THE Stowers REPORT

NEWS AND INSIGHT FROM THE STOWERS INSTITUTE FOR MEDICAL RESEARCH

Photo: V. Craig Sands

The extended Stowers clan gathered in the Library of the Institute during the Grand Opening. Virginia and Jim Stowers, center, their children and spouses from the left: Jeff Johnson, Linda Stowers Johnson, Michele (holding Layne) and Jim Stowers III, Pamela Stowers (to her father's left), and Kathleen Stowers Giacomelli and husband Robert. In front and behind them, the younger generation.

A Family Gives its Wealth to Science

In one of the largest examples of individual generosity in American history, Jim and Virginia Stowers have given $1.114 billion in stock to the endowment supporting the Stowers Institute for Medical Research. This raises the total size of the endowment to more than $1.6 billion and substantially strengthens the hand of the Institute in recruiting scientists of accomplishment and promise.

The incredible gift was made known a few weeks after the three heady days in spring when the Stowers Institute formally opened the doors of its research facilities in a ribbon-cutting ceremony shared with top elected officials, civic, business and academic leaders from two states.

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Major New Gift Strengthens Institute

Demonstrating in a spectacular way their commitment to foster great scientific research at the Stowers Institute and in the Kansas City area, Jim and Virginia Stowers have made an additional gift to the Institute endowment of $1.114 billion in securities. The gift raises the total value of the endowment to more than $1.6 billion and enhances the ability of the Stowers Institute to attract top-quality researchers.

"The recruiting of scientists by Bill Neaves, our president, and Robb Krumlauf, our scientific director, is going so well that we don't want to run the risk of having to reduce the momentum because of financial constraints," Mr. Stowers said when the new gift was announced publicly on May 10. "This gift will give scientists an added sense of the dedication to our purpose."

"Everything we are doing is focused on the goal of making this Institute the best of its kind within 25 years," he added. "It is the centerpiece of our dream of making the Kansas City area into a 'Biomed Valley' that will lead the world in biomedical research."

Previously, the intention had been that these assets would pass to the Institute's endowment after the deaths of both Mr. and Mrs. Stowers. They decided to make the transfer now to provide added financial stability to the Institute at a critical time in the recruitment of scientists to fill the laboratories of the Institute campus, which was completed last year at a cost of more than $200 million.

American Century Stock

The securities in the latest gift consist of the common stock of American Century Companies, which has grown into one of the country's premier investment management firms since Mr. Stowers founded it as Twentieth Century Investments in 1958. A look at the story of how Mr. Stowers built his company shows that this gift is not only an example of magnificent generosity but also a demonstration of the power of private enterprise to build something great from a dream and a few thousand dollars.

Jim and Virginia Stowers

Displaying the kind of power associated with the acorn, private initiative in this case built wealth and set off exponential growth in directions and areas that could not have been imagined by the young Jim Stowers when he made the rounds of potential investors more than 40 years ago. He talked nine people into adding $5,100 each to the $2,000 that he was prepared to invest to launch a mutual funds business.

Success at first came slowly. Then, growth exploded in the early 1980s following the advent of IRAs and 401K plans, helped along by Jim Stowers' early grasp of the importance of computers in selection of stocks.

As the years passed, the number of people who entrusted their savings to the funds managed by Twentieth Century, which was renamed American Century in 1995, grew to two million, and the combined value of those accounts surpassed $100 billion. Also growing was the value of the closely held company itself. Along the way, a few new investors in the company had come aboard, and Jim Stowers bought out one of the nine startup backers after the man became so frustrated at the slow payoff on his capital that he strode into the office one day and loudly banged his umbrella on the floor.

Investment Payoff

However, the wisdom of the investments in Jim Stowers' little startup venture became abundantly clear in 1998, 40 years after the initial financing, when J. P. Morgan bought a large minority stake in American Century for $900 million. Among those with stock to sell to J. P. Morgan were the early backers of the firm as well as Jim and Virginia Stowers. Although the other backers' stakes were small by comparison to the share of the company held by Jim Stowers, small in

this case meant that each of those 1958 investments had grown to be worth more than $60 million, producing a good-sized crop of new multi-millionaires.

