microscope and atomic force microscopy

H. JOHN SHAW
Applied Physics
Income-producing inventions: 45
Field: Fiber optics

LAWRENCE STEINMAN
Neurology
Income-producing inventions: 14
Field: Autoimmune diseases

IRVING L. WEISSMAN
Pathology
Income-producing inventions: 18
Field: Biological research materials

YEAR IN REVIEW: PAST SUCCESSES AND NEW EFFORTS

SERVING OUR INVENTORS

One of our biggest challenges in OTL is to keep inventors informed about the status of their inventions. Toward this end, we introduced the "Inventor Portal" this year, which allows every inventor to go to a secure Web site and review the status of his or her inventions, information about the licensing activity (if they have been licensed), the gross royalty income per docket per year, and his or her personal royalty distribution. Inventors have been very pleased with the Web site, which is the first example of the new "customer relationship management" system we are implementing.

WITH A LITTLE HELP FROM OUR FRIENDS AT THE GSB

As we have in the past with great success, we are working with the Graduate School of Business Alumni Consulting Team (ACT) to improve our operations. This year, two teams have volunteered to work on two different projects, with GSB alumni Dave Plough and Marc Canabou leading the effort. We have asked the ACT to make recommendations on: 1) how to improve the efficacy and efficiency of our marketing efforts and 2) a business strategy to consider the expansion of the Stanford OTL-LLC, the division of the office that works with non-Stanford entities.

With respect to the first project, Stanford's view is that technology licensing involves finding the theoretical "best" licensee that will be committed to developing an invention. We market all inventions broadly to ensure fair access and wide dissemination. Even in the case of inventors who wish to start companies, Stanford believes that marketing helps to mitigate conflict-of-interest issues and the perception of pipelining if interested potential licensees have the opportunity to express interest in a license. Lastly, marketing helps us to assess the commercial interest for an invention. With around 350 inventions a year, however, marketing efforts take significant time and resources so we are seeking to find better ways to disseminate the right information to the right people. GSB alumni who are working on this project are: Aydin Koc, Kathryn Bowsher, Pam Versaw, Patti Fry, Roy Vella, and Tony Seba.

The second project involves the OTL-LLC, which was incorporated September 1, 2002. Although the LLC has relationships with several entities, we hope that the ACT will make some recommendations about additional market opportunities. Alternatively, the ACT may find that the market for technology transfer assistance is too small to grow and will recommend that we essentially keep the LLC as is. GSB alumni working on this project are: Andres Wydler, David Ai, Jerry Huang, James Canizales, Nancy Spangler, Skip Fleshman, and Yvonne Nomizu.

The ACT will issue its formal reports in 2005.

SHARING OUR SUCCESS

Because of our relative success and longevity, technology transfer professionals from all over the world are interested in "how OTL works." In order to provide practical information to new technology transfer organizations, the OTL-LLC produced a DVD, "Inside Stanford's Office of Technology Licensing," available for sale on the Web. The DVD provides information on how we market OTL internally and externally, a discussion of how the paper flows in the office, two hours' discussion about various inventions and how we think about licensing them, standard documents to enable an office to start its own licensing program, and more. Because we have a vested interest in helping our colleagues at other universities become as knowledgeable as possible, we are exploring the possibility of offering in-depth training courses in 2005 to colleagues new to the field.

CUMULATIVE AMOUNT GIVEN TO OTL RESEARCH INCENTIVE FUND

$35,615,000

It is a challenge to educate inventors about patent law and other aspects of licensing. In April and May, we hosted two seminars entitled "Who is an Inventor" – one aimed at medical/life sciences inventors and one tailored for high-tech/ engineering inventors. The seminars were videotaped and are available on our Web site.

THE BENEFITS OF AN AUDIT

One of the best practices for any licensing office is to audit licensees occasionally. We have therefore implemented a practice of auditing several licensees each year. An audit often enables an important dialogue between licensor and licensee – ensuring there is a clear understanding of the interpretation of the agreement language and a careful accounting of the products covered by a license.

