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מכון ויצמן למדע
WEIZMANN INSTITUTE OF SCIENCE



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Morris Kahn

*Serial entrepreneur,
serial philanthropist*

The Bench to Bedside Project

Mort Zuckerman is cultivating
U.S. and Israeli scientific
leadership



From the President

Dear Friends,

In my travels and meetings with friends on nearly every continent, I am always heartened to see the groundswell of support for basic research—and I'm not only talking about financial support but also a deep understanding of its essential value in addressing some of the biggest scientific challenges.

This past year has witnessed several prominent breakthroughs which validate that understanding. Take, for example, the cancer therapy devised by Prof. Zelig Eshhar of our Department of Immunology, which is showing highly promising results in clinical trials. That is the end result of a lifetime of work on the part of Prof. Eshhar and many colleagues and collaborators. Another example is the successful therapy for early-stage prostate cancer that emerged from basic research conducted in the labs of Profs. Avigdor Scherz and Yoram Salomon. You can read about both stories in this issue of *Weizmann Magazine*.

I would also like to point your attention to the Zuckerman Leadership Program (p. 44), which will play a key role in enhancing the global network of scientists with connections to the Weizmann Institute. The program, enabled by a visionary gift by our friend Mort Zuckerman, is a meaningful step to this end and comes at a time when Israeli academia often finds itself under a siege of anti-Israel rhetoric spurred by political goals.

There is much more to read about in these pages, including a look back at our International Board meetings in November and, as always, introductions to some of our newly hired recruits whose research I invite you to follow and take pride in.

With all best wishes,

Prof. Daniel Zajfman

President, Weizmann Institute of Science

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Keep the circadian clocks ticking

As we age, we can feel ourselves slowing down. It turns out that our circadian clocks—mechanisms encoded in our genes that keep our bodies attuned to day and night—slow down as well. **Dr. Gad Asher** of the Department of Biological Chemistry and his research group recently showed that certain substances found in many common foods are linked to the timekeeping abilities of these internal clocks through a group of metabolites whose levels drop as we age.

We get the substances, called polyamines, from food, but our cells manufacture them as well. Dr. Asher and his group knew that polyamines regulate cellular growth and proliferation—processes that are also tied to the functioning of the cells' circadian clocks. And levels of these substances were known to drop as we age.

Working with mice and cultured cells, Dr. Asher and his colleagues found that, indeed, enzymes that are needed to manufacture polyamines undergo cycles that are tied to both feeding and circadian rhythms of day and night. In mice engineered to lack a functional circadian clock, these fluctuations did not occur. These experiments suggested that polyamines are both affected by and affect the clocks: That is, they are embedded components of our circadian mechanisms.

Blocking polyamine synthesis in young mice slowed down their clocks. Conversely, adding polyamines to the drinking water of elderly mice restored the functions of their slowing circadian clocks—giving hope to the researchers that the same might be possible, one day, for humans. Dr. Asher says, “The ability to repair the clock simply, through nutritional intervention with polyamine supplementation, is exciting and obviously of great clinical potential.”

Science Briefs

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To catch a particle of light

Dr. Barak Dayan has figured out how to pluck a single photon—a particle of light—out of a light pulse, a longtime goal of particle physicists who were galvanized by the mere challenge and also aware of its potential applications.

Already today, light pulses are the workhorses of communications systems. “But once we move over to quantum computation and communications systems, which will harness the ‘weird’ rules of quantum physics, information will have to be encoded in single photons,” says Dr. Dayan, a member of the Department of Chemical Physics.

“Each photon will then represent a single ‘qubit’—a quantum bit that can exist in more than one state at the same time (for example, an equal combination of both 1 and 0),” he explains, enabling new types of computing that are nearly inconceivable today.

To build a trap for a single photon, the researchers began with a single atom—guided and cooled to

near-zero temperatures with lasers. In previous work, Dr. Dayan and his group had used the single-atom system as a “photonic router” that switched a single photon to different directions, depending on the command given by the single photon before it.

In the new study, they managed to divert just one photon out of a pulse that contained numerous photons, demonstrating the ability of their system to turn itself off quickly enough to let all the rest of the photons continue undisturbed through the optical fiber.

The applications of this scheme for quantum communications range from eavesdropping for security and other purposes to photonic quantum communication systems, to the purification of quantum cryptography systems. Dr. Dayan says he is particularly excited by the new avenues of scientific research that will be opened by the ability to control individual particles of light.

A timely flight to Jupiter

The Weizmann Institute of Science will have a direct line to Jupiter, if all goes according to plan, sometime in the year 2030. **Dr. Yohai Kaspi** of the Department of Earth and Planetary Sciences is the principal investigator on an experiment that will be sent to that planet aboard the JUICE (JUUpiter ICy satellite Explorer) spacecraft, a mission planned by the European Space Agency (ESA) to investigate the properties of the Solar System's largest planet and several of its moons.

This experiment, one of 11 to be included in the mission, known as 3GM (Gravity & Geophysics of Jupiter and Galilean Moons), is a collaboration between Dr. Kaspi's team and scientists from the University of Rome.

The Israeli group, with funding from Israel's Ministry of Science and Technology, is providing an atomic clock built by the Israeli company AccuBeat; the Italian team will add a radio beam. When focused on the planet, the beam will penetrate the upper layers of its atmosphere, and the clock will time the radio waves as they pass through the planet's atmosphere.

This set-up will give researchers valuable information on the composition of Jupiter's atmosphere. During



📍 *Two clocks, only one of which is going to Jupiter. The difference in accuracy between the two is a factor of 100,000,000.*

scheduled "flybys" of three of Jupiter's moons, the apparatus will measure variations in the gravitational fields, which are expected to help researchers map the liquid oceans that are thought to lie deep beneath their frozen exteriors. Many planetary scientists think that if life on other planets is found—most likely microorganisms—it will be found in these oceans.

Working with AccuBeat, a designer and manufacturer of timing devices used in aerospace, defense, and telecommunications, Dr. Kaspi and his team are currently planning the assembly of a clock that is so accurate it would lose less than a second in 100,000 years, and strong enough to survive the eight-year one-way trip and still function in the harsh conditions of space. Their design was recently approved for flight by ESA, but launch day is six years away—in 2022—and there is plenty of planning yet to be done.

"This will be the first-ever Israeli-built instrument to go beyond Earth's orbit," says Dr. Kaspi. "These measurements will allow us to learn valuable information about the structure of Jupiter's atmosphere and about what is driving the strong jet streams and storms on this planet."

Breakthrough leukemia therapy

A therapy devised by Weizmann Institute immunologist **Prof. Zelig Eshhar** for the treatment of a specific kind of advanced blood cancer has shown tremendous results in an early-stage clinical trial led by researchers at the University of Pennsylvania's Abramson Cancer Center and Perelman School of Medicine. In the trial, cancers in 27 out of 29 patients went into remission or disappeared altogether. All of the patients in the study were considered "end-stage"—people with advanced cancers who have exhausted all other treatment options.

The results were published in the journal *Science Translational Medicine* in February. The trial was carried out at the Fred Hutchinson Cancer Research Center in Seattle, Washington.

The therapy involves extracting a patient's own T-cells from his or her body and genetically modifying them in such a way that they can home in on the tumors and leave the healthy tissue alone. The process, so-called "adoptive cell transfer", involves engineering the extracted cells with new receptors known as chimeric antigen receptors, or CARs, that are designed to recognize proteins specifically found on tumors. The modified cells are

multiplied outside the body and then re-injected into the patient. These T-cells successfully targeted and destroyed the tumor cells in a specific kind of blood cancer called acute lymphoblastic leukemia.

The University of Pennsylvania study was headed by Dr. Stanley Riddell, Dr. David Maloney, and Dr. Cameron Turtle. The therapy was developed by Kite Pharma Inc., in Santa Monica, California.

"I felt a great sense of satisfaction upon hearing the news," says Prof. Eshhar who pioneered the CAR T-cell approach. "The next task of my lab and others working on this is to expand it to other types of cancer."

Prof. Eshhar was awarded the Israel Prize in 2015 and the prestigious Massry Prize in 2014 for his research.

He began working on the concept for the therapy in the 1980s. He hypothesized that the immune system, with its robust T-cell population that plays a central role in the system, holds the key to beating back cancer. "We knew that the T-cells have the ability to destroy tissue. The question was how to convince them to attack cancerous tissue, which they do not normally recognize as foreign or harmful," he says.



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When acute myeloid leukemia is first diagnosed, it appears as an overwhelming disease in need of immediate and aggressive treatment. However, both physicians and scientists ignore the fact that the evolution of the disease is latent in the patient, and—in many cases—takes many years to develop. Dr. Liran Shlush believes that this long, latent period might be an opportunity for early treatment—but that it also hides great mysteries.

Dr. Shlush is a medical doctor who practices at Rambam Hospital in Haifa and joined the Weizmann Institute's Department of Immunology in the fall. He has been investigating acute myeloid leukemia (AML) using a "cell genealogy" approach, which has led to key insights. AML is a cancer of the myeloid line of blood cells that is characterized by runaway growth of abnormal white blood cells accumulating in the bone marrow and interfering with the production of normal blood cells. Although it is a relatively rare disease—accounting for just 1.2 percent of cancer deaths in the U.S.—its incidence is expected to increase as the population ages.

Dr. Liran Shlush

What triggers leukemia?

By tracking the "family history" of individual stem cells from the blood of AML patients and using deep sequencing to identify alterations in genes commonly mutated in the disease, Dr. Shlush and his collaborators were able to identify—for the first time—pre-leukemic stem cells. These mutant stem cells go on to form cancerous cells.

Most cases of AML are diagnosed without any prior indication of cancer. Yet AML, like all cancers, arises from the multi-step accumulation of mutations. Dr. Shlush says that, on average, AML cells already carry about 13 mutations at the time of diagnosis. When AML patients are treated with chemotherapy, the cancerous cells are killed, but these mutant stem cells remain. This finding holds significant promise

New Scientists

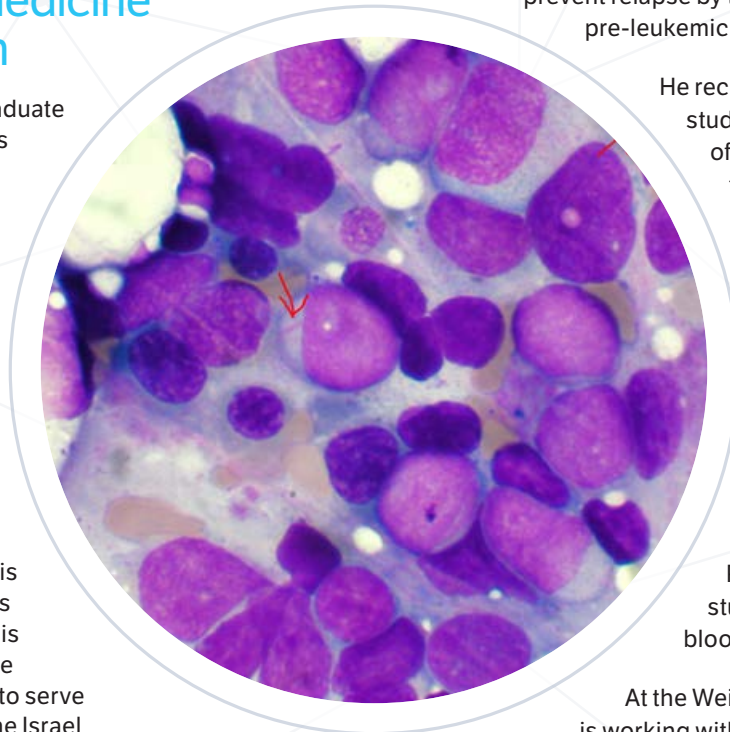
for treatment, earlier diagnosis, and new screening methods for AML and perhaps other cancers as well. The editors of *Nature Medicine* selected his paper on this finding as one of the most notable advances in medicine in 2014 with great clinical and scientific implications.

A fusion of medicine and research

Ever since his undergraduate years, Dr. Shlush, who is from Haifa—and today is married with three kids—has been fully focused on medicine. Over the years, he was increasingly drawn to basic research and says he understood that the fluid combination of the two offers the best promise for advancing human health. He completed his BSc in medical sciences with honors, received his medical degree from the Technion, and went on to serve as Deputy Director of the Israel Navy Medical Institute during his military service. He completed a PhD in population genetics in 2012 at the Technion, and did a three-year residency in internal medicine at Rambam.

In 2012, he packed his bags for the University of Toronto, where he spent the next few years as both a postdoctoral research fellow and a clinical fellow with a focus on leukemia at Princess Margaret Cancer Centre.

During his PhD and medical studies, Dr. Shlush studied leukemia evolution from diagnosis to relapse. He compared paired samples from AML patients at various stages of the disease and treatment



Acute myeloid leukemia cells in bone marrow


and found that blood samples from AML patients at diagnosis contained the ancestral stem and progenitor cells that carried the initiating genetic events in AML. He was able to show that these leukemic stem cells actually survived chemotherapy and contributed to leukemia relapse. These studies have important implications for future approaches to prevent relapse by targeting the surviving pre-leukemic stem cells.

He recently initiated a clinical study to track large cohorts of AML patients by taking samples from diagnosis, after therapy induction, and every three months during remission until relapse. Dr. Shlush continues to collaborate with his postdoctoral mentor, Dr. John E. Dick, and clinical mentor, Dr. Mark Minden, at Princess Margaret to study AML and other blood malignancies.

At the Weizmann Institute, he is working with Prof. Amos Tanay from the Departments of Biological Regulation; and Computer Science and Applied Mathematics and Dr. Ido Amit

from the Department of Immunology to look at the genetic and epigenetic regulation networks involved in these diseases.

Meanwhile, he continues to work as a hematologist at Rambam to follow leukemia and patients with preleukemic conditions. “My clinical work focuses on the treatment of individuals with a pre-leukemic condition called myelodysplastic syndrome,” he says. “In this disease, bone marrow failure is the end result of malignant growth; about 20 percent of these cases will progress to AML.”

A portrait of Prof. Victor Malka, a middle-aged man with short, wavy grey hair and glasses, wearing a light-colored patterned button-down shirt. He is looking slightly to the right of the camera with a neutral expression. The background is a soft-focus green outdoor setting.

The tall, white Koffler Accelerator on the Weizmann Institute campus is the icon of Israeli science, and the fact that it is obsolete—because science has come so far, so fast since it was first built in 1976—is, in some ways, an even bigger statement about the prowess of Israeli science. In planning its construction, Weizmann Institute physicists were seeking a way to accelerate nuclei to study their interactions with one another and their internal organization. Many similar particle accelerators have been built worldwide, the most complex and well-known being CERN in Switzerland, utilized by thousands of physicists.

The newest tenant of that historic facility is, appropriately, a nuclear physicist who has taken particle acceleration to a whole new level: Prof. Victor Malka, a mid-career scientist who, for the last 20 years, has run a world-class laboratory in high-intensity laser physics at the École Polytechnique in Palaiseau, France, and who has directed a leading plasma physics lab at the National Center for Scientific Research (CNRS). He joined the Weizmann Institute in the Department of Physics of Complex Systems in the fall.

Prof. Malka has used laser power to miniaturize particle accelerators into something that fits easily on a lab bench, and even smaller. Conventional particle accelerators require large distances and huge radio-frequency cavities to speed up particles to a velocity that nears the speed of light. Prof. Malka uses powerful but compact lasers focused on a small volume of plasma to accelerate electrons, protons, or highly charged ions, forming them into ultra-bright beams that can be easily controlled.

Prof. Victor Malka

Bringing laser research to light

Plasmas, an ionized medium that contains free electrons and ions, are considered the fourth state of matter after solids, liquids, and gases. Plasmas range from the thermonuclear fires that burn in stars to the cooler plasmas formed within fluorescent light tubes. Physicists have learned to manipulate plasmas to create anything from energy-saving plasma computer screens to superhot, extremely

In December, the Weizmann Institute signed a contract to purchase one of what will be the most powerful lasers in Israel for his lab. "It's not like buying a car and driving it off the lot," Prof. Malka says.

