

InsideSalk

Where cures begin.

THE SALK
INSTITUTE FOR
BIOLOGICAL
STUDIES

08 | 10

Chihuly at the Salk!

Reflections on the Institute's 50th Anniversary Celebration



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ON THE COVER

Dale Chihuly's *Float Boat*. Photo by Joe Belcovson

Institute Gains Visibility During *Chihuly at the Salk*

Dear Friends,

WHAT AN EXTRAORDINARY CELEBRATION WE ENJOYED

in April to herald the Salk Institute's 50th anniversary year. If you took part in one of the sold-out tours we offered during *Chihuly at the Salk*, I suspect you would agree that the wildly colorful glass installation by renowned artist Dale Chihuly was a tremendous success.

The event paid homage to **Jonas Salk**, who was fervently committed to both science and art. It also gave visitors the chance to experience the Institute's inspiring architecture and learn a bit about the groundbreaking research taking place inside these legendary walls.

More than 5,000 people joined us for the arts events, many of whom expressed curiosity about our research. Some have already returned to the campus to learn more about Salk science, most recently for our reinvigorated Back to Basics lecture series.

Attendees of that May 25 Back to Basics event have already shown great interest in our next lecture. Scheduled for Nov. 3, it will highlight Associate Professor **Andy Dillin's** research on aging.

Recently, Dillin's team slowed the aging process in mice engineered to develop Alzheimer's disease and discovered that they could prevent the mice from developing the disease. Worth noting, the genes that were perturbed to acquire the age-slowng effect are the same genes that other studies have found are mutated in centenarians.

Dillin believes his latest finding may open the door to the development of drugs that target this genetic pathway to keep Alzheimer's disease at bay.

Another apparent outcome of *Chihuly at the Salk* and the associated strong media coverage is that we are seeing increased participation in our daily architectural tours. This offers us another opportunity to expose a larger number of visitors to the important work that takes place in the labs and to convey a sense of the Institute's rich 50-year history in La Jolla.

While the Salk is recognized by scientists around the world for its superb research contributions, the Institute's impact in stem cell, molecular biology, neurobiology and plant biology research is far less apparent to our hometown neighbors.



William R. Brody

“*Chihuly at the Salk* helped shed a positive spotlight that raised our profile in the community.”

– William R. Brody

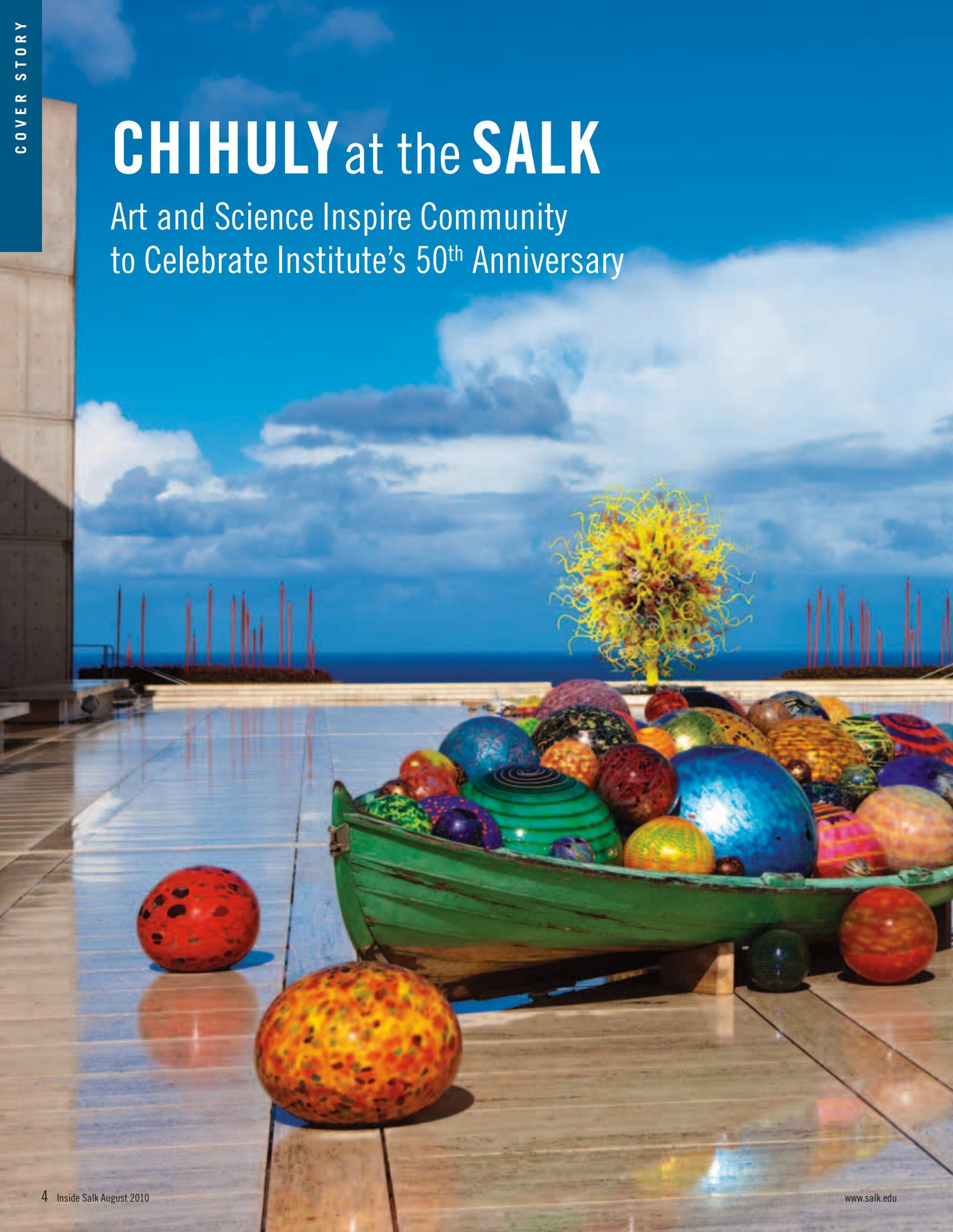
Chihuly at the Salk raised our profile in the community. Four months later, we are still reaping the benefits of our public celebration of five decades of Salk discoveries. The 15th annual Symphony at Salk with Liza Minnelli on August 28th, and a high-profile scientific symposium in late October will round out our special programs marking the 50th anniversary. We intend to build on the momentum of these activities for many years to come. 📊

William R. Brody, M.D., Ph.D.

Irwin M. Jacobs Presidential Chair

CHIHULY at the SALK

Art and Science Inspire Community
to Celebrate Institute's 50th Anniversary



Float Boat, The Sun, Red Reeds

It's no secret Jonas Salk strongly believed that art and science go hand-in-hand. But would he have imagined the dramatic display of vibrant colored glass in the same iconic courtyard that serves to inspire Salk researchers in search of their next major scientific discoveries?

"I HAVE NO DOUBT JONAS WOULD HAVE BEEN VERY PLEASED with the entire event because it was part of his original concept for the Institute," suggested **Tom Albright**, professor and director of Salk's Vision Center Laboratory, speaking of *Chihuly at the Salk*, the installation of wildly expressive glass sculpture by artist Dale Chihuly. "It brought such large crowds of people to the Institute, I've never seen that courtyard so populated in the 23 years that I've been here."

In all, more than 5,000 people visited the Salk Institute between April 22-28 during sold-out day and evening tours, experiencing Chihuly's magnificent glass sculpture set against the Institute's stark architecture. The scale and magnitude of the event was a first for the Salk, yet fitting for its 50th anniversary celebration, said **Inder Verma**, professor in the Gene Expression Laboratory.

"We had an artist at the cutting edge of his field in an institution where the science is also at the cutting edge," Verma said. "It was a meeting of two superb components of art and science that was a



The Sun during installation

“The installation was visually striking, and it wasn’t just that the pieces were beautiful, but there was also the engineering aspect of it. It was neat to see the whole process rather than just seeing the finished piece.”

– RICH KRAUZLIS
PROFESSOR, SYSTEMS NEUROBIOLOGY LAB

wonderful success. What I particularly liked about it was that the art was very accessible, it wasn’t so abstract that you couldn’t figure it out. It was clear what the artist was trying to do and it was exciting to see that it melded so well with the Salk Institute.”

Chihuly at the Salk featured several signature pieces located in the Institute’s Theodore Gildred Courtyard, where visitors were also awed by the sweeping view of the Pacific Ocean. The stunning items on display included *The Sun*, a 15-foot-tall sculpture made of 1,100 tentacle-like glass pieces of vibrant yellow, red and orange hues.

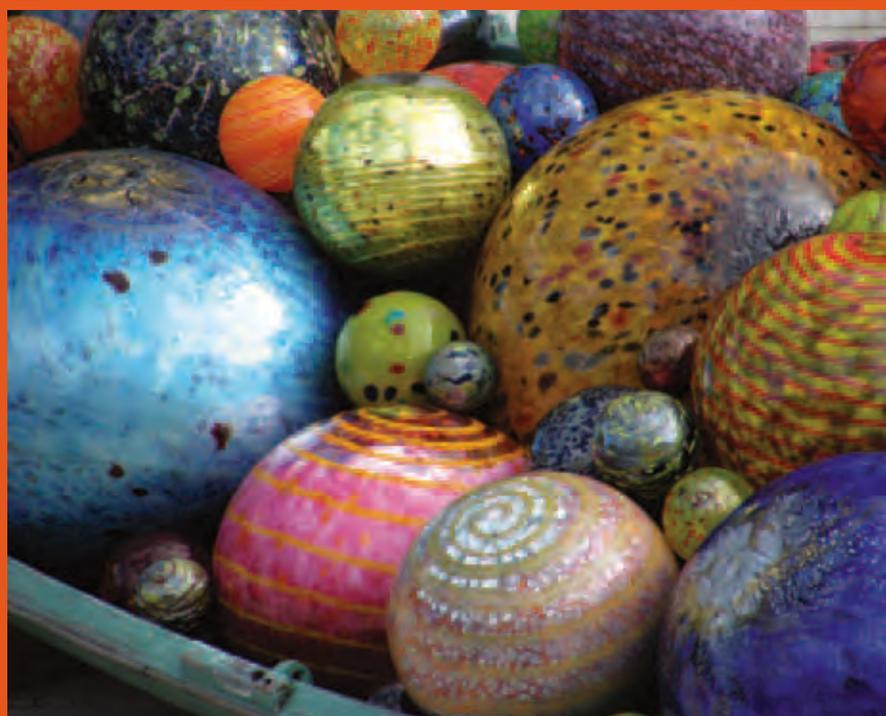
Float Boat was also a crowd pleaser. It featured a 17-foot restored wooden craft that had been filled with intensely colorful glass spheres, or Floats, some measuring up to 40 inches in diameter and weighing 60 pounds.