A half-dozen of the original investors had been young physicians back in 1958, and 40 years later they were retired or approaching retirement. One of them used his new-found riches to endow chairs in medicine at Washington University in St. Louis and the University of Missouri. Another made a sizeable gift to the University of Tennessee and gave $1 million to help build a public swimming pool for his small Missouri hometown. At least one helped his adult children launch a business. And one got the last laugh on his ex-wife. After their divorce some years earlier, the principal asset he had managed to retain was the stock in American Century, because her attorney judged it to be of only minimal value.

> *"It is the centerpiece of our dream of making the Kansas City area into a 'Biomed Valley' that will lead the world in biomedical research."*
>
> *– Jim Stowers*

Jim and Virginia Stowers, meanwhile, had a special vision of where the fruit of their work should go. In 1994, they had decided that they wanted to give back something *"more valuable than money"* to the millions of investors in American Century mutual funds who had made their success possible. That year, they established a $50 million endowment as the first step toward creating the Stowers Institute for Medical Research. Strongly believing in the value of work for themselves, their children and grandchildren, Mr. and Mrs. Stowers had decided not to leave the bulk of their estate to their descendants. The experiences that both of them had had in surviving cancer led them toward the idea of using their wealth for biomedical research.

The Morgan purchase of stock in American Century in 1998 enabled them to add nearly $300 million to the endowment for the Institute, and they made a subsequent gift worth more than $200 million at the end of 1999. The most recent gift increased the endowment of the Stowers Institute to $1.628 billion, even after adjusting for declines in the values of securities as the result of the difficult investment climate of the past year. A percentage of the endowment is used each year to cover the operating budget of the Institute.

American Century's headquarters towers in Kansas City, MO

Ranks of Most Generous

This most recent gift easily puts Jim and Virginia Stowers in the ranks of the handful of most generous living Americans. *The Kansas City Star*, in reporting the gift on the front page of the newspaper on May 11, described it as "one of the largest examples of philanthropy in history." The newspaper said the gift "probably ranks among the five largest ever given by individuals to a philanthropic cause in the United States," attributing that information to Stacy Palmer, editor of the *Chronicle of Philanthropy* in Washington, D.C.

And as much as Jim Stowers dislikes the estate tax in principle, the possibility that the tax might be eliminated in the foreseeable future never tempted him and Virginia to stray from their commitment to using their wealth for the benefit of others. He seems to enjoy, of late, describing himself as "a former billionaire."

Ever the capitalist dreamers, Jim and Virginia Stowers have looked for ways to leverage their gift for the benefit of humanity and their community, creating catalysts to bring about cutting edge research that will, in turn, help to

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catalyze further research in the academic and research institutions of the Kansas City metropolitan area and throughout the surrounding states of Kansas and Missouri. These other institutions and government entities are joining in a community-wide effort to improve and expand research and development in the life sciences area. Like Jim and Virginia Stowers, others are learning to dream big.

Indeed, another reason Mr. and Mrs. Stowers decided to turn over the bulk of their fortune to the Institute while they are still alive is because they intend to continue to take an active role in pushing for the impact of the gift to be felt throughout the community and broadly within the field of biomedical research.

Appreciation from Scientists

When many scientists from institutions in the Kansas City area gathered for a half-day symposium on proteomics during the Grand Opening of the Stowers Institute in April, Dr. Billy G. Hudson, chairman of the Department of Biochemistry and Molecular Biology at the University of Kansas Medical Center, explained part of the significance of the Stowers family gift. "You are championing the cause of medical research in Kansas City like it has never been done before," he said. "You're increasing awareness of the importance of research to the citizens of Kansas City, the legislatures and our university administrators about what is required for medical research, what is really required to become prominent in this field."

"I don't know how this community can ever repay these people," commented his colleague, Prof. Robert Palazzo of the Division of Biological Sciences at the University of Kansas-Lawrence. "I would argue that possibly the only repayment we can offer is our own productivity in the future."

