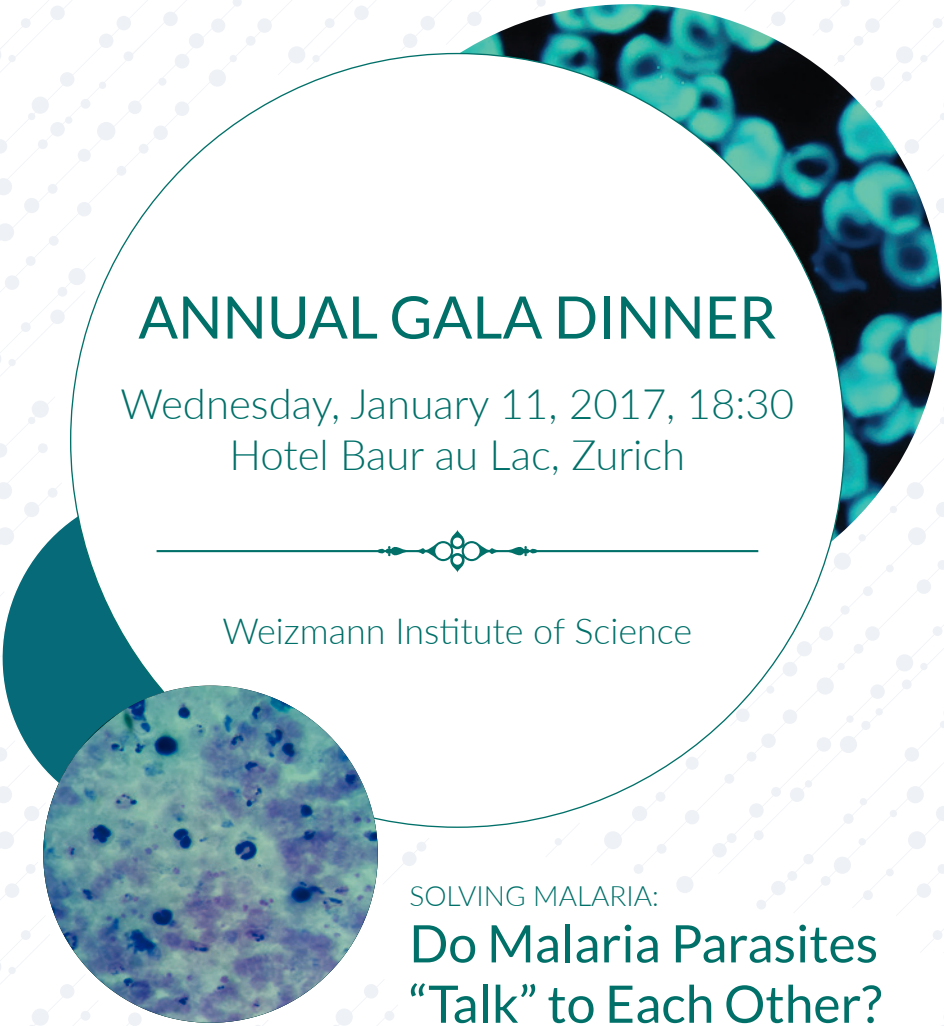
European Committee of the
Weizmann Institute of Science



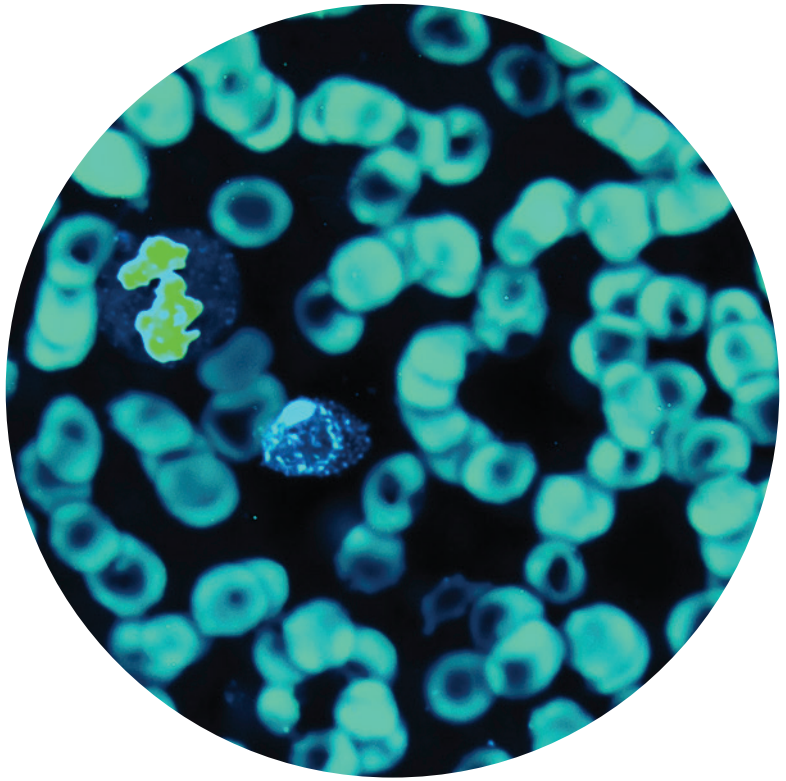
ANNUAL GALA DINNER

Wednesday, January 11, 2017, 18:30
Hotel Baur au Lac, Zurich

Weizmann Institute of Science

SOLVING MALARIA:

Do Malaria Parasites "Talk" to Each Other?



* On the cover: infected red blood cells with malaria parasites

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Weizmann Institute of Science

AMBASSADE DE L´ETAT D´ISRAEL BOTSCHAFT DES STAATES ISRAEL

Dear Friends,

The Weizmann Institute has always been at the forefront of the global scientific-research and its contribution to mankind is beyond measure. Its high level of academic excellence and its brilliant research team has won worldwide recognition and prestigious prizes including the Nobel Prize.

Its annual gala dinner theme, "Solving Malaria: Do Malaria Parasites 'Talk' to Each Other", is one more example of the continual efforts of the Weizmann Institute to find solutions for a better and healthier world. This theme is especially close to my heart. I served for four years as ambassador of Israel to Kenya and five other countries in East Africa, and I witnessed the devastating effects of malaria.

The brilliant scientists of the Weizmann Institute could not do their marvelous work without the support and encouragement of wonderful and generous friends such as the members of European Committee of the Weizmann Institute of Science. It is an honor and privilege for me to send greetings to this annual gala dinner.

Sincerely,

Jacob Keidar

Ambassador of Israel to Switzerland and Lichtenstein

European Committee of the Weizmann Institute of Science

Dear Friends,

It gives me a great pleasure to welcome you all, friends and supporters of the Weizmann Institute of Science from all over Europe, to the 2017 Annual Gala Dinner of the European-Committee of the Weizmann Institute of Science. The scientific activity at the Institute is vast and our passionate and brilliant scientists continue to investigate the mysteries of the universe and of human health and disease, for the betterment of humanity.