“They looked like candy,” said Senior Director, Information Technology **Frank Dwyer**. “My favorite Float was the one that had squiggly brown lines. It looked like someone had drizzled chocolate syrup all over it.”

Two *Chandeliers*, specially designed for *Chihuly at the Salk*, hung overhead between towers, flanking the courtyard. Each measuring about 6 feet tall but offering two very different color schemes (one with brown, pale yellow and black tones, the other with blue, green and yellow), the pieces were assembled from hundreds of hand-blown glass components.



Kebana Drawing 2008
Photo by Teresa Nouri Rishel



Clockwise from top: Salk Board Chairman Irwin Jacobs with artist Dale Chihuly; a variety of colorful glass spheres filled Chihuly's *Float Boat*; *Amber Chandelier* hangs high above the courtyard.

A variety of red, orange, blue and purple *Garden Glass* – ranging from 6-foot-tall spears jutting from the ground, and twisted, cylindrical forms called *Cattails* – was nestled in the Salk's eucalyptus grove. The crowning jewel of the grove was the *White Tower*, a 16-foot-tall structure with pale-to-neon pink, and white needle-like glass pieces. Bringing their research experience to bear on the exhibit, many of the scientists jokingly referred to the *White Tower* as the “bottle washer,” a reference to similarly shaped brushes used to clean lab glass.

Like most of the sculpture on display during *Chihuly at the Salk*, *White Tower* was assembled on site, which many at the Institute found to be among the most fascinating aspects of the celebratory event.

Although he has followed Chihuly's work for more than a decade (and once spoke at a conference on creativity where the artist was also

a guest speaker), **Charles Stevens**, professor in the Molecular Neurobiology Laboratory, had never seen the sculpture being assembled.

“I didn't know how they packed and shipped the pieces. I didn't know what the armatures looked like,” he said. “So it was really interesting for me to see the exhibit being set up. I was just fascinated by the process.”

Rich Krauzlis, a professor in the Systems Neurobiology Lab and artist, agreed.

“The installation was visually striking, and it wasn't just that the pieces were beautiful, but there was also the engineering aspect of it,” he said. “It was neat to see the whole process rather than just seeing the finished piece.”

Some of the community guests had the chance to experience the process during the installation tours, which took place on April 22-23.



Chihuly Studio team member Thomas Gray fields questions during the installation of the *Aqua Chandelier*.

“What I particularly liked about it was that the art was very accessible ... it was clear what the artist was trying to do and it was exciting to see that it melded so well with the Salk Institute.”

— Inder Verma, Professor, Gene Expression Laboratory



They not only had the opportunity to see how the glass components are individually hand-wired into place, but they had the benefit of asking questions of the installation team from the Chihuly Studio.

One fact Stevens and the others uncovered? The installers normally pack 10 percent more glass than they need for each sculpture in case they break some, which they occasionally do.

As impressive as the installation was during the day, it took on new life and offered a breath-taking experience at night when each of the pieces was lit for the evening tours.

The Sun, for example, seemed to radiate with powerful intensity after dark. It was by far the most photographed piece at night. Jonas Salk's son, Peter, visited *Chihuly at the Salk* on several occasions, but none had quite the effect on him as seeing the installation in the evening, he said.

"Seeing people strolling through the courtyard at night and looking at the sculptures in wonderment reminded me of the warm feeling of people walking hand in hand during the evening in European plazas," **Peter Salk** said.

"I don't think a day went by that my father didn't walk through the courtyard and interact with whoever was there. It was part of his nature," he said. "So if he could have seen how this event affected not just those who work at the Institute but also those who came to visit, I think he would have been very pleased."

For some Salk scientists who have great interest in art, it was the similarity they recognized between their work in the lab and the sculpture on display that drew them out of their offices and into the courtyard.

"People who work in Neurobiology are keenly aware of the relationship between the form of neurons and their function," said Stevens. "And so neurobiologists like it, aside from its artistic value, because it reminds them of that. To see the way these glass sculptures were designed to give rise to complicated form is very interesting to us."



Cattails and White Tower

Thomas Albright, who studies vision and whose lab discovered in 2007 that the brain's visual cortex also receives input from memory banks to derive meaning from what we see, compared Chihuly's work to impressionism.

"Symbols or shapes on a canvas elicit an impression of an image and your brain fills in the rest," he explained. "That's the beauty of impressionism. It's not entirely dependent on the physical stimulus that's out there in the world. It's a stimulus that enables your brain to conjure up all sorts of things that can be unique to your own personal experience.

"Chihuly's tangled-glass sculpture is about as characteristically impressionistic as you can imagine," Albright continued. "So when you

look at *The Sun*, it's not veridically like a sun, but it conjures up all kinds of things when you look at it. You can ask, 'What's happening?' The thing that's happening is your brain, based on prior experiences of the world, is complementing the input that's coming up from the retina.

"In the end, I thought it was a fabulous event," he said.

"It was definitely valuable for the Institute from a public relations standpoint, and I was able to see a lot of my colleagues on the courtyard.

I kept thinking, 'We need more of this'." 🏢



Chihuly at the Salk underwriters Irwin and Joan Jacobs at the Black Tie Gala where guests enjoyed an evening of first-rate entertainment and superb food.

Black Tie Gala, *Chihuly at the Salk* Raise \$350K for Basic Research

THE WHO'S WHO OF SAN DIEGO AND BEYOND gathered at the Institute for a glorious evening of beautifully sculptured glass, first-rate entertainment and superb food during the *Chihuly at the Salk* Black Tie Gala on April 24.

Graciously hosted and generously underwritten by **Joan and Irwin Jacobs**, the entire *Chihuly* event helped raise more than \$350,000 (netting \$235,000 from the Gala alone) in unrestricted funds in support of the Salk Institute's groundbreaking basic scientific research.

Guests of the Gala were greeted by the celestial sounds of String Theory, a Los Angeles-based ensemble best known for its signature handmade harps featuring long wires that are clamped on elevated points of the venue where the group performs. On this occasion, the golden wires stretched from the instrument to the top of the Salk's East Building, while guests enjoyed the elegant al fresco reception.

As the music played in the background, guests mingled and freely strolled through the Salk's eucalyptus grove and the Theodore Gildred Courtyard admiring the wildly colorful and expressive glass sculpture by artist Dale Chihuly, who was also in attendance.

Chihuly's gorgeous glass pieces weren't limited to the grounds of the Institute. Each of the 20 tables in the elegantly decorated foyer where the dinner took place featured a *Chihuly Macchia* as a centerpiece. Gala attendees promptly purchased 19 of them.

Salk Institute Executive Vice President **Marsha Chandler** served as the evening's emcee, sharing the stage with Salk President **William R. Brody** and Salk Professor **Ron Evans**, who each addressed the audience.

The Black Tie Gala featured a delectable meal catered by Pamplemousse, and entertainment by Daniel Reichard, a member of the original cast from Broadway's *Jersey Boys*. He was accompanied on piano by Cris O'Bryon as they performed old standards, and songs from the 1960s and '70s. 🎵

Gala Committee

Joan Jacobs (Chair)

Wendy Brody

Linda Chester

Olivia Farrell

Robin Parsky

Mary Jane Salk

Darlene Shiley

Sheryl White

Faye Wilson

Marsha Chandler

Rebecca Newman

Photographs from the Salk Community

Chihuly
CHIHULY at the **SALK**

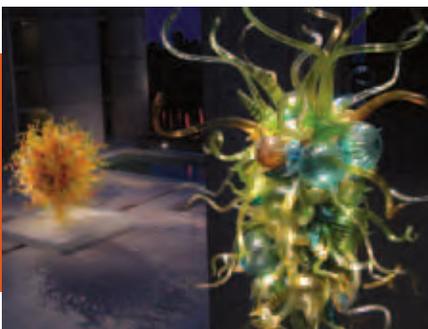


GRAND PRIZE WINNER: MO LI, Gene Expression Laboratory

runners up



SANDRA GUERRA
 Peptide Biology Laboratory
 FIRST RUNNER-UP



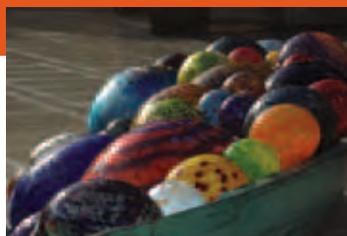
ANDREA CARRANO
 Molecular Cell Biology Laboratory
 SECOND RUNNER-UP



FLORIAN SWEENEY
 Transgenic Core
 THIRD RUNNER-UP

April 22-28, 2010

honorable mention



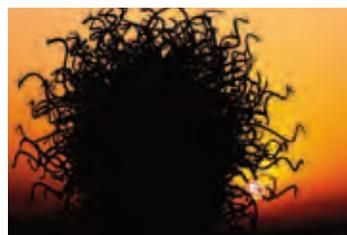
DEBBY LATTERICH
Animal Resources Department



MO LI
Molecular Cell Biology Laboratory



ULLAS PEDMALE
Plant Biology Laboratory



REUBEN RODRIGUEZ
Laboratory of Genetics



REUBEN RODRIGUEZ
Laboratory of Genetics



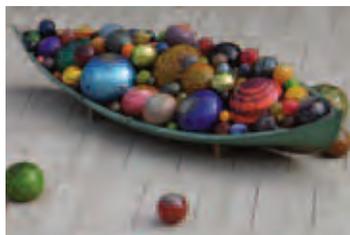
JESSE VARGAS
Molecular Cell Biology Laboratory



SUNNIE YOH
Regulatory Biology Laboratory



STAN HELMS
Facilities Services



STAN HELMS
Facilities Services



DEREK JOYCE
Molecular Cell Biology Laboratory



MICHAL KRAWCZYK
Regulatory Biology Laboratory



LEO KURIAN
Gene Expression Laboratory



ANN KUWAHARA
Purchasing



Members of the President's Club admire images from the *Chihuly at the Salk* Photo Exhibit.