INVENTION UPDATE

Functional Antibodies

"Functional Antibodies" is this year's biggest royalty generator. This 1984 invention, a process for making functional antibodies, covers such antibody products as:

- Remicade for the treatment of Crohn's Disease and rheumatoid arthritis
- Reopro, an anti-clotting agent
- Synagis, a drug for the treatment of respiratory syncytial virus (a major case of respiratory illness in young children).

Professor Sherie Morrison, formerly of Columbia University, and Professor Leonard Herzenberg and Dr. Vernon Oi of Stanford are joint inventors.

As with many significant and complex cases, this patent has been the subject of litigation. Stanford and Columbia University, and exclusive licensee Centocor/Johnson & Johnson, were sued by MedImmune Inc. in the District Court of Maryland. MedImmune, a sublicensee under the Functional Antibody patents, used the District Court action to try to invalidate the patents and obtain a decision of non-infringement. Following a precedent-making decision by the Federal Circuit Court on another case, this District Court action was dismissed due to lack of subject matter jurisdiction. MedImmune is currently appealing the dismissal to the Federal Circuit.

Expiring patents

The patents for several of our biggest income producers of this year have all expired.

- "Amplification of Eucaryotic Genes," invented by Dr. Gordon Ringold, has been generating steady royalties for the last several years from many nonexclusive licensees. The first and broadest patent has expired, so licensees are only paying on inventory made during the patent life but sold after the patent expired. This invention will have produced $21M in cumulative royalties.

- The "Fluorescent Conjugates" patents, licensed nonexclusively, have expired – the last one in April 2003. As with several of our big inventions, the discovery was a result of a collaboration – in this case between Stanford researchers Professor Lubert Stryer and Dr. Vernon Oi, and Professor Alex Glazer of the University of California, Berkeley. We do not expect any more royalties except for possible inventory payments. This invention will have produced $49M in cumulative royalties.

- The Fiber Optic Amplifier, invented by Professor H. John Shaw and Dr. Michel Digonnet and licensed by Northrop Grumman, is at the end of its patent life. One U.S. patent expired in 2003, another will expire in 2005, and their foreign counterparts expired in November 2004. This invention will have produced more than $29M in cumulative royalties.

- The "Continuous Cardiac Output Monitor," invented by former Stanford researcher Mark Yelderman, is licensed to Baxter, which continues to sell products for emergency units. The U.S. patent has expired. This invention will have produced over $5.5M in cumulative royalties.

INVENTORS **$11.8M**
DEPARTMENTS **$12.7M**
SCHOOLS **$12.5M**

Up and Coming Inventions

Google is our best-known licensee and, with much fanfare, had its initial public offering in August. We expect significant returns on the equity that was partial consideration for the license. Google acquired another Stanford licensee, Kaltix, which resulted in additional Google equity to Stanford.

"Selective Amplification of Polynucleotide Sequences" is the newest invention to generate over $1M in royalties. The technology – an alternative to Polymerase Chain Reaction – was invented in 1987 by Professor John Boothroyd, Dr. Philippe Pouletty, and Dr. J. Lawrence Burg and is now being used in several diagnostic tests. The technology is licensed by Gen-Probe and Biomerieux.

FACTS AND FIGURES

In spite of the economic turndown, OTL received gross royalties of $49.5M. More significantly, Stanford retained $47M of gross royalties. We distributed $2.2M to other organizations for their share of royalties. Of the 436 technologies that generated income, 44 generated $100,000 or more each, and of those 44, six produced $1M or more each.

ROYALTY DISTRIBUTION

Stanford's royalty-sharing policy provides for the distribution of cash net royalties (gross royalties less 15% for OTL's administrative expenses, minus direct expenses) to inventors, their departments, and their schools. In FY03-04, inventors received personal income of $11.8M, departments received $12.7M, and schools received $12.5M*.