As the Weizmann Institute's European support arm, ECWIS is honored and committed to advancing efforts needed to ensure the ongoing prosperity of the Weizmann Institute.

Tonight's scientific lecture examines a novel strategy for understanding the way malaria parasites communicate with one another. This basic research may contribute to the prevention of this deadly disease and make a significant impact on the world, especially in developing countries, where malaria is a major scourge and cause of death.

I would like to thank you all for joining us and for your continued support of the Weizmann Institute of Science. Working together, I am confident that our shared dreams for the future of scientific research and science for the benefit of humanity will be realized.

Sincerely,

Bob Drake

Chairman, European Committee for the Weizmann Institute of Science

מכון ויצמן למדע
WEIZMANN INSTITUTE OF SCIENCE

Dear Friends,

Welcome to the Annual Gala Dinner of the European Committee of the Weizmann Institute of Science. I am grateful that you, leaders in your respective fields, have joined us tonight to learn how basic science could lead to important understandings in human health, the principles of the universe, and beyond.

Dr. Regev-Rudzki's lecture is a good example of that: Nearly half of the world's population is at risk of contracting malaria, with the prevalence of the disease concentrated in tropical and subtropical regions.

The work of Dr. Neta Regev-Rudzki from the Department of Biomolecular Science in this domain is vitally important to human health, especially in the developing world. Her discoveries apply not only to malaria, but also provide new insight and tools for addressing a host of parasite-borne diseases.

This research is only one example of the incredible research being conducted at the Weizmann Institute of Science. Dr. Regev-Rudzki exemplifies the excellence of our scientists, whom we hire purely based on their outstanding level of research and approach to tackling key questions in science. Our belief is that the best scientists—the very brightest minds—do the best science.

Thank you for being part of the European family of the Weizmann Institute and best wishes for a healthy and productive year ahead. I wish you a pleasant and stimulating evening.

Sincerely,

Prof. Daniel Zajfman

President, Weizmann Institute of Science

PROGRAM

18:30	**Reception** Followed by presentations and dinner
Greetings	**H.E. Jacob Keidar** Israeli Ambassador to Switzerland and Liechtenstein **Mr. Robert Drake** Chairman, European Committee of the Weizmann Institute of Science
Keynote Speakers	**Prof. Daniel Zajfman** President, Weizmann Institute of Science **Dr. Neta Regev-Rudzki** Department of Biomolecular Sciences Weizmann Institute of Science
Musical interludes with	**Mrs. Tamar Lalo**, Recorder **Mrs. Sara Águeda**, Harp

The growing buzz about mosquito-borne disease

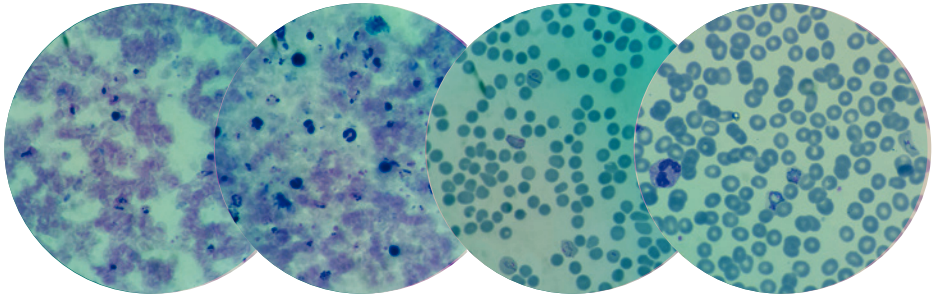
Malaria parasites are master manipulators, capable of making drastic changes during their lifecycle that promote their survival. While still a postdoctoral researcher in Australia, Dr. Neta Regev-Rudzki, now a faculty member in the Weizmann Institute's Department of Biomolecular Sciences, made a significant contribution to our understanding of this disease by demonstrating how individual parasites–located within separate red blood cells–exchange tiny packages of genetic material.

Now, Dr. Regev-Rudzki and her team have further clarified the picture, by itemizing the packages' genetic cargo and identifying the cargo's function: promoting parasite survival by manipulating the immune system.

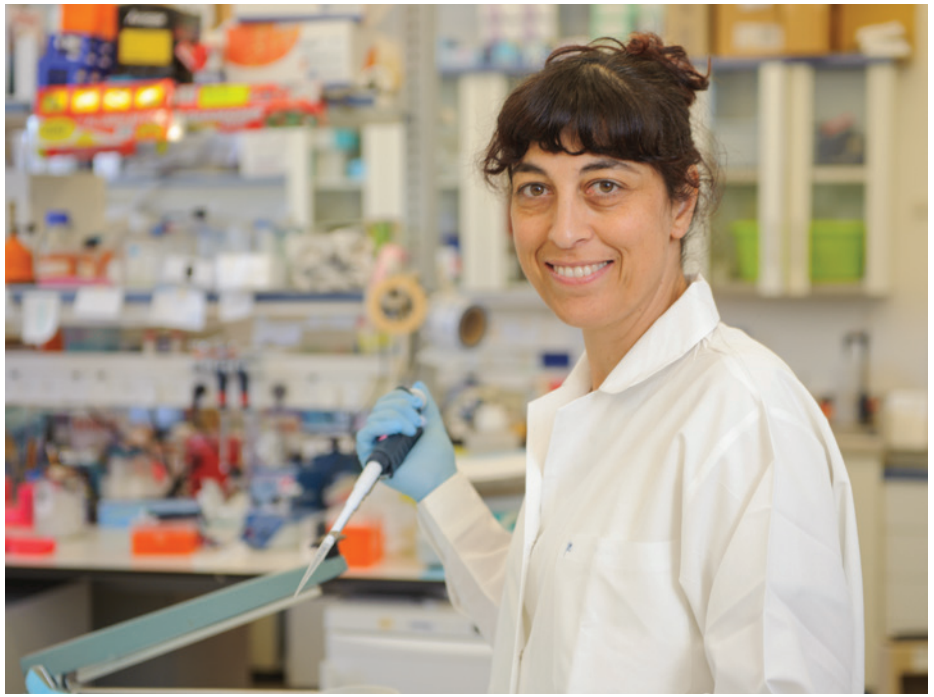
"In that earlier project, we found that malaria-infected red blood cells communicate by exchanging vesicles–tiny, membrane-bound sacs," Dr. Regev-Rudzki says. "Later, by isolating and purifying large quantities of such vesicles, we were able to see what they held inside–a specific collection of genes, RNA, and proteins. Having established the nature of this molecular message, we are now turning to the most interesting question: What is the message's function?"