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dense plasmas which attempt to reach the threshold of nuclear fusion power.

Since producing the first laser-plasma-driven electron beams in the late 1980s, Prof. Malka has demonstrated new applications in many diverse fields such as medicine, aerospace, and security—for instance, for scanning a truck for hidden explosives—and more. And he hopes to discover more uses for his plasma-powered particle accelerators, making the Weizmann Institute an emerging leader in the field of lasers interacting with plasmas.

Yet he faces a challenge that most new recruits don't face because they build their labs from scratch upon arriving: transitioning a lab with sophisticated equipment accumulated over 20 years from one country to another. To help in that effort, he recently recruited two PhD students who will spend their first months in his lab in Palaiseau learning to use these challenging instruments.

In December, the Weizmann Institute signed a contract to purchase one of what will be the most powerful lasers in Israel for his lab. "It's not like buying a car and driving it off the lot," he says. "These are very powerful, delicate instruments. We have to design and customize them, and then have them installed and calibrated, and train people to use them." It will take nearly two years from this point to build, ship, and install the lasers that form the heart of the lab.

His new Schwartz/ Reisman Laboratory for Intense Laser Physics is being remodeled in the Koffler Accelerator in the Canada Centre of Nuclear Physics. The foundation of the lab needs to be so stable that passing trucks will not cause any vibrations to disturb the delicate aim of the powerful laser setups.

Beams of promise

The promise of these new laser beams is immense. For instance, his miniature laser-driven particle accelerators can produce streams of protons that can be used for proton and hadron therapies in cancer treatment. These are potential methods for

the targeted treatment of tumors located deep in the body, and radiotherapy-resistant cancers. Proton therapy is now widely used for children, whose growing bodies are highly susceptible to collateral damage from radiation therapy; proton therapy is far more precise and therefore avoids destruction of healthy tissue surrounding tumors. However, the conventional proton-generating equipment is both massive and expensive.

In clinically approved prostate treatment experiments, Prof. Malka has already shown that such beams are well-suited for delivering the required dose of radiation, very precisely concentrated, with a deep penetration into tissues, resulting in less damage to adjacent healthy tissue.

He has also demonstrated how his plasma lasers can be used as a powerful portable x-ray for industrial applications that require penetrating dense materials and producing a high-resolution image of features within. Such instruments are being tested for applications in the security field and for inspecting airplane parts for stress and fractures, precluding the need to take them apart.

Prof. Malka believes that his new lab will quickly become a hub of exciting new research avenues, and will work closely with Weizmann Institute specialties such as ultrafast optics, high-energy physics, high-resolution microscopy and imaging, and more.

He says he's thrilled to join the Israeli scientific community, which he admires for its energy, flexibility, and creativity. For the next year and a half, he is dividing his time between his old lab near Paris and his emerging lab here.

"Weizmann has an outstanding scientific environment which motivates me to build my ambitious scientific program here," says Prof. Malka. He first visited Israel at age 10 and has been a frequent visitor ever since. His parents divide their time between Ashdod and Paris. He is married to Agnes Fiquel, an artist, and they have two children (Maya and Dinah) who are looking forward to calling Israel their fulltime home.

Poetic justice

How two Miami lawyers beat the tobacco industry—and are using tobacco money to fund lung disease research

Spotlight On

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Today, most everyone takes it for granted that cigarette smoking and second-hand smoke are bad for our health. But it wasn't so long ago that the public was in the dark—or at least behind a screen of smoke and mirrors—about the dangers of smoking.

An early battlefield in turning the tide of public opinion was litigation involving the airline industry, which became a petri dish in the public debate about the health hazards of smoking and smoke exposure. The first of the smoking bans on U.S. domestic flights was enacted in 1988; the international flight ban came a decade later. The litigation that in large part led to that legislation began with two Miami lawyers, Susan and Stanley Rosenblatt, who launched a David-and-Goliath style fight against Big Tobacco on behalf of a group of nonsmoking flight attendants.

Their landmark suit, filed in 1991, *Broin v. Phillip Morris*, was the first class-action suit filed against the tobacco industry and the first non-smoker's case seeking damages for injuries from exposure to second-hand smoke. It resulted in a settlement after months of trial that included, among other benefits, the endowment of a \$300 million nonprofit foundation, the Flight Attendant Medical Research Institute (FAMRI). Since its establishment in 2001, FAMRI has prudently distributed that money—handed over by R.J. Reynolds, Phillip Morris, and other tobacco giants in a 1997 settlement—in the form of grants for lung disease and cancer research at top-notch scientific institutions and by leading scientists, including significant grants to the Weizmann Institute of Science under the auspices of the FAMRI Center of Excellence at the Institute. (See related story).

“The wonderful irony is that this is money from the biggest cigarette manufacturers that is going to fund research which we hope and believe will lead to a cure for lung cancer and other lung diseases,” says Susan Rosenblatt. She and her husband represented the class of U.S. flight attendants in the Broin suit and, upon its settlement, worked with the court to establish FAMRI.

Weizmann Magazine interviewed the Rosenblatts in Miami's Dade County Courthouse where the trial took place. That courtroom was also the location of the Rosenblatts' second case, *Engle v. Reynolds*, which represented smokers against the tobacco companies and resulted in the biggest punitive damage verdict in U.S. history at \$145 billion. FAMRI trustee Patty Young, a former class representative and former flight attendant, joined the interview to describe her historical struggle to ban smoking in airline cabins and her personal mission to have all health care professionals ask their patients about exposure to second-hand tobacco smoke.

Seeking justice

Patty Young joined American Airlines in 1966 at age 20. She noticed that her fellow flight attendants who had never smoked were receiving diagnoses of chronic problems such as bronchitis, asthma, sinusitis, and emphysema.

“We were all required to have annual physicals, and many of us were being told by our doctors: ‘You have the lungs of a smoker,’” she recalls. “I wanted to know why, though the answer was obvious. It felt like a huge injustice. Putting an end to smoking on planes became my lifelong crusade.” For years Ms. Young has suffered from sinusitis and is recovering from a recent surgery.

Ms. Young, who lives in Dallas, traces her sense of outrage at injustice to the age of three. It was several years after the end of WWII and her father, who had been a photographer in the U.S. Army Air Corps, opened up to her mother about the atrocities he witnessed and documented in the concentration camps. His photographs were later used in the Nuremberg Trials. “He was crying, and he said to her: ‘Everyone just stood by and watched it all happen,’” she recalls.

“I was too little to understand everything, but I knew that what he was saying was terrible. At that moment, I said to myself: ‘I'm never going to be quiet if I witness an injustice. And so, years later when I began to see



what was happening to flight attendants, I had found my mission.”

Ms. Young testified before Congress and lived in perpetual fear of being fired, but she persisted. In her travels, she would thumb through the Yellow Pages to find lawyers and showed up on their doorsteps, pleading with them to sue the tobacco companies on her behalf. But she could not convince a single attorney to take on the industry; at that time, smokers had never successfully sued a tobacco company and second-hand smoke was considered an annoyance, not a danger.

In the late 1980s, she learned about Stanley and Susan Rosenblatt, who had achieved renown in Florida for successfully taking on tough and controversial cases. Ms. Young was advised that if she learned of a flight attendant with a potentially serious injury, she should give her the Rosenblatts' phone number. She did just that when she was contacted by a young nonsmoking flight attendant in 1990 who had just been diagnosed with a small lesion on her lung and had undergone surgery to remove the lesion.

The Rosenblatts ultimately agreed to accept the case, but not as an individual lawsuit. Susan had previously worked on class actions and came up with the idea of filing a national class-action suit on behalf of nonsmoking flight attendants. Patty Young and other flight attendants asked to be included as class representatives and the case was filed in 1991. “Everyone told us not to take the case—that it

was a lost cause, that we'd be in way over our heads, and that we'd just throw ourselves into massive debt,” says Susan. “But Stanley was eager to take the deposition of the CEOs of the cigarette makers.

We did go into great debt, and we had nine kids to raise. The trial took a heavy toll on us.

But the deeper we got into it, the more single-minded we became to see it through.”

“It became an obsession and there was no turning back.”
—Stanley Rosenblatt

Stanley's depositions of the seven CEOs were the first time the executives had testified under oath about their companies' advertising and marketing practices; it became front-page news in the *New York Times* business section, triggering national interest and ultimately, the famous Waxman Hearings in which the same CEOs testified before Congress. In Stanley's depositions,

all of the CEOs testified that smoking does not cause lung cancer or other lung diseases and is not addictive, the same stance they later took at the Waxman Hearings.

“It became an obsession and there was no turning back,” says Stanley. “What was an eye-opener to me was that a tremendous number of kids began smoking when they were as young as 11. So when the CEOs talked about choice, I sized it up as another piece of their propaganda.”

The Rosenblatts are both originally from Brooklyn, NY, and both received their law degrees at the University of Miami. In addition to the couple's law practice in downtown Miami, Stanley hosted two PBS television series, “Within the Law,” and “Israeli Diary”

Stanley Rosenblatt's depositions of the seven CEOs were the first time the executives had testified under oath about their companies' advertising and marketing practices; it became front-page news in the New York Times business section, triggering national interest and ultimately, the famous Waxman Hearings in which the same CEOs testified before Congress. In Stanley's depositions, all of the CEOs testified that smoking does not cause lung cancer or other lung diseases and is not addictive, the same stance they later took at the Waxman Hearings.

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for which he interviewed Israeli political figures, including prime ministers and presidents.

The Rosenblatts battled the dozens of tobacco lawyers alone, Stanley doing the courtroom litigating and Susan doing research, handling all appeals and gathering evidence. Beyond being outnumbered, grappling with the reams of documents and evidence, and surviving the long hours, the essence of the trial was difficult because they also had to do battle with the body of skewed science developed since the 1950's through the Counsel for Tobacco Research, a nonprofit foundation run by tobacco industry CEOs ostensibly to disseminate accurate scientific research findings on tobacco-related research. One of the Rosenblatts' most important



successes in the trial was their exposure of CTR for what it was, a public relations machine for the industry.



A turning point came when Stanley recruited two former U.S. Surgeons General—one of whom later became FAMRI's mentor and chairman of the medical advisory board—who testified about the dangers of smoking and second-hand smoke.

The impact of FAMRI

The Rosenblatts and the court established FAMRI as a nonprofit in Florida and the Rosenblatts appointed a majority of flight attendants to sit on the Board of Trustees. The medical advisory board includes some of the top American physicians and scholars with expertise in lung diseases. Its founding chairman



Patty Young



“Everyone told us not to take the case—that it was a lost cause.”
—Susan Rosenblatt

was the late Julius B. Richmond, MD, who served as U.S. Surgeon General and Secretary of Health under President Jimmy Carter.

Today, its medical advisory board is chaired by Dr. David Sidransky of the Johns Hopkins School of Medicine. Stanley is FAMRI’s chairman and Susan is a trustee, both serving without compensation.

Its board and the Rosenblatts painstakingly review the many grant applications, following an extensive peer review process by the American Institute of Biological Services. Research to date has focused on sinusitis, emphysema, chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, heart disease, lung cancer and other cancers, stem cells, neurologic effects of smoking, reproductive and pregnancy effects, and more.

“We are very hands-on,” says Susan. “One of the areas that excites us most is the promise of stem cells, which is why we’re supporting that research at Weizmann [of Prof. Yair Reisner].” The Weizmann Institute research, headed by Prof. Varda Rotter, “is very impressive,” adds Stanley.

Since its inception, FAMRI has funded extensive research throughout the world, including through its five centers of excellence. In addition to the Weizmann Institute (the only non-American institution), the others are Hopkins, the American Academy of Pediatrics, the University of California at San Francisco, and Mount Sinai Medical Center in New York. FAMRI funds health screening centers for nonsmoking flight attendants throughout much of the U.S.

Research projects that have been funded by FAMRI have resulted in 2,366 peer-reviewed publications, with a high citation index that underscores the impact of the research. In 2013, FAMRI commissioned a professional outside analysis of the impact of FAMRI-funded research. “The outcome is astonishing as it shows in an objective manner that FAMRI as an entity ranks between the top two institutions in the U.S.—Harvard and Johns Hopkins—and ranks above the leading

institution on the European stage—Oxford—in overall impact of its published research,” wrote Dr. Sidransky in the most recent FAMRI summary report.

‘Help from above’

In addition to the creation of FAMRI and individual lawsuits for flight attendants that determined liability, the suit also caused a cascade of events that led to various smoking bans and created a critical tipping point for the general public’s awareness of the dangers of smoking and second-hand smoke. Shortly after filing the flight attendants’ case, the Rosenblatts filed a second class-action case in which the lead plaintiff was their children’s pediatrician, Dr. Howard Engle. Dr. Engle was a chain smoker who told the Rosenblatts that he was desperate to quit but couldn’t; he eventually died of emphysema and COPD.

The Engle trial, filed in 1994, claimed that the tobacco companies intentionally hooked smokers despite knowing about its dangers. That trial was and still is the longest trial in U.S. history, at two years (1998-2000). Its original punitive damages verdict was appealed and set aside. But two of the three compensatory damages awards were affirmed, as were key liability findings including conspiracy to commit fraud, which enabled class members to file separate lawsuits with binding liability findings—a major breakthrough in holding the tobacco companies accountable for diseases and health risks associated with smoking. The Engle trial ultimately spawned about 8,000 individual lawsuits and helped produce hundreds of millions of dollars in compensatory and punitive damage verdicts.

The Rosenblatts, who are Orthodox Jews, say their religious beliefs and commitment to justice were driving forces behind their mission. “And now, years later, I feel even more committed religiously—like we had some help from up above—because we fought and won a seemingly impossible battle,” says Susan.

Research projects that have been funded by FAMRI have resulted in 2,366 peer-reviewed publications, with a high citation index that underscores the impact of the research.

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“I have never had many people in my life that I looked at as heroes,” says Patty Young. “But, finally finding Stan and Susan Rosenblatt to help us and represent the U.S. flight attendants against Big Tobacco, they became true heroes to me. The day our class-action trial started on June 2, 1997, American Airlines finally became smoke-free worldwide. Our trial made this happen because of the publicity around it. What a win we enjoyed that very day alone.”

A dozen years of FAMRI-funded lung disease research at the Weizmann Institute

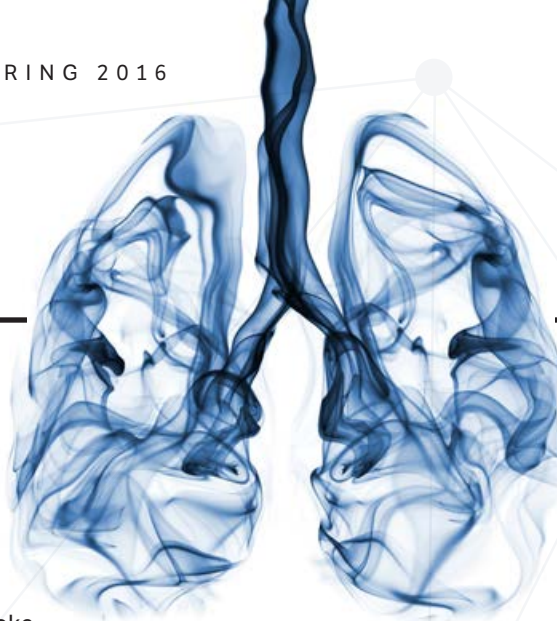


Some of the members of the Weizmann Institute FAMRI Center of Excellence, from L to R: Center head Prof. Varda Rotter, Prof. Ronen Alon, Prof. Zvi Livneh, Prof. Amos Tanay, Prof. Gidi Rechavi

Since 2003, the Flight Attendant Medical Research Institute (FAMRI) has supported the FAMRI Center of Excellence at the Weizmann Institute, one of FAMRI's five centers of excellence. The center pursues multiple avenues of lung disease research. Prof. Varda Rotter of the Department of Molecular Cell Biology heads the center, which brings together Weizmann Institute scientists with physicians at Chaim Sheba Medical Center at the Tel Hashomer Hospital. The center has generated significant results that have been published in more than 200 journal articles. The FAMRI Center of Excellence at the Weizmann Institute aims to achieve a comprehensive understanding of the molecular genetic events underlying the initiation and progression of lung diseases and lung cancer.