Fruits of a Dream

In summary, then, here is what has emerged – so far – from that long-ago dream and a few thousand dollars:

- A thriving company – American Century – valued at several billion dollars.
- Nest eggs, large and small, for about two million individual investors.
- As many as a dozen multi-million-dollar fortunes in the hands of the early backers of Jim Stowers' business idea.
- Endowed teaching chairs in medicine and other gifts to universities, plus donations to other worthy causes and the creation of individual foundations to make continuing gifts.
- The Stowers Institute for Medical Research – a state-of-the-art basic research facility built at a cost of more than $200 million and backed by an endowment of more than $1.6 billion.
- Ambitious plans by Kansas City and the states of Missouri and Kansas to take advantage of the creation of the Stowers Institute by strengthening other research institutions in the area and creating mechanisms for collaboration among them.

Like the dream of 1958 and those first investments, these elements have almost endless potential to give birth to new dreams, setting off growth in more directions than we can imagine, from generating new wealth to ending the terror of the worst diseases. And they certainly put into perspective a comment that Jim Stowers made to one of his original investors back in the startup days: "If we can just get $10 million into this thing we'll have it made."

Photo: V. Craig Sands

In the library of the Stowers Institute, U.S. Sen. Pat Roberts of Kansas and Jim Stowers study the model for the campus that has now become reality.

Winds and Hope Buffet Grand Celebration

Capping three days of Grand Opening events, top elected officials from both Missouri and Kansas joined Jim and Virginia Stowers to cut the ribbon and formally open the Stowers Institute for Medical Research. Fighting strong winds that whipped around the entrance, Kansas City Mayor Kay Barnes snipped a big red ribbon to allow civic, academic and business leaders to walk through the doors of one of the country's most advanced scientific facilities.

> *"This building not only represents the dreams and hard work of two individuals with us tonight. It also represents the future."*
>
> *– Bill Neaves*

Stowers scientists were at their posts in laboratories and other areas throughout the five-story research building to answer questions and demonstrate the technology that promises to take biomedical research to new levels. Donors and special friends of Jim and Virginia Stowers toured on April 17, area scientists visited on April 18, then the formal opening for several hundred elected leaders and other guests was held on April 19.

"This building not only represents the dreams and hard work of two individuals with us tonight. It also represents the future," said William B. Neaves, President and CEO of the Institute, as the brief ceremony began on the 19th.

"A future of cooperation and discovery," continued Dr. Neaves. "A future in which this region can emerge as one of the foremost centers of biomedical research. A future in which many diseases will lose their power to destroy human life and happiness."

"This Institute will be successful only if we can attract the very best scientists in the world," said Jim Stowers, who followed Dr. Neaves to the podium. "My wife and I dream of a time within 25 years when this area will be recognized as one of the best places for biomedical research in the world. The more we understand about life, the more we can hope for life."

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Photos: V. Craig Sands

With Virginia and Jim Stowers holding the ribbon against strong wind, Mayor Kay Barnes uses giant scissors to successfully snip it – to her surprise. In the background, Governor Holden and Senators Carnahan, Bond and Roberts demonstrate bi-state and bi-partisan support.

Praise and Optimistic Forecasts at Grand Opening

Senator Kit Bond, Republican of Missouri: "This is going to be the century of biotechnology. We have here the facility. We have here the people who I think are going to complete the linkage across the State of Missouri where biotechnology is going to be at the forefront….We look forward to working with you … and seeing that this truly is what you expected it to be and what you hope it to be – a tremendous site for developing cures for and understanding the diseases that afflict all of us."

Photos: V. Craig Sands

❶ *Bill Neaves, President and CEO of the Stowers Institute, welcoming guests from in front of the fireplace in the library.* ❷ *Robb Krumlauf, Scientific Director of the Stowers Institute, left, with Senator Roberts and Mayor Barnes; Governor Holden and Jim Stowers at the right.* ❸ *Lori and Carl Peterson with Jim and Virginia Stowers.* ❹ *Stowers scientist Leanne Wiedemann shows guests through a laboratory office suite; behind her, Jim Stowers III; at the left in the photo, Sprint's Bill Esrey.* ❺ *Guests milling around the buffet table in the gallery overlooking the terrace and Brush Creek.* ❻ *Heather Marshall shows Governor Holden some of the equipment in her lab; Bill Neaves looks on.* ❼ *Shirley and Barnett Helzberg, right, listen to Robb Krumlauf describe research.* ❽ *Kansas City Star publisher Arthur Brisbane, left, with Stowers President/CEO Bill Neaves.*

Senator Pat Roberts, Republican of Kansas: "Jim and Virginia, your scientific field of dreams has become a reality. And as a consequence, we all have taken a giant step with regard to the life sciences initiative in Greater Kansas City….On both sides of the state line, this is one area we can agree with, we now have access to the newest medical equipment, the latest life-saving research technology, drug therapies and breakthrough treatments. The benefits are limitless….Serving together in the United States Senate, Kit and Jean and myself, we need a few miracles. Jim and Virginia, we're proud to be part of this one and pledge to you our continued support."