Art and Our Brains: *Recognizing the Familiar is Key to Visual Perception*

WHAT IS IT ABOUT ART THAT DRAWS OUR attention and stirs our emotions? The beauty of the piece itself is only part of the answer. The familiar patterns we recall when we look at the artwork provide a context that deeply influences our reaction, says **Thomas Albright**, professor and director of the Salk Institute's Vision Center Laboratory.

Albright spoke to nearly 100 members of the President's Club and other friends of the Institute who attended a *Chihuly at the Salk* Photo Exhibit and Lecture on June 17, featuring 34 vivid photographic images of the renowned artist's glass sculpture taken by Salk staff members. Albright's presentation followed the reception.

Although for centuries artists have been known to use certain techniques in their work to manipulate perceptual experiences, Albright said discoveries in neuroscience over the last 50 years help better explain how the brain processes the information it receives through our eyes.

Vision begins in the retina, which breaks down the incoming signal into smaller elements of information (color, motion and form), before sending it down the optic nerve to the visual cortex area of the brain. Here, the information is processed and reconstructed to achieve an internal representation of what is being perceived.

But the story doesn't end there. Albright's lab discovered two years ago that the brain's memory banks also contribute to the perceptual process.

This is best illustrated when we observe abstract forms or art that is not precisely representational.

A Renoir Impressionist painting or a Chihuly glass sculpture may not be an exact representation of a particular object or scene, but the colored dots, or the tangled glass may provide the impression of that object or scene, Albright explained. The impression serves as a spark for recognizing patterns stored in our memory that help us, individually, complete the picture.

"This is the nature of all visual experience. As you go around the world, your perceptual experience is a combination of the stimulus and memory," Albright said. "As we look at magnificent Chihuly images around us, what we do is take the impressionist patterns of light in the retina and we complement them with a life's worth of experiences that are stored in memory.

"The undeniable pleasure that we get from looking at these Chihuly pieces is an example of what the 19th century psychologist William James called, 'The victorious assimilation of the new,' meaning we interpret the art in the context of things familiar. This is in essence why we find these things so appealing." 📖

*The beautiful collection of photos of Chihuly at the Salk in the Foyer will remain on display through the month of August. Visitors are welcome, weekdays, during normal business hours. Call **Gena Hamme** at ext 1262 to arrange for parking.*





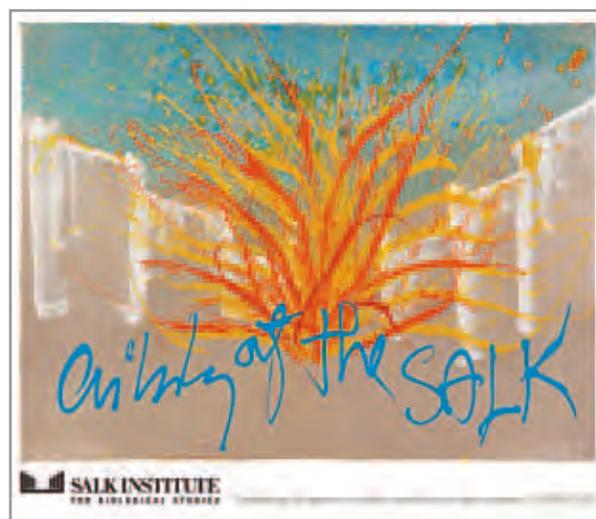
Experience *Chihuly* All Over Again

If you didn't have a chance to experience *Chihuly at the Salk* in April or want to see it again, you can still do so. Several pieces of the glass sculpture from the installation will remain on display at the Institute through September 2010.

White Tower, the two *Chandeliers*, and a variety of the *Garden Glass* (including the *Cattails* and *Spears*) are among them. Standing 16 feet tall, *White Tower* features blown-glass pieces ranging from white to light and neon pink and was personally chosen by Dale Chihuly to serve as the introductory sculpture for the installation.

You can also view a dazzling Chihuly photo exhibit and several of the artist's *macchia*, large bowl-shaped glass pieces, in the Salk's foyer. For more information, contact Geña Hamme, 858-453-4100 x1262 or email: hamme@salk.edu.

The outdoor installation can be viewed for free Monday through Friday from 8 a.m.-5 p.m. You can also register online for a free architectural tour that includes information of the Chihuly pieces on display. To register, visit salk.edu/tours. The Salk Institute's gift shop, which sells several *Chihuly at the Salk* items such as tee-shirts, books and DVDs, is open daily from 11 a.m.-2 p.m.



Tabac and Onyx Chandelier, and Macchia

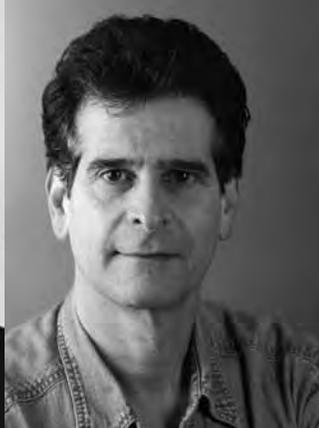
Blue Marlins (detail)



Ralph S. O'Connor



Conrad T. Prebys



Dean L. Kamen



Margaret Faye Wilson

Salk Institute Board of Trustees Elects Leaders in Business, Innovation and Philanthropy to its Membership

THE BOARD OF TRUSTEES OF THE SALK INSTITUTE UNANIMOUSLY voted to elect four new members with records of extraordinary entrepreneurial success and expertise in business, innovation, real estate and philanthropy during its April meeting in La Jolla.

"These four individuals exemplify uniquely American success stories of innovation, entrepreneurial acumen and the desire to give back to their communities and the world," said Salk Board Chairman **Irwin M. Jacobs**. "I am confident that their considerable business expertise, overall good sense and generosity will make them invaluable colleagues and assets to the Institute."

Jacobs said the four new board members are joining the Salk leadership at a moment of both impressive research productivity and a growing public awareness of the small but internationally renowned non-profit institute in La Jolla.

Dean L. Kamen, of New Hampshire, is a vastly successful inventor best known for designing the Segway, the two-wheeled, upright scooter he unveiled in December 2001. He holds more than 440 U.S. and foreign patents, many of them for innovative medical devices that have expanded the frontiers of health care worldwide.

While still a college undergraduate, he invented the first wearable infusion pump, which rapidly gained acceptance from such diverse medical specialties as chemotherapy, neonatology and endocrinology. In 1976 he founded his first medical device company, AutoSyringe, Inc., to manufacture and market the pumps. At age 30, he sold that company to Baxter International Corporation. By then, he had added a number of other infusion devices, including the first insulin pump for diabetics.

His most recent project, the "Luke Arm," is a state-of-the-art robotic arm for amputees, funded in part by a grant from the U.S. Department of Defense.

Kamen has won numerous awards for his contributions to science and technology. He was elected to the National Academy of Engineering in 1997 for his biomedical devices and for making engineering more popular among high school students. In 2000 he was awarded the National Medal of Technology by President Bill Clinton. Two years later he received the Lemelson-MIT Prize for inventors for his invention of the Segway and the infusion pump for diabetics. Kamen was inducted into the National Inventors Hall of Fame for his invention of the AutoSyringe the following year.

Ralph S. O'Connor has served as chairman and CEO of the private investment firm of Ralph S. O'Connor & Associates since 1987, when he formed the company. Previously he was corporate director for Texas Eastern

Corporation (1963-1989). O'Connor was among the four original partners who acquired the NBA's San Diego Rockets and took them to Texas as the Houston Rockets. He is Chairman of Arnaud's Restaurant, a landmark New Orleans eatery.

He is also Trustee Emeritus of Johns Hopkins University, having served from 1969 to 1975 and again in 1981. His exceptional generosity at Hopkins helped fund scholarships for undergraduates at the Krieger School for Arts and Sciences, a named professorship in biology, and the creation of the Walter J. Stark Chair in Ophthalmology in the School of Medicine.

He is also a Trustee Emeritus of Rice University; and former president of the Marian and Speros Martel Foundation of Houston (1983-2003), the organization that funded Martel College at Rice University.

Conrad T. Prebys built a real estate empire after founding Progress Construction and Management Company in 1966 in El Cajon, Calif. With a network of buildings and single-family homes spread across San Diego County, Prebys is among the region's 20 largest property tax payers.

Since 2004 he has been broadening his legacy as a philanthropist, giving away nearly \$50 million to San Diego organizations. His philanthropy has had a significant positive impact on a number of area organizations, including the Boys & Girls Club of East County, the Scripps Mercy Medical Group, UC San Diego and the Sanford-Burnham Institute for Medical Research (which renamed its genomics facility the Conrad Prebys Center for Chemical Genomics).

Margaret Faye Wilson, a leader in the banking and retail industries with more than 25 years of executive experience, currently serves as principal and co-founder of Wilson Boyles & Company, a business management and strategic planning consulting firm with offices in San Diego and Chicago.

She previously held the position of senior vice president of the Risk Management Group for The Home Depot, also serving on that board of directors.

Wilson spent 21 years at Bank of America, where she flourished as a top-level executive and manager, including executive vice president, and chairman and president of Security Pacific Financial Services (a wholly owned subsidiary of Bank of America Corporation).

During her career at Bank of America, Wilson was responsible for several successful initiatives: She led the turnaround and sale of a \$2.4 billion consumer finance business; and created new corporate advisory services, debt restructuring products, and a mergers and acquisition division for the company's European and U.S. entities. ■■■

Deciphering the Glial Code

Physicist/Neuroscientist Axel Nimmerjahn

to join Salk's Waitt Advanced Biophotonics Center

A GROUP OF CELLS LIVING IN THE SAME "NEIGHBORHOOD"

do not necessarily speak the same "language." Such is the case in our brains, between neurons, the cells that electrically transmit information, and their supportive neighbors, glial cells. Yet, glia intricately communicate with neurons to somehow ensure that our nervous system functions properly. So just how do glia function?