Prof. Rotter's team's research addresses two main avenues: the exploration of the basis for lung pathologies including Chronic Obstructive Pulmonary Disorder (COPD) and cancer; and finding ways to cure lung pathologies.

With respect to understanding the connection between smoke, inflammation and COPD, the group of **Prof. Ronen Alon** of the Department of Immunology is investigating the influence of the enzyme heparanase in smoke-induced inflammation in the lung, which may establish heparanase as a risk factor and a potential therapeutic target in smoke-induced COPD.



Prof. Zvi Livneh and **Dr. Tamar Paz-Elizur** of the Department of Biomolecular Sciences have shown that individuals differ greatly in their ability to cope with tobacco smoke-inflicted DNA damage, which they found to be a key determinant of the risk of developing lung cancer. They are also investigating whether DNA repair capacity plays a role in COPD.

The group of **Prof. Gidi Rechavi**, a pediatric hematologist-oncologist at Sheba, is exploring transposable genetic elements—sequences of DNA that move from one location in the genome to the other—and their contribution to human cancer. The work addresses the possibility that exposure to tobacco smoke may increase the mobility of transposable genetic elements, thereby contributing to the insertion of mutations and deregulation of genes.

Tumor heterogeneity is emerging as a key challenge in the future implementation of personalized cancer medicine. **Dr. Einav Gal-Yam** of Sheba together with **Prof. Amos Tanay** of the Department of Biological Regulation and the Department of Computer Science and Applied Mathematics are developing methods that will enable the expression profiling of many single cells derived from an individual lung tumor. They expect that this will lead to an in-depth picture of the heterogeneity of the cancer stem cell population with respect to several characteristics such as the nascent epigenetic states of single cells.

Another avenue of research focuses on cancer stem cells, which are considered “cellular milestones” in the development of cancer, and may arise from smoke induced genomic damage in stem cells. For that reason, the group of **Prof. Rotter** is developing methods to identify and isolate lung cancer stem cells for the detailed characterization of this important cell population and expanding these studies to human lung tumors using cancer biopsies to be obtained from the human tissue bank of **Dr. Amir Onn** at Sheba, a pulmonary oncologist and co-director of Sheba’s Tissue Bank.

The **Livneh group** is also looking at whether DNA repair mechanisms are compromised in stem cells. This is expected to lead to the development of safe ways to propagate stem cells, which could

ultimately help prevent the formation of cancerous mutations in stem cells used for transplantation. They are collaborating with **Dr. Jacob Hanna** of the Department of Molecular Genetics and **Dr. Itai Pessach** of Sheba on this project.

The **Hanna** team, which has already greatly contributed to the development of stem cells under laboratory conditions, mostly Induced Pluripotent Stem Cells (iPSCs), is working to increase the efficiency of generating such stem cells and their adaption for human patient stem-cell based therapy. He will focus on implementing his developing technology to lung damaged patients and develop novel technological platforms and make them available to the other members to pursue their research goals. This study is done in collaboration with the **Pessach group** which is creating specific iPSC lines derived from pulmonary tissue obtained from patients with tobacco-associated disorders. This repository will be made available to the other collaborators in the center. In addition, they are investigating how various tobacco-associated damages affect the tumor environment.

Taking yet a different angle for developing stem-cell based therapy for damaged lungs, members of the group of **Prof. Yair Reisner** of the Department of Immunology are seeking ways to isolate stem cells from lung cells and using such physiological agents for lung therapy. He is working on improved methods of stem cell transplantation to heal the lungs of mice afflicted with smoke and second-hand smoke induced lung injury. This will be a prelude for a clinical trial in COPD or idiopathic pulmonary fibrosis (IPF) patients. The application of this study will be done in collaboration with the **Onn group**, which is providing biological bio-specimens of human lung biopsies, representing the various subtypes of lung cancer with a known smoke exposure history.

Morris Kahn may be best known in Israel as the founder of Amdocs, one of Israel's largest, most established high-tech companies with 26,000 employees worldwide, and the founder of Coral World, which operates the underwater observatory in Eilat.

But his spirit is more serial entrepreneur than CEO, and he enjoys recounting with some humor his most low-tech ventures, including a bicycle factory in Bet Shemesh and a cattle company in the Northern Galilee. Today, just before he turns 86, he is a serial philanthropist with a deep concern for the environment, science, and a healthy and productive and democratic Israeli society.

A major donor to the Weizmann Institute of Science, Mr. Kahn helped launch the field of systems biology with a multi-million dollar gift in 2005. The Institute

Morris Kahn

Serial entrepreneur, serial philanthropist

quickly became a world leader in this nascent field, which fuses physics and biology to create a holistic understanding of how the structure of our biology is closely intertwined with its function. Recently, he established the Morris Kahn Institute for Human Immunology at the Weizmann Institute with another significant gift. The Institute will fund

Cover Story

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the work of a range of studies in this field, in which the Weizmann Institute is a world-renowned leader (see sidebar).

“I’m very interested in understanding the mechanisms by which the body protects itself against disease,” says Mr. Kahn. “When I invest, it is not only in the concept but in the people. There is a critical mass of immunology talent at Weizmann—a real powerhouse of outstanding individuals.”

He grew up in South Africa, and in 1948, Morris joined the Habonim youth movement. He wanted to come to Israel but was encouraged by the movement’s counselors to wait since he was still young. “I was becoming aware of the social problems in South Africa and decided that I wanted to move to Israel,” he says.

After getting married to Jackie, he opened bicycle and jewelry stores. “I created my retirement plan: I developed a building in Welkom, South Africa, and figured that I could retire on the rent, providing I lived modestly. My plan was to retire by the beach by the age 26. I haven’t stopped working since,” he jokes. In 1956, the family moved to Israel with their two sons, David and Benjie, who were 3 and 1.5 years old.

They settled in Bet Yannay, a moshav near Netanya, which had about 40 families. He bought a truck and spent a year transporting chickens and citrus to the markets, and then set up a bike factory with Kibbutz Tzora near Bet Shemesh. “It was my first real lesson in doing business in Israel in the early years,” he says.

“I was supported throughout the years by Jackie, who passed away from a long illness, and I have been fortunate in meeting my partner, Ariella Delaney, who has been my source of constant support and very helpful with my philanthropy, especially with the Weizmann Institute.”

Deeply committed: the joys of diving and giving

While Amdocs was the source of his fortune, Morris is much more eager to talk about his various philanthropic ventures and two of his life’s passions—deep sea diving and sailing.

He began scuba diving with his family in Eilat in the late 1960s. He perforated an eardrum when he dove too deep, which gave him pause and caused him to think about about the prospect of not diving, though he dives to this day. “I realized that most people don’t get a chance to see the beautiful underwater world—the coral and the fish—because they don’t dive,” he says. So in 1972 he began the construction of the Underwater Observatory and Marine Park in Eilat. Since its opening in 1974 (its construction was put on hold during the Yom Kippur War), it has welcomed about 400,000 visitors per year.



With Prof. Uri Alon



With his partner, Ariella Delaney, and Prof. Stanley Fischer, former Governor of the Bank of Israel



With his children Benjamin and David

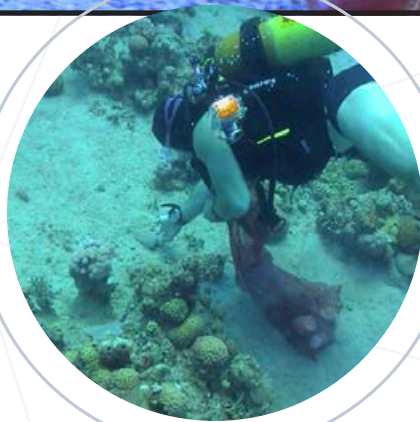


Receiving an honorary doctorate in 2006

Witnessing its immediate success, he established Coral World, a company that operates a series of similar underwater observatories and aquariums around the world, in Maui, Hawaii; Perth, Australia; and Palma de Mallorca in Spain.

His son Benjamin has taken over Coral World's operation. In 2014, the underwater observatory in Eilat built a shark tank that attracts tourists from Israel and around the world.

In addition to giving generously to a wide variety of organizations, mostly in Israel, he established two other organizations: LEAD, a nonprofit that nurtures leadership skills among young Israelis, and the Therapeutic Riding Center of Israel, which aims to improve the lives of people with disabilities through



therapeutic riding and dog therapy.

"There are a lot of things that need doing—so many things that we can do to make this a better society and a better country," he says.

He is also one of the investors in Time to Know, a nonprofit whose mission is to leverage education technology to offer an empowering and meaningful experience to learners and educators worldwide.

He is a donor and a public board member of SpaceIL, Israel's nonprofit initiative to land an unmanned spacecraft on the Moon as part of the Google Lunar X Prize. SpaceIL was founded by three Israeli aerospace engineers in 2010. "Landing a robot on the

The Morris Kahn Institute for Human Immunology

The Weizmann Institute has historically been a world leader in immunology, starting with the groundbreaking work of Prof. Michael Sela and Prof. Ruth Arnon and the late Dr. Dvora Teitelbaum that led to the blockbuster drug Copaxone® for the treatment of multiple sclerosis. Another example is Prof. Zelig Eshhar of the Department of Immunology, whose innovative work in immunotherapy for cancer won him the Israel Prize in 2015; the therapy based on his discoveries is showing highly promising results in clinical trials.

Building on a history of achievements in this area, the Kahn Institute, which will be headed by Prof. Michal Neeman as Vice President of the Weizmann Institute,



 Dr. Ziv Shulman

will advance the research of Dr. Ziv Shulman of the Department of Immunology and collaborations around his work, in addition to a wide array of projects in this area. Dr. Shulman, who joined the

Department of Immunology in 2015 after a postdoctoral fellowship at Rockefeller University, is investigating the molecular interaction of the antibody-producing cells in the body's lymph nodes.

Forming efficient antibodies against specific pathogens involves a biological process called "affinity maturation" in which random mutations are introduced into B-cell antibody genes. Dr. Shulman has studied how T and B cells interact with one another during a critical period following infection in order to prepare

 *Morris Kahn and Ariella Delaney*

Moon is very complex but I enjoy being involved in the challenge,” he says. “I am a great believer in education and one of our goals at Space IL is getting the young generation excited and educated about science and space. We are trying to create the effect that Apollo had on the young generation in the U.S. I think it would be important for Israel to succeed in a competition like this. It would put Israel on the map in Space.”

Mr. Kahn was introduced to the Weizmann Institute about a decade ago by a friend who attended a lecture by Prof. Uri Alon of the Department of Molecular Cell Biology. He was deeply impressed.

“Uri’s group became a world-class group, and I’m proud of having financed it from the beginning,” he



says. That major visionary gift built the foundations of the field and attracted additional donors to the area. Prof. Modi Segal, a member of the International Board of the Weizmann Institute, also gave funding to Prof. Alon’s systems biology initiative. And in 2011, the Azrieli Institute for Systems Biology, headed by Prof. Naama Barkai of the Department of Molecular Genetics, was founded with a gift from the Azrieli family of Israel and Canada.

Mr. Kahn follows science with intensity. His recent gift in immunology reflects his increasing attention to this area, and, he adds, “We must have a better understanding of immunology. I believe that this is ‘where it is at’ in terms of solving many diseases.”

the best antibodies and establish long-lasting protection. In order to understand the cellular dynamics of this process, he developed a system for direct visualization and quantification of the antibody selection process in living mice by using two-photon laser scanning microscopy and high-throughput computerized analysis.

He has since made multiple discoveries about how these cells interact, creating a clearer picture of the antibody affinity maturation process and shedding new light on the process of acquired immunity.

Other avenues of research include:

The molecular and cellular mechanisms that control immune tolerance, a process in which the immune system “learns” to recognize and tolerate the body’s own components—with implications for multiple sclerosis and other autoimmune disorders (**Dr. Kobi Abramson**).

The mechanisms by which white blood cells exit blood vessels at specific sites of inflammation and injury, with implications for autoimmune diseases and of novel anti-inflammatory therapies for smokers at high risk of chronic inflammatory pulmonary obstruction (**Prof. Ronen Alon**).

The gastrointestinal tract and microflora, a diverse ecosystem that contains trillions of bacteria, viruses, fungi and parasites—which has implications for Inflammatory Bowel Disease, diabetes, obesity, and autoimmune disorders (**Dr. Eran Elinav**).

How immune system cells communicate while coordinating an immune response, with implications for cancer and Type 1 diabetes. (**Prof. Nir Friedman**).

The homing process by which immune cells reach inflammation sites in the body (**Prof. Idit Shachar**)

Literal ray of hope

New prostate cancer therapy provided by novel photosynthetic molecules and light

The number of men diagnosed with early-stage prostate cancer has dramatically increased in the last two decades as a result of widespread screening of prostate specific antigen (PSA) levels followed by biopsies and imaging. These patients currently face a dilemma: undergo surgery or radiotherapy—which come with the unwelcome risk of impotence and incontinence—or remain under “active surveillance,” which carries the risk of disease progression. With no midway option, an increasing number of patients opt for the second alternative.

But a new therapy invented by Weizmann Institute scientists Prof. Avigdor Scherz and Prof. Yoram Salomon means that patients don’t have to choose anymore between the two opposite poles. The new therapy—called Vascular Targeted Photodynamic Therapy used in concert with Tookad Soluble® (TS-VTP)—enables targeted destruction of the prostate lobe containing the cancer tissue while preserving potency, continence, and overall quality of life.

Moreover, TS-VTP can be applied at any stage of active surveillance, rather than shifting immediately to the more morbid options. It can also be repeated, with similar rates of success, and does not preclude surgery to remove the prostate or radiotherapy if cancer progresses locally.

The therapy, which was clinically developed by Steba Biotech of Luxembourg in ongoing collaboration with the scientists, was recently approved by Cofepris, the Mexican Health Authority, for medical use in patients with early-stage prostate cancer. It is currently under consideration for approval by the European Medicines Agency, which regulates drug and device approvals in 27 European countries. The U.S. Food and Drug Administration is currently reviewing approval in the U.S., where Memorial Sloan Kettering Cancer Center (MSK) in New York oversaw a multi-center trial. And four more clinical trials will open this year at MSK: for locally advanced prostate cancer and three other cancer types.

A patient speaks

One of the men enrolled in the early-stage prostate cancer trial at Memorial Sloan Kettering spoke to *Weizmann Magazine* about his experience, but requested anonymity.

He describes how a routine checkup in late 2009 indicated elevated PSA levels—a blood-based biomarker for prostate cancer—and a biopsy revealed a small cancerous growth. His urologist gave him two options: watch and wait, or surgery (a radical prostatectomy), though he recommended surgery. The New Jersey resident who is a computer programmer with a science background and whose wife is an epidemiologist recalls “being in a total quandary... I was worried about the potential side effects of surgery but ‘watching and waiting’ was also worrisome, even though the urologist said it was low-grade and potentially slow-growing.”


While he was pondering his options, his primary physician referred him to Dr. Jonathan Coleman at MSK. At MSK he underwent a more advanced MRI guided biopsy that established the cancer’s grade and localization. In 2010 Dr. Coleman told him about a new clinical trial at MSK for TS-VTP, and asked if he would be interested in participating, and he underwent the procedure that summer. “I was back to work the next week. And I have had no side effects—none. At my follow-up visit after another biopsy, Dr. Coleman told me, ‘There’s no trace of cancer.’”

He adds, “Of course, like many people who have had cancer will attest, once you’ve had it you will always live with the possibility of its return hanging over your head. But the reality is that, six years later, I’m cancer-free. I feel very fortunate.”