We contributed $2.3M to the OTL Research Incentive Fund, which is administered by the Dean of Research for the support of early-stage, innovative research ideas. In addition, we contributed $573,000 to the OTL Research and Graduate Fellowship Fund; this $573,000 was a portion of the liquidated equity. Stanford also paid the University of California and other organizations $2.2M for jointly-owned technologies for which Stanford has licensing responsibility.

* While net royalties are divided evenly between the inventor, the inventor's department, and the inventor's school, some inventors designate a portion of their royalty income to their laboratories, hence the discrepancy in income.

FY03–04 ROYALTY PAYMENTS TO STANFORD SCHOOLS	
School of Medicine	$10,312,715
School of Humanities and Sciences	$1,058,509
School of Engineering	$655,421
Vice Provost for Student Affairs	$211,543
DAPER (Athletics)	$141,028
Dean of Research	$110,124
School of Earth Sciences	$2,042

EXPENSES

We spent $6M on legal expenses, of which $2.4M was reimbursed by licensees. We have an inventory of $6M, which represents patent expenses for unlicensed inventions. Our operating budget for the year (excluding patent expenses) was $3.2M.

NEW LICENSES

The economy clearly is affecting our ability to license technology. In FY03-04, we concluded 89 new license agreements totaling $1.2M in up-front license fees. We received equity from 9 start-up companies. The average upfront royalty was more than $14,000. Fifty-three of our 89 licenses were nonexclusive; five of these nonexclusive licenses were "ready-to-sign" agreements (i.e., downloadable from the OTL Web site, set price and no negotiation).

EQUITY

As of August 31, 2004, Stanford held equity in 85 companies as a result of license agreements. The market for initial public offerings was dismal this year and share prices were down. For institutional conflict-of-interest reasons and insider trading concerns, the Stanford Management Company sells our public equities as soon as Stanford is allowed to liquidate rather than holding equity to maximize return. This year, we received $725,534 in liquidated equity from nine companies.