This research builds on an earlier discovery made by Dr. Regev-Rudzki: that a protein called PfPTP2 promotes vesicle release and ensures the stable transmission of the malaria parasite from the human host to the mosquito. Now, another molecular survival mechanism has been revealed, in the form of the vesicle-encased cargo that–once delivered to the proper address–throws the normal immune response off-balance, allowing the parasite to live on, and to infect again.

"When the vesicles travel between red blood cells and deliver their molecular messages, this process manipulates immune cell activity, causing certain pathways to be either activated or inhibited," Dr. Regev-Rudzki explains. "This is to the parasite's advantage, because a 'confused' immune system cannot launch an effective attack against infection."



The team is currently expanding its examination of malaria, by taking a close look at molecular processes that occur, not just inside humans, but also inside the mosquito host. "In collaboration with scientists from the Hebrew University's Faculty of Agriculture–located across the street from the Weizmann Institute–we are investigating the biomolecular processes that occur when human blood-derived vesicles enter a mosquito's body. With over a million people worldwide dying from mosquito-borne diseases ever year–diseases that include malaria, but also West Nile Virus and Zika–this line of research may have great clinical significance."



The Weizmann Institute of Science

The Weizmann Institute of Science is one of the world's leading basic research institutions. It is comprised of 250 experimental and theoretical research groups across five faculties–Mathematics and Computer Science, Physics, Chemistry, Biochemistry, and Biology. Insights that emerge from its laboratories help provide a fundamental understanding of the biological, chemical, and physical world, and lead to advances in medicine, technology, and the environment. This is science for the benefit of humanity at its best.

Weizmann Institute scientists are credited with inventing amniocentesis, blockbuster drugs for multiple sclerosis, nano materials and compounds for industrial and medical uses, advanced computer technology, and breakthrough data-storage options. Institute cancer research has led to many discoveries, including the protein implicated in certain lung cancers, the basis for the drug Erbitux to treat colorectal cancer and head and neck cancer, a new potential therapy for prostate cancer, the gene that encodes p53 - the tumor suppressor protein found to be dysfunctional in almost all cancers - and a protein that triggers chronic myelogenous leukemia. The latter discovery provided the foundation for the development of Imatinib (known as Gleevec in the U.S. and Glivec in Europe). About 40 percent of Institute life science labs are involved in cancer research.

In 1954, Institute scientists built Israel's first computer, one of the first in the world. Today, Institute physicists and computer scientists are harnessing advances in quantum mechanics to design a quantum computer much faster and more efficient than current computers.In the 1970s, the algorithm that allows safe and secure computer transactions, RSA, was co-invented by our scientists and provided the foundations for start-up companies that fuel Israel's booming telecommunications industry.

Today, Weizmann Institute research is vast and vibrant. Scientists are investigating the intricacies of the immune system, breaking new ground in understanding rare genetic disorders, advancing semiconductor research, elucidating basic physical properties of the universe, revealing the mechanisms behind disorders, and offering insights into how the brain and nervous system develop and function in health and disease. They are breeding plants that can be grown in harsh climates and require fewer pesticides. The development of low-cost solar cells for gathering and storing sunlight for fuel and the development of fuels based on biomass are at the core of efforts that promise to change the energy landscape. Planetary scientists are exploring supernovae and climates on other planets to better inform our understanding of Earth. And much more.

The Weizmann Institute is also an institution of higher education whose aim is to train the next generation of world-class scientists. Its academic arm, the Feinberg Graduate School, offers master's and doctoral degrees in an environment in which students and postdoctoral fellows work shoulder-to-shoulder with faculty scientists - sharing data, exchanging ideas, and learning together. Science education is also a key part of the Institute's agenda, which places great emphasis on improving science instruction in schools, enriching the knowledge of school-aged children, and ensuring literacy for the public so that society can best benefit from new insights and discoveries.

Foundations of a world-class institution

The Weizmann Institute of Science began modestly as the Daniel Sieff Research Institute, founded in 1934 by Israel and Rebecca Sieff from the U.K. in memory of their son, Daniel. It was renamed and formally dedicated as the Weizmann Institute of Science in November of 1949. Dr. Chaim Weizmann, Zionist leader and the first President of the State of Israel, who was a chemist by training, was the visionary behind the establishment of the Institute as well as its first president.

Daniel Sieff Research Institute

Dr. Chaim Weizmann's historic laboratory

The scientific work of Dr. Chaim Weizmann was held in a small laboratory located at the Sieff Research Institute building until he passed away in 1952. Researchers from the Organic Chemistry department in the Weizmann Institute of Science continued working there until 1993. In 1993 it was decided to preserve the laboratory as a museum. Today, one may see inside this historical lab, an exhibit of a variety of instruments which served Dr. Weizmann and his colleagues in their research.

Display of scientific instruments from Dr. Chaim Weizmann's laboratory

The Feinberg Graduate School

Educating the next generation of scientists

The Weizmann Institute of Science plays a central role in developing Israel's scientific brain power. Providing more than one-quarter of the nation's new PhDs in science and mathematics each year, the Institute strives to cultivate the scientific leaders of tomorrow. The Weizmann Institute's Feinberg Graduate School (FGS) trains tomorrow's scientists, offering MSc and PhD degrees in five faculties: Biochemistry, Biology, Chemistry, Mathematics and Computer Science, and Physics.

The Feinberg Graduate School is one of the leading schools of science in the world, with all instruction in English. Accredited by the Council for Higher Education in Israel and chartered as an institution of higher education in the State of New York, FGS provides the highest quality science education for a community of over 1,000 MSc and PhD students and more than 370 postdoctoral fellows from all over the world at any given time.

Over the years, FGS has awarded about 4,000 PhD degrees and nearly 4,000 master's degrees. FGS alumni have gone on to become leaders in academia and industry in Israel and abroad, paving the way in fields such as nanotechnology, pharmaceuticals, computer vision and artificial intelligence, and science teaching for all ages.

The School, which is housed in the David Lopatie Hall of Graduate Studies, applies a unique model for studying science. Each student or postdoctoral fellow is affiliated with a specific lab among the 250 research groups at the Weizmann Institute. Their time in the lab is considered part and parcel of academic duties toward an MSc or PhD, and students are evaluated by their mentors (all principal investigators) for their scientific performance.

In this hand-on atmosphere which promotes interdisciplinary collaboration, it is not uncommon to find graduate students leading their own research projects and publishing their research in leading journals as first authors. They are given full access to all research facilities and services on campus and are encouraged to collaborate with peers from other labs, suggest innovative ideas for research, and actively participate in scientific discourse together with their supervisors.

FGS attracts leading science students from all over the world. Here, students are given optimal conditions that will enable them to devote their full time and energy to both coursework and laboratory research. We do that by providing each full-time student with a scholarship (total exemption from tuition) and living stipend, thanks to the generosity of our supporters.

The FGS and the Weizmann Institute also offer subsidized housing, travel allowances for overseas scientific conferences, full social benefits including paid maternity leave, and excellent childcare facilities on campus.