Science Feature

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 Prof. Avigdor Scherz (L) and Prof. Yoram Salomon (R)

The Mexican approval comes after about 80 percent of patients evidenced a local cure in the treated prostate a year after treatment while maintaining potency and continence, and in the wake of the recent successful completion of a Phase III clinical trial of more than 400 patients in 43 medical centers across 11 European countries. The European study compared disease progression in TS-VTP treated patients and patients that underwent active surveillance.

The majority of the TS-VTP treated patients were home free in a few hours after treatment and back

to normal activities a few days later—with none of the side effects usually encountered by the radically treated patients.

The therapy involves intravenously infusing patients for 10 minutes with Tookad Soluble®, which is non-toxic to both the tumor and normal tissues unless exposed to light. The infusion is immediately followed by confined tissue exposure to 22 minutes of near-infrared illumination delivered through miniscule optical fibers into the prostate tissue. The illumination triggers a cascade of events leading to the tumor's destruction. It generates the release

of short-lived oxygen and nitric oxide radicals, which rapidly destroy the blood vessels that nourish the diseased prostate tissue, leading to its destruction—all while leaving the healthy surrounding structures intact. The procedure takes about 90 minutes and the drug clears from the body rapidly (within about three to four hours).

Lessons from photosynthesis

The story of the development of TS-VTP has all the components of a great scientific success story: fruitful collaboration between different scientific disciplines, and in this case, the serendipitous turn of events that turned a chemist and a plant scientist into inventors of a cancer therapy; a commercial entity that invested in and collaborated on a highly innovative idea and remained committed through the ups and downs; a partnership with international hospitals and world-leading physicians; and enthusiastic donors who believed in the research and in the scientists driving it.

TS-VTP is based on research that took place over the course of two decades in the labs of Prof. Scherz of the Department of Plant and Environmental Sciences and Prof. Salomon from the Department of Biological

Regulation—a collaboration that sprung up from a hallway conversation between two friends.

“We weren’t thinking, ‘How do we cure prostate cancer,’” recalls Prof. Scherz. “We were curious as to whether we could find a way to combine principles of photosynthetic light conversion and our knowledge about cancer for selectively eliminating cancerous tissue, while not destroying the surrounding normal structures.”

“The entire mechanism and the respective treatment protocol that we successfully developed represent a unique mode among anti-tumor treatments of which we are very proud.” says Prof. Salomon.

At the time the duo began their joint research, in the early 1990s, other types of photodynamic therapy existed, but they weren’t effective for the destruction of thick, solid tumors or else they were toxic, with patients at risk of major skin toxicities for up to 50 days. The photodynamic therapy methods were also not selective enough to effectively distinguish between the tumor and healthy tissue.

That initial hallway conversation consisted, essentially, of this: Nature has supplied photosynthesis with bacteriochlorophylls, the photosynthetic pigment of certain aquatic bacteria that draw their energy supply from

At the bedside

Dr. Jonathan Coleman, a urologic surgeon at Memorial Sloan Kettering Cancer Center (MSK) who led the U.S. efforts in multi-center clinical trials for early and locally advanced prostate cancer, says that patients treated using the TS-VTP method “can be rendered free of identifiable cancer on biopsy with close to zero or no side effects. This therapy has the potential to be a game-changing approach to managing this kind of cancer.”

With further supporting evidence from clinical trials, he expects the method could become a front-line treatment for early-stage prostate cancer, because, he says: “We could counsel our patients: Let’s try this first and follow carefully, especially if there is very little risk involved and success rates are reasonably

high. In the case where it doesn’t work, we might know within three to six months and then go to the next option, whereas treatments like radiation can take much longer to know whether the tumor is truly gone and salvage options are less feasible.”

Dr. Coleman and a team of specialists at MSK will be organizing and leading clinical trials where TS-VTP is applied to advanced prostate cancer, bladder cancer, gastroesophageal cancer, and breast cancer. More than 15 physicians and over 20 researchers from MSK and the Weizmann Institute are involved in this highly collaborative, multi-disciplinary program, which plans to spawn future studies of TS-VTP combined with complementary methods to treat both localized and disseminated diseases.

This model of philanthropy for supporting bench-side biomedical research and the resulting translation to clinical trials, when utilized properly, is really ideal because it enables important work to get done on a shorter timeline—and directly benefit patients that much faster,” says Dr. Coleman.

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sunlight. They could be the ideal molecules for generating toxic radicals deep in tissue under the right illumination, the scientists surmised. Administering these molecules to cancer patients followed by local illumination should then lead to tumor necrosis—similar to the body’s way of eliminating malfunctioning organs. And of course the therapy would have to be safe and cause few or no side effects.

Investment from industry

An early investment by Steba got them off to a start, and after attempting some 200 derivatives (molecules) of bacteriochlorophyll, the scientists finally arrived at the current drug combination. Yeda Research and Development Co. Ltd., the Weizmann Institute’s tech transfer arm, licensed rights to Steba in 1996.

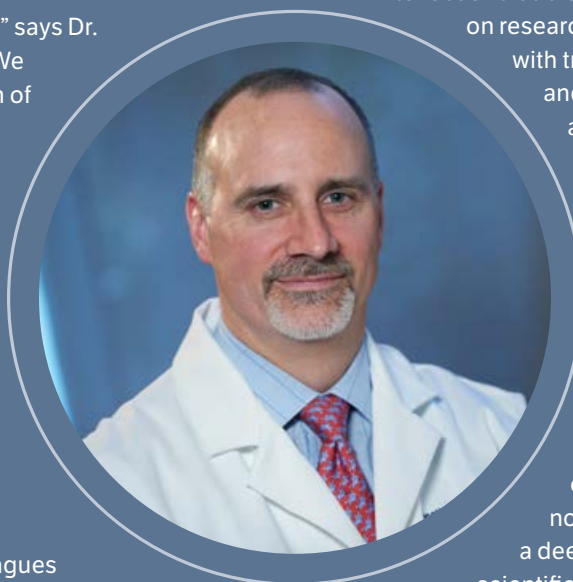
The recent approval and envisioned practice will finally turn into reality the far-reaching concept

that motivated Steba Biotech’s founder and owner, Raphael Harari, to join the Weizmann Institute scientists at the earliest stages of the therapy’s development. Following licensing from Yeda, Steba established a 50-person R&D facility near campus with multiple teams involved in Tookad’s development.

Says Mr. Harari, “I carefully examined this idea and strongly believed that it would succeed in offering a therapy while preserving the patient’s quality of life... Truly, I did not anticipate that it would take several hundreds of millions of dollars and two decades to be translated and approved in the clinical setting. But we believed in it.”

Profs. Scherz and Salomon are also developing photodynamic therapy to treat three non-malignant ophthalmic diseases: age-related macular degeneration, a vascular disease of the retina; keratoconus, a malfunction of the cornea, which seriously impairs vision and may lead to blindness; and early-stage myopia.

“The Thompson Family Foundation made this happen,” says Dr. Coleman (see related story). “We owe the foundation a mountain of gratitude. This model of philanthropy for supporting bench-side biomedical research and the resulting translation to clinical trials, when utilized properly, is really ideal because it enables important work to get done on a shorter timeline—and directly benefit patients that much faster,” he adds. He explained that this funding opportunity has enabled him and his colleagues



to focus valuable time, resources, and effort on research in ways that are not possible with traditional funding agencies and their long timelines for approvals.

“The synergy between MSK and the Weizmann Institute has been phenomenal,” he adds, “because our strengths complement each other—outstanding basic research on the Weizmann side and powerful clinical research and patient care on our side. There is no direct competition—just a deep friendship and productive scientific endeavor.”

Wanderlust for a cure

The Thompson Family Foundation's visionary investment, at a pivotal moment

Wade Thompson was born and bred in New Zealand, but he captured one of the essential features of America—a zeal for taking to the wide-open road—and made his fortune in the recreational vehicle (RV) business, which consists of travel trailers and motor homes. He died in 2009 at age 69 after a long battle with various forms of cancer which started 15 years earlier with a prostate cancer diagnosis. When he established the Wade F. B. Thompson Foundation with the bulk of his estate (now the Thompson Family Foundation) and asked his attorney and close friend Alan Siegel to head it, Mr. Thompson's goal was to give back to America—through arts, culture, and science, and in particular, cancer research.

When Mr. Siegel met Prof. Avigdor Scherz in 2011 and heard about the Weizmann Institute scientist's plans for an innovative collaboration with Memorial Sloan Kettering Cancer Center to advance research and clinical trials on prostate cancer, the foundation head said he was "sold". Today, five years later, the partnership has resulted in successful clinical trials for an early-stage prostate cancer therapy (see story).

The multi-million dollar grant enabled the trials to get up and running in a short time relative to the time it would typically take to apply for and receive grants from traditional funding agencies. And it has paved the way to four more planned trials that will get underway this year, for advanced prostate cancer and three other cancer types.

With a partner, Mr. Thompson bought an RV company named Airstream at the height of the oil crisis in

the late 1970s for dirt cheap, convinced that Americans were just putting their wanderlust on temporary hold. The duo later formed Thor Industries, whose sales exceeded \$4 billion in 2015.

"Wade was an entrepreneur who saw an opportunity and went for it. He had never driven an RV before he bought his first RV company, but he had good business sense," said Mr. Siegel in an interview in the foundation's offices on Park Avenue in Manhattan. Wade was an achiever, and so I try my best to make sure that his foundation follows in his footsteps: identifying a worthy goal and doing what it takes to achieve it."

With assets of \$535 million as of 2014, the Thompson Family Foundation is one of New York's largest family foundations. Angela Thompson, Wade's widow, is president emerita and advisor, and the couple's daughter, Amanda, serves as president. Amanda's twin brother, Charles, lives in Moscow. The foundation gives primarily to arts, culture, and historic restoration projects in New York City, projects that are close to Angela's heart.

One of the most notable beneficiaries is the Park Avenue Armory, the city's largest indoor space—spreading across an entire city block. Built in the Gilded Age of New York by the city's wealthiest families including the Roosevelts and the Rensselaers and opened in 1880, the Armory had fallen into disrepair. The Thompsons, who lived across the street, were distressed to see the historic venue neglected. So the foundation funded the Armory's restoration with a gift of \$129 million, transforming the 55,000-foot Wade Thompson Drill Hall and eventually, the bulk of the structure.

“Wade suffered a lot from cancer and chemotherapy,” says Mr. Siegel. “He would be happy to know that this new therapy that we have funded will mean that other people will not have to suffer in the way that he did,” says Alan Siegel.

Today, the Thompson Arts Center at Park Avenue Armory (which will become the Thompson Armory) hosts music, theater, and other cultural events.

A collaboration ‘worth supporting’

After Wade Thompson was diagnosed with prostate cancer, he later battled melanoma and ultimately died of metastatic colon cancer. “Wade suffered a lot from cancer and chemotherapy,” says Mr. Siegel. “He would be happy to know that this new therapy that we have funded will mean that other people will not have to suffer in the way that he did.” It was in this vein that, during Mr. Thompson’s lifetime, Thor Industries funded an RV equipped to travel around the U.S. to offer PSA testing for early detection of prostate cancer.

The Weizmann Institute-MSK collaboration was an unlikely beneficiary, initially, of the foundation’s support, he notes. Although the foundation has supported some scientific research (for instance, on chemotherapy-induced neuropathy and idiopathic neuropathy, a project of Columbia University), that wasn’t its focus. Also, he says, “We weren’t interested in funding anything outside the U.S., and as a small family foundation we had no way of evaluating the research progress of such a complex project. But when I met Avigdor I was immediately struck by his enthusiasm, and I felt that this was a project that Wade would have liked and he would have seen the importance of supporting the development of a noninvasive prostate cancer treatment, or cure.”

An outside philanthropic advisory organization evaluated the project’s progress. “They said to us,



Alan Siegel of the Thompson Foundation

‘Any project spearheaded by Peter Scardino and Jonathan Coleman [both of MSK] and Avigdor Scherz is a project worth supporting. That was enough justification to me to go ahead and spend a lot of money,’ jokes Mr. Siegel.

Furthermore, we really liked the synergy of basic research and patient care, in particular how these two institutions had already proven they work so well together.”

Mr. Siegel’s first visit to the Weizmann Institute, in 2012, he says, was “mind-blowing... It all became clear to me, in seeing the extraordinary facilities and scientists, that this is a truly global environment, intricately linked to the scientific hubs of the world.”



Wade Thompson

But something else moved him as well on that visit. Prof. Scherz and his wife, Dr. Zehava Scherz of the Department of Science Teaching, hosted him for a meal in their garden, where other guests included scientists and students from the former Soviet Union, or who were children of Soviet refugees.

In the early 1990s, Mr. Siegel had been one of the first American lawyers to go to Russia after the breakup of the Soviet Union, to explore business opportunities on behalf of U.S. companies who saw potential opportunity.

“I saw Jews standing in lines ready to leave the country. They were being humiliated and harassed by officials. It was horrendous, and that image never left me,” he recalls. “Then, years later, sitting at Avigdor’s table, I experienced an amazing moment where I thought: ‘What a loss for the countries that treated the Jews as they did, and what a tremendous thing Israel has done—and on top of that, created such great science in such a short time frame.’”

The 67th General Meeting of the International Board: Art, science, imagination

The theme of this year's General Meeting of the International Board was the thread that wove together—with great fanfare—the inspiring science and art presented at the Opening Gala on Nov. 8. Board members and friends heard TED-style talks by Weizmann Institute scientists. Singer Matti Caspi performed a series of much-loved songs, and the Inbal Pinto and Avshalom Pollak Dance Company presented “Oyster”, which has received critical acclaim worldwide. And students from Shenkar, the Israeli engineering, design and art school, showcased unique innovations in fashion.

The Closing Gala, held at the Hilton Tel Aviv Ballroom, was dedicated to science education for youth, teachers, and the public, highlighting the successes of the Davidson Institute of Science Education. The event honored Prof. Haim Harari, Chairman of the Davidson Institute (pictured below), who retired from that role; Prof. Harari, a member of the Faculty of Physics, served as President of the Weizmann Institute between 1988 and 2001.



“We are keenly aware that science literacy is not just about doing science homework and taking tests,” said Karen Davidson, whose late husband Bill established the Davidson Institute; at the event, she announced the Davidson Foundation's most recent gift, which supports the upgrading of a new Davidson Institute website. “It's about science becoming part of our lives—for personal advancement and self-efficacy; for informed decision making; in addition to paving the way for new discoveries ... We make this gift out of gratitude for our friendship with Haim and with this special place.”

Prof. Harari said, “If knowledge and wisdom are the most sought-after commodities in the world, then their creation—which is education—is the best investment in the world.”



Special Events

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New centers, chairs, and funds

Donors and scientists alike were honored for the establishment of new chairs and centers at the Festive Open Session. The **Wertheimer Center for Computational Biology** was marked in the presence of Jeremy Wertheimer of Boston (see Q&A); and the **Dr. Dan Andrae Fund for an Annual Conference in Neuroscience**, marked in

the presence of Dan Andrae of Toronto (pictured below). The Institute also marked the establishment of the **Center for Translational Research, in memory of Prof. Haim Garty**, who served as Vice President of the Weizmann Institute and was a member of the Department of Biological Chemistry. Prof. Garty passed away in 2014.



Prof. Haim Garty z"l

The new **Edmund A. and Arlene Grossman Hall** in the David Lopatie Conference Centre was dedicated in the presence of Edmund Grossman of New York, who spoke eloquently about his late wife Arlene. "I can think of no better place than the Weizmann



Institute to unravel the mysteries of science," he said. When he was first introduced to the Institute, one of the elements that resonated the most with him was "the idea that scientists follow their curiosity and that that makes for great science."

At the dedication of the **Laura Gurwin Flug Family Fund**, which is supporting the research of Dr. Ruth Scherz-Shouval, a new scientist in the Department of Biological Chemistry, Ms. Flug talked about her late parents Joe and Rosalind Gurwin, who were strong supporters of the Weizmann Institute and staunch advocates of Israel. "I am proud to be associated with such an illustrious institution and I look forward to a long-term friendship," said Laura Flug (pictured above, center, with Dr. Scherz-Shouval and Prof. Zajfman).