CUMULATIVE INCOME

$643,615,000

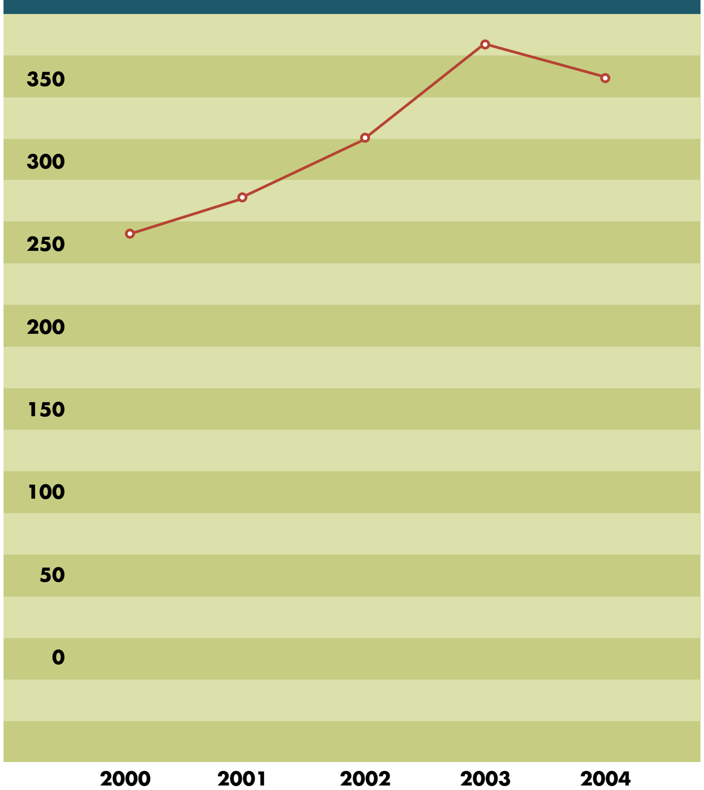
START-UPS

While Stanford entrepreneurs are still starting companies, the economy clearly has negatively affected the Silicon Valley entrepreneurial ecosystem. Venture capital investments dropped dramatically and investors are becoming more stringent. Yet licenses to nine start-up companies involved equity: Brion Technologies, General MEMS, Lumen Therapeutics, Lyncean Technologies, Optimedica, PharmacoFore, Rox Medical, Spinal Kinetics, StemCor.

NEW DISCLOSURES

In calendar year 2004, we received 350 new technology disclosures. Approximately 48% were in the life sciences and 52% were in the physical sciences, including computer science technologies. Our work with the Stanford Biodesign Network's Biomedical Technology Innovation Program class generated 14 disclosures from students as part of their coursework.

5-YEAR HISTORY OF DISCLOSURES



STANFORD TRADEMARK ENFORCEMENT FUND

The Chief Financial Officer and General Counsel of Stanford recommended that Stanford provide a permanent source of funding for extraordinary cases associated with the protection of the Stanford name and associated logos and trademarks. Based on their recommendation, the President and Provost approved the creation of the Stanford Trademark Enforcement Fund (STEF). Initial funding for the STEF comes from 1% of the department and school shares of net revenue OTL receives. For FY03-04, we transferred $255,314 to STEF.

BIRDSEED FUND

The OTL Birdseed Fund, administered by the Dean of Research, has provided small amounts of money (typically up to $25,000) to fund prototype development or modest reduction-to-practice experiments for unlicensed technologies. This year, the Birdseed Fund funded six new projects, for a total of 39 projects funded to date. The rate of licensing of Birdseed funded inventions is about the same as unfunded inventions (20-30%) but without this funding, many of these inventions would likely have remained unlicensed.

RESEARCH INCENTIVE FUND

In the past seven years, the Dean of Research has used the OTL research incentive funds to fund over 140 seed research projects in all parts of the University. Primarily for assistant professors, research grants of $20,000 to $30,000 were used to fund 24 projects, including Professor of Communication Jeremy Bailenson's *Digitally-Mediated Person Recognition*, Professor of Mechanical Engineering J. Christian Gerdes' *A Race-Track Inspired Approach to Self-Stabilized Vehicles*, and Professor of Neurology Christine Wijman's *Selective Cerebral Hypothermia in Acute Stroke*.

CUMULATIVE U.S. PATENTS ISSUED

1,442

INDUSTRIAL CONTRACTS OFFICE

In its seventh year of operation, OTL's Industrial Contracts Office (ICO) negotiated more than 600 sponsored research and other research-related agreements. Of this total, about 400 were material transfer agreements with industry and nonprofit organizations, for incoming and outgoing research materials ranging from heart tissue to optical fiber to reagents.

ICO negotiated agreements with well over 100 different companies in industries ranging from aircraft engines to semiconductors to medical imaging to drug targets. The sponsored research agreements covered studies performed by faculty and student researchers from the Schools of Medicine, Engineering, Humanities and Sciences, Education, Earth Sciences and the Independent Laboratories. Each agreement describes the research project, and sets forth the conditions for funding and publication, as well as ownership of, and licensing rights to, intellectual property that may result from the research.

Among these agreements, ICO negotiated several with pharmaceutical and medical imaging companies sponsoring research at Stanford's Molecular Imaging Program headed by Director Sanjiv (Sam) Gambhir. Based in the Clark Building, Professor Gambhir and his group are developing imaging assays to monitor fundamental cellular events in living subjects for new ways to diagnose disease and monitor patient therapies. Professor Gambhir is investigating molecular/cell biology and bio/medical imaging through micro positron emission tomography (microPET), bioluminescence optical imaging with a charge coupled-device (CCD) camera, fluorescence optical imaging, and micro-computerized axial tomography (microCAT) in small animal models.