Physicist-turned-neuroscientist **Axel Nimmerjahn** has been intrigued by this scientific problem since first encountering glial cells during his graduate studies at the Max Planck Institute for Medical Research in Heidelberg, Germany. Deciphering glial cells' enigmatic language, and their role in contributing to a functioning brain, both in its healthy and diseased states, will be his lab's aim when he joins the Salk Institute as assistant professor in the Waitt Advanced Biophotonics Center, *funded by a \$20 million grant from the Waitt Foundation*, on Nov. 1.

Nimmerjahn will use the latest in light microscopic tools, some of which he developed during his postdoctoral studies at Stanford, to dive deep into tissue of lab models to visualize glia and other cells in action. The results of his research could have implications in developing possible treatments for many diseases, he says.

"We know that glial cells are critically involved in many injuries and diseases, but it's unclear at this point what their specific contribution is to each one of them, Nimmerjahn says. "In some cases like glioma (tumors in the nervous system), they appear causal, yet in others they undergo reactive changes. But even if they are not the source of the actual disease, given their essential supportive role and potential to undergo reactive changes, glia can profoundly influence disease progression and regeneration.

"So this is why it is critically important to define the role of glial cells in health and disease. If we better understand these cells, then hopefully we can come up with a treatment that targets and tweaks them," he says. "In a number of diseases, protecting or restoring glial cells' supportive function may turn out to be a more effective neuroprotective strategy than targeting neurons itself."

Among the important discoveries his group made was demonstrating that microglia, a type of glial cell that protects our brains from foreign material, don't stand idly by, as was once thought. They found that in healthy brains the cells are in fact continually on patrol to remove potentially harmful substances and react instantly to disruptions of the blood-brain barrier.

With a multidisciplinary team at Stanford he developed miniature epifluorescence microscopes, measuring about 1 cubic centimeter in size and weighing less than 2 grams, that enabled him to take the first-ever optical recordings from glia and neurons in freely behaving mice. Using his novel techniques, he also provided evidence that glial cells might be more than just support cells.



“Salk is a highly collaborative place, which makes for a perfect scientific environment, and, of course, the support of the new Waitt Advanced Biophotonics Center is just amazing.”

– AXEL NIMMERJAHN

Nimmerjahn's work will lend itself to collaborations with a wide range of scientists at the Salk Institute. "Salk is a highly collaborative place, which makes for a perfect scientific environment, and, of course, the support of the new Waitt Advanced Biophotonics Center is just amazing," Nimmerjahn says. "This is a great opportunity to add a new level to the biological projects that are really excellent at the Salk." 

A portrait of Clodagh O'Shea, a woman with short blonde hair and blue eyes, wearing a red button-down shirt. She is resting her chin on her hand, looking thoughtfully to the side. The background is dark.

One on
One with ...
Clodagh O'Shea

FOR YEARS SCIENTISTS HAVE BEEN WORKING TO RE-ENGINEER THE HUMAN ADENOVIRUS,

which in its normal state causes acute respiratory distress syndrome, as a potential tool to wipe out cancerous tumors. **Clodagh O’Shea**, assistant professor in the Molecular and Cell Biology Laboratory, is at the forefront of this bold technology. Her lab has developed a new generation of the engineered adenovirus to more effectively seek out and burst cancer cells, while leaving healthy cells intact. But her lab’s story doesn’t end there. She and her team are also working in parallel on novel, multi-pronged strategies ranging from arming her tumor-seeking viruses with toxic proteins, to re-engineering their outer “coat” so they can home in on tissue-specific targets.

Explain how your lab is developing viruses that target specific tissues in the body.

The virus is an incredible nano machine that can be re-engineered on several levels for cancer. One way is to manipulate how the virus binds to a cell. If you can imagine the virus as a rocket ship with spikes, it uses these points to make contact with the cell’s surface and thereby enters specific cells. The virus that’s been used in research naturally enters the cells in our airways. But there are 52 human adenoviruses and each targets different tissues. If you’re going to treat cancer in the colon, we believe you should use a virus that has evolved to target that tissue. And now that’s what we’re doing for the first time, and which no one has been able to do.

How are you doing this?

We’re asking whether we can direct the virus that normally infects the cells in the lung to other cells by changing the “coat” or the surface of the virus so that it binds to tumor blood vessels or the colon, for example. The idea is not to change the regulatory component, but to use what we already know. The “coat” is a defined point in the virus’ genome, so we’re just swapping that out.

To do this, we looked at the evolution of the genome – from fish adenovirus, to chicken adenovirus and snake adenovirus, the whole way up – and we identified which parts of the genome have stayed very constant. We found that the evolution has taken place on the ends, which means the entire middle core is where the coat proteins are. So what we’ve been able to do is come up with a way to manipulate the genome

and swap the part of the genome that encodes the coat from these different viruses into my lab’s virus. So I think within the next year we’ll know whether these synthetically engineered viruses can be used to target tissue-specific tumors.

How did you become interested in this area of research?

I did my Ph.D. in Immunology in London’s Imperial Cancer Research Institute and was pursuing a career in tumor immunology. But as a student I heard (UCSF cancer researcher) Frank McCormick, who I did my postdoc with, come through and give a talk on this idea of making a mutant virus that can activate p53 and then kill tumor cells. (Called the “Guardian of the Genome,” the p53 gene is almost always found to be inactive in all human cancers.) The idea that you depend on the loss of the p53 gene just fascinated me. How do you activate something that is just gone? I just thought, “I’ve got to work on this.”

What has been the scientific discovery that’s fascinated you the most during your career?

The cell is a scale-free network, which is like the World Wide Web. By that I mean that not all nodes or points of contact in a network have the same number of connections. Some nodes, for example, are hubs, they have thousands of connections, but many others have only a few. This explains many things. Think about a tumor. There have now been 100,000 mutations identified in cancer. Many of them are probably irrelevant. You can lose about five percent of the genes in your cell and your cell will be fine. And that’s because they’re not connected to major processes. But some

continued on page 20

“For me, it’s about that one moment when you know you’re the only person who has ever discovered this one thing – it’s extraordinary.”

– CLODAGH O’SHEA



of these genes are hubs, which is why they have profound effects in so many pathways.

That for me explained why the genetic targets the virus is hitting and why the ones the tumor is hitting are the same. Even though there are 26,000 genes in a cell, the virus has just 20, so that’s probably the number you need to hit to control the cell. If you can control the hub you can control many different processes. The same holds true for cancer. You can take all these mutations and still survive. But if you hit just the critical target, that’s it. And that’s what we need to understand in cancer. We need to understand those (genetic) hubs and how those connections have been perturbed.

What keeps you passionate about science?

Science is knowledge and knowledge improves the human condition in its purest sense. It’s not so much about being published in scientific journals. For me, it’s about that one moment when you know you’re the only person who has ever discovered this one thing – it’s extraordinary. It’s a celebration of life at its deepest level. To understand even a fraction of how it can be and then to share it with others is really just amazing.

It can never be negative because you can only add to knowledge, and for me that’s a very powerful thing. Also knowing that I can actually help someone beyond me by wielding that knowledge to alleviate suffering through therapies keeps me passionate about science. And finally, just seeing that joy of knowledge in my postdocs is also extraordinary.

At what point in your life did you know you wanted to become a scientist?

I was quite young. I grew up in Ireland and went to a convent school where the environment was very rigid and conservative, and you would be severely punished if you asked the teacher the reasoning behind an idea. So for me, I think

science gave me a license to ask questions. It's a requirement. In many ways it was the idea that there's so much more to learn, and not just accept, that led me to this field.

Did you have family members or others in particular who encouraged you to pursue a career in science? If so, who?

Not really. I was the first in my family to go to college. I had a great biology teacher in secondary school, but my family believes that the ultimate success for anyone is achieving happiness. And for me, science makes me deeply happy. So they encouraged me to find something that made me feel fulfilled.

They actually discouraged me to become a doctor because they thought I'd have a dreadful bedside manner. (laughs) They know I have a tendency to want to understand how things work and I wouldn't have been satisfied applying cures that don't make sense to me. So I think they thought science would be where not only I'd be happier, but the people I work with. (laughs)

What's the one scientific question you'd like to answer in your lifetime?

I'd like to know if we could ever understand molecular details enough and actually translate that into more selective and potent therapies that can alleviate the suffering of patients. That's what gets me out of bed in the morning. You only really understand that which you can build from scratch. So with viruses, I can only really understand them if I can build them from their components and predict the outcome.

For me, that's the kind of knowledge that we need for cancer. I mean it's a crazy question, but you have to aim high, right? It's a huge problem to tackle and I don't even care if we're going to be foot soldiers or captains. That's not what's important to me. It's the battle itself, and probably more so that we win it. And if we contribute in any way I'll feel that it's been worth it. 

Clodagh O'Shea braves the peaks of Cerro Torre during an ice climbing trip to the Patagonia region of South America prior to starting her cancer research at the Salk Institute.



Terry Sejnowski (left) and Fred H. "Rusty" Gage

Researchers Elected to Prestigious Organizations for Contributions to Science

THERE WAS PLENTY OF CAUSE FOR CELEBRATION AT THE SALK Institute in April with the announcement that two senior scientists had received major honors on the same day for their contributions to science.

Announcements came on April 27 that **Terry Sejnowski**, whose work helped spark the neural networks revolution in computing in the 1980s, had been elected a member of the National Academy of Sciences (NAS), and **Fred H. "Rusty" Gage**, one of the most highly cited neuroscientists in the world, had been inducted to the American Philosophical Society (APS).

Election into each of these prestigious organizations is among the highest honors bestowed upon scientists. Members of the NAS are recognized for their distinguished and continuing achievements in original research. Founded in 1743 by Benjamin Franklin and modeled after the Royal Society of London, the APS was the first organization in America to promote scientific endeavors and knowledge.