The Institute also marked the establishment of the **Dr. A. Edward Friedmann Career Development Chair**, whose first incumbent is Dr. Avraham (Rami) Aizenbud of the Department of Mathematics. Susan Friedmann spoke about her late father, who loved mathematics and for whom the chair is named.

Q&A with Jeremy Wertheimer

Jeremy Wertheimer of Brookline, Massachusetts, was recognized at the International Board for his generous gift establishing the Wertheimer Center for Computational Biology. The Center will enable the integration of big data into a wide array of biological research projects, including advancing precision medicine, working hand-in-hand with experts at the Nancy and Stephen Grand Israel National Center for Personalized Medicine.

Dr. Wertheimer (pictured with Prof. Daniel Zajfman) is a computer scientist who co-founded ITA Software in 1996 with colleagues from MIT, with the aim of enabling airlines and travelers to find the best airline fares. He developed the idea while completing his PhD in artificial intelligence at MIT, also in 1996. The 400-person company's software was first used by Orbitz in 2001, followed by a long list of airlines including American Airlines, United Airlines and Delta Air Lines. In 2011, Google acquired the company and shortly thereafter launched Google

Flight Search. Dr. Wertheimer is now a Vice President of Engineering at Google. He is a trustee of Cooper Union, and serves on several other boards.

Q What was the origin of your idea behind ITA?

A I was initially surprised by how difficult it was to find the best airline fares when booking a ticket. I realized that the software that the industry used had been written in the 1960s for the needs of a regulated industry and with the constraints of running on mainframe computers, neither of which were now appropriate. Perhaps it was a bit of hutzpah to think that we could transform the industry, but we were trained computer scientists and this was a computational challenge. And in the end we did transform the industry.

The core part of the problem is finding the right information for the individual situation—similar

The Maurice M. Dwek Rose Garden was dedicated in a ceremony on Nov. 9, a gift to the Dwek family from the Weizmann Institute of Science in recognition of Maurice's close friendship with and support for the Institute over many years. The Garden is located in a quiet, shady corner of Jubilee Plaza, in clear view of the Dwek Campus Center which Maurice and his wife Janet established together with his brother Solo and his wife Jeanette, in addition to many other gifts to the Institute. Pictured L to R: Denitza Roussinova, Jeanette Dwek, Marco Dwek, Edward Dwek, Julian Dwek, Solo Dwek.

At the Board meetings, the family announced a magnanimous new gift for the establishment of the Dwek Institute for Cancer Therapy Research at the Moross Integrated Cancer Center. Research at the Dwek Institute is expected to lead to the identification of new drugs and other types of treatment methods, while inflicting minimal or no damage to healthy tissues.

Dedication of the Maurice M. Dwek Rose Garden



to the situation with health data. And sometimes, bringing together two separate fields or industries that didn't communicate much in the past can be very successful. That thought first occurred to me when I went to a computer conference in 1993 attended by people from the airline industry but not by people from the computer science research community. And that also applies in the case of fusing computational tools with biology.



Q Why did you establish the Wertheimer Center?

A The scale of the data that we have at our fingertips now is breathtaking. We are becoming better and better at gathering data and at analyzing it with sophisticated algorithms and other computational tools. I think there is great potential in bringing computational tools and techniques into the world of biology. I believe it will make a difference in the study of cancer and many other diseases, and in ways that we have not yet imagined.

Q Why is the Weizmann Institute the place to do this?

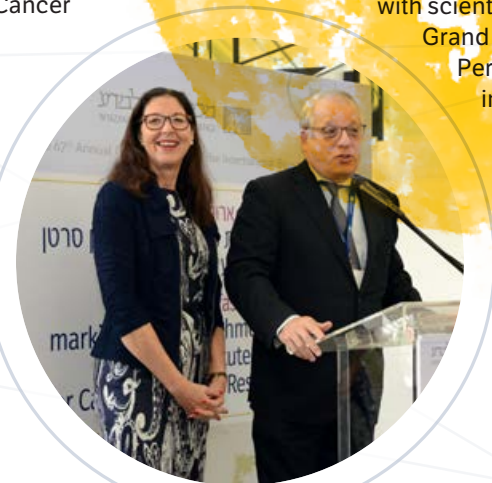
A Weizmann has identified the great potential of big data and its scientists are integrating it into their work with the knowledge that large data sets and computational tools can advance biomedical research. I hope that we can create an entrepreneurship ecosystem where we can bring the benefits of computational biology to the world.

Establishment of the EKARD Institute for Cancer Diagnosis Research

D iagnosis of cancer is becoming increasingly dependent on identifying types of cancers with ever greater precision—and treating them with more specific targeted therapies. The establishment of the EKARD Institute for Cancer Diagnosis Research in the Moross Integrated Cancer Center (MICC) is a key step toward that goal. The EKARD Institute was established by Bob and Renée Drake of the Netherlands and was celebrated in a festive breakfast ceremony on November 10.

“Whereas a doctor might have previously said, ‘You have cancer,’ or ‘You have melanoma,’ the next step that

scientists are working on is to specify what kind of melanoma,” said Prof. Yardena Samuels of the Department of Molecular Cell Biology and head of the new EKARD Institute, who is a melanoma specialist. The EKARD Institute will work closely with scientists at the Nancy and Stephen Grand Israel National Center for Personalized Medicine to translate insights on diagnosis to potential personalized therapies.



Bob Drake is Vice Chair of the Executive Board of the Weizmann Institute and Chairman of the European Committee for the Weizmann Institute of Science (ECWIS).



From top left, clockwise: Shlomo Bar, Prof. Claude Cohen-Tannoudji, Pascal Mantoux, Prof. Serge Haroche, Miel de Botton, Prof. Lord Winston

Our new Doctors of Philosophy, *honoris causa*

In a special session of the Annual General Meeting, the Weizmann Institute recognized the achievements of six people whose contributions to society resonate beyond their own fields of activity, by bestowing on them the Institute's highest honor, the degree of Doctor of Philosophy honoris causa.

Shlomo Bar is an Israeli composer, drummer, and social activist and a pioneer of ethnic music in Israel. He has created musical continuity between past and present, in his words, “a link in the chain that connects my parents to my children.” He was born in Rabat, Morocco, in 1943 and came to Israel at the age of six. He founded one of Israel's most innovative musical bands, *HaBrera HaTiveet* (*The Natural Choice*).

Prof. Claude Cohen-Tannoudji is known for developing the theoretical framework that explains the laser-cooling of atoms. This work has enabled their study with great detail and paved the way toward ever-smaller electronic components, improved space navigation, and more precise measurement of gravitational forces. He received the Nobel Prize in Physics in 1997 with Steven Chu and William Daniel Phillips. He was born in Constatine, Algeria, and has spent his life in France.

Miel de Botton is a clinical psychologist, a contemporary art collector, a munificent philanthropist, and a singer-songwriter. She was born in Zurich and lives in London. Her father, Gilbert de Botton, was a strong supporter of the Weizmann Institute. At the Weizmann Institute, Ms. Botton established the de Botton Institute for Protein Profiling at the Nancy and Stephen Grand Israel National Center for Personalized Medicine, and the de Botton Center for Marine Science.

Prof. Serge Haroche is a quantum physicist who actualized Albert Einstein's dream of isolating and studying individual protons without destroying them. By enabling quantification and control of

fragile quantum states, he has tested the field of quantum mechanics at its most fundamental level, opening the way to harnessing it for applications in quantum computing. A citizen of France, he received the Nobel Prize in Physics in 2012.

Pascal Olivier Mantoux has held various senior management positions for several global corporations and lives in France and Israel. He is a member of the Executive and International Boards of the Weizmann Institute and serves on several management committees. With his wife, Ilana, he has given generously to the Weizmann Institute, including establishing the Ilana and Pascal Mantoux Institute for Bioinformatics at the Nancy and Stephen Grand Israel National Center for Personalized Medicine, supporting scientific collaborations with Sheba Medical Center, and funding the research of Dr. Jacob Hanna of the Department of Molecular Genetics.

Prof. Lord Winston is a world-renowned fertility expert, an acclaimed author, and one of Britain's best-known faces of science. He is a pioneer of in-vitro fertilization and treatment of female reproductive diseases. And he is a passionate believer in science education and a gifted communicator of science to the public, through popular science books, TV programs, and lectures. He was born and grew up in England. He was made Baron Winston of Hammersmith in 1995 and is an active member of the House of Lords. He is a Professor of Science and Society and Emeritus Professor of Fertility Studies at Imperial College London. He is chancellor of Sheffield Hallam University and chairman of the Council of the Royal College of Music.

Groundbreaking ceremony for the Arnon Science Education Campus



 Prof. Ruth and Dr. Uriel Arnon

Guests gathered on Nov. 10 for the cornerstone-laying ceremony for the Ruth and Uriel Arnon Science Education Campus, in the presence of Prof. Ruth Arnon of the Department of Immunology and her husband Dr. Uriel Arnon, whose visionary gift established the campus. The building will add an important new dimension to what is becoming an increasingly busy corner of the Weizmann Institute of Science, dedicated to science education for school-aged youth.

This campus, located on municipal land adjacent to the Weizmann Institute campus next to the Davidson Institute for Science Education, will house the Schwartz-Reisman Center for Science Education. The Schwartz-Reisman Center will provide chemistry and physics coursework at the highest possible level for outstanding high school students from Rehovot and nearby Nes Ziona.

The Center is currently operating with close to 800 students at the Davidson Institute for Science Education. More than 1,500 students are expected to enroll once this campus is complete.

The Arnons have been part of the fabric of the Weizmann Institute community for almost 60 years. Prof. Arnon, a world-renowned immunologist and winner of the Wolf Prize and Israel Prize for Medicine, has served in many roles at the Institute and the international scientific community, including as Vice President (twice) and Chair of the Israeli Academy of Science and Humanities.

Prof. Arnon expressed her and her husband's great appreciation and gratitude for the opportunity to support this unique campus, which is an "important milestone in educating the next generation of Israeli scientists, engineers, and high-tech entrepreneurs".

THE AZRIEL
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IMAGING & RESEARCH

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Azrieli dinner and dedication

On the evening of November 10, the members of the International Board and guests honored the Azrieli family for its dedication and support for the Weizmann Institute throughout the years and the establishment of the Azrieli National Institute of Human Brain Imaging and Research. David Azrieli, the family's patriarch and a long-time supporter of the Institute, passed away in 2014. His daughters (pictured L to R), Danna, Naomi, and Sharon, and Stephanie, his wife, were in attendance at the event (pictured below).

Naomi Azrieli shared her feelings for the Weizmann Institute, saying, "It is like a family for us," and called the Institute "a trailblazer in innovative technology and scientific creativity". Prof. Noam Sobel, head of the Department of Neurobiology and head of the new Azrieli Institute, described some of the latest developments in neurobiology research at the Institute and the impact that the Azrieli Institute will have in the future, specifically the addition of a more powerful MRI which will be a major feature of the new Azrieli Institute.





Clore Lunch

Israeli author and journalist Ari Shavit (pictured at left) was the keynote speaker at the traditional Clore Lunch, hosted by Dame Vivien Clore Duffield on Nov. 9. Mr. Shavit is the author of the 2013 bestseller *My Promised Land: the Triumph and Tragedy of Israel*. Mr. Shavit was born and raised in Rehovot, and his father was a scientist at the Weizmann Institute. “Being at the Weizmann Institute really is, literally, like coming home,” he said. At the lunch he echoed Dame Vivien’s praise of the value of women in science, noting that his great aunt was the English chemist Rosalind Franklin, who is played by Nicole Kidman in *Photograph 51*, a UK play about the pioneering woman scientist behind the discovery of DNA’s double helix structure.

Dame Vivien awarded the Clore Prize to Dr. Ziv Shulman, a new recruit in the Department of Immunology, and awarded the Clore Postdoctoral Fellowships. The lunch was also an opportunity to celebrate the establishment of the **Clore Institute for High-Field Magnetic Resonance Imaging** which will set a new bar for MRI research.

Foreign postdocs: at home at Weizmann



Weizmann Institute international postdocs discussed their research and their experiences in Israel and on campus at a special session at the International Board on Nov. 11. Board members and guests heard from Dr. Savani Anbalagan, a neuroscientist from India; Dr. Valentina Caracuta, an archaeologist from Italy; Dr. Anne Fages a French scientist working in Chemical Physics; Dr. Michael Krueger, a physicist from Germany; Dr. Benjamin Palmer, who is from Wales and is studying biomineralization; and Dr. Nicolas Panayotis, a French biochemist.

Each postdoc extolled the virtues of his or her lab, saying that it is known in the field that the Weizmann Institute is the best place to study their specialization, and that they appreciated the friendly atmosphere and good working relationships with their respective principal investigators—and life in Israel.

Learning science in 3 minutes



Eight PhD students from the Feinberg Graduate School presented a short summary of their research to Board members and guests on November 11. Naama Aviram, Iris Grossman, Ron Hadas, Eran Kotler, Akiva Rappaport, Maya Shamir, Liran Szlak, and Gal Winer opened a window into their research on genomics and cancer genomics, biomedical engineering, fertility, neurobiology, and quantum computing. The informative presentations served to illustrate the top-tier quality of FGS students, who play integral roles in lab work on campus.



The establishment of the Dimitris N. Chorafas Institute for Scientific Exchange was celebrated on Nov. 10 in the presence of Eva Binder, the longtime partner of Dimitris Chorafas of Zurich. Mr. Chorafas passed away in 2014, shortly after making the visionary gift to establish the Chorafas Institute, which funds international scientific conferences on the Weizmann Institute campus, enabling the Weizmann Institute to solidify its role as a world hub of scientific research. The Chorafas Foundation also funds the Chorafas Prize for outstanding students at the Feinberg Graduate School and at leading academic institutions worldwide.

מכון ויצמן למדע





New Labs dedicated at the G-INCPM

Three new labs in the Nancy and Stephen Grand Israel National Center for Personalized Medicine were established by generous donors: the Leesa Steinberg Automated Biology Laboratory; the Steven Romick and Carol Ann and Moise Emquies and Family and Eden and Steven Romick and Family Compound Management Laboratory; and the Blythe Brenden-Mann Genomic Sequencing Laboratory. All the gifts provide cutting-edge tools for Weizmann Institute scientists and other Israeli scientists to advance research on precision medicine.



Dedication of the ACWIS 70th Anniversary Lab

Some 70 American friends came together to support the establishment of a new lab at the Weizmann Institute, in a gesture honoring the 70th anniversary of the American Committee for the Weizmann Institute of Science. The ACWIS 70th Anniversary Lab, headed by Dr. Noam Stern-Ginossar and located in the Arthur and Rochelle Belfer Building for Biomedical Research, was dedicated in a ceremony on Nov. 8.



The fundraising effort was spearheaded by Alan Fischer of New York, in 2014, with the intention of supporting the lab of a newly recruited scientist; in a mere year and a half, U.S. donors doubled the original goal, thereby supporting the lab and equipment needs of Dr. Stern-Ginossar. Dr. Stern-Ginossar, of the Department of Molecular Genetics (pictured with Mr. Fischer), studies viruses and how they invade healthy cells, then take over the cell's systems to survive and reproduce.

"This lab is a treasure, and a shining example of the close partnership we have enjoyed with our American friends since the 1940s," said Prof. Daniel Zajfman.

A gift for memory and renewal: A new lab for Dr. Ofer Firstenberg

Dedicating a laboratory at the Weizmann Institute of Science offered a chance to “close the circle and bring renewal” to a family’s bittersweet story of loss, love, and survival, said Ettalana Goldman of South Africa at the lab’s dedication on November 9. The Laboratory in Memory of Leon and Blacky Broder of Switzerland funds the research of Dr. Ofer Firstenberg of the Department of Physics of Complex Systems.