Senator Jean Carnahan, Democrat of Missouri: "There's a teaching in the Jewish faith. It's called Tikkun Olam. It means repairing the world. And fortunately, we have a lot of opportunities to do that. We do it in science. We do it in philanthropy. We do it in public service, and we're seeing it done here today. It means making the world a better place. And Jim and Virginia know how to do that. They have lived through dark times. And the scriptures tell us that those who walk in darkness have seen a great light. And they saw a great light. And they acted upon it. Because of that, we have this Institute here today."

Mayor Kay Barnes: "What a wonderful evening. What a wonderful day it is to celebrate this official opening.…I've had the pleasure of knowing Jim and Virginia since our children were in high school together. I have watched what they have accomplished in this community, what they have been able to do over the years in so many different ways. But, certainly, this is an incredible accomplishment."

Governor Bob Holden: "This is my fourth visit to this remarkable research facility. In fact, I think I've been on the construction crew. As they've built this place up, I've seen it in every one of the stages. I keep coming back because this is a prime example of the endless possibilities that can occur in Missouri when people dare to dream and work together.…The Stowers Institute will literally put the State of Missouri on the map as one of the nation's top locations for medical research.…And as someone who was born in Kansas City, I'm proud that Jim and Virginia Stowers have decided to do this so all of us may have a brighter future."


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Appointments Fill Stowers Labs Quickly

With the recent appointments of five additional scientists to head laboratories and core facilities, the Stowers Institute is well ahead of its recruitment timetable. Each of these new scientists is assembling teams of associates, so the number of people working at the Stowers Institute will nearly double from about 80 in June to about 150 by early fall.

Construction crews have gone back to work on the Stowers campus, finishing out space in the structure to the west of the main research building that had been expected to be held in reserve for another year or two. William B. Neaves, President and CEO of the Institute, predicted that the entire campus – with space for about 600 people in 40-50 laboratories – will be filled by the end of 2004, nearly six years ahead of schedule.

"I have been delighted that things have gone faster and more successfully than I would have dared predict when I came here a year ago," said Dr. Neaves. "There seems to be a sort of magic associated with Jim and Virginia Stowers' efforts to make this Institute the best possible place for doing high-quality biomedical research."

This recruitment effort was further strengthened by the announcement in May of a major new gift to the Institute by Mr. and Mrs. Stowers. They transferred $1.114 billion in securities to the Stowers Institute endowment, bringing the total value of the endowment to more than $1.6 billion. Mr. and Mrs. Stowers had originally intended to leave these assets to the Institute at their deaths, but Mr. Stowers said they decided to advance the gift in part to strengthen the Institute's hand in recruitment. The size of the endowment helps to convince scientists of the seriousness of the purpose of the Institute.

Expert in Genetics of Meiosis

Among those who will be joining the Institute during the summer or early fall is Scott Hawley, an internationally recognized expert in the genetics of meiosis. His work concentrates on the cell division that occurs in the germline, the cells of the ovary and testis that produce eggs and sperm. Dr. Hawley has discovered a number of genes that influence chromosomal crossover events, or meiotic recombination. These studies have the potential to help understand the causes of some kinds of birth defects, such as Down Syndrome, in humans.

Dr. Hawley joins the Institute as a Senior Scientist to head an independent research program. Until accepting the Stowers appointment, he was Professor of Genetics in the Section of Molecular and Cellular Biology at the University of California-Davis.

Dr. Hawley is also a co-author of *The Human Genome: A User's Guide*, published by Harcourt/Academic Press. The book, both a text for novice geneticists and a guide for the non-expert, has been praised by reviewers for covering the fundamentals of the biological foundations of humanity and examining the potential impact of the study of the genome on our society.