"Both Terry and Rusty are exceptional scientists," said Salk President **William R. Brody**. "Their latest honors are a testament to their pioneering research that is helping to answer important questions in neuroscience."

A Howard Hughes Medical Institute investigator, Sejnowski tries to understand the computational resources of brains, and to build linking principles from brain to behavior using computational models. He pursues his goal by combining both experimental and modeling techniques to study the biophysical properties of synapses -- the connections between brain cells -- and the population dynamics of large networks of neurons.

Sejnowski's election raises the number of Salk scientists who are members of the NAS to 16 (about 27 percent of the faculty). He is also a member of the Institute of Medicine and a fellow of the American Association for the Advancement of Science.

Gage joins a distinguished group of former APS members who include Albert Einstein, Charles Darwin, Thomas Edison, past and present Salk faculty members **Renato Dulbecco**, **Sydney Brenner**, **Francis H. C. Crick**,

Ronald M. Evans, **Inder Verma**, **Tony Hunter** and former Salk president **Augustus B. Kinzel**.

Gage's laboratory concentrates on the adult central nervous system and unexpected plasticity and adaptability to environmental stimulation that remains throughout the life of all mammals. He and his colleagues showed that, contrary to accepted dogma, human beings are capable of growing new nerve cells throughout life.

His lab also showed that environmental enrichment and physical exercise can enhance the growth of new brain cells. His team is studying the underlying cellular and molecular mechanisms that may be harnessed to repair the aged and damaged brain and spinal cord.

Gage has been elected to the National Academy of Science, the Institute of Medicine and the American Academy of Arts and Sciences. He is also the past recipient of the Bristol-Myers Squibb Neuroscience Award, the Robert J. and Claire Pasarow Foundation Award, the Max-Planck Research Award, and the Keio Medical Science Prize. 🏢

“Both Terry and Rusty are exceptional scientists. Their latest honors are a testament to their pioneering research that is helping to answer important questions in neuroscience.”

– WILLIAM R. BRODY
SALK PRESIDENT

New Salk Researcher Named 2010 Rita Allen Scholar

LESS THAN SIX MONTHS AFTER HE JOINED the Salk's faculty, assistant professor **Ye Zheng** was named a 2010 Rita Allen Scholar. He will receive \$500,000 over a five-year period to study how regulatory T cells prevent the immune system from attacking the body's own tissue and causing autoimmune disease.

"It is really an honor for me to have been chosen as a Rita Allen Scholar. I feel I'm following the footsteps of some of the top scientists today, including Salk faculty member **Greg Lemke** and non-resident fellow **Tom Jessell**," Zheng said. "One of the obstacles in the process of starting a lab is the difficulty to obtain external funding, especially grants from NIH. This award will significantly boost the bottom line of my nascent lab and put my research program on the fast lane."

Scholars are nominated by premier institutions and then selected by the Rita Allen Foundation Scientific Advisory Committee and ratified by the organization's Board of Directors. Out of 40 applicants reviewed this year, only seven were designated Rita Allen Scholars.

"Anyone aware of the caliber of the members serving on our Scientific Advisory Committee and Board of Directors knows the vetting process for Scholars is a rigorous one," said Elizabeth G. Christopherson, president and CEO of the Rita Allen Foundation.

"A significant part of our mission is to promote the common good through the work of our Scholars. The Scholars Program concentrates on medical research, and we also hope to advance understanding of the human condition," she said.

Zheng joined the Salk's Nomis Center for Immunobiology and Microbial Pathogenesis in November 2009 after spending four years at the University of Washington and a short stint at the Memorial Sloan-Kettering Cancer Center.

His lab's goal is to tease apart how the body's regulatory T-cells are generated and maintained so that new therapeutic approaches can be developed for a wide range of autoimmune diseases such as type 1 diabetes, Crohn's disease, lupus, and rheumatoid arthritis.



Ye Zheng

Zheng will use the support from the Rita Allen Foundation to generate an autoimmune mouse model that will allow him to dissect the cellular and molecular mechanisms. In addition to providing a better understanding of regulatory T cells, his experiments will suggest new therapeutic approaches, how to improve organ transplant survival, and boost the immune system's response to tumors.

A native of China, Zheng is a graduate of Biochemistry and Molecular Biology from Peking University. He received his master's degree and doctorate in Biological Sciences from Columbia University before completing a postdoctoral fellowship at the University of Washington in Seattle. He is the recipient of the Cancer Research Institute Fellowship and the John S. Newberry Prize. 📄

Discovery Roundup

Computer Modeling Yields Clues to How the Brain Works

A COMPUTER SIMULATION DEVELOPED BY Salk researchers led by investigator **Terrence J. Sejnowski** reveals that neurons in the thalamus, the central switchboard that processes and distributes incoming sensory information to all parts of the visual cortex, engage in a coordinated effort to get their message out loud and clear.

Their findings, published in *Science*, hold important clues to how the brain encodes and processes information, which can be applied to a wide variety of applications, from understanding psychiatric disorders to the development of novel pharmaceuticals and new ways of handling information by computers or communication networks.

Historically, neuroscientists have been limited to recording the activity of single brain cells, but communication between neurons is not limited to one-on-one interactions. Instead, any

given cell receives signals from hundreds of other cells, which send their messages through thousands of synapses.

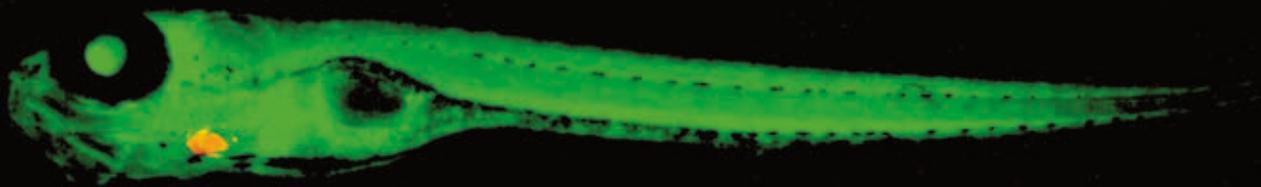
For this reason, nobody could answer a very basic question: How many neurons or synapses does it take to reliably send a signal from point A to point B? This question is particularly pressing for the thalamus. Thalamic input only accounts for five percent of the signals that so-called spiny stellate cells in the cortex receive, even though they drive a good portion of activity throughout the cerebral cortex.

“That is a paradox,” says Sejnowski, a Howard Hughes Medical Institute investigator and professor and head of the Computational Neurobiology Laboratory. “How can so few synapses have such a big impact? If the average spiking rate were the determining factor, thalamic input would be drowned out

by the other 95 percent of the inputs from other cortical cells.”

Based on the assumption that the brain cares about the reliability and precision of spikes, Sejnowski's team developed a realistic computer model of a spiny stellate cell and the signals it receives through its roughly 6,000 synapses. They found that it is not the number of spikes that's relevant but rather how many spikes arrive at the same time.

The team's model predicted that it only takes about 30 synapses out of 6,000 firing simultaneously to create extremely reliable signaling. And the prediction lined up with currently available in vivo measurements. The researchers hope that their findings will give them new insight into the holy grail of neurobiology: decoding the neural code or language of the brain. 



Zebrafish Study with Human Heart Implications

RESEARCHERS LED BY SALK PROFESSOR **Juan Carlos Izpisua Belmonte** have identified a population of heart cells in zebrafish with the amazing ability to regenerate within a month after 20 percent of the tissue has been destroyed. The finding, published in *Nature*, could provide insight into how mammalian hearts might be coaxed into repairing themselves after injury brought on by heart attack.

Interestingly, it is not stem cells that repair the injured fish hearts. Instead, the patch-up work is done by differentiated cardiac muscle cells known as cardiomyocytes, the cells whose normal job is to supply the contractile force of the heart.

“What the results of our study show is that mother nature utilizes other ways besides going all the way back to pluripotent stem cells to

regenerate tissues and organs,” says Izpisua Belmonte, noting that, at least in fish, the body may have evolved surprising repair strategies driven by cell types more seasoned than stem cells.

Human hearts cannot undergo these types of regenerative changes on their own. When damaged by heart attack, our heart muscle is replaced by scar tissue incapable of contracting. However, prior to heart failure, damaged mammalian heart muscle cells enter a save-yourself state known as “hibernation,” in which they cease contracting in an effort to survive.

Chris Jopling, a postdoctoral fellow of Izpisua Belmonte's at the Center for Regenerative Medicine in Barcelona who worked with researchers at the Salk, sees human heart “hibernation” as significant. “During heart

regeneration in the zebrafish, we found that cardiomyocytes displayed structural changes similar to those observed in hibernating cardiomyocytes,” he said, noting that those changes were actually necessary before the fish cardiomyocytes could start dividing. “Because of these similarities, we hypothesize that hibernating mammalian cardiomyocytes may represent cells that are attempting to proliferate.”

So the good news is that mammalian hearts can undergo a kind of metabolic “downsizing” that is a prelude to cell division. “This idea fits nicely with the findings from a number of groups – that forced expression of cell cycle regulators can induce cardiomyocyte proliferation in mammals,” says Jopling. “Maybe all they need is a bit of a push in the right direction.” 

How Light Receptors Get Their Message Across

A TEAM OF RESEARCHERS FROM THE SALK INSTITUTE AND

Duke University have identified the courier that gives the signal to revamp a plant's gene expression pattern after photoreceptors have been activated by light. Their findings, which are published in the June 25 issue of *Cell*, bring scientists closer to being able to harness plants' phenotypic plasticity to help boost agricultural yields and manage weeds under challenging growing conditions.

"Light is probably the most important environmental cue for a plant," says Howard Hughes Medical Institute investigator **Joanne Chory**, professor and director of the Plant Molecular and Cellular Biology Laboratory. "Understanding how light signaling triggers morphological changes in the plant will have a really big impact on every facet of plant biology."

