ADAMS
Fellowships מלגות אדאמס

האקדמיה הלאומית הישראלית למדעים
THE ISRAEL ACADEMY OF SCIENCES AND HUMANITIES

ADAMS SEMINAR 2010

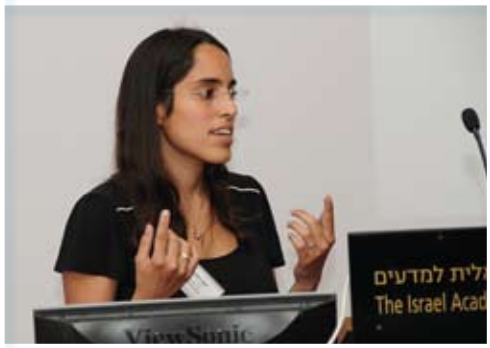
סמינר אדאמס תש"ע

Guest Lecturer

Dr. Julian Adams
President of Research and Development and
Chief Scientific Officer of INFINITY

Adams Seminar, May 2009

Prof. Yaari welcoming Mr. Adams



Reut Shema on behalf of the Fellows

Making a point to Prof. Heiblum and Dr. Meir Zadok

Prof. Heiblum on *Physics and the Information Revolution*

Presenting Prof. Groner with a gift of appreciation

ADAMS
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The Adams Fellowship Program is a joint effort of Mr. Marcel Adams of Canada and the Israel Academy of Sciences and Humanities.

Chartered by law in 1961, the Israel Academy of Sciences and Humanities acts as a national focal point for Israeli scholarship in both the natural sciences and the humanities. The Academy consists of approximately 100 of Israel's most distinguished scientists and scholars, who, with the help of the Academy's staff and committees, monitor and promote Israeli intellectual excellence, advise the government on scientific planning, fund and publish research of lasting merit, and maintain active contact with the broader international scientific and scholarly community.

For more information, please send an e-mail to batsheva@academy.ac.il or telephone to 972-2-5676207

Dr. Julian Adams

President of Research & Development and Chief Scientific Officer of INFINITY

Julian Adams, PhD, is President of Research and Development and Chief Scientific Officer of Infinity Pharmaceuticals Inc., an innovative cancer drug discovery and development company, that leverages its strength in small molecule technologies to bring important new medicines to patients.

Prior to joining Infinity, Dr. Adams was the Senior Vice President for Drug Discovery and Development at Millennium Pharmaceuticals. In this capacity, he had global responsibility for multiple drug discovery programs, including the successful, groundbreaking research, discovery and development of VELCADE® (previously known as PS-341), the first selective proteasome inhibitor for the treatment of multiple myeloma, a rare but deadly blood cancer. By curbing the proteasome's appetite, VELCADE® prevents the destruction of key proteins that are responsible for the survival and proliferation of this cancer. This small molecule represents a new target area for anticancer agents and proves the ultimate benefit to cancer patients of targeted therapies. Dr. Adams joined Millennium through its acquisition of LeukoSite in 1999 where he was Senior Vice President for Research and Development.

Dr. Adams joined LeukoSite as a result of its acquisition of ProScript, Inc., where he had served as, Executive Vice President of Research and Development, and a member of the Board of Directors. Earlier in his career, Dr. Adams served in various positions, including Director of Medicinal Chemistry at Boehringer Ingelheim, where he successfully discovered the drug Viramune®, the first non-nucleoside reverse transcriptase inhibitor for the treatment of HIV. From 1982-1987, he was a Medicinal Chemist at Merck.

Dr. Adams received a BS from McGill University and a PhD from the Massachusetts Institute of Technology in the field of synthetic organic chemistry. He has received many awards, including the 2001 Ribbon of Hope Award for VELCADE® from the International Myeloma Foundation and the Bruce F. Cain Award from the American Association for Cancer Research. Dr. Adams is an inventor of over 60 patents and has authored over 150 papers and book chapters in peer-reviewed journals. He is the editor of *Proteasome Inhibition in Cancer Therapy* published in July 2004. He was honored by PharamVOICE as one of the top 100 most inspirational and influential people in the life sciences industry.

Introductory remarks by

Professor Menahem Yaari,
President of the Israel Academy

The Adams Fellowship Program arose from the vision and generosity of Mr. Marcel Adams, of Montreal, Canada. Mr. Adams views young Israeli scientists as the key to the State's future, so he has designed a program that would help create a young Israeli cadre of scientists committed to remaining in Israel and advancing scientific knowledge and research. Mr. Adams views this endeavor as the most worthwhile form of investment.

Adams Fellows enjoy sustained financial support for three to four uninterrupted years of PhD study. As long as the Fellow maintains good standing in his/her training program, no further requirements are placed for continued support.

Adams Fellows also enjoy two privileges, not normally available in graduate student support programs. First, each Adams Fellow is entitled to funding towards travel abroad to participate in international, scientific conferences or workshops. Second, Adams Fellows are given the opportunity to interact with one another and to form a small science community of their own. This is achieved through initiatives such as invited lectures by renowned scientists and periodic seminars and conferences.