Hildegard “Blacky” Broder was Mrs. Goldman’s late aunt, who had been in the Dutch resistance movement against the Nazis. Blacky met Leon, from Leipzig, after the war. His first wife and their 13-year-old son, Manfred, were killed in the Holocaust. Leon survived the Auschwitz and Buchenwald death camps. Leon and Blacky built a successful life together in the Netherlands and Switzerland, and left part of their estate to the Weizmann Institute. “We remember them with much love and great respect. They were generous to family and friends, and their bequest to the Weizmann Institute reflects their appreciation of excellence,” Toby Goldman said, adding, to Dr. Firstenberg: “May you follow your dreams and break through the barriers in your field of science, and may they bear fruit for the benefit of all humanity.” Pictured from left to right: Toby and Ettalana Goldman, Dr. Firstenberg.



Dedication of the Neil Shore Laboratory



Neil Shore of Toronto, after unveiling the plaque at the newly dedicated Neil Shore Laboratory at the Davidson Institute of Science Education, on Nov. 12. Mr. Shore has actively participated in the programs he supports, in particular Math-by-Mail, an online program that teaches math to elementary-school students through stories, puzzles, and riddles.

Two of the most exciting scientific revolutions of our time—genomics and big data science—promise to usher in a new era characterized by rich, sensitive, personalized, and adaptive medicine.

To that end, the Weizmann Institute of Science and Clalit Health Systems—Israel's largest health maintenance organization (HMO)—are launching a joint research program that will leverage the availability of patient data for the benefit of scientific research and clinical care. The program, which is the central feature of the new Bench-to-Bedside Project, represents a major step in linking a world-leading scientific research institution with a world-leading big data repository providing medical records on more than half of the Israeli population.

The project aims to engage scientists and physicians in shaping new medical research paradigms by harnessing modern mathematical and statistical modeling of millions of patients' genomic profiling data, leading to improved diagnosis and personalized treatment protocols.

"The Weizmann-Clalit program is a major step in the rapid transformation we see in the way biomedical research is being carried out," says Weizmann Institute President Prof. Daniel Zajfman. "It will allow scientists to link the work done at the bench more directly with the bedside. The ability to link the knowledge in such a medical database with

The Bench-to-Bedside Project

Big data, the genomics revolution, and a new era in medicine

Science Feature

scientific results in the laboratory has the potential for speeding up scientific discoveries in many fields of the life sciences.”

“This is a highly unique translational research collaboration that is certain to yield major insights in a range of biomedical specialties,” says Prof. Gabi Barbash, MD, MPH, who has joined the Weizmann Institute to direct the Bench-to-Bedside Project (see sidebar).

His first task will be to coordinate four “pioneering projects” utilizing the Clalit database: two on diabetes, one on multiple myeloma, and one on human phenotypes. Each will bring together advanced analysis of anonymized medical records and innovative Weizmann Institute-made genomic analyses of select patients. Prof. Barbash expects that these projects will pave the way to an even broader initiative, leading to the broad sequencing of 100,000 genomes of Israelis, a \$100 million initiative called the “IL100K” project, which, he says, “could change the face of patient care in Israel and hopefully serve as a model for other healthcare systems.”

Prof. Amos Tanay, of the Department of Biological Regulation and the Department of Computer Science and Applied Mathematics, is working with Prof. Barbash to establish the project, and is co-leading one of the four pioneering projects (on multiple myeloma).

“Beyond the exciting opportunity in applying our genomics tools to

key common disease, we believe that providing the Weizmann Institute research community with access to the Clalit’s data can be truly transformative,” he says. “We cannot predict which insights our scientists will generate from this treasure, but we expect novel and paradigm-changing discoveries in

based on additional data. However, unlike today’s decisions, which are typically based on a few dozen tests within a standard blood workout, tomorrow’s medical decisions will likely take into account millions of patient-tailored data points that are derived from modern genomic technologies.



Prof. Amos Tanay

both basic science and practical healthcare applications,” says Prof. Zvi Livneh, Dean of the Faculty of Biochemistry.

Converging basic science and clinical care

Doctors and scientists alike are used to observing disease processes, hypothesizing about origins of diseases and potential cures, testing these ideas in experiments, and making decisions

Combining all patient data—including clinical records and genetic data—into one coherent and trustworthy medical tool requires an entirely new set of interdisciplinary methods. These should incorporate concepts from mathematics, computer science, and modern biology into clinical knowledge. Synthesis of ideas can happen only if physicians and scientists come together to develop such tools jointly, points out Prof. Barbash.

“We believe immediate action is needed in order to transform the



potential of clinical genomics research in Israel into a real engine of research and innovation, for the benefit of medical research, and healthcare innovation,” he says. “The window of opportunity is narrow, since within a few years, several competing initiatives in the world might set standards and establish leadership in this young field.”

Building a framework allowing such exchange is not an easy task, but both the Institute and Clalit are exceptionally positioned. First, the unique structure of the healthcare system in Israel—just a few HMOs in a compact country with a socialized healthcare

system—means that much of the data is centralized. Indeed, over the last 20 years, Clalit has processed and stored its medical data for over half of the Israeli population.

Meanwhile, the Weizmann Institute is a world leader in genomics, starting from the earliest days as a key participant in the Human Genome Project in the 1990s. That initiative spawned a wide range of research avenues, and Institute scientists have gone on to explore the molecular and genetic mechanisms that underlie basic biological processes in complex organisms, addressing a wide range

Prof. Gabi Barbash: Director of the new Bench-to-Bedside Project

In his 18 years as director of Tel Aviv Sourasky Medical Center, one of Israel’s largest hospitals, Prof. Gabi Barbash managed medical crises, oversaw an emergency room that treated victims of terror attacks, supervised a vibrant clinical research program, and grappled with some of the most vexing challenges in healthcare. He accompanied the trauma teams as they tried to save the life of Prime Minister Yitzhak Rabin when he was brought to the ER unit after being shot on the night of Nov. 4, 1995.

Prof. Barbash served in that role until last year. For three of those years (1996-1999) he served as Director General of Israel’s Ministry of Health. In 1997, he launched a nationwide program to control an outbreak of tuberculosis after a dramatic surge of new cases occurred with the arrival of a large number of immigrants from the former Soviet Union and Ethiopia. That required orchestrating all four of Israel’s health maintenance organizations (HMOs) to cooperate in controlling the re-emergence of this disease.

When it became evident that Israel has one of the highest rates of breast cancer in the world, he introduced nationwide mammography screening for women over age 50.

As chairman of the Israeli National Transplant Center (1998-2000), he reorganized the system of organ harvesting, doubling the number of organ transplantations in Israel. The transplantation revolution was a particular challenge in Israel, where religious beliefs in addition to other


factors inhibit families from donating the organs of their loved ones. “What I discovered when I looked into the problem was that while it is difficult to negate these belief issues, we were not even approaching many of the families because we did not have an effective process that identifies the potential donors in all the hospitals,” says Prof. Barbash. “As a result, we were approaching only half of the families of potential donors.”

To tackle the problem, the Ministry of Health hired a nurse stationed in every Israeli hospital designated to identify candidates for organ donation and to manage these highly sensitive situations. A nurse director at the National Transplantation Center oversees the national operation and ensures that the harvesting process proceeds smoothly after a family’s approval.

Prof. Barbash is a graduate of the Hadassah Medical School of the Hebrew University of Jerusalem and is board certified in Internal Medicine, Medical Management, and Occupational Medicine. He holds a master’s degree in public health from the Harvard University School of Public Health. He was Israel’s national coordinator and principal investigator for numerous multi-center cardiology studies (1989-2000). He is a Professor of Epidemiology and Preventive Medicine at Tel Aviv University’s Sackler School of Medicine.

He is widely published in his field, cardiology, specifically acute myocardial infarction, and was a visiting professor at Columbia University.



 Weizmann Institute scientists who are also medical doctors, from L to R: Dr. Liran Shlush, Dr. Gad Asher, Dr. Ayelet Erez, Dr. Jacob Hanna, Prof. Gabi Barbash, Dr. Eran Elinav, Prof. Eran Hornstein, Dr. Ravid Straussman.

of biological questions. In addition, Weizmann Institute scientists have world-renowned expertise in bioinformatics and systems biology. In addition, the Nancy and Stephen Grand Israel National Center for Personalized Medicine has quickly become a nationwide hub for transformational research that integrates genomics, protein profiling, bioinformatics and drug discovery.

In the long term, the infrastructure created by the initiative will be made accessible to the entire spectrum of medical researchers—from data analysts and machine learning experts to medical doctors and scientists throughout Israeli academia, above and beyond the Weizmann-Clalit initiative.

“The Bench-to-Bedside Project will strive to develop a major, nationwide clinical genomics initiative, a domain in which the Israeli system may have an edge over other healthcare systems like in the U.S., the UK, and the EU,” says Prof. Barbash. “Our projects will

set new standards in integration of clinical data and genomic analysis, and in the long run, we believe we can transform the potential of clinical genomics research in Israel into a major engine of research and innovation for the benefit of patients and the entire healthcare system.”

“Combining the Weizmann Institute’s state-of-the-art research capabilities with the immense patient base from Clalit represents a strategic opportunity to join forces in incorporating big data approaches into the clinical patient care scheme,” says Dr. Eran Elinav of the Department of Immunology, a medical doctor who is involved in one of the four pioneering projects. “As such, the fruits of this alliance may enable the diagnosis, prevention, and treatment of common disease by integrating human genomic and microbiome features into the personalized medicine field. The growing number of Weizmann scientists holding a medical degree may help to form the bridge making this vision a reality.”





A transformational gift

Mort Zuckerman is cultivating U.S. and Israeli scientific leadership

 Prof. Menachem Ben-Sasson, Prof. Daniel Zajfman, Gov. Andrew Cuomo, Prof. Ada Yonath, Mr. Mort Zuckerman, Prof. Peretz Lavie, Prof. Richard Axel, Prof. Joseph Klafter, Prof. Eric Kandel

American business leader and philanthropist Mortimer B. Zuckerman announced on Jan. 25 the launch of the Zuckerman STEM Leadership Program, a \$100 million initiative to promote deeper scientific ties between North America and Israel. The gift, which will be split evenly between four Israeli institutions of higher learning including the Weizmann Institute of Science, will fund scientists from the U.S., Canada, and other Western countries during their postdoctoral fellowship period in Israel; and the recruitment of top Israeli scholars from abroad to join the faculties of the Israeli institutions, enabling the institutions to effectively compete with top North American institutions for the best candidates.

The other participating institutions are the Technion—Israel Institute of Technology,

Tel Aviv University, and the Hebrew University of Jerusalem.

Mr. Zuckerman is the chairman and editor-in-chief of *U.S. News & World Report* and is the chairman and publisher of the *New York Daily News*. He is the co-founder and chairman of Boston Properties, Inc. A native of Montreal, Mr. Zuckerman is a frequent commentator on world affairs and is a former chairman of the Conference of Presidents of Major American Jewish Organizations.

The launch event was held at the Harvard Club in Manhattan in the presence of New York Governor Andrew Cuomo, three Nobel laureates including the Institute's Prof. Ada Yonath, and the presidents of the Israeli institutions: Prof. Daniel Zajfman of the Weizmann Institute, Prof. Peretz Lavie of the

Special Section

44–45

Technion, Prof. Joseph Klafter of Tel Aviv University, and Prof. Menachem Ben-Sasson of the Hebrew University.

“At a time when collaboration is essential to advance scientific research, this program gives the next generations of leading American and Israeli academics the ability to work together on cutting-edge research in ways that stand to benefit their fields for years to come,” said Mr. Zuckerman. “The result will help transform not just the work of the scholars involved, but the way the United States and Israel approach collaboration and cooperation across the sciences.”

Prof. Zajfman said, “The Zuckerman Leadership Program is truly visionary in that it will create important links between North American and Israeli science by investing in new scientists at key moments in their careers as they establish their global network and begin their research. In a terrific synergy, Israeli science and these visiting scientists will nourish one another, and in the process strengthen Israel’s role as a world hub of science and technology.”

He continued, “We expect that the relationships built within this framework will generate life-long collaborations that will advance many areas of science. The Weizmann Institute of Science, a world leader in basic research, is looking forward to this new partnership and we are deeply grateful for the friendship and support of Mr. Mort Zuckerman. We look forward to witnessing the success of this program in the years to come, and the great science that will spring forth from it.”

Prime Minister of Israel Benjamin Netanyahu said in a video message: “Mort’s friendship is demonstrated yet again through this important initiative. Together with the Technion, the Weizmann Institute, the Hebrew University and Tel Aviv University,



International postdocs on the Weizmann Institute campus

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this project will help bring back home some of Israel’s most brilliant sons and daughters, allow them to advance their own careers here, and in so doing contribute to Israel’s growing scientific excellence. It will also enable some of America’s brightest young scientists to conduct their research in Israel.”

In an interview with *Weizmann Magazine*, Mr. Zuckerman said, “I have deep affection for Israel. I decided to establish this program because I believe it to be an excellent way to bring together two powerhouses in science and identify the next generation of leaders in science... This will be equally beneficial to American science as it will be to Israeli science, and, given the complexity and sophistication of scientific research today, it is critical that the best scientists collaborate.” Mr. Zuckerman went on to say that the program will have world-class scientists review and select the postdoc and faculty candidates, which will help ensure that the best-of-the-best be selected.

A visit to Israel with his nephews Eric Gertler and James Gertler in October “only reinforced my understanding of the strength of Israeli science,” he said.

Additional information on the program is available on the program’s website at <http://zuckerman-scholars.org>.



Women in Science alumni luncheon

The Weizmann Institute of Science hosted an event for the alumni of the Israel National Postdoctoral Award Program for Advancing Women in Science on December 18 at the iconic Koffler Accelerator building on campus.

The informal lunch meeting was the first of its kind since the program's inception in 2007, bringing together 20 women scientists from a range of scientific fields. The women received the award in recognition of the excellence of their research and spent their postdoc years at leading academic institutions in the U.S., UK, and Europe.

The goal of the Israel National Postdoctoral Award Program is to nurture the careers of women scientists in Israel and enrich the ranks of Israeli academia with women, thereby enriching Israeli science. The program, which is funded exclusively by donors, offers 10 women scientists awards of \$40,000 over two years to ease the financial burden during the postdoc years abroad. The program is open to all Israeli women scientists (graduates of all institutions).

Prof. Daniella Goldfarb, who heads the program as the President's Advisor for Advancing Women in Science, presented on the success of the program and Prof. Israel Bar-Joseph, Weizmann Institute Vice President for Resource Development and Public Relations, gave a welcome address. The women then took part in a roundtable discussion, describing their individual experiences in their postdoc fellowships and how the award helped them. Each woman had her own personal story, but they were united in their praise and appreciation for the financial help and the boost in confidence that they received through securing the fellowship.

"It was clear from the accounts of the women scientists that the award helped to alleviate many challenging situations, whether to help pay for childcare, travel, or general living costs. Receiving the award helped these women to feel supported and empowered to succeed," says Prof. Goldfarb.

The program, now in its ninth year, has awarded grants to 96 women to date. About three-quarters of those who have completed their postdocs have attained faculty-track positions in Israel.

Weizmann World

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Weizmann Canada: Cathy Beck steps down as chair after six years of leadership

Cathy Beck recently stepped down as chair of Weizmann Canada after serving two consecutive terms. Under her chairmanship, Weizmann Canada surpassed fundraising goals, increased engagement, and spread awareness for the Weizmann Institute of Science.

The Beck family has a longstanding relationship with the Weizmann Institute. Cathy's parents, Tom and Mary, were founding members of Weizmann Canada, strong leaders, and avid supporters. Cathy has been a part of the Weizmann Institute family for over four decades. Together with her husband Dr. Laurence Rubin and



L to R: Tom Beck; Prof. Daniel Zajfman; Cathy Beck

their children, they have continued the Beck family tradition and legacy. Sadly, Tom Beck passed away on March 13.

A few of the many successful initiatives under Cathy's leadership included a highly successful Global Gathering in 2012, welcoming over 420 guests from 11 countries. In November 2014, the Leading Men Gala surpassed Canadian fundraising records and engaged a new individuals. Cathy has made an impact on the entire organization and is recognized for her deep commitment to the vision and mission of the Weizmann Institute.