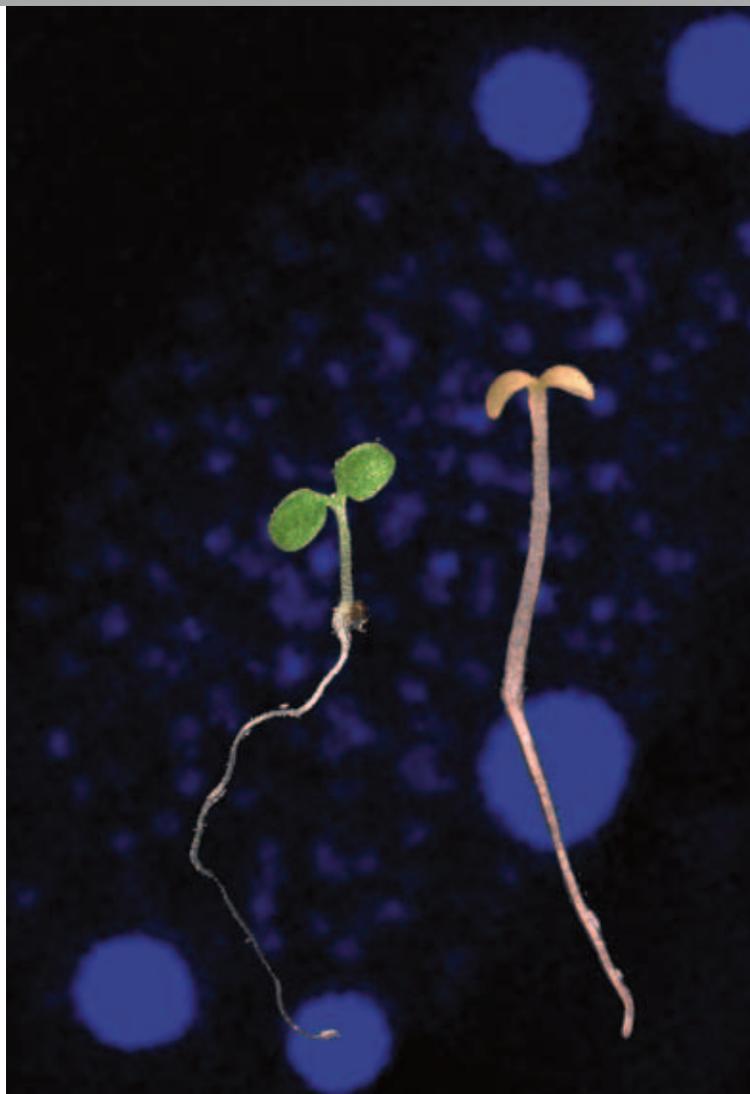
Because plants are so reliant on light, they have evolved a number of different photoreceptors that are defined by the color of light they absorb. For example, photoreceptors absorbing in the red/far-red spectral range, also known as phytochromes, help sense the presence of other plants in their neighborhood by detecting changes in the color of light.

Other studies had shown that light directly regulates the relocation of phytochrome A (PHYA) and phytochrome B (PHYB) from the cytoplasm to the nucleus, where they congregate in distinct foci that are commonly referred to as phytochrome nuclear bodies. Sitting at the microscope for hundreds of hours allowed first author **Meng Chen** to identify a new gene based on his observation that PHYB could not be found in large nuclear bodies. When HEMERA was missing, plants were unable to respond to light, Chen explains, and grew into spindly, albino seedlings that died before they could make flowers.

Chen and his collaborators then found that in HEMERA mutants, key proteins that must be degraded by cells responding to light were still present, thereby making the seedling believe it was still in the dark. Digging deeper, they found striking structural similarities between HEMERA and the yeast protein RAD23, whose job it is to shuttle proteins flagged for destruction to the cellular junkyard. Thus, these nuclear bodies appear to be sites where key regulatory proteins go when they need to be removed from cells.

But Chen discovered that HEMERA does something else: It also slips into chloroplasts, small compartments that contain chlorophyll and are in charge of photosynthesis, which could explain the pale appearance of hemera mutants.

Although chloroplasts contain their own tiny genome, most proteins necessary for chloroplast maturation are encoded in the nucleus and need to be directed to their final destination. In order to ensure proper chloroplast differentiation, gene expression in the nucleus needs to be coordinated with gene expression in the chloroplast.



Plants without a functional HMR gene (shown on the right) are unable to respond to light. They fail to produce chlorophyll and grow into spindly albino seedlings that die young. Phytochrome nuclear bodies, which contain activated phytochrome and HEMERA are shown in the background (blue dots).

Image courtesy of Dr. Meng Chen, Duke University

"A protein that travels to both organelles could serve as a simple yet elegant solution to ensure coordinated gene activity in both locales," says Chory, holder of the Howard H. and Maryam R. Newman Chair. "Although we do not know what HEMERA is doing in the chloroplast, its presence in both the nucleus and chloroplast would ensure that the seedling has a rapid and appropriate response to light when it emerges from the soil." 



Colleagues Remember Former Salk Chairman Frederick Rentschler

FREDERICK B. RENTSCHLER, 70, a corporate leader and longtime Salk Trustee who served as Chairman and Vice Chairman of the Board, and briefly as Salk Chief Executive Officer, died July 6 in Scottsdale, AZ.

Salk colleagues expressed deep sadness at the news of his passing, observing that he was a great friend to the Institute, providing his generous support and leadership when it was most needed.

"Fred loved the Institute, loved the faculty and loved to be around the science," said **Inder Verma**. "He was a friendly, warm, big bear of a man."

"He was generous with his time...and when we needed his leadership he provided it," said **Fred H. Gage**. When Rentschler served as Salk CEO, he would fly in to San Diego on a weekly basis. "We were grateful to Pam (his spouse) for allowing him to do this – it was a sacrifice."

During his highly-successful business career, Rentschler was the President and CEO of the Beatrice Companies, Northwest Airlines, and Hunt-Wesson. A native of Cincinnati, he earned a B.A. in Economics and History from Vanderbilt University, and an MBA in Marketing from Harvard Business School. He was a Captain in the U.S. Marine Corps in the 1960s and served as Deputy Director of the White House Fellows Program in the 1970s.

Rentschler, who with his wife, Pam, split their time between cattle ranching in Cameron, Montana, and a home in Scottsdale, Arizona, provided nearly 20 years of service to the Institute. His relationship with the Salk began in 1986 when he joined the International Council. In 1988 he joined the Board of Trustees, serving until November of 2005 when he stepped down and became a Trustee Emeritus.

During a period of leadership transition, Rentschler served as the Salk's CEO, his large frame and booming voice a major presence in the Institute's North Tower. "He was a former Marine, and occasionally had the personality of a Marine," recalled Verma. "He was passionate about Salk science and was always happy to be around here."

"He was in command of every situation and knew instinctively the right thing to do," agreed Salk CFO **Kim Witmer**. "Fred really connected with the science and the Salk's mission."

Rentschler's legacy to the Salk included sponsoring the Institute's first developmental chair, saying it gave him great pleasure to help advance the careers of young scientists. (The Frederick B. Rentschler Developmental Chair is currently held by **Lei Wang**.)

Memorial contributions may be made to Madison Valley Medical Center, 305 N. Main St., Ennis, MT, 59729.



Richard Krauzlis

Jeff Long

Researchers in Systems Neurobiology and Plant Biology Receive Promotions

SALK INSTITUTE SCIENTISTS

Richard Krauzlis and **Jeff Long** have each been promoted to full professor and associate professor, respectively, in the latest round of faculty reviews that took place in March.

The promotions were based on recommendations by the Salk faculty and non-resident fellows, then approved by President **Bill Brody** and the Institute's Board of Trustees.

Krauzlis is interested in understanding the brain mechanisms that link motor control to sensory and cognitive processing. The long-term goal of his research is to understand how neural circuits distributed across multiple brain regions coordinate even simple motor outputs like eye movements to higher-order processes, such as attention, perception and executive control.

This information is a fundamental step toward developing better clinical approaches to complex disorders of attention and impulse control, such as attention deficit hyperactivity disorder and autism. A graduate of Princeton University and the University of California at San Francisco, the latter being where he received his doctorate, Krauzlis joined the Salk Institute in 1997.

Long, who conducts his research in the Salk's Plant Molecular and Cellular Biology Laboratory, studies embryogenesis in *arabidopsis*, the lab rat for plant biologists. His lab focuses on the TOPLESS gene, so named because of its power to regulate the development of a shoot or a root structure from a seedling. His team has learned how to control the function of this gene, which ultimately can serve to manipulate plant structure and agricultural output.

A recipient of the Ray Thomas Edwards Foundation Career Development Award and graduate of the University of Wisconsin–Madison, where he received his doctoral degree, Long conducted his postdoctoral research at the California Institute of Technology before joining the Salk in 2003.



Golfers from left: nbbj architects Jean Claude Constadse, Brian Mumford, Thomas Clyman, Lillian Asperin-Clyman

Annual Foundation Seminar and Golf Tournament Bring Out the Best of Salk's Supporters

PROMINENT ATTORNEYS FROM SOME OF the country's top law firms and consultants in the non-profit field were among the featured speakers during the Salk Institute's 38th annual Tax & Management Seminar on Private Foundations in May.

Chaired by **Edwin K. Hunter**, an attorney with the firm of Hunter, Hunter & Sonnier (LLC) in Lake Charles, LA., and trustee for the Joe W. and Dorothy Dorsett Brown Foundation, among other charitable foundations, the event drew representatives from national and international foundations who spent three days in La Jolla for an update on the latest developments in tax laws and regulations, as well as foundation management and governance issues.

New to this year's seminar was the addition of a second track of discussions focused specifically on management and governance. Guest

speakers such as **Valerie Jacobs**, founder of Valerie Jacobs Consulting, provided an insightful talk on succession planning, while Rockefeller Philanthropy Advisors covered impactful investing issues.

"The second track proved popular. Most of the foundations with multiple attendees split their personnel between parallel presentations. This gave them a more efficient experience," Hunter said. "We also witnessed significantly more interactions between presenters and audience, probably attributable to the smaller break-out groupings."

Since its inception in 1972, the tax seminar has provided an invaluable service to foundation managers. What started out as an intimate gathering has steadily grown into a highly informative and comprehensive tax briefing for the non-profit community.