The FGS research schools

The graduate school is comprised of five donor-funded research schools, mirroring the five faculties of the Institute. The schools offer grants and incentives for students to pursue their research avenues, expanding their contacts with the international research community and enabling greater exposure to world leaders in the respective fields.

- André Deloro Research School of Physical Science
- Solo Dwek and Maurizio Dwek Research School of Chemical Science
- EKARD Research School of Biological Science
- Lorry I. Lokey Research School of Biochemical Science
- Moross Research School of Mathematics and Computer Science

Thank you to our donors: Scholarships make a difference

FGS is unique in its approach of offering all students the ability to study tuition free and receive a living stipend, freeing them up to focus solely on their studies. We are able to do this thanks to our generous supporters worldwide, who sponsor scholarships for MSc and PhD students, as well as postdoctoral fellowships.

The Feinberg Graduate School by the numbers

140 MSc degrees awarded annually

140 PhD degrees awarded annually

370 postdoctoral fellows

500 new students and postdocs join us annually

325 international postdoctoral fellows and students

NICE TO MEET YOU

Meet some of the European students at the Feinberg Graduate School

David Schreiber

MSc Student working in the lab of Dr. Sarel-Jacob Fleishman, Department of Biomolecular Sciences

Belgium

I was born in Belgium and made aliya from Antwerp as a yeshiva student when I was twenty years old. I've always liked the sciences, and being from a yeshiva background, I was fortunate to find a program that enabled me to combine secular and religious studies. I completed a BSc in combined chemistry and biology at the Open University of Israel, where I was chosen to be valedictorian at the graduation ceremony.

In the Fleishman lab, I am using computers to design new proteins. I want to understand what makes proteins stable, so that we can improve proteins that exist in nature by enhancing their stability. Currently, I am working on stabilizing the protein GP160 which is located on the envelope of the human immunodeficiency virus (HIV). Doing so will bring scientists a step closer to developing a vaccine against HIV. No vaccine is currently available, partly because of the protein's instability which makes research fraught with challenges.

My work involves a combination of computational and experimental work. Rather than rely on "trial and error", we are using computers for "rational protein design" and then testing the results in experiments.

I am married and have six sweet children ranging in age from twelve years to six months. I travel every day from Jerusalem to attend classes and conduct research work at Weizmann. On my way to Weizmann and in the evenings, I learn Torah. In addition, I like to enrich my knowledge on topics ranging from Jewish history to nuclear physics and, whenever possible, I enjoy a hike or a bike ride in nature with my family.

Marie Louise Bang

PhD Student, working in the lab of Prof. Elior Peles in the Department of Molecular Cell Biology

Denmark

I was born in Denmark and I am a passionate researcher in the field of molecular neurobiology. I have earned BSc and MSc degrees in molecular biomedicine with a focus on neurobiology from the University of Copenhagen. My master's studies equipped me with a broad knowledge base in biochemistry, molecular cell biology, and pathophysiology.

My PhD research centers on myelination—the production of myelin. I am studying the molecular organization of myelinated nerves. This organization is essential for the transmission of nerve impulses, and its disturbance may result in the pathophysiological changes seen in demyelinating human conditions such as multiple sclerosis. A nerve cell communicates via electrical impulses that are transmitted from the nerve cell through a protrusion of the cell. Myelin is the material that forms a sheath around some of these protrusions, thereby increasing the speed of the electrical impulses through the protrusion. It is essential for the proper functioning of the nervous system. I'm investigating the role of a protein which seems to be involved in the organization of the myelin sheath and the underlying protrusion.

My father passed away in my first year of PhD studies while suffering from Lewy Body Dementia (LBD), a type of progressive dementia resulting from abnormal microscopic deposits that damage brain cells over time, and leads to a decline in thinking and reasoning ability, and independent function. As I learned more about neurobiology, I discovered that very little research was being conducted on myelination vis-à-vis other areas of neurobiology research. I consequently decided to focus on unraveling the mysteries of its mechanisms in my PhD thesis research. When not busy with my studies and research, I like to read, run, and write fiction.

Christoph Thaiss

PhD Student, working in the lab of Dr. Eran Elinav, Department of Immunology

Germany

I was born in Germany and hold a BSc in molecular biomedicine from the University of Bonn, and an MSc in microbiology and immunology from Yale University and the Swiss Federal Institute of Technology (Zurich). Following completion of my master's studies, I decided to follow my advisor's recommendation to apply to the PhD program at the Weizmann Institute. Studying in Israel has been a valuable experience for me, both scientifically and personally, and I am greatly enjoying my time here. Research opportunities abound, the vibrant scientific community is collegial, and the equipment is comparable to that at some of the best research institutions in the world.

I am studying the interaction between humans and the trillions of microorganisms they live with, collectively called the microbiota. In particular, I am interested in the function of the microbiota in mediating modern human diseases, including obesity, autoimmunity, and cancer. I recently discovered a role for the intestinal microbiota in the susceptibility to regain weight after dieting, a phenomenon that is typically called the "yo-yo effect" of recurrent obesity. We found that the bacterial community in the gut is altered by obesity and remains altered even after dieting and return to normal weight. This memory effect, in turn, is critical for the susceptibility to rapid weight regain and relapsing obesity. We hope that the insights gained from this study will be useful in the development of future weight management strategies. After completion of my PhD, I plan to continue in scientific research and explore new avenues towards a better understanding of modern human disease.

Outside the lab, I enjoy traveling in Israel, composing music, and doing sports. I am a member of the Weizmann Rowing Team that practices at the Daniel Rowing Center in Tel Aviv. In addition, I collaborate with various musicians across Israel and abroad for music composition and performance projects.

Melanie Bokstad Horev

PhD Student, working in the lab of Prof. Benjamin Geiger, Department of Molecular Cell Biology

Sweden

I was born in Sweden and relocated later with my Austrian-born mother to Denmark. We lived in a lovely, verdant suburb of Copenhagen, and after finishing high school, I moved to the center of the city to study biology and sports medicine at the University of Copenhagen. My drive to study derives from a thirst for knowledge; I am the first university graduate in my family. Before commencing my studies, I traveled to Mexico to work as a volunteer English teacher for young children in Guadalajara.

In my BSc studies at the University of Copenhagen, I focused on the tumor suppressor protein p53. Wanting to pursue an international MSc, and after exploring several options, I decided on Ben-Gurion University of the Negev. It provided an excellent opportunity to work on developing a state-of-the-art three-dimensional imaging method in collaboration with Weizmann scientists. For this research, I received the Nordea Foundation Scholarship amongst other awards.

In my PhD work at the Weizmann Institute, I am researching platelets and their role and adhesion in the early stages of the formation of a thrombus—a blood clot. Since stroke is the second-most common cause of death worldwide, I see my research as highly relevant. Incidentally, two of my grandparents suffered debilitating strokes. I hope to contribute toward improving understanding of the process of blood clotting on a deeper level, and finding better therapies for treating stroke.