Under a School of Medicine sponsored research project, researchers in Stanford's pulmonary and critical care medicine divisions are collaborating with researchers at Predicant Biosciences, Inc. to identify serum molecular patterns that can be used to diagnose lung cancer and lung cancer sub-types. In a project sponsored by a new research group within Novartis, Inc., Professor Helen Blau is using mice as "incubators" to study stem cells' ability to change from one type of cell into another.

In the School of Humanities and Sciences, EPOCH Labs Inc. is sponsoring a research project by Psychology Professor John Gabrieli. Professor Gabrieli's research is designed to measure the efficacy of a program to remediate reading problems among dyslexic youth.

During the year, ICO and the Boeing Company negotiated a five-year "master" research agreement to fund a variety of research projects in aviation, space, defense and communication in the School of Engineering and elsewhere at Stanford. Boeing is currently funding 11 research projects at Stanford.

In another research program initiated last year, Kenneth Goodson's laboratory in Mechanical Engineering began researching microchannel transport in proton exchange membrane fuel cells. Honda Research Institute is funding this research in fuel cells, which offer promising technology for power generation because of their efficiency, low emissions, and low noise output.

For information on Stanford's policies on intellectual property and industry-sponsored research, please visit www.stanford.edu/group/ICO

JUST SOME OF THE NEW INVENTIONS FOR 2004

A Variable Diameter Circular X-ray Collimator

Catheter-based Expandable Ball-Cage Valve

Ligands of the Human TIM Family

Germanium-Silicon Electroabsorption Modulator

Solid-State Thin Film Fuel Cell

Feeder Layer and Serum Independent Embryonic Stem Cells

Image Transform Video for Coding

Nanowires Cast from the Microtubule Lumen

Optimization of the Therapy and Real-time Dosimetry for Retinal Laser Treatment

Methods for Imaging Drug Treatment Efficacy with Fluorescent Glucose Analogs

Open Source Learning Management System

Microspine Wall-climbing Robot

QBTI Recombinase for Genome Modification

Device for Surgical Airway Access

Lung Nodule Registration

Small Animal Ultrasound Platform

Lipophilic DNA Conjugate for Facile Modification of Membranes

Human Plasma Membrane Receptome - HPMR

Re-condensation Bonding for Micro-structured Multi Layer Fabrication

A Diagnostic to Predict Good Prognosis for Patients with Non Small Cell Lung Cancer

On-Column Metal Coating

High Frequency F-bar Filters and Resonators

Polyfluorinated Nucleotide Analogs

Drop Charging Plates for the Fluorescence-activated Cell Sorter

Matrix Lens System

Improving Natural Language Understanding

Far Field Array Microphone for Human Computer Interaction

e-School Technology

Insulin Sensitizing Agents in the Treatment of Disorders of Mood and Cognition

Genomic Nomenclature Management Software

Method for DNA Transformation

Organization Design Optimization Using Genetic Programming

3D Motion by Estimating 2D Tracking

Optical Traveling Wave Analog-to-Digital Converter

Expression system for Wnt proteins

Full Body Bicycle

Scatter Measurement in Volumetric CT

Distance Ranging using Ultrasonic Transmitter-Receiver Feedback Loop

Regulatory T Cells

Parameterization of In-car Dialog Systems

Treating Disorders of the Spine

Genes for Biopolar Disorder (BPD) or Major Depressive Disorder (MDD)