The Fellows are selected annually from a list of candidates nominated by the Rectors of Israel's institutions of higher learning. The selection is carried out by the Program's Steering Committee, under the chairmanship of Professor Howard (Chaim) Cedar. We seek outstanding and highly motivated students, bent on building their scientific careers in Israel. Only candidates from the natural sciences, engineering, life sciences, computer science and mathematics are eligible. The Program welcomes candidates from fields which transcend traditional disciplinary boundaries and conventional frameworks.

Since the Program's inauguration in May of 2005, 47 Adams Fellows, PhD students of the highest academic standing have been inducted. We are proud to introduce this year's 12 new Fellows briefly in this brochure. With them, we will have a total of 59 Fellows to date.

I am sure that I speak for Israel's science community at large in expressing heartfelt admiration and appreciation to Marcel Adams for his gracious and far-sighted support of Israel's outstanding young scientists. My colleagues at the Israel Academy of Sciences and Humanities join me in conveying our heartfelt congratulations to Mr. Adams on his 90th birthday. כה לחי!

Adams Fellowship Steering and Selection Committee

Professor Chaim Cedar
Chairman

Professor Yakir Aharonov

Professor Amiram Grinvald

Professor David Kahzdan

Professor Moshe Moshe

Professor Itamar Willner

Professor Chaim Cedar,
Chair of the Adams Fellowship Committee

Dear Friends,

It is with great pleasure that I welcome you to this year's Adams Fellowship Seminar and hope that you enjoy the program and the opportunity to get together and discuss science.

I am happy to report that the Adams Family Tree of students is growing nicely and is constantly producing new fruit. This year we again accepted a new round of excellent students. The competition was quite stiff, and I congratulate those who were selected and wish them much success in their research. Every year, as we go over the applications for all of the academic institutions in Israel, I am reminded how Israel is really blessed with some of the brightest, motivated and creative graduate students in the world and it is indeed an honor to be part of this endeavor. As was the case in past years, students who have finished the program were accepted to the most prestigious centers of learning in the world, and we are all hoping that they will soon return to Israel to take up key positions in academia and industry.

Finally, I would like to add my own blessing to Mr. Marcel Adams on his 90th birthday. According to the "Ethics of Our Fathers", ninety is the age when man is "weighed down" with the events and accomplishments of his long life, giving him new insights about life. There is no question in my mind that this fellowship program is one of your most important endeavors in the way it is having a critical impact on Israel and the Jewish People.

Best wishes,

Chaim Cedar

Visit to Sde Boker and Ben-Gurion University
May 2009

In David Ben-Gurion's study

Lunch with Prof. Weinblatt, Rector of Ben-Gurion University and
Prof. Herskovitz, Vice President and Dean for Research & Development

President Prof. Rivka Carmi welcoming Mr. Adams

Visiting Mor Peretz in his lab for electrical and computer engineering

Discussing computer science with Michael Orlov

Studying desert ecology with Oded Berger-Tal

Marcel Adams

Hebrew-speaking philanthropist Marcel Adams, who escaped from a forced-labor camp in Romania in 1944, fought in Israel's War of Independence and made his fortune in Montreal, has endowed the Adams Fellowship Program to support Israel's brightest doctoral students in the natural and exact sciences each year.

Marcel Adams (Abramovich) was born in Piatra-Neamt, Romania, in 1920. The anti-Semitic regime in Romania during the Holocaust interrupted his studies, triggering a lifelong quest for learning and a zest for the life of the mind. An active member of Hanoar Hazioni in Bucharest, Adams survived forced labor, food shortages and arbitrary harassment by the authorities.

After coming to Israel with the Jewish Agency's help in 1944, Adams settled in Pardes Hanna and participated in the War of Independence. He moved to Canada in 1951 and worked as a tanner before going into real estate. He eventually developed dozens of properties, mostly in eastern Canada, including Galeries de la Capitale, the largest shopping mall in the province of Quebec. With his late wife Annie, he established Tel-Aviv University's Adams Institute for Business Management Information Systems and endowed the university's Adams Super Center for Brain Research. A Montreal resident, the proud father of four and grandfather of eleven, he remains full of energy, works a full week and looks at least a decade younger than his 90 years.

Adams officially signed an agreement to establish the Adams Fellowships with the Israel Academy of Sciences and Humanities in Jerusalem in May 2005. The fund is large enough to provide $1 million annually to outstanding PhD students, covering their full tuition and living expenses throughout four years of study and including funds for attending scientific conferences abroad. Most recipients are aged 26 to 34.

The easy way would have been to hand over a check, but Adams wishes to pay back his 1944 debt to the Jewish people, which gave him a new identity and hope for rebuilding from the ashes of Europe. The fellowship helps young men and women thrive technologically, scientifically and intellectually. In turn, Adams believes they will carry the flag for the next generation and for future generations.

Academy President Professor Menahem Yaari describes the agreement as one of the most important documents ever for the future of higher education in Israel. A professional committee at the Academy reviews applications from doctoral students and chooses the awardees, for study in such fields as organic chemistry, molecular biology, chemistry, mathematics, engineering, physics, genetics, computer science and brain research.

Marcel. Adams wishes to help the best and brightest academics, those with tremendous potential for growth, who have demonstrated excellence in both quality of mind and personal character.

