



Engine of Growth (page 12)

From the President



In the midst of a world where news can be overwhelming in its immediacy, it is sometimes refreshing to take a step back and survey one's accomplishments. Overall, it has been a year of growth, with a massive investment in physical facilities and research infrastructure. After years of devastating budget cuts, we were able to offer significant recruitment packages that can compete with those offered by other, central and more established universities in Israel and hire some exceptional new faculty members. And once again, Ben-Gurion University of the Negev was voted the most popular university for undergraduate studies in Israel by the National Student Union, reinforcing our commitment to engage students and faculty alike to maintain and develop this very special atmosphere.

We are now in the process of broadening our reach, enhancing our support infrastructure for international students, creating new degree programs in English while expanding our exchange agreements with the European Union and faraway places such as Singapore and Australia. This year we will be hosting 26 outstanding post-doctoral students from China and India who have been hand-picked to advance Israel's relationships with these countries through scientific collaboration. For Israel, this is about an investment in developing long-term relationships with the world's fastest growing nations while BGU benefits from their collective knowledge and diversity. This is part of the global initiative of internationalization undertaken by the University that will enrich the entire BGU community.

Despite the great challenges lying ahead, brought about by the world economic downturn and the government decision to cut its promised budgets, we are determined to stay the course. There is no going backwards, only forward – into the future.

We have recently completed the purchase of land and received permission to develop a long-term plan for the “northern campus” – an area adjacent to the Marcus Family Campus, across the railroad and comparable to it in size. Our plans are ambitious, but they have to be if we are to succeed in our mission – to be a world class university with a social conscience, to educate our students to realize their dreams while advancing the country's economic, security and social well-being.

All of this has been made possible thanks to the vision and support of our friends around the world who have worked with us to help make this happen. In the name of the entire BGU family, I say, Thank you!

Prof. Rivka Carmi, M.D.
President

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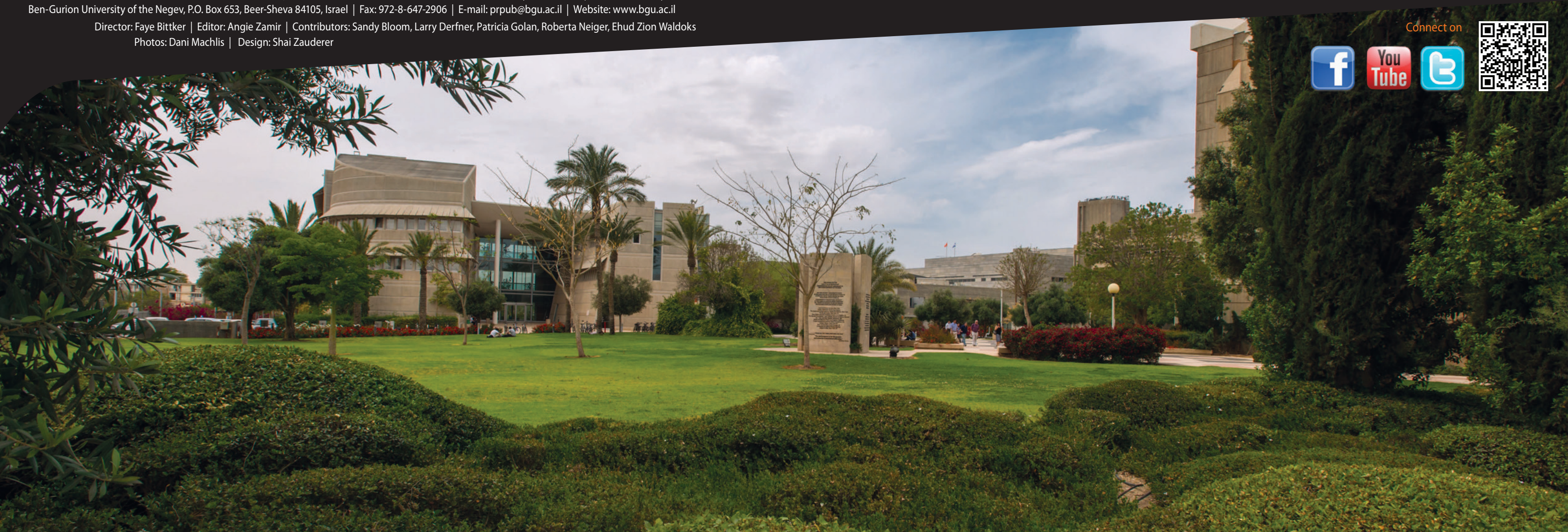
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Back to the Future

The interplay between contemporary and traditional makes for fascinating discourse – we must always look at what came before



historian of art and architecture, Dr. Inbal Ben-Asher Gitler looks behind to see what lies ahead.

A member of the Department of the Arts, Gitler focuses on two main areas: Israeli architecture and visual culture. Examining contemporary architecture, she keeps an eye firmly fixed on its precursors during the British mandate and in the 1950s and '60s. In the sphere of visual culture, she looks at early posters that shed light on the ideology of Zionism and how it still affects us.