I enjoy spending time with my husband Ran, and our two young children, Emma and Tommy. We love traveling and hiking together. I play handball professionally and play the piano, and I love musicals. After I finish my PhD, I plan to embark on a scientific career either in Israel or abroad.

Filip Bochner

PhD Student, working in the lab of Prof. Michal Neeman, Department of Biological Regulation

Poland

I was born in Poland in 1988 and hold a BSc in engineering and biotechnology from the Warsaw University of Life Sciences, and an MSc in life sciences from the Weizmann Institute of Science.

In my PhD research, I am focusing on ovarian cancer, which poses one of the most dangerous threats to women's wellbeing in the Western world. The Neeman lab is a perfect match for my interests. I am using cutting-edge imaging tools such as magnetic resonance imaging and microscopy to observe changes as they occur real time in ovarian tumors. My research in this area was published in the journal Scientific Reports. I am hopeful that insights received from live imaging will help to improve understanding of ovarian cancer and contribute to the development of new drugs and therapeutic strategies.

I was thrilled to be accepted to the Weizmann Institute, where I'm enjoying the opportunity to work with world-renowned researchers who, like me, are striving to improve the quality of human life. From the time I started at Weizmann, I've gained the impression that everything is possible here. In my research group, I can think freely about the direction of my research, develop new skills, and put my best efforts into something that I find important.

Music is another passion of mine and I enjoy very much from playing the piano.

Tabitha Bucher

PhD Student, working in the lab of Dr. Ilana Kolodkin-Gal in the Department of Molecular Genetics

Switzerland

I was born in Switzerland and I am a molecular microbiologist who's fascinated by bacteria—so small and yet enormously complex, bacteria make me marvel at the power of evolution. Studying bacterial communities also brings in social aspects like competition and cooperation. This fascination with microbiology was nourished during my undergraduate studies in Switzerland at the University of Basel, where I also completed my master's degree in 2011. Joining the Weizmann Institute of Science in Israel for my doctoral research was an entry into an extremely creative, open-minded and dynamic environment and I couldn't dream of a scientifically more-nourishing spot.

Bacteria in nature do not live a lonely life—rather, they gather together in huge communities, so called biofilms. Biofilms are very widespread in natural and anthropogenic environments. They can be beneficial and help plants to grow when they form on plant roots, or dangerous when they cause severe clinical infections. Therefore, research that generates new knowledge about these communities can have broad ramifications, from agriculture to medicine. Within biofilms, the single bacterial cells stick to the surface they colonize, and to each other, by an extracellular matrix, a glue derived from proteins, DNA and polysugars. In the root-colonizing and plant-growth promoting bacterium Bacillus subtilis, this extracellular matrix is anchored to the envelope of the cell.

I am studying the interaction of the B. subtilis extracellular matrix with the cell envelope. I'm especially intrigued to find ways to stimulate or prevent biofilm formation by manipulating this interaction. Recently, my results about efficient ways by which to disturb biofilm formation by altering the cell wall-extracellular matrix interactions and the underlying molecular mechanisms were published in Environmental Microbiology Reports. Within the second part of my PhD, I will study the Bacillus species isolated from soil, and how they cope with modifications to their cell envelope in their natural environment.

I love to spend time in nature and relax by running, hiking, biking or swimming. Besides sport, I also do paper arts: origami and pop-up cards. In Israel, I enjoy the atmosphere of the outdoor market, and frequently buy fresh vegetables and fruits for a delicious Friday night dinner.

INTRODUCING SCIENCE

Meet some of the outstanding scientists at the Weizmann Institute of Science

Study identifies mechanism for coping with social pressures

Prof. Alon Chen

Head, Department of Neurobiology

Two recent studies by Prof. Alon Chen, head of the Department of Neurobiology, have shown how the management of stress is built into our brains. As reported recently in *Nature Neuroscience*, Prof. Chen showed how people who make friends easily may be hard-wired to do so, thanks to a neural mechanism that—when switched on—regulates one's ability to cope with social challenges.

The mechanism involves a small signaling molecule called Urocortin-3, and a receptor on the surface of neurons to which Urocortin-3 binds. Drs. Yair Shemesh and Oren Forkosh—both members of Prof. Chen's lab—found that varying levels of Urocortin-3 may help determine how willing we are to leave the safety of our social group and strike up new relationships. The researchers devised a "social maze" for mice that allowed them to choose whether to interact with familiar mice or with strangers, or to avoid social contact altogether. They also designed a special arena in which group interactions could be tracked with video cameras.

Prof. Alon's team demonstrated how mice with high levels of Urocortin-3 in the brain actively sought out contacts with new, unfamiliar mice. But when this receptor was blocked, the mice chose to socialize mainly within the most familiar group, and to avoid strangers. This stress-regulation mechanism may impart an evolutionary advantage, says Prof. Chen, stimulating social contact within trusted groups, while promoting caution with intruders. And, he adds, what's true of mice may be true of men. "Since an analogous system operates in the human brain, our findings suggest that this mechanism might be responsible for coping with social stress," he says. "Disruption of this mechanism may be implicated in social anxiety, as well as more serious behavioral disorders."

Food-related stress: hard-wired in women?

Another research on stress management, suggests that of those struggling with serious eating disorders such as anorexia and bulimia, only about 10 percent are male. While many blame cultural messages that strongly link female thinness with social acceptability, this gender discrepancy may be based, at least in part, on differences between the male and female brain.

The study, published in *Cell Metabolism* by Dr. Yael Kuperman, a staff scientist in the Department of Veterinary Resources, has demonstrated a critical difference in how the male and female brains react to stressful situations.

Working with graduate student Meira Weiss, Dr. Kuperman began this study while still a doctoral student in Prof. Chen's lab. The team discovered that, in about half the neurons known to be involved in the arousal of appetite, a receptor called CRFR1 mediates the body's stress response. To investigate the exact role of CRFR1, the researchers created a mouse model in which this receptor was removed specifically from these appetite associated cells. The mice were then monitored for their response to stressful stimuli, including the withholding of food. When the mice were exposed to stressful stimuli, the female CRFR1-deficient mice displayed a dramatic reaction—the level of glucose produced by their livers dropped significantly—while the male mice were barely affected.

The findings show that male and female bodies exhibit significant differences in their metabolic response to stressful challenges. They may also help explain why women are much more prone to eating disorders than men—a discovery that could lead to the development of drugs that mediate behaviors associated with eating disorders.