Gene Knockouts in Mice

Another scientist with an international reputation who is joining the Institute is Brian L. Sauer, a leader in crafting gene knockouts in mice using a method that he developed, the Cre-lox recombinase technology. Dr. Sauer will direct the transgenic technology program at the Institute and oversee the operations

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Scott Hawley, Ph.D., Senior Scientist. Since 1991, Professor of Genetics at University of California-Davis. Previously Assistant Professor and Associate Professor in Departments of Genetics and Molecular Biology, Albert Einstein College of Medicine, New York, N.Y. Postdoctoral Fellow at Institute for Cancer Research, Philadelphia, 1979-82. Searle Scholar 1984-87. Ph.D. in Genetics, University of Washington. B.S. in Biology, University of California-Riverside.

Brian L. Sauer, Ph.D., Director of Transgenic Technology. Since 1998, Member and Program Head in Developmental Biology, Oklahoma Medical Research Foundation. Various positions with National Institutes of Health, 1993-98. Senior Research Scientist, DuPont Merck Pharmaceutical Co., 1991-93. Principal Investigator, E.I. du Pont de Nemours & Co., 1987-90; Visiting Scientist, E.I. du Pont de Nemours, 1984-86. Ph.D. in Molecular Biology, University of California-Berkeley. B.S. in Mathematics, University of Wisconsin.

Ranjan Perera, Ph.D., Associate Director of Genomics. Since 1999, leader of DNA microarray facility and gene regulation program, Akkadix Corp. Previously, project leader in genomics, Genesis Research and Development Corp., Auckland, N.Z., 1998-99, and scientist at IPST Inc., Atlanta, Ga., 1995-98. Ph.D. in Yeast Genetics, Moscow State University. Other studies at Maris College and Nalanda College, Colombo, Sri Lanka. Postdoctoral associate, Massachusetts Institute of Technology.

of the animal facility while also pursuing his own research.

Dr. Sauer invented the Cre-lox recombinase technology while working as a scientist for E.I. du Pont de Nemours & Co. and DuPont Merck Pharmaceutical Co. from 1984 to 1993. The technology, which is owned by DuPont and licensed to research institutions, allows the removal of individual genes from mice embryos so that scientists can study the impact on the mouse. This helps scientists draw conclusions about gene function and yields insight about how genes cause disease. As a member of the Stowers team, Dr. Sauer will play a key role in helping scientists at the Institute incorporate this technology into their research.

Most recently, Dr. Sauer has been Member and Head of the Developmental Biology Program at the Oklahoma Medical Research Foundation in Oklahoma City.

Associate Director of Genomics

If anyone can be said to truly personify the international character of the growing Stowers team, it must be Ranjan Perera, who joins the Institute as Associate Director of Genomics, working with Arcady R. Mushegian, Director of Bioinformatics. Educated in Sri Lanka and Russia, he previously worked in New Zealand, California and Georgia.

Like Dr. Mushegian, who came to the Institute in the spring, Dr. Perera comes directly from the Akkadix Corp. in La Jolla, Calif., an agro-industrial firm named for the ancient Mesopotamian city-state where agriculture is thought to have originated. At Akkadix, he was leader of the DNA microarray facility and the gene regulation program.

Two new Assistant Scientists (assistant professor equivalents in a university setting) have also accepted appointments to establish laboratories at the Stowers Institute. One of them is Chinese-born Chunying Du, who comes from a Hughes Institute position as postdoctoral fellow in Biochemistry and Molecular Biology at the University of Texas Southwestern Medical Center. The other is Australian-born Paul A. Trainor, coming from a postdoctoral fellowship at the National Institute for Medical Research in London.

Chunying Du, Ph.D., Assistant Scientist. Since 1997, Postdoctoral Fellow in Biochemistry and Molecular Biology, Howard Hughes Medical Institute, University of Texas Southwestern Medical Center. Previously Postdoctoral Fellow in Immunology, Department of Molecular and Cellular Biology, Harvard University. Ph.D., Iowa State University. B.S. and M.S., Beijing Normal University.

Paul A. Trainor, Ph.D., Assistant Scientist. Since 1996, Postdoctoral Research Fellow, National Institute for Medical Research, Mill Hill, London. Also, teaching assistant, Marine Biological Laboratory, Embryology Course, Woodshole, Mass., 1998-present. Ph.D. in Developmental Biology, Children's Medical Research Institute, Westmead, University of Sydney. B.S. in Genetics and Biochemistry, University of Sydney.