(This article includes extensive quotes from an article by Judy-Siegel-Itzkovich in the Jerusalem Post, May 29, 2005)

Avital Adler

PhD student of Prof. Hagai Bergman, Interdisciplinary Center for Neural Computation (ICNC), The Hebrew University of Jerusalem
Dissertation topic: Value Encoding in the Striatum in View of Serotonin Neurotransmission

Avital's PhD research is on the effects of 5-HT depletion on the axis of cortex-to-basal-ganglia and its relation to depression. In her unique work which initiated a new era of research in her advisor's group, Avital was able to discriminate between two arousal states by video analysis of the open/close state of the monkey eyes. With EEG, she verified the correspondence between state of eyes and arousal level and found differential arousal modulation of activity between the basal ganglia and the cortex. Most importantly, she showed that the changes in the discharge rate and pattern of the basal ganglia precede the changes in the cortex. A paper with Avital as the first and leading author was accepted for publication by the *Journal of Neurophysiology*. In her current experiments, Avital is recording data from the different sub-territories of the striatum before and after 5-HT depletion.

Avital is a most exceptional PhD student with a broad knowledge of computational neuroscience and a strong background in psychology, statistics and physiology. After a year of research and extensive recording of the physiological activity at different basal ganglia structures in the Physiology Department, she was accepted to the prestigious PhD program at the ICNC in order to gain broader knowledge in neural computation for her research. She could have finished her PhD in a few months, but decided to take on a more challenging route, tackling issues that have not been previously explored and that are of great interest for the basic and clinical neuroscience communities. Her advisor believes Avital will provide new insights into the role of basal ganglia in emotional processing and decision making, as well as into the pathophysiology of clinical depression. He considers her his best PhD student and at the top 1% of all PhD students he has met worldwide.

2010-2011

Leonid Barenboim

PhD student of Dr. Michael Elkin, Department of Computer Science, Ben-Gurion University
Dissertation topic: Efficient Network Utilization in Locality-Sensitive Distributed Algorithms

Leonid's MSc research focused on the Maximal Independent Set and Vertex Coloring problems on sparse communication networks. These two problems are among the most fundamental and well-studied problems in this field. Leonid devised novel algorithms which have proven to perform better than the previous state-of-the-art classical algorithms, which were subject to intensive research for more than twenty years.

Leonid's article describing these algorithms was accepted to the Annual Symposium on Principles of Distributed Computing PODC 2008. This symposium is the premium venue in the area of Distributed Algorithms, and publishing in it is an achievement for any well-established researcher. The peer reviews for Leonid's article were exceptionally good. His article was also invited for publication in the special issue of the *Distributed Computing Journal*. Recently, another article of Leonid's was accepted to the Annual Symposium on Theory of Computing, STOC 2009. This, too, is a major achievement, even for a well-established researcher.

Dr. Elkin describes Leonid as a very independent researcher who needs little or no guidance and comes up with surprising new ideas, substantiating them with technically brilliant mathematical proofs.

Due to Leonid's great achievements, he was invited to speak in the colloquium of the BGU Computer Science Department and in the Network Algorithms Seminar of Tel-Aviv University, where his talks were received enthusiastically. It was the unanimous opinion in Tel-Aviv University that Leonid's presentation was one of the best they have seen in the Network Algorithms Seminar this year. Recently, Leonid won the Feder award for the best thesis in a national competition conducted by the ACC – Advanced Communication Center at Tel-Aviv University. He was invited to present his work in the annual ACC workshop. In his advisor's opinion, Leonid is on his way towards becoming one of the leading scientists in the area of Distributed Algorithms.

Arren Bar-Even

PhD student of Dr. Ron Milo, Department of Plant Sciences, Weizmann Institute of Science
Dissertation topic: The Design, Analysis and Testing of Synthetic Carbon Fixation Cycles

In his MSc studies at the Weizmann Institute, Arren used his mathematical and computational skills to combine an experimental and analytical effort and understand how a cell can cope with its internal noisy environment. He found general scaling rules that can explain what the major characteristics of inter-cellular fluctuations are. His finding has fundamental implications for evolution and the natural selection of regulatory circuits, as well as for the use of a living organism as a production factory or a smart nano-machine. His results, published in *Nature Genetics*, had a considerable impact on the field.

Arren left Academia to head the R&D department of a start-up company, dedicated to pest-free and toxic-free agriculture. He developed various insect repellents having a significant physiological effect on insects and negligible toxicity to mammals. Fascinated by the field of sustainable food and energy production, Arren tackled the issue of plant growth from an engineering perspective. He established a methodology of searching and analyzing various synthetic metabolic pathways capable of assimilating CO_2 from the atmosphere, with the intention of finding superior alternatives to natural pathways that can enable plants and algae to increase their productivity. His work was accepted for publication at the *Proceeding of the National Academy of Science*. Back at Weizmann for his PhD, Arren joined efforts to establish a model system to test and compare the different proposed carbon fixation cycles.

Arren's goal is to implement the most promising synthetic carbon fixation pathways in natural photosynthetic organisms, furthering the sustainability of food and energy production. A photosynthetic organism carrying a synthetic carbon fixation pathway may hold great promise from a biotechnological viewpoint, increasing crop yields under controlled and optimized agricultural conditions. Arren hopes to help place Israel at the forefront of global sustainability efforts, export his technology and contribute to Israel's economy.