Using silkworms and spiders to fix brain cells ravaged by disease

Dr. Ulyana Shimanovich

Department of Materials and Interfaces

Anyone who thinks that worms and spiders are simply nuisances can think again. And not just because they keep insects at bay. Now, they may help fix cells ravaged by Parkinson's and Alzheimer's diseases.
Dr. Ulyana Shimanovich, a new scientist at the Weizmann Institute in the Department of Materials and Interfaces, is fascinated by the ultra-fine fibers formed by proteins, ranging from the tough, elastic fibrils spun by silkworms to the sticky plaques made up by amyloid protein fibers that affect the brains of those with advanced Alzheimer's and Parkinson's diseases. In fact, her research may lead to a way to use the former to fix the latter.

Traditionally, amyloids have been thought of as purely "bad" because they form toxic plaques or bundles in the brain. However, her research on the biophysical and biochemical properties of amyloids has shown that they might have positive properties. She wants to figure out the mechanisms for creating useful protein fibrils and for breaking down harmful ones, and how to correlate the structure and functionality of various nano-scale protein fibrils like amyloids, and control their formation.

Doing so, she believes, will be a major step towards designing new nano-scale therapeutic agents such as micro-reactors to encapsulate time-release medications, or nanofibrils with antibacterial properties to resist infection.

Using nature to heal nature

Her approach is all about learning the natural, "positive" properties of proteins in nature to fix nature's deficiencies. Her treasure trove is the protein-silk pulled directly out of the silk glands of live silkworms and spiders. She uses these fibers to control the self-assembly processes of the pathological (diseased) amyloid proteins by converting them into functional biomaterials. In this way, the silk is used to heal the cell instead of using chemical compounds that may cause deleterious effects on surrounding cells—thereby addressing one of the key challenges in drug therapy.

"The silk is a natural resource that, essentially, gives new life to a damaged cell," she says. Her research has implications for diagnostics, the design of new compounds for targeted therapeutic approaches, and materials science more broadly.

Dr. Shimanovich is part of the Weizmann Institute's efforts to expand its research in nanobiology and materials science. This includes a new André Deloro Building, which will house research enterprises in so-called advanced and intelligent materials and a new center dedicated to this field, which will leverage the Institute's strength in this burgeoning and important area. And the implications are vast—including fluorescent biological labels, drug and gene delivery, detection of proteins and pathogens, probing DNA structure, tumor destruction, and tissue engineering.

94% success rate in trial based on research of Prof. Zelig Eshhar

Prof. Zelig Eshhar

Department of Immunology

A therapy devised by Weizmann Institute immunologist Prof. Zelig Eshhar for the treatment of a specific kind of advanced blood cancer showed 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. 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.

"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.

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.

Quantum computing

Prof. Roee Ozeri

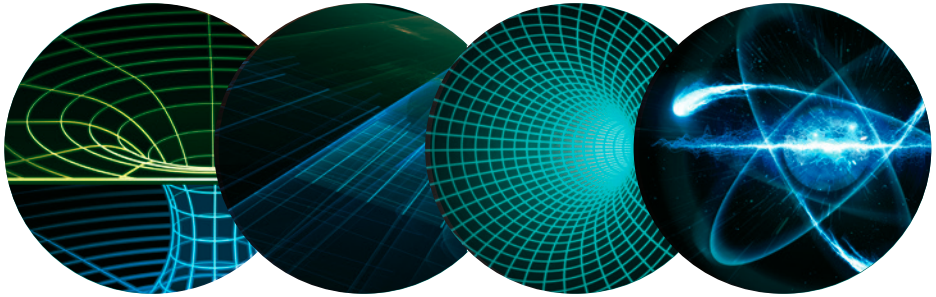
Department of Physics of Complex Systems

It is hard to isolate a single atom, electron, or photon. Therefore, scientists like Prof. Roee Ozeri have created elaborate, laser-driven, electromagnetic "traps" to capture and hold these fundamental particles of matter so that they can be measured and studied.

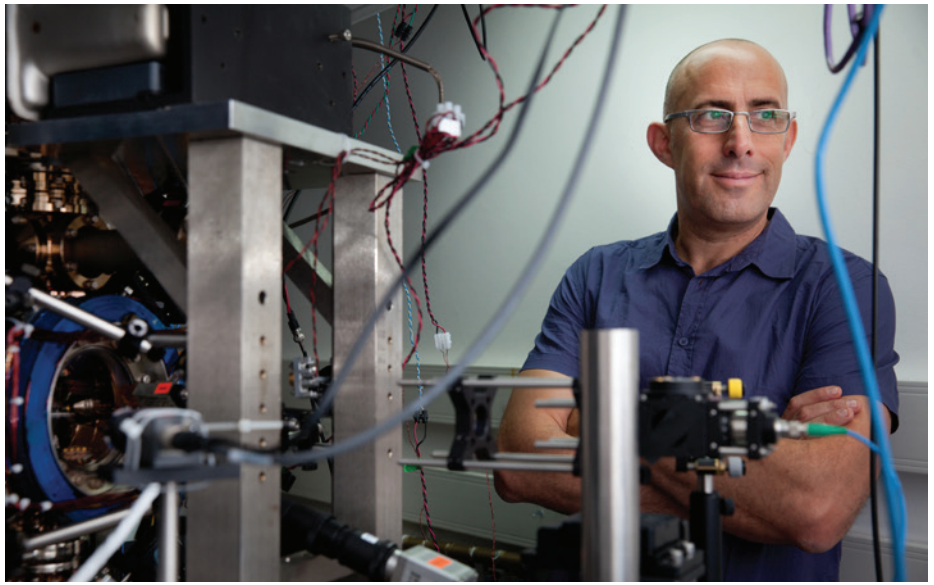
Recently, Prof. Ozeri and his group in the Department of Physics of Complex Systems have succeeded in detecting the minuscule magnetic interaction between two individual electrons that were bound to two ions separated by the atomically vast distance of about two micrometers. The background noise was a million times stronger than the weak force he measured. However, his achievement not only taught new information about an essential atomic force, but may also be extremely useful in the emerging fields of quantum sensing and quantum information systems—a whole new era in electronics and computing.

Prof. Ozeri studies the basic building blocks needed for quantum computing—the development of computing systems that make use of the principles of quantum mechanics. Such quantum systems have the potential to perform immense information-processing tasks that are out of reach of regular computers, and they can have a vastly greater capacity for storing information. If such systems are indeed built, they will revolutionize the world of computing, requiring, for example, an entirely new approach to ensuring the secrecy of information in online banking transactions. Prof. Ozeri focuses on one of the greatest challenges in developing quantum computers: finding appropriate units, or bits, for storing information.

To create the basic building blocks for quantum information systems, Prof. Ozeri and his group use ultra-cold trapped ions. When he says cold, he means very cold—as cold as it gets. The Ozeri group laser-cool their ions to a temperature of a few millionths of a degree above absolute zero, where they can only occupy the ground-state of their trapping potential. These trapped ions are well isolated from the noisy lab environment. In fact, the only way the scientists can investigate these super-cold ions is by using laser light. Under these conditions, the laws that govern ion dynamics are those of quantum mechanics.