A recipient of a Rich Foundation Grant for the Advancement of Women in the Academy, Gitler believes that architecture combines international trends with a local twist. She has been studying the involvement of the well-known Israeli architecture firm "Sharon Architects" in designing the campus architecture of the university in Ile-Ife, Nigeria. Known as the father of Israeli architecture, the firm's founder, Arie Sharon, designed buildings at almost all of Israel's major public places. Guided by a humanistic philosophy, Sharon sought to place the person at the center when designing a building's space.

"It was interesting to see how these architects appropriated Israeli architecture to Nigeria while assimilating local influences," Gitler says. "They had to convey complex cultural codes and conditions to create their modern architecture. For example, they imprinted designs in concrete, integrated Nigerian stage design in their auditorium and incorporated primitive sculpture in a Western way. In this work, you can see how Western modernism is tailored to the local climate and the university's needs."

Gitler based this study on architectural plans, photographs and interviews. She is now considering doing similar multi-source research on how immigration brought about a new, different type of architecture in planning the Negev after 1948.

She has also done research on the architecture of the BGU campus. A study in collaboration with researchers from Sapir College examines how contemporary Israeli architecture relates to early architecture and spatial concepts introduced in post-modernism. "You always have interplay between tradition and resistance," she says.

Gitler has also explored architecture and landscape design in Israeli films set on kibbutzim. Many of these films deal with the experience of losing a spouse or son in a war, and she examined the connection between the subjects and their settings.

In the area of visual culture, Gitler investigates



Dr. Inbal Ben-Asher Gitler

graphic communication in the form of Israeli posters targeted at diaspora Jews after the state's creation. These posters, hung in schools, congregations and embassies, served to encourage aliya, settling peripheral areas and Zionist ideology. "I look at how gender equality and inequality is featured in these posters, how ethnic differences were mediated, and what this says about Zionist ideology then and now," she says.

Gitler regards her job as more than a source of personal satisfaction. "On a national level, it is important to have good lecturers in the country's periphery," she says, adding that she plans to work with her department in advancing research on Negev architecture.

Gitler has helped the Municipality of Beer-Sheva in creating a list of buildings marked for preservation. "There are 50-year-old buildings that have deteriorated as a result of climatic conditions and lack of preservation. BGU students from all faculties are now taking courses dealing with the architecture of Beer-Sheva and the campus in which they are learning the importance of preservation. Through this project, we can familiarize students with the city and look at what should be done to provide sustainability in the desert."

Gitler has had a deep connection with BGU and the south of Israel throughout her life. She was born on Kibbutz Givat Brenner near Rehovot. Her father, Jiftah Ben Asher, is a professor emeritus of geology and hydrology who worked at BGU's Jacob Blaustein Institutes for Desert Research in Sede Boqer, where she spent much of her childhood. Today, she resides in Omer, near Beer-Sheva, with her husband, a neurobiologist in BGU's Faculty of Health Sciences, and their three children.

Constantly viewing present trends through the prism of their forerunners, Gitler plans to examine how past graphic design and art affect visual communication today, particularly that on the Internet. "The interplay between contemporary and traditional makes for fascinating discourse – we must always look at what came before," she says.

And perhaps in reaction to current global trends that diverge from past practice, Gitler makes a general appeal for continued support of the humanities. "In an era that places so much emphasis on the exact sciences, it is important to remember that our life wouldn't be what it is without art and architecture," she says. ●

Dr. Uri Yoel

Our Best Friends

Dogs are known as the human's best friend. Contributing to our sense of peace and play, they may also be the guardians of our physical health. Dr. Uri Yoel, M.D., a 43-year-old specialist in internal medicine and instructor at the BGU Faculty of Health Sciences, conducts research on the ability of dogs to smell cancer. His finding: there is no doubt that dogs can differentiate the smell of cancer cells from non-cancerous cells in cell cultures.

This research project, like so many others, was born of serendipity. During Yoel's residency at BGU, his advisor, Prof. Pesach Shvartzman, incumbent of the Mayman Chair in Family Medicine, invited him to join an investigation into dogs' capacity to detect cancer. The project was the idea of a family friend, a dog trainer, eager to extend his subjects' skills to beyond sniffing out drugs and explosives.

The idea of using the sniffing ability of dogs to detect cancerous cells first emerged a decade ago in an article in a medical journal about a woman who discovered she had melanoma when her dog repeatedly barked at her tumor. This set off a tidal wave of letters from readers who had had similar experiences. "In the case of lung cancer or melanoma this did not come as a great surprise, as it made sense that the cancer could be smelled on the patient's breath or skin. Regarding other forms of the disease, like breast cancer, it was less evident," says Yoel. "All smells leave a molecular footprint, but with something like breast cancer it was hard to understand how this worked."