Omer Bobrowski

PhD student of Prof. Robert J. Adler, Electrical Engineering, The Technion
Dissertation topic: Some Topics in the Algebraic Topology of Random Fields

Omer has always been fascinated by mathematics and embarked on academic studies at Bar-Ilan University while still in high school. He completed his BA in Math and Computer Science at the Open University during his military service. Omer went on to explore applications of mathematics to real world problems at the Department of Electrical Engineering at the Technion. Following his masters and despite his acceptance to the top schools with first class programs such as the Courant Institute in New York, UBC in Vancouver and Stanford, Omer decided to stay in Israel to do his doctorate in the Technion, focusing on theoretical mathematics in the field of probability and stochastic processes.

Omer presented the first deep and truly new result in an area that is both new and exciting – the Topological Complexity of Random Sets – at a workshop at the American Institute of Mathematics in Stanford, where it generated much excitement and became the center of attraction. Omer has two other sets of interesting results related to homologies generated by some classes of random simplicial complexes.

It is important to Omer that his research not only involves deep mathematical theories, but that it is also related to real world applications. Research in random fields has contributed to brain imaging applications and to data analysis in astrophysics. Applied topology has possible applications in signal processing, control and machine learning. Omer believes that combining these two fields will lead to extremely useful applications. His PhD research is part of a combined effort of elite universities, the University of Chicago and Stanford University among them, to form a completely new mathematical area that will have great significance in real world problems. Omer hopes that this effort will place Israeli science in the frontier of yet another exciting field of research.

Ronit Bustin

PhD student of Prof. Shlomo Shamai, Department of Electrical Engineering, The Technion, Dissertation topic: The I-MMSE approach for Multi-Terminal Problems in the Gaussian Regime.

Ronit's army service, working in a high-tech environment, led her to study Electrical Engineering and Computer Science at Tel-Aviv University under the supervision of Prof. Hagit Messer-Yaron. Two years after finishing her master's degrees and after four years of work in the IBM research and development labs, she began studying towards a PhD at the Technion. Her advisor, Prof. Shamai took into consideration her experience in Estimation Theory and suggested a research topic that combines Information Theory and Estimation Theory.

Ronit's main field of interest is multi-terminal information theory, which - particularly in its theoretic aspects such as capacity of multi-terminal channels - is a mathematical field. Scientific progress in this field will be translated into progress in our technological environment. For example, knowing the maximum data transition capacity of a network is the basis to the construction of good codes, which achieve this capacity. This way Ronit's research helps advance science and directly affects the high-tech industry.

Ronit developed a new methodology to solve the information theoretic secrecy capacity problem and to gain insights into expressions that are central in other techniques. Ronit published this result in a special issue of the *EURASIP Journal on Wireless Communications and Networking*, and presented it at the premier conference in the field, the 2009 IEEE International Symposium on Information Theory. Her work gained attention by top researchers in this field and she was invited as a plenary speaker in the Physical Layer Security Workshop in Padova, September 2009.

Ronit feels that her contribution to Israel's strength is twofold, both as an educator of soon-to-be engineers in the academia, and as a researcher in one of Israel's primary industries.

2010-2011

Klim Efremenko

PhD student of Prof. Amnon Ta-Shma and Prof. Oded Regev, Computer Science,
Tel-Aviv University
Dissertation topic: Algebraic Constructions in Computational Complexity

Klim loved mathematics at a very young age. At aged nine, he won the city math tournament for ages 10-12 at his home town Alma-Ata, the capitol of Kazakhstan. At twelve he immigrated to Israel to continue his mathematical career. He started his studies at the Technion from 10th grade and served in the elite technological unit where his knowledge of mathematics was central to his work. Today Klim is doing his doctorate in Theoretical Computer Science, mostly in the field of error correcting codes. He has already constructed new codes which allow a receiver to decode one symbol of a message just by looking at three symbols at the possibly corrupted transmitted message, instead of reading the entire codeword.

According to his advisors, Klim is among the brightest students they have ever seen. He has the rare combination of high technical skills, ingenuity and long-range vision. Klim's work significantly improved and simplified previous constructions, presenting a beautiful, elegant and powerful explicit construction with parameters well beyond what was believed to be possible. His major breakthrough provides an unconditional proof that codes of sub-exponential encoding length exist, and do not rely on any unproved conjecture. According to Prof. Luca Trevisan of Berkeley, his result is one of the most interesting ones in theoretical computer science this year.

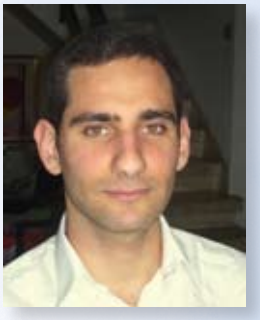
Klim's result immediately brought him international recognition and he is now regularly invited to the main workshops in the field. Klim remains in close contact with the IDF and consults there in the fields related to his academic research.