L to R: Marshall Levin, CEO of the American Committee; Richard S. Price; Dr. Jay Levy, American Committee President

Midwest region gala dinner

Under the theme of "Limitless: Celebrating Collaborative Achievement," the Midwest Region Gala Dinner, held at the Fairmont Chicago Millennium Park, hosted over 800 prominent Chicago leaders and friends of the Institute for an inspiring evening honoring Richard S. Price, Chairman and CEO of Mesirow Financial. Mr. Price, who was introduced to the Institute's groundbreaking work by his son, dinner co-chair Brian Price, brought the crowd to its feet as he spoke about his passion for brain research. The night also included two video presentations, one of which featured the Institute's latest explorations in neuroscience. In addition, guests enjoyed a fascinating panel with Weizmann Institute neurobiologists Prof. Alon Chen, Prof. Nachum Ulanovsky, and Dr. Ofer Yizhar. The gala was a tremendous success, raising nearly \$2 million to establish a brain research scholarship at the Institute in Mr. Price's name.



Making Connections in Australia

In October, nine Weizmann Institute scientists, leaders in cancer research, traveled to Australia to participate in Weizmann Australia's second Making Connections symposium. The symposium, entitled "Future Directions in Cancer Biology and Targeted Therapeutics", was held in Melbourne and was attended by over 100 Australian scientists, postdocs, and graduate students. Strong scientific connections were made and those that already existed were enhanced.

Two evening events took place, a dinner in Melbourne hosted by Mr. Philip Zajac of the Erdi Group, and a cocktail event at the Museum of Sydney. Attendees heard from Profs. Moshe Oren, Michal Neeman, Avigdor Scherz, and Varda Rotter.

L to R: Prof. Moshe Oren; Weizmann Australia board member Jeffrey Mahemoff

Festive events in Rome, Milan, and Lugano



In December, the Italian Society of the Weizmann Institute of Science hosted events in Rome and Milan at which Prof. Israel Bar-Joseph, Vice President of Resource Development and Public Affairs, spoke about the philosophy of the Weizmann Institute and the value of basic research. The Italian Society is chaired by Eric Labi. The events held in Rome and Milan were hosted by Prof. Dario Perugia, Vice Chair of the Italian Society (Rome) and Dr. Enrico Cucchiani, a member of the board of the Italian Society (Milan). The events were attended by a diverse group of philanthropists and leading scientists from the region.

In addition, Institute friends in Lugano, Switzerland, Milvia Perinot and Roberto Franchini, hosted a festive dinner for close friends and business acquaintances.

Annual Gala dinner of the European Committee

The 2016 Annual Gala Dinner of the European Committee of the Weizmann Institute of Science, held on January 11 at Hotel Baur au Lac in Zurich highlighted the Weizmann Institute's research efforts in cancer prevention and celebrated the establishment of the Swiss Society Institute for Cancer Prevention Research at the Moross Integrated Cancer Center.

More than 130 guests attended the dinner and heard from Prof. Daniel Zajfman, President of the Weizmann Institute of Science, and from Prof. Zvi Livneh of the Department of Biological Chemistry, Dean of the Faculty of Biochemistry, and Director of the Swiss Society Institute for Cancer Prevention Research. They spoke about the Weizmann Institute's mission to harness the power of basic research in order to facilitate the prevention and early diagnosis of cancer.

Mr. Eric Stupp, Chairman of the Society of Swiss Friends, is leading the Swiss initiative to support the new Swiss Society Institute for Cancer Prevention Research.

New lab in optogenetics

Members of the Schwartz and Gersen families of France gathered on Dec. 28 to dedicate the lab of Dr. Ofer Yizhar of the Department of Neurobiology which they have named with a generous gift. The Laboratory in Memory of Paul and Lucie Schwartz Georges and Vera Gersen will advance research on optogenetics, a new method of light-based activation or suppression of neurons in the brain to explore a range of neurological diseases and disorders. "This is a very important day because it is a great opportunity to create a lasting memory for our family members on the Weizmann Institute campus while at the same time advance an important area of science," said Prof. Jean Charles Schwartz.

"I am grateful for this honor of allowing my lab to carry your family name and I look forward to the many years ahead of research that will be conducted here," said Dr. Yizhar.



 *Members of the Schwartz family*

Former Intel President speaks to Israeli Friends



The Israeli Friends of the Weizmann Institute of Science hosted Mr. Mooly Eden (pictured above), who served as President of Intel Israel and Senior VP of Intel International until 2015, on Dec. 24 at the Dan Hotel. Dr. Yifat Merbl of the Department of Immunology also spoke about the next challenges in personalized medicine: novel mechanisms in protein activity.

In his talk, entitled "The man-machine interface: Will we one day be replaced by robots?" Mr. Eden discussed how the Internet will become an expansion of the human mind. Human beings, he

predicted, will have chips implanted in their bodies that could fill many technological functions of external devices, such as credit cards and car keys. This technology exists today, but it is mostly designed for the disabled or the chronically ill, for instance for hearing aids, pacemakers, and brain stimulators for epileptic patients.

He advocated for implanting such chips in healthy individuals to monitor health parameters, provide early notice of severe health events, and track the movement of dependents such as children and elderly. Despite the invasion of privacy, stated Mr. Eden, this technology has great potential to improve our quality of life. One of Mr. Eden's most well-known inventions was the "anti-eraser," an electronic component installed in televisions in Israel in the late 1970s to bypass the regulatory restrictions on color television broadcasting.

His son, Dr. Eran Eden, received his PhD at the Weizmann Institute in systems biology and is co-founder and CEO of MeMed, which offers diagnostic solutions for inflammatory and infectious diseases.

➤ Former Mexican President Vicente Fox Quesada visited the Weizmann Institute on Jan. 28, where he met with Prof. Brian Berkowitz of the Department of Earth and Planetary Sciences and Prof. Mudi Sheves, Vice President for Technology Transfer and a member of the Department of Organic Chemistry.



Congress of the Future— and a side trip to Antarctica

It was high summer in southern Chile and Antarctica, but Prof. Lucio Frydman and Prof. Ernesto Joselevich brought their warmest winter gear to attend the Congress of the Future in Santiago, Chile.

The fifth Congress of the Future, which took place Jan. 9-23, is one of Latin America's most important events. Its goal is to bring together leaders from a variety of fields to discuss the future of the planet and humankind. The event, organized by the Chilean Congress, was inaugurated by President Michelle Bachelet and included the participation of about 100 prominent scientists and intellectuals. Other participants included Chilean senators, telecommunications industry leaders, historians, sociologists, anthropologists and astrophysicists, journalists, and more.

Scientific topics included artificial intelligence, energy and climate, astronomy, medicine, and

more. Prof. Frydman, of the Department of Chemical Physics, and Prof. Joselevich of the Department of Materials and Interfaces, presented on their respective fields of research.

As part of the Congress, the Weizmann Institute duo set off with dozens of fellow participants in two planes—a Hercules and a smaller jet—for an expedition to southern Chile and Antarctica. Pictured here are Prof. Frydman (left) and Prof. Joselevich (right) with Prof. Steven Chu, Nobel Laureate in Physics and former U.S. Secretary of Energy.

“It was an unbelievable experience. The meeting gave us a chance to meet new colleagues in our research areas and in science in general, and strengthen our links with the Chilean scientific community and with the local Jewish community,” says Prof. Frydman, who is originally from Argentina, as is Prof. Joselevich.



House of Commons reception for ISSI alumni

Weizmann UK started the year on a high note with a reception held at the House of Commons for alumni of the Dr. Bessie Lawrence International Summer Science Institute (ISSI).

Almost 100 participants of the program who had spent a summer in Rehovot between 1970 and 2015 gathered in the Churchill Room at the Palace of Westminster. The event was hosted by Chris Philp MP, who is himself a Bessie alumnus.

He said: “My memories of that summer 22 years ago in Israel were amongst the happiest in my life. What the Weizmann Institute has achieved in little over 80 years to become so renowned internationally is remarkable.”

Another alumnus, from 1988, Piran Mazaheri, who is from Iran, gave a personal and entertaining account of his experiences, saying: “I was given an opportunity to attend the program at the Weizmann Institute and I have reaped the benefits ever since.” He went on to describe how he felt his connections to the Weizmann Institute had led to his



Pictured (L-R): Lydia Wood of Weizmann UK, Prof. Benny Chain, Piran Mazaheri, Sheridan Gould of Weizmann UK, Chris Philp MP

acceptance at Cambridge University and later aided in forging a successful career in engineering. At the event, he announced his decision to sponsor an ISSI student scholarship.

Closing remarks were made by Prof. Benny Chain, a member of the Institute’s International Board who had been on the selection panel for many of the ISSI alumni. He paid tribute to the high quality of both the Weizmann Institute and the students he had encountered throughout the years.



Art exhibit: Time Crack

Art exhibit: Time Crack

Benni Efrat’s works of art all carry future dates, because his art is a message from the future to the present that we are headed for environmental ruin. His exhibit in the David Lopatie International Conference Centre, *Time Crack*, suggests that our estrangement from nature and continuing disregard for the effects of industrial society on the environment are a ticking time bomb as the clock runs out on the future of modern culture.



Marla Schaefer and Prof. David Cahen

When Rowland Schaefer first visited the Weizmann Institute in the 1980s and learned about its solar energy research, he was intrigued and excited. “He remembered well the oil embargoes against Israel in the 1970s, and he understood how critical it was for the country to become independent of foreign oil,” recalls his daughter Marla Schaefer. “The idea of helping Israel kick-start the development of an alternative source of energy was irresistible to him.”

In 1986, the Institute inaugurated the Rowland and Sylvia Schaefer Solar Research Complex. When the family came to campus that year to visit, Marla says she recalls her father being captivated to see how a solar panel absorbed the sunlight and converted it into a laser-sharp beam of light that burned a hole through a slab of metal. The project soon drew in hundreds of other supporters from around the world, leading to key new understandings on how to most effectively convert sun into energy.

The Institute established a career development chair in the Schaefer's honor the next year; it has been held

by a series of young scientists and is today held by Dr. Ilana Kolodkin-Gal of the Department of Molecular Genetics. Then, in 1994, the Institute conferred an honorary doctorate upon Rowland Schaefer, which Marla calls “one of the most meaningful honors of his life.” And the family’s giving continued throughout the years in an array of areas.

In 2002, the Schaefer's established the Rowland and Sylvia Schaefer Professorial Chair in Energy Research, with the incumbent Prof. David Cahen. Prof. Cahen, of the Department of Materials and Interfaces, is a leader in solar energy research. “The investment—forward-thinking philanthropy—that the Schaefer's made in solar energy research early on helped an important area of research get started in Israel—research that had never been done here before,” he says. “Their gift for the Solar Research Complex, in particular, drew attention to this field and to alternative energy in general.”

Even before her parents’ death (they died two days apart from one another, in 2013) Marla was already deeply involved in the Weizmann Institute of her own

Profile of a Pair

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accord. A member of the International Board, she has continued her family's long tradition of support to the Institute and, together with her sister Bonnie, she oversees the family foundation in Boca Raton, Florida. Marla was inducted into the President's Circle in the 2014 Global Gathering in New York. She and her sisters, Bonnie and Roberta, are philanthropically active in a variety of causes.

The foundation is a leading supporter of the Israel National Postdoctoral Program for Advancing Women in Science, which funds Israeli women doing postdoctoral research overseas—a critical step in attaining a faculty position in Israel. Dr. Kolodkin-Gal received the prize in 2009, during her postdoc studies at Harvard University. "I am honored to be associated with the Schaefer family, both through the CDC and through Marla Schaefer's support of the postdoctoral program for women, which truly helped advance my research career," says Dr. Kolodkin-Gal.

'A good business model'

Marla Schaefer grew up in South Florida and moved to New York City; today she and her husband Steve split their time between Boca Raton and New York. They have two daughters.

Marla grew up with a father who, she says, was "a true entrepreneur, and I believe the entrepreneurial spirit he saw at the Weizmann Institute resonated with him."

In the early 1960s, Rowland started what became an international wig business. He acquired a company that owned leased counters at department stores across the U.S.; part of that acquisition was a small chain of wig, hat, and accessory stores called Claire's Boutiques. In the 1970s, as wigs fell out of fashion, he sold the wig business and concentrated on rolling out Claire's as a jewelry and accessory business. By 1990, the business had more than 1,000 stores in the U.S. alone. In 2002, Rowland handed over the management of Claire's to Marla and Bonnie, and by the time the sisters sold the company in 2007, Claire's



Prof. David Cahen

had 3,200 stores on four continents including a thriving franchise in the Gulf countries.

"As a businesswoman I can say that I love the business model of the Weizmann Institute—that it is not 'siloed', opening up communication between disciplines to nurture collaboration... At Claire's, Bonnie and I opened up the management to women not simply because they are women but because they were good at what they did, and the company flourished. At Weizmann, the model is similar: open up opportunity to the excellent people and science will flourish."

When one of her nieces was diagnosed with type 1 (juvenile) diabetes, it deeply affected her father, she recalls, and the family began thinking about how to help work toward a cure and where their philanthropic impact might be best felt. Among the beneficiaries of their giving was the diabetes research of Prof. Irun Cohen (now Professor Emeritus) of the Department of Immunology.

She continues, "I feel that if there is going to be a cure for a disease, it's going to come out of Weizmann, because the scientists here don't hold their discoveries close to their chest; they share it, knowing that sharing will lead to something great, she says. "At Claire's, I felt that the best moments of inspiration would come from discussions in the hallway. I think you're more likely to have a situation like that at Weizmann where the cross-pollination is part of the fabric of the place."

Mario Livio

A curious mind



Last year, the Hubble Space Telescope turned 25: Since its launch from Cape Canaveral, Florida, it has been circling Earth for a quarter century, capturing important objects from dust clouds to distant galaxies, and in the process, widely acclaimed beautiful images (such as the image on these pages of spiral galaxy M106). Prof. Mario Livio's tenure as a theoretical astrophysicist at the Space Telescope Science Institute in Baltimore, Maryland—which operates Hubble—is nearly as long: 24 years. But after retiring last year, he says he's working harder than ever doing what he loves most: researching and writing.

Prof. Livio, who received his master's degree in theoretical particle physics at the Weizmann Institute in 1972, may be just as well known for his bestselling popular science books and his public talks as for his research on supernova explosions and how they can be used to determine the rate of expansion of the universe. He has generated hundreds of journal articles on black holes, dark energy, and the formation of planetary systems; and at the same time, his books and talks speak to the masses, explaining in simpler but highly convincing language why science matters to all of us.

As one indicator of his instinct to bridge the audience of scientists and the general public, his article in *Nature* last year summarized Hubble's success both as a scientific achievement, attaining realms of unprecedented scientific information and attracting more scientists to the field, and also hailed it as a public relations vehicle for science in society. Thanks to Hubble and other satellites, he writes, "For the first time in human history, an answer to the question, 'Are we alone?' is within reach."

Born in Romania, Prof. Livio moved to Israel at age five. He served as a paramedic in the Six Day War and the Yom Kippur War. He received his bachelor's degree from the Hebrew University, and at the Weizmann Institute, he says two instructors made a deep impact on him: Prof. Harry Lipkin, who died last year, and Prof. Haim Harari. He went on to get a PhD in astrophysics from Tel Aviv University and was a professor at the Technion for a decade before moving to Baltimore in 1991 to work for Hubble.

Having been a student or faculty member on four Israeli campuses—and a frequent visiting scientist at some of them, including at the Weizmann Institute, where he spent two weeks this winter—he has a reliable grasp of the quality of astrophysics research in Israel.

"It used to be that astrophysics research in Israel was limited because we only have a small telescope in the Negev, and we didn't have access to the big telescopes in the world," which can cost around \$10 billion (like Hubble), he says. "But now that scientists obtain time on the big telescopes, that limiting factor has disappeared, and Israel now has internationally leading astrophysics groups comprised of many 'observers'. It used to be that most Israeli astrophysicists were theorists like myself and not observers for this reason. But Weizmann in particular

Alumni

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has been phenomenal in recently hiring extremely good people, quite a few of them observers.”