Transgenic Mouse with HSV-TK Gene

Protein Conjugation with Gold Clusters

Automated Electron Microscopy Freezing Robot

Tumor Specific Antibodies of the Epsilon Isotype

Low Leakage Electromagnet Field Boosting Acceleration Module for MRI

Use of Chaperone Mimetics to Reduce Stroke and Neurodegenerative Disease

PKC in Heart Transplantation

Artificial Facet Joint

Artificial Cornea

High Speed Videography

Fabrication of Thin-Film Solid Oxide Fuel Cells

Cathepsin Inhibitors

Image-based Display of Microarray Data

Utilizing Exhaust Gas Recirculation

Managed Low Temperature Oxidation Kinetics

Structure-Function Relationship of Metal Nanoparticles

BookBox- a "Book" for every Child in Every Language

DNA Sequencing Decoding Algorithms

Inhibiting Activation of NK T Cells

Cancer-Specific Therapy Using Oncogenic Signalling Pathways

Dual-Axis Confocal Microscope

Inducers of Suppressor Tumor and Cell-growth Arrest Genes

Muscle Progenitor Cells

Design and Optimization of Configurable Analog and Radio Frequency Circuits

Gluten Detoxification

Representational Fragment Amplification (RFA)

Microring and Microdisk Resonators

Expression in Adult Mesenchymal Stem Cells

Analysis of Quantitative PCR

Micro Propulsion and Control System for Small Vehicles

Miniature Wireless Stereo Vision System

Polycarbonate Membrane as a Support for Cells

Hereditary Hypertrophic Cardiomyopathy APEX Mutation Detection Assay

New Atherosclerosis Targets for Novel Diagnostics and Therapeutics

Improved Delivery of Right Atrial and Left Ventricular Pacing Leads

Method of Monitoring Latent Virus Activity

Micromachined Slow Wave Resonator with Capacitive Cross Ties

Minimizing Shocks in Implantable Defibrillators

Therapeutic Uses of Allogeneic Myeloid Progenitors Cells

Stem Cell Activation in Tissue Regeneration

Regulation of Hepatitis C

Therapy for Glaucoma

Calibration of Antibody Binding Capacity

Defining Oncogenes as Therapeutic Targets

Non-invasive Phototherapy of Blood in Circulation

Endovascular Treatment of Wide Neck Cerebral Aneurysms

Suppressing Gene Expression to Reveal Down Syndrome and Alzheimer's Disease

LifeCuff

Device for Emergent Internal Jugular Vein Catheterization

Transgastric Endoscopy Device

Bronchoscopic Anesthesia Device

Combination Carotid Artery Stenting With Embolic Protection

Alignment of Nanotubes

Target for Asthma Therapy

CVD of Arrayed Nanostructure

Device to Reduce Intracranial Pressure

Drug Delivery to the Spinal Epidural Space

Devices to Prevent Aspiration Pneumonia

Markers for Improved Prognostication in Prostate Cancer

Minimally Invasive Lumbar Fusion Device

Session State Storage Layer

Enhancement of Cell Survival Following Cell Transplantation

Multimodality Imaging

Silicon Compatible Monolithically Integrated Light Intensity Modulator

Engineered Tissue for Organ Restoration

Synthetic Aperture Confocal Imaging

Optimization of Image Sensor Pixels

Prosthetic Intervertebral Disc

Serum Test for Detection of Early Breast Cancer

Optimal Sampling Pattern Determination

Positive Contrast MRI

Servers For E-mail Traceability

Ultrasound Intraoperative Imaging System for Ultrasound-Guided Surgery

X-ray Compatible RF-Coil for MR Imaging

Optically-activated Microfluidic Chip

Neural Stimulation Array

New Pharmacological Targets & Diagnostic Markers in Heart Failure

Intraoperative Targeting System

Left Atrial Pressure Reduction

Design and editorial services: Artefact Design, Menlo Park
Cover photograph: Art Streiber
Interior photography: Steve Gladfelder, Stanford Visual Art Services
Printing: Paris Printing, Point Richmond

OFFICE OF TECHNOLOGY LICENSING
STANFORD UNIVERSITY
1705 EL CAMINO REAL
PALO ALTO, CA 94306-1106
650.723.0651
HTTP://OTL.STANFORD.EDU