Yoav Livneh

PhD student of Dr. Adi Mizrahi, The Department of Neurobiology, The Hebrew University of Jerusalem
Dissertation topic: Adult Neurogenesis: From Synapse Formation, Through Sensory Coding to Animal Behavior

The regenerative capacity of neurons in the adult brain is limited. Over 99% of neurons are never replaced during the lifetime of an organism and as we mature, we continue losing neurons. The capacity for treating damaged brain regions, underlying many neurological disorders such as Parkinson's and Alzheimer's diseases, is therefore highly restricted. Questions, such as whether it will be possible to integrate new neurons into adult brains and if so, how they will become synaptically integrated and fully functional, and whether and how new neurons can contribute to the function of the network, are questions that lie at the heart of Yoav's research.

The adult mammalian brain does maintain at least two stem cell niches that continuously regenerate under normal conditions. These unique stem cells hold promise for exploiting their regenerative capacity *in vivo* and have been implicated in many different processes such as enhanced neural plasticity and learning and memory. Yoav is exploring the role of this unique neuronal population in their network's function, and ultimately in behavior. Using a wide array of neuroscience methods - genetic manipulation of specific subpopulations of neurons, *in vivo* structural and physiological imaging, electrophysiology and behavioral tests - Yoav aims to study the unique population of adult-born neurons. Hopefully, this knowledge will enable the harnessing of the tremendous potential of the adult-born neurons to replace other damaged ones, creating better treatments for neurodegenerative and other neurological disorders. Yoav's first manuscript as an MSc student was published in the *Journal of Neuroscience* with him as first author. In his direct PhD program, Yoav has several more papers underway.
Since Yoav feels that the general public should be educated in new scientific knowledge, he is part of a team, creating a new exhibition called "Journey Through the Brain" for Jerusalem's Bloomfield Science Museum.



Itai Roffman

PhD student of Prof. Eviatar Nevo and Prof. Avraham Ronen, The International Graduate Center of Evolution, Haifa University
Dissertation topic: Studying Suite of *Homo* Traits in *Pan*: Supporting Cultural and Genetic evidence for their inclusion in *Homo* Genus

Itai's advisor, Prof. Nevo, describes his research as uniquely important to human and great-ape evolution. His extraordinary master's degree thesis showed the close cultural links of bonobo chimpanzees and humans. Itai's doctoral thesis will shed light on their genomic (DNA) and phenomic (cultural) shared heritage. His laboratory studies will attempt to unfold their great cognitive similarities, which could be effectively used in therapeutics of communication for disabled youth.

Itai's work is anticipated to be a milestone in our understanding of the human-chimpanzee evolution, primarily because of its interdisciplinary approach of field and laboratory, genomic and socio-cultural perspectives. It will advance theoretical evolutionary perspective as well as practical medical and educational frontiers. It will erode the still existing belief about human linguistic uniqueness and enrich the intimate biological and cultural links which unify chimpanzees and humans evolutionarily.

Dr. Jane Goodall describes Itai as a leader among his peers. As an active member of the Jane Goodall Institute's Roots & Shoots global program for youth, Itai initiated Roots & Shoots groups in dozens of schools, scout groups, universities and community centers. With Itai's leadership, these groups completed a variety of projects to make the world a better place for people, animals and the environment. Dr. Goodall became captivated by Itai when she learned that he helped save an endangered species of amphibians by raising awareness to protect an Israeli wetland.

As part of his promotion of the advancement of chimpanzee personhood rights, Itai helped found the Israeli Hominid Welfare Association, which is working to establish a sanctuary for chimpanzees on Mt. Carmel, Israel. He has also started an initiative to help autistic and mentally retarded children to express themselves through video-assisted sessions with bonobo-chimpanzees who competently converse in English Lexigram Language.

Yoav Oved Rosenberg

PhD student of Prof. Jiwchar Ganor, Department of Geological and Environmental Sciences, Ben-Gurion University of the Negev
Dissertation topic: The Fate of Radium in Evaporitic Systems

The finding of naturally occurring radioactive materials (NORM) in water resources is an emerging water quality issue in the Middle East. High concentrations of carcinogenic radium have been discovered in groundwater in the Negev and southern Jordan. Drinking this groundwater can have severe health implications, such as a significantly higher frequency of bone cancer. Treating the radioactive groundwater by reverse osmosis desalination is one of the treatment options, but desalination plants would produce brine effluent. with even higher levels of radium that are rejected by the reverse osmosis membrane and discharged to the environment.

Yoav's research focuses on the ability of internal processes such as salt precipitation to remove radium from the solution. His findings can shed some light and allow a better understanding on the dynamics of Ra co-precipitation with evaporate minerals and could be applied for future management of radioactive waste solutions. Yoav is now expanding his study to natural evaporitic environments such as the Dead Sea. His novel and unique research could lead to further understanding of the distribution of radium isotopes between brines and salts and the residence time of radium in such environments. In two years, Yoav has developed a new geochemical tool to quantify radium retention in brine solutions. He is now working on the feasibility of already developed tools for the measurement of radium isotopes from brine.

Yoav is particularly interested in the practical applications of science in the real world. He is also attracted to science because it crosses cultural, national and language boundaries. His research is an essential part of a large Israeli-Arab US-AID (MERC) project that includes researchers from Jordan, the Palestine Authority, Israel and the United States. Yoav hopes his research will have a positive impact and create better opportunities for the region.