Communicating science

In the 1980s, when the Technion began filming some classes for students who missed them while on IDF reserve duty, two of Prof. Livio's courses were among them. He received positive feedback from students—and thanks to YouTube, he continues to—which made him think about communicating science in other ways to the broader public. He has written pieces on several blogs. He published his first book, *The Accelerating Universe*, in 2000. It didn't become a bestseller, but he found a labor of love in writing, and he went on to pen *The Golden Ratio* (2003), which was a bestseller in the U.S. and Italy. Its positive acclaim even surprised its author;

after all, the topic is mathematics, and specifically the number phi. He went on to write two more books about math, *The Equation that Couldn't be Solved* (2005), and *Is God a Mathematician?* (2009).

Why math? “I am a theoretical physicist—math is what I eat for breakfast,” he explains. “Some of the greatest compliments I've ever received have been when a person comes up to me and says: ‘The reason I did a PhD in math is because I read one of your books’. To me, this is what makes it all worthwhile.”

He goes on, “After I wrote *The Accelerating Universe*, which was about astrophysics, I decided not to write books about my personal research area. Instead, I wanted to use the time to explore different areas of science. I want to enhance appreciation for how critical science is to our lives. In today's world, you can't say you are not interested in science. Science is all around you and is essential in everything you do.”

For his latest book, *Brilliant Blunders* (2013), he took a leap outside math into biology, chemistry (and physics). As the subheading suggests (*From Darwin to Einstein—Colossal Mistakes by Great Scientists that Changed our Understanding of Life and the Universe*), the book explores the major discoveries and mistakes made by some of the household-name scientists of the modern era, emphasizing the importance of taking risks in one's work, and also the critical value of

ongoing research to examine and refine existing paradigms.

All of his books (excluding the first) have been translated into Hebrew and were bestsellers in Israel as well.

When he's not researching the skies above or penning a new manuscript, Prof. Livio probably has his nose buried in an art book. He's a self-proclaimed art fanatic who owns thousands of books on the subject. He jokes, “As a scientist, I could never afford to buy art so I bought the next best thing—books on art.” He says he sees a similarity between scientists and artists: “They are both looking at the universe around them and trying to give an account of it. Scientists try to explain the universe and make predictions about it. Artists try to describe it terms of their emotional response. So I think they are two complementary things—science and art—though they do not directly influence one another.”

Prof. Livio is already hard at work on his next book: on curiosity. “I'm an extraordinarily curious person, so I want to understand curiosity,” he says. The impetus for doing basic research, he adds, is grounded in that instinct. “You never know what basic research is good for when it's being done, except satisfying your curiosity. However, often a decade or a century later, it shows to have great value. And there is no stopping us [scientists and others] in those terms. You can't say, ‘Let's not be curious’. It's a natural human drive.”

On genes and diplomacy

Dr. Stavros Bashiardes doesn't fit the typical profile of a visiting scientist. He is a geneticist specializing in the effects of HIV infections on the gut microbiome of patients, conducting research in the laboratory of Dr. Eran Elinav of the Department of Immunology, while living in the ambassadorial residence of Cyprus in Herzliya with his wife, Thessalia Salina Shambos, the new Cypriot Ambassador to Israel, and their two young children.

Dr. Bashiardes was born in Zambia to a Greek mother and Cypriot father. His family moved to Cyprus when he was six and he spent the rest of his childhood living on the sunny Mediterranean island. His academic studies took him to the UK where he studied genetics and received his PhD, and then he moved to the U.S. to work at the lab of the renowned Prof. Michael Lovett in the Division of

Dr. Stavros Bashiardes

Visiting Scientists

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Human Genetics at Washington University School of Medicine in St. Louis. He spent five years there implementing genomics approaches to study sensorineural deafness (a specific type of hearing loss), implementing various approaches to identify disease-causing genes, and developing methods to study the human genome.

After returning home to Cyprus, Dr. Bashiardes continued his scientific career at the Cyprus Institute of Neurology and Genetics in Nicosia, Cyprus's leading scientific research center. There, he investigated gene therapy approaches to neuromuscular disorders using viral gene delivery systems, implementing genome analysis methods to identify causative variations in rare diseases, and investigating clinical aspects of HIV pathogenesis.

He also married his wife, the daughter of a diplomat who served as Cyprus' permanent representative to the UN.

Amb. Shambos, who had completed four years of medical school before she decided to change her path and pursue a career in international relations and diplomacy, has long been an advocate for Israel. Following several postings, including in Athens and Rome, and gradually climbing up the diplomacy ladder, she was offered the position as Ambassador to Israel.

At home in Israel

Cyprus is only a 38-minute flight away, but the family sticks around Israel on weekends and has begun to feel very connected to the country, says Dr. Bashiardes. As a geneticist, he hoped that his wife's assignment to Israel would open doors for his career too. He immediately reached out to Dr. Elinav, whose work he greatly admired, and was thrilled to secure a visiting scientist position.

In Dr. Elinav's lab, Dr. Bashiardes is studying the effects of viral infections on the gut microbiome and their consequences. He is implementing new techniques to study compositional changes in gut microbiota and genes expressed by the bacterial community, and the effects on patients. He is part of a team carrying out the HIV project that began upon his arrival in collaboration with the AIDS Center of the Hadassah Medical Center in Jerusalem led by Dr. Elinav.

"I could not be in a more ideal situation," says Dr. Bashiardes. "Dr. Elinav is an incredible scientist and person, with an amazing publication record. His leadership is inspiring in the way he has handpicked his team of scientifically unique individuals, how he guides and motivates the team, and how he achieves a sense of community in the lab."

Dr. Bashiardes says his family is very happy in Israel and feels a sense of "home away from home," drawing similarities between the climate, culture, and food in Cyprus.

In addition to the scientific research and official ambassadorial duties, he and his family are involved in supporting the many Cypriot families who come to Israel for emergency medical care, helping them to navigate the bureaucracy and alleviating the daily burden of maintaining a sense of balance while caring for sick family members.

In Memoriam

Harry (Zvi) Lipkin

by Prof. Haim Harari

Prof. Harry (Zvi) Lipkin passed away on September 15, 2015. Lipkin has been one of the leading theoretical physicists of Israel, one of the founders of the Physics Department of the Weizmann Institute and a major contributor to an amazingly broad spectrum of topics. Unlike most theoretical physicists, his originality and creativity continued for many decades, and he has been a prolific author of excellent new ideas at an age when others retire and most have forgotten their last important contribution.

Lipkin was born in New York City in 1921, grew up in Rochester, New York, graduated in engineering, contributed to the WWII anti U-boat radar project at MIT, received an experimental physics Ph.D. from Princeton, immigrated to Israel with his wife Malka to a pioneering life in a Kibbutz on the Lebanese border, was sent to France to study Nuclear Reactors, joined an R&D unit of the Israeli military, co-founded the newly created department of nuclear physics at the Weizmann Institute, and we have only reached 1955 in this history. For the remaining 60 years of his life he worked on an unusually broad spectrum of topics in physics, including nuclear physics, condensed matter physics, basic problems in quantum mechanics and he made very major contributions to particle physics. He received several major prizes, including the Wigner Medal, the E.M.E.T. Prize and the Rothschild Prize, spent long periods of research in the USA, especially at Argonne National Lab, and has been, for decades, a frequent invited speaker in just about every major physics department and conference.



 Prof. Zvi Lipkin

But his original contributions to physics have been only one aspect of his incredible career. He always felt that one should never take oneself too seriously, and founded with virologist Alexander Kohn the “Journal of Irreproducible Results”, in which no allegedly serious scientific topic remained immune against parodies, jokes and ridiculing remarks. Lipkin was also passionate about the teaching of reading in elementary schools, a subject in which he held strong views, often arguing his case in widely distributed written pieces. He has done the same regarding his views on events in the Middle East, and he was essentially a prolific blogger, decades before the word Blog was coined. In the 1980’s Lipkin corresponded with the exiled dissident Andrei Sakharov, in the Soviet Union, and was instrumental in keeping Sakharov’s fate in the focus of public opinion.

His research, as well as his attitude to anything else, was enriched by a unique ability to provide simple descriptions and explanations, often using analogies to better understood topics. His physics work was always standing on several solid legs: Maximal contact with experiments; a rare intuition for complex quantum mechanical paradoxes and dilemmas, a feature that most physicists understand but have no intuition for; and an ability to see through myriad details, straight into the heart of the matter.

An excellent scientist, great mind, and a wonderful tour guide through many labyrinths. I am proud to have been his student, friend and collaborator.

Thank you to our supporters

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Gad Asher

- ▶ Adelis Foundation
- ▶ The Estate of Dorothy Geller
- ▶ Samuel M. Soref & Helene K. Soref Foundation
- ▶ Willner Family Leadership Institute
- ▶ Yeda-Sela Center for Basic Research
- ▶ Dr. Asher is the incumbent of the Pauline Recanati Career Development Chair

David Cahen

- ▶ The Mary and Tom Beck Canadian Center for Alternative Energy Research which he heads
- ▶ Carolito Stiftung
- ▶ Ben B. and Joyce E. Eisenberg Foundation Endowment Fund
- ▶ Nancy and Stephen Grand Center for Sensors and Security
- ▶ Leona M. and Harry B. Helmsley Charitable Trust
- ▶ Martin Kushner Schnur, Mexico
- ▶ Wolfson Family Charitable Trust
- ▶ Prof. Cahen is the incumbent of the Rowland and Sylvia Schaefer Professorial Chair in Energy Research

Barak Dayan

- ▶ The Benozziyo Endowment Fund for the Advancement of Science
- ▶ Crown Photonics Center
- ▶ Deloro Institute for Advanced Research in Space and Optics
- ▶ Rothschild Caesarea Foundation
- ▶ Dr. Dayan is the incumbent of the Joseph and Celia Reskin Career Development Chair

Zelig Eshhar

- ▶ Comisaroff Family Trust
- ▶ Leona M. and Harry B. Helmsley Charitable Trust

Jacob Hanna

- ▶ Abisch Frenkel Foundation for the Promotion of Life Sciences

- ▶ The Benozziyo Endowment Fund for the Advancement of Science
- ▶ The Sir Charles Clore Research Prize
- ▶ Erica A. Drake and Robert Drake
- ▶ European Research Council
- ▶ Flight Attendant Medical Research Institute (FAMRI)
- ▶ Leona M. and Harry B. Helmsley Charitable Trust
- ▶ Pascal and Ilana Mantoux, France/Israel
- ▶ Alice & Jacob K. Rubin Charitable Remainder Unitrust
- ▶ Fritz Thyssen Stiftung
- ▶ Dr. Hanna is the recipient of the Helen and Martin Kimmel Award for Innovative Investigation

Yohai Kaspi

- ▶ The Helen Kimmel Center for Planetary Science

Ilana Kolodkin-Gal

- ▶ The Abramson Family Center for Young Scientists
- ▶ Adelis Foundation
- ▶ Ayala Benjamin-Mashat, Switzerland
- ▶ The Benozziyo Fund for the Advancement of Science
- ▶ Angel Faivovich Foundation for Ecological Research
- ▶ Leo and Julia Forchheimer Center for Molecular Genetics
- ▶ Dan and Susan Kane, Westlake Village, CA
- ▶ The Larson Charitable Foundation
- ▶ Abraham and Sonia Rochlin Foundation
- ▶ Lois Rosen, Los Angeles, CA
- ▶ Lord Sieff of Brimpton Memorial Fund
- ▶ The late Rudolphine Steindling
- ▶ Estate of Samuel and Alwyn J. Weber
- ▶ Dr. Koldkin-Gal is the incumbent of the Rowland and Sylvia Schaefer Career Development Chair in Perpetuity

Zvi Livneh

- ▶ Y. Leon Benozziyo Institute for Molecular Medicine which he heads
- ▶ Flight Attendant Medical Research Institute (FAMRI)
- ▶ Leona M. and Harry B. Helmsley Charitable Trust
- ▶ Herbert L. Janowsky Lung Cancer Research Fund

- ▶ Dr. Erhard, Emmi and Fred Loewinsohn Center for Pediatric Health which he heads
- ▶ Sergio Lombroso Award for Cancer Research
- ▶ Hilda Namm, Larkspur, CA
- ▶ Rose Richman Living Trust
- ▶ Rising Tide Foundation
- ▶ Mike and Valeria Rosenbloom through the Mike Rosenbloom Foundation
- ▶ Prof. Livneh is the incumbent of the Maxwell Ellis Professorial Chair of Biomedical Research

Victor Malka

- ▶ The Abramson Family Center for Young Scientists
- ▶ Leona M. and Harry B. Helmsley Charitable Trust
- ▶ Dr. and Mrs. Irving and Cherna Moskowitz
- ▶ Sam Revusky, Canada
- ▶ Gerald Schwartz and Heather Reisman Foundation

Yair Reisner

- ▶ Flight Attendant Medical Research Institute (FAMRI)
- ▶ Leona M. and Harry B. Helmsley Charitable Trust
- ▶ Roberto and Renata Ruhman, Brazil
- ▶ Prof. Reisner is the incumbent of the Henry H. Drake Professorial Chair of Immunology

Varda Rotter

- ▶ Flight Attendant Medical Research Institute (FAMRI)
- ▶ Philip Garoon, Chicago, IL
- ▶ Leir Charitable Foundation
- ▶ Prof. Rotter is the incumbent of the Norman and Helen Asher Professorial Chair of Cancer Research.

Avigdor Scherz

- ▶ The Berdie and Irvin Cohen Weizmann Institute Research Fund
- ▶ Leona M. and Harry B. Helmsley Charitable Trust
- ▶ Principal Anstalt
- ▶ The Thompson Family Foundation
- ▶ Sharon Zuckerman, Canada
- ▶ Prof. Scherz is the incumbent of the Robert

and Yadelle Sklare Professorial Chair in Biochemistry

Liran Shlush

- ▶ The Abramson Family Center for Young Scientists
- ▶ ACWIS Midwest Gala Donors
- ▶ Estate of Leah Arbel
- ▶ The Benozziyo Fund for the Advancement of Science
- ▶ CNRS - Centre National de la Recherche Scientifique
- ▶ David and Fela Shapell Family Foundation INCPM Fund for Preclinical Studies
- ▶ Estate of David Turner
- ▶ The Morris & Ruth Wagner and Marek Sutkiewicz Laboratory for Cancer Research
- ▶ Dr. Shlush is the incumbent of the Ruth and Louis Leland Career Development Chair

Ziv Shulman

- ▶ The Benozziyo Endowment Fund for the Advancement of Science
- ▶ Irma & Jacques Ber-Lehmsdorf Foundation
- ▶ The Sir Charles Clore Research Prize
- ▶ Comisaroff Family Trust
- ▶ Kahn Foundation
- ▶ Rising Tide Foundation

Yoram Salomon

- ▶ Principal Anstalt
- ▶ Prof. Salomon is the incumbent of the Charles W. and Tillie K. Lubin Professorial Chair of Hormone Research

Amos Tanay

- ▶ Moise and Carol-Ann Emquies, Santa Monica, CA
- ▶ Flight Attendant Medical Research Institute (FAMRI)
- ▶ Helen and Martin Kimmel Award for Innovative Investigation
- ▶ The Mantoux Institute for Bioinformatics which he heads
- ▶ Rothschild Caesarea Foundation

Photon

/foh-ton/

noun

The quantum (quantity) of electromagnetic energy, generally regarded as a discrete particle having zero mass, no electric charge, and an indefinitely long lifetime.

Origin:

Gilbert N. Lewis (1875–1946), an American physical chemist known for his contributions to the theories of chemical bonding, was nominated 35 times for a Nobel Prize in Chemistry. He coined the term ‘photon’ in 1926 for the smallest unit of radiant energy. “I therefore take the liberty of proposing for this hypothetical new atom, which is not light but plays an essential part in every process of radiation, the name *photon*.”