The Weizmann Institute of Science is a world leader in mathematics and computer sciences, with one of highest caliber teaching faculties in the world. Its scientists have won three prestigious A.M. Turing Awards, considered the equivalent of a Nobel Prize in the fields of mathematics and computer sciences. Prof. Amir Pnueli won the Turing Prize in 1996 for his "temporal logic" methodology used for verifying the correctness and reliability of computer hardware and software. Prof. Adi Shamir at the Weizmann Institute and his colleagues at MIT developed encryption algorithms that have provided the basis for secure Internet monetary transactions and computer-based transactions, earning a Turing Prize in 2002. And Prof. Shafi Goldwasser was awarded the 2012 A.M. Turing Award for her groundbreaking work in cryptography.



Class Act: The Schwartz/Reisman Science Education Center at the Ruth and Uriel Arnon Science Education Campus

The Weizmann Institute celebrated the opening of the Schwartz/Reisman Science Education Center at the Ruth and Uriel Arnon Science Education campus at the Annual Meeting of the International Board in November.

It offers quality physics (and soon chemistry) curricular education to excellent science students from seven feeder high schools in Rehovot and Ness Ziona.

The Center caters to over 700 high-school students. These students benefit from highly trained teachers with advanced science degrees who form a vibrant intellectual community; state-of-the-art lab equipment that any single school cannot offer; and courses at the highest levels of sophistication.

The new building, includes 18 designed "class-labs" equipped with the most advanced materials and equipment, preparation rooms for teachers and lab assistants, and a Fabrication Laboratory (a so-called "Fab Lab") where students can create tools and parts for experiments from scratch using 3D printers, laser cutters, circuit board printers, and more. The Center is thus poised to become a standout in the Israeli educational environment and thereby play a key role in educating the next generations of leaders in Israeli science and technology. is thus poised to become a standout in the Israeli educational environment and thereby play a key role in educating the next generations of leaders in Israeli science and technology.

ISSI mission, 2016

The Dr. Bessie F. Lawrence International Summer Science Institute (ISSI)

The Dr. Bessie F. Lawrence International Summer Science Institute has been offering a unique scientific learning experience for exceptional high-school students from around the world for more than half a century. Students participating in ISSI enjoy working side-by-side with Weizmann Institute scientists and students, conducting high-level research, learning new things about science, and forming friendships for life with like-minded teens from all over the world.

Each year, about 80 outstanding students from various countries are carefully selected to come to Israel for the ISSI–a month-long summer program that offers its participants the opportunity to conduct their independently-planned research in the labs of the Weizmann Institute. Working under the supervision of veteran scientists and mentored by graduate students and postdocs, these talented high-school students get to explore their topics of scientific interests. In addition, they participate in scientific lectures on a variety of disciplines, organize their own seminars, and enjoy social activities throughout the entire month. The last week of the program is dedicated to a field trip to the Dead Sea area, where participants learn about the unique Israeli ecosystem and history.

The social bonds formed at ISSI are a significant added value. Participants establish friendships and relationships with like-minded peers from different cultures and countries, and cultivate these relationships over time. Given that many participants in ISSI choose a scientific career in the future, these international networks prove useful in their adult life.

The ISSI will be held this year between July 4 and July 30, 2017, at the Weizmann Institute campus. Registration is open for all applicants online.

A QUICK LOOK INTO THE FUTURE

Every year, the Weizmann Institute of Science sets its priorities for the next scientific, educational, and building initiatives for the coming year

We are pleased to share with you a few of the future programs and projects which will advance the mission of the Weizmann Institute.

❖ Center for Advanced and Intelligent Materials

Ever since pre-historic man discovered that fire could transform mud into a durable ceramic vessel, advances in Materials Science have been offering up the stuff of scientific dreams. Today, the Weizmann institute of Science is launching a sweeping research initiative that will strengthen its already impressive efforts toward the identification and fabrication of new and useful materials for medicine, energy, electronics, communications and security.

Research at the Center for Advanced Intelligent Materials will help stock society's toolbox with smart materials that will have a positive impact on society. By providing the specialized infrastructure needed to deepen the partnership between the Institute's physicists, chemists, biologists, and computational researchers—and by promoting recruitment of additional faculty members and the establishment of new collaborative projects—the new Center will solidify the Weizmann Institute's international leadership in this exciting scientific field.

Rendering of the Center for Advanced Intelligent Materials Campus

One component of this enterprise is the construction of the André Deloro Building, a new, 6,000 square-meter building that will serve as a hub for all activities in advancing materials research. The building will include an underground zone shielding sensitive experiments from environmental noise and other disturbances. It will also house three infrastructure units: a Material Observatory for high-resolution imaging, a Foundry for materials fabrication, and the Molecularium, a state-of-the-art facility for the chemical analysis of new compounds.

❖ Establishing the Genomics Innovation Laboratory

Technological progress drives scientific discovery. In bio-based research, some of the most dramatic technological progress is occurring in genomics—an approach in which scientists examine an organism's full set of genes and their inter-relationships. With modern, "single cell" genomic techniques becoming ever-more complex and expensive, Weizmann Institute scientists are left with a choice: to stagnate with old techniques, or relinquish the analysis of their experimental results to outside experts.

To overcome this dilemma, the Weizmann Institute has committed to the establishment of a Genomics Innovation Laboratory (formerly, "The Sandbox"), an environment in which scientists can not only learn how to use the most advanced genomic technologies, but can also craft customized analytic approaches to fit their own unique scientific needs.

The laboratory's activities—which provide targeted training for scientists in all biomedical areas of research—are structured around short, "hands-on" workshops designed to familiarize researchers with up-and-coming techniques.
This training, directed by a dedicated staff of PhD-level technical experts, will also serve as an engine for innovation, as Institute teams, working on biologically- and medically-significant projects, tease out the untapped potential of emerging single-cell technologies.

❖ The Bench-to-Bedside Project

Two of the most exciting scientific revolutions of our time—genomics and Big Data science—promise to usher in a new era in medicine, characterized by personalized, adaptive approaches. The Weizmann Institute, together with Clalit Health Systems—Israel's largest health maintenance organization (HMO)—has launched a research program that will leverage the availability of patient data for the benefit of scientific research and clinical care. The program represents a major step in linking world-class researchers to a vast repository of medically significant data. This partnership paves a scientific "superhighway" leading to improved diagnosis and personalized treatment protocols.

Creating strong links between Weizmann Institute scientists and physicians and specialists, the project will transform tests performed during typical doctor's visits into a library of scientifically significant—and fully anonymous—genetic samples. The project will establish infrastructure for acquiring, transporting, and processing DNA, RNA, blood cells and microbiome data; set up protected data storage protocols; and develop the big data algorithms required to match optimum analytic productivity with patient privacy.

❖ Building Bridges to the Global Community

In order to raise its profile in the scientific community and increases its impact, the Institute plans to increase the number of foreign students, postdocs and senior investigators who come to campus to train, offer guest lectures, participate in colloquia, or serve as visiting faculty.