Hope Shares℠

New contributions of more than $1,000, the minimum for establishing a Hope Shares℠ account in the endowment of the Stowers Institute, were received from, or in memory or honor of, the following individuals, firms and foundations in the first six months of 2001:

$100,000

American Century Companies
Dunn Family Foundation[1]
Frederick and Louise Hartwig Family Fund

$10,000

Country Club Bank
David A. and Wendy B. Welte
Mr. and Mrs. Michael Zolezzi

$5,000

Mary Breed Brink
Thomas R. Kmak Family
Betsey and Rick Solberg
Byron and Jeanne Thompson
Virginia C. Wimberly (In Honor Of)

$1,000

Rob J. Aneweer
Evelyn Louise "Lovey" Byrer (In Memory Of)
Kathleen Giacomelli
Mr. and Mrs. Jules Goldman
Laura W. Greenbaum
Mr. and Mrs. LeRoy Larsh Johnson
Shirley and Robert Meneilly
William B. and Priscilla W. Neaves
Austin E. and Laura Wilson[2]

These donors and those they honor will never be forgotten.

[1] Second gift in a five-year commitment.
[2] Additional gifts brought their cumulative total to more than $1,000.

Scientists See Proteomics as Field of Opportunity

During the week in April when Kansas City leaders turned out for the Grand Opening of the Stowers Institute, the area's leading biomedical researchers gathered one afternoon in the Stowers auditorium to explore how to work together to help conquer the next frontier in discovering how our bodies – and those of other forms of life – are put together.

They were talking about proteomics, the large-scale study of proteins, which are considered the building blocks of life because they do the work assigned by the genes in creating life. As William B. Neaves, President and CEO of the Stowers Institute, explained in opening the symposium: "Proteins are the effectors of most of the information encoded in the genome, and it is only by understanding the structure and functions of proteins that we can understand cellular life and disease processes."

Robb Krumlauf, Scientific Director of the Stowers Institute, told the some 200 assembled scientists that proteomics was one of the principal areas of research in which area scientists might collaborate to build on local strengths. He suggested that the symposium might lead to the creation of a "proteomics consortium" to advance such research.

> *"Recently I read in The New York Times that three companies are trying to identify all human proteins. This is just one indication of how hot this field is now."*
>
> *– Nobel Laureate Hans Deisenhofer*

Message of a Nobel Laureate

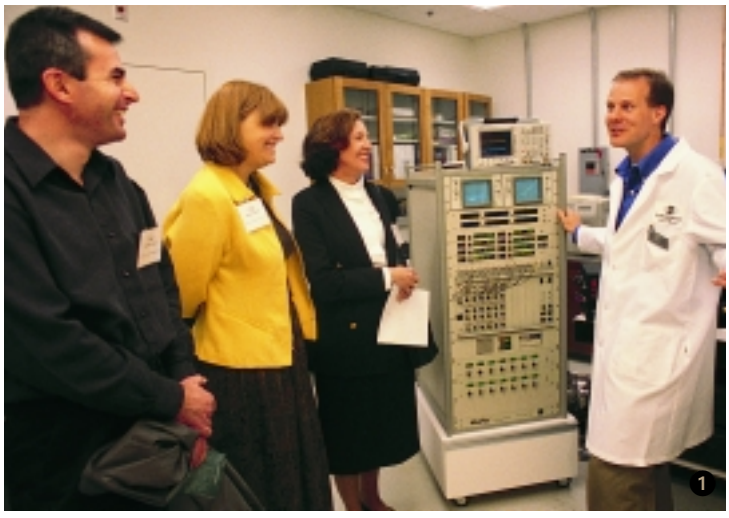
Many researchers have studied proteins for years, but in the aftermath of the successful completion of the sequencing of the human genome proteins have become the object of the next big research push. That is why Nobel Laureate Hans Deisenhofer of the University of Texas Southwestern Medical Center at Dallas closed the symposium with the message that "Proteins are 'In,' Again!"

"Recently I read in *The New York Times* that three companies are trying to identify all human proteins," he said. "This is just one indication of how hot this field is now."