2010-2011

Osip Schwartz

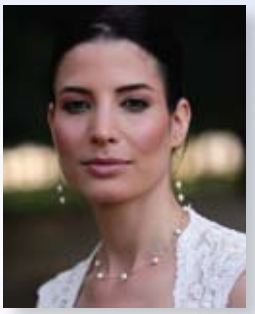
PhD student of Dr. Dan Oron, Department of Physics of Complex Systems, Weizmann Institute of Science
Dissertation topic: Nonlinear Microscopy with Nanoparticles

Having brought with him a rich research background from Novosibirsk, for his MSc project at the Weizmann Institute, Osip successfully set up an experimental system for the background free detection of anisotropic plasmonic nanoparticles by nonlinear optical processes. His results were published in *Nano Letters*. For his PhD, Osip is imaging saturable nanoparticles beyond the diffraction limit. His ideas involving a new scheme of sub-diffraction-limited microscopy based on a thorough analysis of optical nonlinearity were accepted for publication and presentation in "Focus on Microscopy", one of the most important bioimaging conferences.

Osip has worked in the fields of quantum electrodynamics, gas spectroscopy, fiber optic communications, nonlinear optical microscopy, superresolution microscopy and optical properties of nanoparticles. Realizing that he enjoys using theoretical ideas to develop new technologies, he gradually shifted from purely theoretical research to experimental and applied science. His understanding of the underlying theoretical background corresponding to his area of research, along with his excellent experimental capabilities and creative thinking, enable him to approach well-recognized experimental problems with a fresh view from an unexpected angle.

With an intrinsically interdisciplinary approach, he is working on the experimental implementations of two ideas. The first is a versatile and easy to use superresolution microscopy technique. Osip suggested a new, simple and elegant technique to increase the resolution in nonlinear microscopy by cleverly manipulating the pupil function. The second is a novel technique for ultrafast pulse characterization by showing that one can measure ultrafast signals with detectors that are much slower than the duration of the signal. This, too, is an original and simple idea that could have significant implications.

Osip is involved in many projects other than his own, becoming the department expert on low-light detection whose advice is sought regularly. He is also a co-organizer of the weekly optics student seminar at the Weizmann Institute.



Adi Sheinfeld

PhD student of Prof. Avishay Eyal, Electrical Engineering, Tel-Aviv University
Dissertation topic: Optical Detection of Alzheimer's Disease Via Ocular Spectroscopy

Adi acquired her first degree at the Technion, and majored in electro-optics and image processing. Upon graduation, she worked at Applied Materials as an algorithm engineer in the field of image processing and later became a team leader. Parallel to her full-time job, Adi started her MSc, eventually leaving her high-tech job to concentrate on a direct track to her PhD.

Adi's research is highly interdisciplinary. It is about biomedical applications of the Photoacoustic (PA) effect. The PA effect is based on the detection of sound-waves which are generated by the absorption of light in a tested medium. Adi concentrates on Photoacoustic spectroscopy and imaging, which is most suitable for non-invasive in-vivo measurement.

At the basis of her research lies recent evidence that the hallmark proteins of Alzheimer's disease (AD), which are known to be deposited in the brain, can also be detected in the eyes of patients. The presence of AD-related proteins in the eye facilitates implementation of optical methods for their detection. During the first two years of her research Adi constructed a fiber-optic photoacoustic sensor which is suitable for ocular measurements and tested it on protein solutions *in-vitro* and on isolated ovine eyes. The sensor was also utilized for implementation of a novel flow measurement method based on the Doppler photoacoustic effect, which is intended for vascular bioimaging applications. Her results were published in the *Optics Express Journal* of the Optical Society of America and presented by Adi in several scientific conferences.

Although still in its preliminary stage, Adi's research has the potential to revolutionize the early detection of Alzheimer's disease and to become an important tool in the search for new drugs and treatments for this common and devastating disease.

Avital Swisa

PhD student of Dr. Yuval Dor, Department of Developmental Biology and Cancer Research, The Faculty of Medicine of the Hebrew University of Jerusalem
Dissertation topic: Role of LKB1 in Pancreatic Beta Cell Dynamics

Diabetes Mellitus is one of the leading epidemics of the 3rd Millennium, especially in the developed world. Patients with DM1 (autoimmune related diabetes) and patients with advanced DM2 (polygenic-environmental insulin resistance related diabetes) suffer from a reduced β-cell mass. Insulin supplement is an excellent therapy, but not a cure. Avital is studying what controls the form, function and proliferation of beta cells in the body. Learning how to enhance beta cell mass or ameliorate their function, holds promise for better care for diabetics.

Avital studied the role of the LKB1 tumor suppressor in adult beta cells, using a mouse knockout approach. Using a series of exceptionally demanding, but well-performed experiments in mice and cell lines, she showed that LKB1 is a critical regulator of beta cell size, polarity and function. Her surprising results were published in *Cell Metabolism*. Her paper was selected for "Faculty of 1000 Biology", an award-winning online service that highlights and evaluates the most interesting papers published in biological science. Avital is now examining an extremely interesting phenotype that she observed while working on LKB1- deficient mice. She noticed that LKB1-deficient beta cells degenerated mitochondria, a finding that may have far-reaching implications for therapeutic approaches to Diabetes.