Some of the many foundations represented at this year's seminar included: the Leona H. and Harry B. Helmsley Charitable Trust; the Guenther Foundation, and the Conrad Hilton Foundation.

The seminar was preceded on May 11 by the Salk Institute's 1st annual Golf Tournament, which drew more than 100 golfers—both Tax Seminar attendees and corporate sponsors from the local community.

Held at the Del Mar Country Club, the Golf Tournament helped raise funds for the Salk Institute's basic biological research. Everyone enjoyed a relaxing day of golf, a delicious dinner, and raffle prizes. Up for grabs was a Mercedes Benz to the golfer who could make a hole-in-one at the 12th hole; but no one was lucky enough to take home the luxury sedan. 🏌️‍♂️

Nomis Foundation Gifts Additional \$6.5 Million to Salk Center, Establishes Endowed Chair

TWO YEARS SINCE ITS INITIAL \$11.5 MILLION

contribution to launch the Nomis Center for Immunobiology and Microbial Pathogenesis, the Switzerland-based Nomis Foundation has gifted an additional \$6.5 million in support of continued research efforts in understanding infectious disease.

Two million of the \$6.5 million gift will establish the Nomis Foundation Chair, a senior scientist endowed chair that will be awarded to the Center's director, **John A. T. Young**. The fund will be augmented with an additional \$1 million in accordance with the Joan Klein Jacobs and Irwin Mark Jacobs Senior Scientist Endowed Chair Challenge. Launched in 2008, the Challenge is intended to create 10 new permanent chairs in support of senior faculty members.

An additional \$2.5 million of the most recent Nomis gift will fund a comprehensive fellowship program to train and support 10 promising scientists to become leading researchers in the field. The remaining \$2 million will establish an endowment to fund the purchase of cutting-edge technology and equipment to ensure the NCIMP remains at the forefront of research in Immunobiology.

"We are enormously grateful for the Nomis Foundation's continued commitment and generosity toward this very important area of biological research," said Salk Executive Vice President **Marsha A. Chandler**.

Salk President **Willima R. Brody** observed: "The work that will continue as a result of this latest contribution will help scientists decipher the underpinnings of immunological deficiencies and the inflammatory process associated with major acquired disease, while endowed chairs created through the Jacobs Chair Challenge ensures the Salk Institute retains some of the world's brightest senior scientists."

The overarching goal of the Nomis Center is to take a multi-pronged approach toward research on the pathophysiology of disease that develops from chronic infections. In addition to Young, who studies the cell biology of virus infection and anthrax intoxication, the Center includes assistant professors



John A. T. Young

Björn Lillemeier and **Ye Zheng**. Both joined the Salk faculty in November 2009 and conduct complementary research on T-cells, which play an important role in regulating the body's immune system.

The Young lab has made significant discoveries over the last two years, particularly in understanding details associated with the early stages of AIDS infection. His team's findings regarding the virus-host interaction are pointing scientists toward possible new therapeutic strategies to combat infection. 

Palo Alto Meeting

THE INSTITUTE HOSTED A SCIENTIFIC TALK IN PALO ALTO, Calif., where Salk Associate Professor **Andy Dillin** (center, right) gave a presentation titled *Aging and Alzheimer's: New Approach to an Old Problem* in March. Pictured with Dillin is philanthropist **Vincent Coates** (seated) with his wife, Stella, Salk President **Bill Brody** and Salk Board of Trustee member **Fred Dotzler**. 



Back to Basics Lecture Draws Friends Back to the Salk

DONORS GATHERED AT THE SALK INSTITUTE to hear the answer to a question that one of its senior faculty members has investigated for the better part of his 30-year career: Is it possible to mimic the positive effects of exercise with a pill?

The answer is yes, said **Ron Evans**, a professor in the Gene Expression Laboratory and a Howard Hughes Medical Institute investigator. In a study that made international headlines, his team of scientists showed that the investigational drug, AICAR, revved up the metabolic master switch in the genes of sedentary mice, resulting in enhanced muscle tone and endurance when the animals were placed on treadmills.

Evans' presentation in May was part of the Back to Basics program, which returned after an extended hiatus. The popular event, organized by Salk's Planned Giving office, also

featured a presentation by **Mary Van Nostrand**, a certified financial planner with more than 27 years of investment experience.

Evans explained in detail how the drug, made up of molecules naturally produced in the body, works at the genetic level to trigger an increase in metabolic activity, essentially mimicking exercise. While AICAR and a second drug produced in his lab, GW1516, immediately caught the attention of athletes looking for an edge in their performance, Evans said the drugs could have much broader medical applications.

"These drugs are not for athletes, but they have the potential to treat a number of serious medical problems, such as frailty, obesity – essentially anyone who cannot physically exercise as a result of disease or injury."

Van Nostrand preceded Evans with a presentation on the latest rules and regulations

and wealth-building benefits associated with Roth IRAs. In most cases, she said, donating traditional IRAs to charity is the best option to maximize their funding impact since they are taxed heavily upon the owner's demise.

On the contrary, Van Nostrand explained that Roth IRAs are never taxed since contributions you make have already been taxed, and they don't have minimum required distributions. Also, if a Roth IRA is willed to a younger member of the family, the interest it earns, as well as additional contributions to the account, continue to compound year after year tax-free, making it an effective estate planning tool.

"I like to think of Roth IRAs as the gift that keeps on giving," Von Nostrand said. 📞

*For more information on Back to Basics and/or planned giving, please contact **Cheryl Dean**, Senior Director, Planned Giving at 858.453.4100 x1228 or e-mail cdean@salk.edu.*



Mobile Science Lab Van Road-Ready

MEMBERS OF LAS PATRONAS JOINED SALK INSTITUTE STAFF in March for a ceremony to unveil the new Mobile Science Lab van. The all-volunteer, non-profit fundraising organization donated \$25,000 to purchase the vehicle, its wrap-around exterior graphics and interior shelving for Salk's educational outreach program, which annually visits

at least 18 schools in the San Diego region to provide more than 2,200 middle school students with hands-on science experience. Las Patronas representatives pictured here are **Lise Wilson**, 2010 Ball Chair (from left), **Sallie Warren**, vice president of Grants, and **Tracy Lyon**, president. 📞

A TASTE of DISCOVERY

Researchers Share Stories of Latest Breakthroughs in New York City

TWO SPECIAL EVENTS IN NEW YORK CITY ON APRIL 13TH

introduced East Coast friends to some of the Institute's latest and most exciting research.

The New York Salkexcellerators held its inaugural meeting in the offices of Covington and Burling LLP in *The New York Times* building.

More than 50 people attended to hear a fascinating presentation by **Inder Verma**, a senior scientist in the Salk's Laboratory of Genetics and an American Cancer Society Professor, who discussed the steady development of gene therapy – a field in which he pioneered the use of stripped-down versions of viruses, in particular HIV, to ferry intact versions of genes that are defective or missing to cells throughout the body.

Non-Resident Fellow Thomas M. Jessell, Ph.D. (left) and Inder Verma



Most recently, the lenti virus engineered in his lab in the 1990s was successfully used in clinical trials to arrest a genetic brain disease in two boys from Spain. The news has since sparked a renaissance in gene therapy.

“Dr. Verma’s delivery made even the most complex research accessible to an audience with a generally non-science background,” said **Lena Evans**, a founding cabinet member of the New York Salkexcellerators. “Many were impressed by the incredible strides made at the Salk over the last 20 years. For those in the audience who were interested in a particular disease or therapeutic target, it was clear that gene therapy applies to so many of their concerns, which stressed the broad impact of basic research.”

The New York group is spearheaded by Evans and fellow cabinet members **Carrie Hammerslag**, **Mark Kronfeld**, **Mary Jane Salk** and **Sara Tirschwell**. Its West Coast counterpart, which held a meeting May 3 with guest speaker and Salk scientist **Fred H. “Rusty” Gage**, formed in 2008.

More than 80 friends of the Institute attended the Taste of Discovery luncheon, which was held at the 21 Club. Verma and Salk’s **Joanne Chory**, professor and director of the Plant Molecular and Cellular Biology Laboratory, each gave brief talks from their respective fields in a presentation titled *The Broad Reach of Salk Science: From Plants to Cancer*.

A world-leading plant biologist, Chory explained her lab’s interest in the mechanisms governing how plants respond to light and her discovery of brassinolide, a steroid hormone that controls plant development. It is her lab’s goal to help solve the world’s food supply shortage with this and other findings. Mary Jane Salk underwrote the event. 🏠

For more information on attending Salk events, please contact **Betsy Reis**, director of Donor Relations and Stewardship, at 858-453-4100 x1426 or e-mail: breis@salk.edu.



Kenneth Rind, Ph.D.



Irwin Mark Jacobs, Sc.D. (Chair, Salk Board of Trustees)



Morleen Rouse (left) and Françoise Gilot



JoAnn Faust in her 20s

Salk volunteers Jane Spahn (from left), JoAnn Faust, Otilie Baer, Ellen Zimmerman and Jeannie Robert during the Salk's unveiling of the March of Dimes plaque in 2005.

Friends Make Donations in Memory of Longtime Co-Worker and Volunteer JoAnn Faust

FORMER SALK RECEPTIONIST JOANN FAUST MAY HAVE RETIRED

from the Institute 17 years ago, but her endless supply of laughter and her fun-loving personality are still fondly remembered by close friends and colleagues.

She worked at the Institute from 1975-1993, after which she remained closely involved as a volunteer – first with the Women's Association of the Salk Institute (WASI) and later as a member of the Salk Institute Associates (SIA).

If you couldn't catch her at the front desk, you would likely find JoAnn passing the time during her lunch break knitting in the WASI meeting room. This is where fellow knitter and Salk Administrative Assistant **Cindy Doane** says that, despite their 36-year age difference, she developed a deep friendship with JoAnn that lasted 22 years.

"She was my best friend in San Diego. We were always talking about knitting and exchanging patterns," says Doane, who is among a group of friends who made contributions to the Salk in JoAnn's memory. "We'd often go to the knitting shop together and, of course, do lunch in the process. She had four great-grandchildren she would knit for, but she would also knit baby caps and booties for premies and donate them to the hospital."