Dr. Deisenhofer and other speakers made the point that proteins offer the greatest potential for becoming the targets of drug development aimed at curing or preventing specific diseases. This, they suggested, opens up possibilities for the Kansas City area's fledgling effort to focus its community-wide resources in the life sciences.

Promise of Drug Discovery

"This is an exciting time to be involved in medical research, and certainly proteomics," said Billy G. Hudson, chairman of the Department of Biochemistry and Molecular Biology at the University of Kansas Medical Center. "For me, there are two aspects of it: One is the great promise for understanding the events that underlie the cell behavior of the human body and the defects that occur in disease. The second part, for me, is the promise



Photos: Don Ipock

❶ *Jeff Haug, right, shows the computer that operates the Stowers Institute's high-speed cell sorter to three area scientists after the proteomics symposium: from left, Drs. Paul Vozuyan and Olga Bondar of the University of Kansas Medical Center and Dr. Elizabeth Rowe of the MidAmerican Neuroscience Research Foundation.* ❷ *On the terrace at the reception following the symposium for scientists, from left: Virginia Stowers, David A. Welte, legal counsel of the Stowers Institute, Jim Stowers and Pamela Stowers.*

for drug discovery to do something about it."

Dr. Hudson and five other scientists from area institutions, in addition to Dr. Deisenhofer, gave presentations on their own research, in each case explaining the contribution that study of the pertinent proteins might make toward the larger project. One of them was George K. Giddes of Children's Mercy Hospital, who has been doing research for more than a dozen years into how the pancreas forms in the embryo. His work is of great importance to people with diabetes, a group that is growing at an alarming rate.

"Basically, the idea is to say, how can we replace the cells that are missing in a pancreas in a diabetic?" he said. "Reconstruction is one option, but probably unlikely. Transplantation, particularly of islets, is something that has been done and is being done and is particularly interesting. Cellular engineering is really what I am talking about when I say, what can we do to these cells to make them turn into insulin-producing cells? Can we use cells in a petri dish? That's cellular engineering, and that's really the long-term cure for diabetes."

Dr. Giddes said that the study of proteins could provide breakthroughs in his research because it is probable that there are proteins telling stem cells what to do at a stage when stem cells can become any cell in the body – including an insulin-producing cell of the pancreas.

Mass Spec Technology

However, proteins are far more numerous and more complex than genes, so identifying them and learning their structures and functions requires a new generation of sophisticated technology. Dr. Hudson pointed out that there are estimated to be up to a million proteins in the human body – compared to the mere 30,000 or so genes uncovered by the Human Genome Project. Perhaps 10,000 of the proteins are relevant to disease. "So the key," he said, "is figuring out which ones should be the drug targets because it takes $200 million to $500 million to go from here to here" – from research to drug development.

Like several others, he pointed to the potential of mass spectroscopy technology for identifying proteins and determining their structures and functions. Using very sophisticated equipment, mass spectroscopy vaporizes a sample of molecules, measures the atomic spectra of all the components, and then puts it back together, permitting identification of the proteins in the tissue with 99 percent accuracy.

Viorica Lopez-Avila, an associate of Midwest Research Institute in Kansas City and an authority on mass spectrometry, said that mass spectrometry, together with bioinformatics – the large-scale manipulation of biological data on computers – will "really help us put the pieces together and come up with an identification" of a protein.

While DNA and the genes that it contains are wrapped into chromosomes, proteins are mixed up throughout the cell, requiring great time and effort to separate and identify them, leading Dr. Lopez-Avila to warn that "If it ends in 'omics' that means expensive."

Nevertheless, another of the speakers, Robert Palazzo of the University of Kansas-Lawrence, said that area-wide collaboration in the study of proteomics would offer the Kansas City area the chance to go beyond discovery and use the area's tradition in pharmaceutical innovation to "impact not only the health of our loved ones but possibly our economic development."

Photos: Don Ipock

❸ Nobel Laureate Hans Deisenhofer, left, with Robb Krumlauf and Bill Neaves after his presentation at the proteomics symposium for area scientists on April 18 in the Stowers auditorium. ❹ Visiting scientists on the terrace of the Stowers Institute after the symposium on proteomics.

Photo: V. Craig Sands

Michele Stowers, Director of Resource Development for the Stowers Institute, and Layne Stowers.

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