Avital is also studying the impact of islet vasculature on beta cell proliferation using a transgenic mouse system for over expression of VEGF. Here again, her careful analyses led to the surprising finding that increased islet vascularization leads to enhanced beta cell replication, a finding with potential relevance for regenerative medicine for Diabetes. Based on Avital's results, her lab won competitive grants from the Juvenile Diabetes Research Foundation and the European Union.

Avital is proud to take part in research which merges basic science and clinical implications, and intends to continue her studies as a medical student to help people.

Monther Abu-Remaileh

PhD student of Prof.Yehudit Bergman, Human Genetics,
The Hebrew University of Jerusalem
Dissertation topic: Understanding the Molecular Mechanism of Oct-3/4 Oncogenicity

Danny Ben-Zvi

PhD student of Prof. Naama Barkai and Prof. Ben-Zion Shilo,
Molecular Genetics, Weizmann Institute of Science
Dissertation topic: Scaling and Robustness in Embryonic Development

Oded Berger-Tal

PhD student of Prof. David Saltz, Desert Ecology,
Ben-Gurion University
Dissertation topic: Movement Ecology of Persian Fallow Deer

Ronen Gabizon

PhD student of Dr. Assaf Friedler, Institute of Chemistry,
The Hebrew University of Jerusalem
Dissertation topic: Activating Proteins by Shifting their Oligomerization Equilibrium: A New Approach to Drug Design

Alex Hayat

PhD student of Prof. Meir Orenstein, Electrical Engineering,
The Technion
Dissertation topic: Applications of Multi-Photon Processes for Semiconductor for Quantum Photonics.

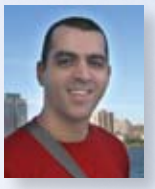
Efrat Mashiach

PhD student of Prof. Haim Wolfson and Prof. Ruth Nussinov in Computer Science, Tel-Aviv University
Dissertation topic: Structural Bioinformatics: Flexible Molecular Docking

Or Meir

Phd student of Prof. Oded Goldreich, Theoretical Computer Science, Weizmann Institute of Science
Dissertation topic: Combinatorial Construction of Probabilistic Proof Systems

2009-2010

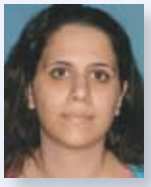


Moshe Mishali

PhD student of Prof. Yonina Eldar, Electrical Engineering, Technion
Dissertation topic: Compressive Processing of Analog Signals

Uri Roll

PhD student of Lewi Stone in Zoology at Tel-Aviv University
Dissertation topic: Spatial Perspectives of Epidemiological and Ecological Problems



Sivan Sabato

PhD student of Prof. Naftali Tishby, School of Computer Science and Engineering, The Hebrew University of Jerusalem.
Dissertation topic: Supervised Learning with Partial Information

Efrat Shema

PhD student of Prof. Moshe Oren, Molecular Cell Biology, Weizmann Institute of Science
Dissertation topic: RNF20 as a Novel Tumor Suppressor: Exploring its Roles in Transcriptional Regulation, Formation and Progression of Cancer, Senescence and Development

Keren Censor explaining her research in computer science

Keren Censor

PhD student of Prof. Hagit Attiya, Computer Science, The Technion
Dissertation topic: Probabilistic Methods in Distributed Computing

Emanuele Dalla Torre

PhD Student of Dr. Ehud Altman, Condensed Matter Physics, Weizmann Institute of Science
Dissertation topic: Strongly Correlated States in Ultra-cold Atoms

Noam Gross

PhD Student of Dr. Lev Khaykovich, Physics, Bar-Ilan University.
Dissertation topic: Nonlinear Dynamics and Interactions of Bright Matter-wave Solitons in a Bose-Einstein Condensate.

Ishay Haviv

PhD Student of Prof. Oded Regev, Computer Science, Tel-Aviv University
Dissertation topic: Combinatorics and Theoretical Aspects of Computer Sciences; Complexity of Lattice Problems

Amir Ingber

PhD Student of Prof. Meir Feder, Electrical Engineering, Tel-Aviv University
Dissertation topic: Coding Methods and Bounds for the Bandwidth Limited Regime

Mor Mordechai Peretz

PhD Student of Prof. Shmuel Ben-Yaakov, Electrical Engineering & Computer Science, Ben-Gurion University
Dissertation topic: Time Domain Design of Digital Controllers for PWM Converters

Michael Orlov

PhD Student of Prof. Moshe Sipper, Computer Science, Ben-Gurion University
Dissertation topic: Evolutionary Computation

Eran Segev

PhD Student of Dr. Eyal Buks, Electrical Engineering,
The Technion
Dissertation topic: Back-Reaction Cooling and Quantum Phenomena in Nanomechanical Resonators

Gil Segev

PhD Student of Prof. Moni Naor, Computer Science,
Weizmann Institute of Science
Dissertation topic: The Complexity of Resilient Sketches

Reut Shema

PhD Student of Prof. Yadin Dudai, Neurobiology,
Weizmann Institute of Science
Dissertation topic: The Role of PKMzeta in Long Term Memory Storage in the Rat Brain

Eran Segev on nanomechanical resonators

Uri Roll on zoology

Avraham Ben-Aroya

PhD student of Dr. Oded Regev and Dr. Amnon Ta-Shma, Computer Science, Tel-Aviv University
Dissertation topic: Quantum Computation and Quantum Information