Enriching the international presence on campus has the obvious advantage of exposing the Institute's students and researchers to new ideas and approaches. Indeed, the Institute took a symbolic step in this direction this year, by welcoming its first Principal Investigator born in China. Dr. Binghai Yan. However, the Middle East's geopolitical situation deters many successful scientists from viewing the Institute as their campus of choice for sabbaticals, or even short visits. Therefore, the Institute is undertaking a concerted effort to fund increased activity in four frameworks: the International Campus, the International Postdoctoral Scholars Program, the Visiting Faculty program, and an initiative for Named Colloquia.

♦ International Campus

As a hub of scientific activity in Israel that feeds directly into the country's vibrant economy the Weizmann Institute's overall success depends on strong, international connections.

Illustration of the International Campus

Proactively cultivating a worldwide network of collaboration–through conferences, postdoc fellowships, sabbaticals, and short- and long-term visits by foreign academics–is critically important because of the country's geographic and political isolation. Indeed, a global community of foreign scientists who have spent time on the Weizmann Institute campus and have become acquainted with the real Israel become the best kind of "foreign ambassadors" for Israel and the Institute once they return to their home countries and home institutions.

Yet there remains one crucial limiting factor: a severe lack of housing. Israel as a whole is in the midst of a housing crisis, and the Weizmann Institute is not immune. The Institute has only 150 units for foreign guests, with a handful of other apartments rented as a "stop-gap" measure for housing foreign guests, at very high prices. To address this challenge, the Weizmann Institute is planning the construction of an International Campus on the south side of campus which will include about 300 units in four buildings.

Upon completion, it will be a vibrant hub of activity and further solidify the Institute's reputation as a global crossroads for science. Ultimately, the International Campus will be a key step toward ensuring that the Institute, and Israel more broadly, cultivates a community of foreign scientists who have had positive, enriching experiences on campus and in Israel individuals who become the best possible "ambassadors" for the Institute and for Israel, all while advancing science for the benefit of all.

♦ International Postdoctoral Scholars Program

To nurture intellectual achievement and the competitive edge of the postdoctoral training it provides to top PhD graduates, the Weizmann Institute of Science proposes establishing a far-reaching program to select and nurture the most talented candidates from around the world, who will benefit from the excellent mentoring program and multidisciplinary atmosphere of the Weizmann Institute. This program will be a very selective and thereby highly regarded fellowship program in the scientific world, accepting only the most highly recommended PhD graduates who have a strong record of academic excellence, an outstanding PhD thesis, scientific productivity, and publications in leading journals, and show clear potential in their research paths.

The Weizmann Institute of Science plays a central role in developing Israel's scientific brain power, training more than one-quarter of the nation's new PhDs in science and mathematics. The new International Postdoctoral Scholars Program will take the Weizmann Institute's outstanding record of educating the finest graduate students to the next stage by training the highest level of postdoctoral fellows from each scientific discipline.

♦ The Visiting Faculty Program

Over the past few years, the Visiting Faculty program has enabled the Institute to reach out proactively to the international science community, specifically targeting relatively young, recently tenured academics who are spearheading new fields of research. This program has been responsible for the presentation of fascinating lectures and seminars; the launch of joint research projects with Weizmann Institute faculty; and the establishment or strengthening of long-term relationships between the Weizmann Institute and major research centers abroad.

♦ Named Colloquia

The Institute aims to establish named colloquia each of its five faculties. The highlight of these colloquia would be public lectures and professional scientific presentations by prominent researchers from around the world. Envisioned as prestigious events that will attract top Israeli investigators from other institutions to the Weizmann campus, the colloquia will also provide a framework in which invited speakers could lead classes, workshops, symposia, and hands-on demonstrations in the Institute's specialized facilities.

Be our guest...

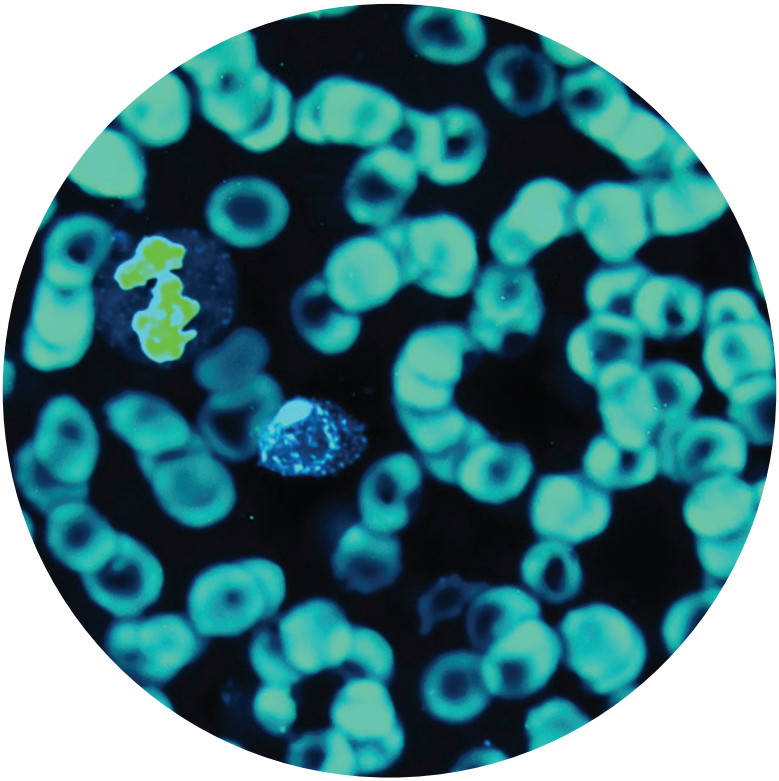
If you are traveling to Israel in the near future, we would like to invite you for a visit at the Weizmann Institute of Science. Some of the activities you will experience while on the Weizmann Institute campus include:

- Visiting the state-of-the-art Levinson Visitors Center. The center contains technologically advanced exhibits, taking the visitor on a journey of knowledge and discovery and opening up the world of science and that of scientists who uncover the secrets of nature and decipher the codes of the universe.

- Spending time at the Institute's award-winning Clore Garden of Science, a unique open-air museum which invites children and adults alike to explore the wonders of science and nature through 90 hands-on exhibits.

- Touring one of Israel's historical landmarks, Weizmann House, once the home of Dr. Chaim Weizmann, first President of the State of Israel and founder of the Weizmann Institute of Science, and his wife, Dr. Vera Weizmann. The house was designed by the famous architect Erich Mendelsohn and was built on a beautifully landscaped hill overlooking the coastal plain to the west and the Judean Hills to the east.

For more information please contact the European Committee's office on campus,
♦ **Tel:** 972-8-9343956 ♦ **Email**: shira.terri@weizmann.ac.il



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