Others like Project Coordinator **Betsy Pené** remember JoAnn's penchant for laughter and how she could find amusement in some of the simplest things. She was particularly fond of JoAnn's adolescent side.

"We used to have secret Santa gift exchanges in our department and one year I drew her name," Pené says. "I went to a street fair and picked up some toys, and she loved them. She was just like a big kid."

For her 75th birthday, JoAnn announced that she wanted to spend the night at the San Diego Wild Animal Park for its Roar & Snore sleepover program. It was the first time she ever slept in a tent, and she fulfilled her birthday wish with her family in tow.

"She said the snore came from her cousin who shared her tent and snored all night," Doane says with a laugh.

JoAnn may have been a child at heart, but her friends say she was a serious collaborator when it came to her work at the Salk. Originally hired as a receptionist after moving to California from the East Coast with her three children, she regularly volunteered to take on extra duties whenever she was needed.

"She was really so much more than a receptionist," Pené says. "JoAnn served as the Institute's events coordinator because we didn't have one at the time. She was always running around picking up food and anything else that was needed for an event. JoAnn also managed all volunteer coordination for mailings and tours. She was very dedicated to the Institute."

After retiring, JoAnn spent more time on the golf course, where Doane says she would join her for a round almost every Friday morning. She continued volunteering at the Institute until the fall of 2009 when JoAnn was diagnosed with a brain tumor after the Thanksgiving holiday.

The news shocked her close friends since she had never had any major health problems until that point, Doane says. By December of last year, JoAnn went into hospice, choosing to no longer see her friends. Doane kept in touch with her best friend by sending letters until just before JoAnn passed away on Jan. 16. She was 84 years old.

"My guess is that she didn't want people blubbering over her," says Doane of JoAnn's decision not to take visitors. "I miss talking with her about anything and everything. She was very special." 📖

If you would like to learn more about making a donation to the Salk Institute in memory of a loved one, please visit: www.salk.edu/plannedgiving.



Maestro Thomas Wilkins at the helm during last year's Symphony at Salk. He returns in August for the sixth consecutive year.

Symphony's Maestro Wilkins Anticipates 'Electric' Performance from the Legendary Liza Minnelli

IT WAS IMPOSSIBLE FOR MAESTRO

Thomas Wilkins and his colleagues not to talk about Liza Minnelli over dinner. They had witnessed a performance by the stage and screen legend to commemorate her induction into the Hollywood Bowl's Hall of Fame and were still electrified by what they had seen two hours earlier.

"I'll tell you, when Liza steps out on the stage she has the energy of a 14 year-old. I mean she just does not surrender," says Wilkins, principal guest conductor for the Hollywood Bowl Orchestra. "She pours all of her heart and soul into her performance. It's really electric and mesmerizing all at the same time."

Friends of the Salk Institute will have the opportunity to experience Minnelli's pizzazz firsthand when she headlines the 15th annual Symphony at Salk – A Concert Under the Stars on Aug. 28. For one night only, Minnelli will bring her larger-than-life spectacle to the Institute's intimate Theodore Gildred Courtyard where she will share the stage with the San Diego Symphony Orchestra, which Wilkins will conduct for the sixth consecutive year.

Aside from the music and the time he gets to spend in sunny San Diego each year, Wilkins says it's the chance to contribute a small part to a worthy cause that keeps him coming back to Salk's annual fundraiser.

"Not only is it a fun event, but the people at Salk are just great human beings. I always

walk away inspired and hopeful about the future of medical science," he says. "I love the minute part that I can play in helping to advance their scientific research. And they've really adopted me as part of the Salk family, which is pretty cool."

Wilkins is in his third season with the Hollywood Bowl Orchestra and continues his role as music director for the Omaha Symphony. He stepped down last year as the resident conductor of the Detroit Symphony Orchestra after nine seasons.

"At this stage in my career, I end up guest conducting so many weeks out of the year I just couldn't give enough time to the Detroit Symphony for me to warrant staying on staff," says Wilkins, who has developed into one of the most sought after guest conductors in the United States during his more than 20-year career. "And quite frankly, it's really time for some young whippersnapper to come along and have an opportunity."

With each passing year as Symphony at Salk's guest conductor, Wilkins has concluded that there is little difference between his work in music and that of the scientists in the Institute's laboratories. Both disciplines are focused on the same goal: to improve the human condition.

"The classical music genre represents some of the greatest achievements of mankind like any scientific endeavor," he explains. "You think of the lasting power of Beethoven's Fifth Symphony



Liza Minnelli

and 200 years later it is still current and appropriate to our lives.

"Much of classical music deals with this indelible human spirit when faced with some sort of obstacle or challenge. And to the extent that people receive this music and understand the journey that composers take us on, the aim is that we do indeed walk away as better human beings," Wilkins says. "And clearly that is what they are doing scientifically at Salk as well." 



Excited about the Institute's new BioMark Fluidigm microfluidic system, Geoffrey Wahl commented that "this technology, among many other uses to which it can be put, will revolutionize our ability to interrogate single cells to determine how they receive and process signals from the environment." Pictured (from left): Ben Spike, Samantha Cheung, Wahl, and Jennifer Lin

Researcher to Serve on Advisory Panel for Top Breast Cancer Organization

SALK PRINCIPAL INVESTIGATOR GEOFFREY WAHL HAS BEEN selected to serve on a new international panel of more than 60 top-ranking scientists, clinicians and advocates to guide the extensive research program of Susan G. Komen for the Cure®, the world's largest breast cancer organization.

The distinguished experts from a wide range of disciplines and seven countries will serve as inaugural members of Komen for the Cure's new Scientific Advisory Council (SAC). They will provide scientific peer review for the breast cancer grants and programs that Komen funds annually. The Scientific Advisory Council will also provide Komen leadership with guidance on breast cancer education and public policy.

Susan G. Komen for the Cure®, the largest source of breast cancer research funding outside of the U.S. government, currently funds nearly 760 active research grants around the world, with plans to invest another \$55 million in 105 projects this year.

The new advisory council members have expertise in many specialties, including clinical research, laboratory research, surgery, pathology, radiation oncology, epidemiology, medical oncology, behavioral sciences, disease prevention, bioinformatics and international health. Wahl, a professor in the Salk's Gene Expression Laboratory, studies the genetic basis of the origin and progression of cancer. [Read more](#)

Education Outreach Program Receives Award of Excellence

THE SAN DIEGO SCIENCE EDUCATORS ASSOCIATION (SDSEA) recognized the Salk Institute's Education Outreach Program (EOP) with an award of excellence for its support of K-12 science education in the local region.

Two San Diego teachers whose students participated in the Salk's Mobile Science Lab and the annual High School Science Day programs nominated the Salk program for the award.

The SDSEA is a professional organization supporting science educators. Its mission is to promote science literacy and advocate for science education by promoting professionalism, leadership and community outreach.

"As a past teacher, it is an honor to be recognized by my former colleagues for providing quality educational opportunities to San Diego students," said Salk Education Specialist **Dona Mapston**. [Read more](#)

Dona Mapston (left) and Ellen Potter





Salk President William R. Brody at the groundbreaking ceremony with his wife, Wendy.

Johns Hopkins University Honors Brodys with Learning Commons

THE HOMEWOOD CAMPUS OF THE JOHNS

Hopkins University held a ceremony on June 6 to celebrate the groundbreaking of the Brody Learning Commons, a state-of-the-art building named in honor of its former president, **William R. Brody**, and his wife, Wendy.

Several years in the planning, the Brody Learning Commons will be a light-filled, four-story hub for collaborative learning, with a robust

technology infrastructure and spaces for group and individual study. The building will feature a quiet reading room, a new home for the Department of Rare Books and Manuscripts, new laboratory and instruction space for the Department of Preservation and Conservation, and a new atrium and café.

More than 200 guests attended the groundbreaking ceremony, which was held outside the

campus' Milton S. Eisenhower Library. Brody served as JHU president for 12 years before being named president of the Salk Institute in late 2008.

"Having a place where students will gather to study and learn named after us feels like we get to keep a piece of Hopkins with us forever," said Wendy Brody. The building is scheduled to be completed in July 2012. 📶📶

Wireless Sensor Startup Wins UC San Diego Entrepreneur Challenge

PING WANG, A GRADUATE STUDENT IN **Terry Sejnowski's** Computational Neurobiology Laboratory, was part of a UCSD Engineering and Rady School of Business graduate student team that won the university's Entrepreneur Challenge. The students developed wireless sensors that monitor the heart without touching the patient's skin.

Jacobs School of Engineering graduate student Mike Chi developed the technology with other team members, including the Salk's Wang, **Yuchen Cao**, **Mehmet Parlak**, and **Stephen Chen**. The group received \$25,000 in cash and

\$15,000 in legal services to support their start-up company, Cognionics.

Engineers and physicians are increasingly turning to wireless technologies and innovative circuit designs to develop sensors that cut health care costs through better preventive care and shorter hospital stays. Wireless sensors also offer patients more freedom than wired sensors that are attached to machines. The UC San Diego wireless sensor project could lead to unobtrusive heart sensors for long-term cardiac health monitoring.

The sensors record "biopotentials" – tiny voltage signals that appear on the skin surface.

Biopotentials emanate from electrically active cells, such as neurons and cardiac cells, and propagate through the conductive media of the human body.

One of the project's goals is to take the sensing technology out of the hospital setting and into the home environment, without constraining the mobility of the patient. The technology would also allow doctors to track cardiac or brain activity during exercise, or to monitor the health of soldiers on the battlefield. 📶📶



Ping Wang

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Salk Calendar

AUGUST 2010

25–28 International Council Meeting
at the Salk Institute

28 Symphony at Salk,
Featuring Guest Artist Liza Minnelli

SEPTEMBER 2010

29 A Taste of Discovery San Diego

OCTOBER 2010

27–29 Faculty Symposium on Biological Complexity
Salk Medal Awards Ceremony

NOVEMBER 2010

1 Breathing & Sleep Symposium



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A Concert Under the Stars
Symphony at SALK