Shai Carmi

PhD student of Prof. Shlomo Havlin, Physics, Bar-Ilan University
Dissertation topic: Complex Systems

Chen Davidovich

PhD student of Prof. Ada Yonath, Structural Biology, Weizmann Institute of Science
Dissertation topic: Ribosome Structure and Function

Shahar Dobzinski

PhD student of Prof. Noam Nisan, Computer Science, Hebrew University of Jerusalem
Dissertation topic: The Power of Approximations in Mechanism Design

Moshe Goldstein

PhD student of Prof. Richard Berkovits, Physics, Bar-Ilan University
Dissertation topic: Interference Effects in Interacting Mesoscopic Systems

Amir Goren

PhD student of Prof. Gil Ast, Human Genetics and Molecular Medicine, Tel-Aviv University
Dissertation topic: Inferring Regulatory Elements of Splicing Using Comparative Genomics

Dan Hermelin

PhD student of Prof. Gad M. Landau, Computer Science, Haifa University
Dissertation topic: Algorithmic Challenges in RNA Comparative Analysis

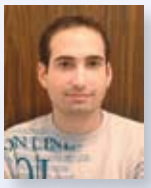
2007-2008

Yoav Lahini

PhD student of Prof. Yaron Silberberg, Physics, Weizmann Institute of Science
Dissertation topic: Disordered Nonlinear Systems

Guy Ron

PhD student of Prof. Eliezer Piasetzky, Experimental Physics, Tel-Aviv University
Dissertation topic: Measurement of the Proton Elastic Form Factors at Low Q2



Avraham Saig

PhD student of Prof. Ehud Ahissar and Dr. Amos Arieli, Neurobiology, Weizmann Institute of Science
Dissertation topic: Guiding Principles for Sensory Substitution: From Vision to Touch

Alexander Sodin

PhD student of Prof. Vitali Milman, Mathematics, Tel-Aviv University
Dissertation topic: Probabilistic Methods in Asymptotic Geometric Analysis

Efrat Mashiach on structural bioinformatics

Haim Beidenkopf

PhD student of Prof. Eli Zeldov, Physics, Weizmann Institute of Science
Dissertation topic: Vortex Thermodynamics in High-Temperature Superconductors

Liat Benmoyal Segal

PhD student of Prof. Hermona Soreq, Biological Chemistry, and Prof. Hagai Bergman, Physiology,
The Hebrew University of Jerusalem
Dissertation topic: The Role of the Cholinergic System in the Pathogenesis of Parkinson's Disease

Yael Elbaz

PhD student of Prof. Shimon Schuldiner, Biological Chemistry, Hebrew University of Jerusalem
Dissertation topic: Structure-Function Study of Multidrug Transporters

Olga Khersonsky

PhD student of Dr. Dan Tawfik, Chemistry, Weizmann Institute
Dissertation topic: Mechanistic Enzymology: From Classical Tools to Directed Evolution

Dana Moshkovitz

PhD student of Prof. Ran Raz, Mathematics,
Weizmann Institute
Dissertation topic: Probabilistically Checkable Proofs

Ariel Procaccia

PhD student of Prof. Jeffrey S. Rosenschein, Computer Science, Hebrew University of Jerusalem
Dissertation topic: The Theoretical Foundation of Multi-agent Systems (MAS)

Carmel Rotschild

PhD student of Prof. Moti Segev, Physics, The Technion
Dissertation topic: Soliton Interactions in Nonlocal Nonlinear Media

2006-2007

Ofer Shayevitz

PhD student of Prof. Meir Feder, Electrical Engineering,
Tel-Aviv University
Dissertation topic: Universal Communications with Feedback

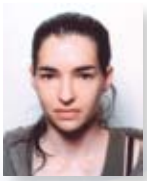
Amir Shlomai

PhD student of Prof. Yosef Shaul, Biochemistry,
Weizmann Institute
Dissertation topic: Metabolic Alterations in the Liver and Hepatitis B Virus Gene Expression

Noam Stern

PhD student of Prof. Ofer Mandelboim, Immunology,
Hebrew University of Jerusalem
Dissertation topic: Natural Killer (NK) Cells

Dr. Meir Zadok leading a discussion over lunch at the Conference in January 2010



Yael Eshed-Eisenbach

PhD student of Prof. Elior Peles, Molecular Cell Biology, Weizmann Institute of Science
Dissertation topic: Neuro-Glial Interactions

Nathan Keller

PhD student of Prof. Gil Kalai, Mathematics, The Hebrew University of Jerusalem
Dissertation topic: Probabilistic Combinatorics and its Relations with Harmonic Analysis

Tal Lev-Ami

PhD student of Prof. Shmuel Sagiv, Computer Science, Tel-Aviv University
Dissertation topic: Efficient Transformers for the Verification of Heap Manipulating Programs

Raz Palty

PhD student of Dr. Israel Sekler, Physiology, Ben-Gurion University
Dissertation topic: Characterization of the Novel Exchanger NCLX – a FLJ2233 Gene Product

Sharon Shwartz

PhD student of Prof. Moti Segev, Physics, The Technion
Dissertation topic: Nonlinear Optics in CZT:V

Emanuele Dalla Torre on explaining condensed matter physics