Yoel volunteered to enter the project. First the two canine participants were taught to smell and detect cell cultures originating from malignant breast cancer and to differentiate them from non-cancerous cell cultures. When the dogs were ready they were tested for their ability to find one malignant cell culture plate located between four other non-cancerous cell culture plates.

The experiment raised fascinating questions. Do all cancers share a common smell or do different forms of the disease have distinct odors? Are the dogs detecting material from cancer cells themselves or the body's reaction to the disease, in the form of necrosis or inflammation? And while Yoel wanted the animals to give a total scan of all cancers, the dogs would identify one form and ignore another.

"We checked this with *in vitro* cell cultures of breast and lung cancer and melanoma. It was logical that if the dogs respond to cell cultures, they are reacting to the smell of the cancer itself," says Yoel. "The dogs were taught to smell only breast cancer cell cultures but were tested also for their ability to recognize lung cancer and melanoma cell cultures. They scored a perfect 100 percent in all cases."

"Our research proves that dogs can smell cancer cells *in vitro*, and that different types of cancer share the same smell print," says Yoel. "Again, we cannot know for sure if *in vivo*, the dogs are reacting to the cancer itself or to the body's reaction to it. I think that the cancer itself has a special smell print that the animals detect, though it may be a combination of the two factors."

The next step is to check the dogs' reaction to people with cancer. Yoel will begin by training the dogs to identify lung cancer. To do this, he will expose them to hundreds of smokers to look for those with early stage disease.

However promising, this research is hindered by the fact that it is conducted solely by volunteers, including Yoel, who work in their free time. To take the project further, Yoel must employ two dog trainers for at least a year. He will also need to add another two dogs as backups in case one of the original two trained animals is unable to work. Further, he needs a permanent place in which to house the canines.

"Even before we start training the dogs, we must see if they are suitable for this type of work," he says. "We need to see the dogs' qualities as puppies and to trace their development. All this takes time – and modest resources."

This compelling research and Yoel's intensive work as an internist at Soroka University Medical Center are linked to his personal ethic, which centers on active connection to others. His private life is no less governed by the principle.

Yoel, his wife and five children live at Kfar Rafael, a community close to Beer-Sheva for adults with mental disabilities. The Yoels share their home with six mentally disabled adults and Yoel's wife Michal, oversees the group.

"I became an internist because it combines connection with people, the thought process of diagnosis, research and intensive care," says Yoel. "And living at Kfar Rafael, you devote 'more than a little' time to others. This has made for a life filled with meaning." ●

Our research proves that dogs can smell cancer cells *in vitro*, and that different types of cancer share the same smell print

Dr. Yifat Miller



Applying Chemistry to Biology



remember that as a child, I liked both biology and chemistry very much and I knew I would learn one of the two,”

says Dr. Yifat Miller from the Department of Chemistry and the Ilse Katz Institute for Nanoscale Science and Technology, who was recently recognized by the National Cancer Institute in the United States with the publication of her research as a “Platinum Highlight” article in their *Poster Newsletter*.

“After I did my matriculation in biology,” she explains, “I turned to chemistry and got all my degrees in the field, all at the Hebrew University of Jerusalem, with a doctorate

We are interested in the peptides that link diseases such as Alzheimer’s and Parkinson’s or Type 2 diabetes and Alzheimer’s

in computational physical chemistry. But then I began to see that the future was in biology. So now I’m combining the two.” It is this combination that helped her achieve the singular accomplishment of identifying a potential target for slowing Alzheimer’s disease.

Miller’s focus is on peptides, small proteins that are related to numerous diseases, such as Alzheimer’s disease (AD), Parkinson’s disease (PD) and Type 2 diabetes (T2D). “In our lab, we are investigating the molecular mechanism of these diseases. In particular, we are interested in a research avenue that has never been explored before – the interactions between various types of peptides that link these diseases, such as AD and PD or T2D and AD.”

She says that a breakthrough was achieved a decade

ago when clinical trials showed that victims of T2D have a higher-than normal chance of developing Alzheimer’s. “So far, no one knows for certain the reason behind that link,” says Miller. “Recently it’s been shown that the peptide that is responsible for the T2D and the peptide related to AD are co-localized, unusually, in the pancreas and the cerebrospinal fluid. What we don’t know yet is how these peptides interact molecularly, so this is what we are studying in our lab.”

This is the first of Miller’s long-term goals – to solve the problem of unknown mechanisms of brain degenerative diseases. “What we’re doing will hopefully help prevent sufferers of one of these degenerative diseases from developing another one, which is happening all too frequently.”

“The work I’m doing now is new,” she says. She’s collaborating with Prof. Aphrodite Kapurniotu of the Technische Universität in Munich, and says the results that they have come up with are “very promising.”

“We’ve shown from our simulations the specific interactions between the peptide that is related to T2D and the peptide that is related to AD, so this is very interesting. Future work will focus on drug development, hopefully leading to new drugs potentially capable of impeding such interactions, thereby reducing the chances of T2D patients of developing AD.”

Miller is also working on another protein related to AD. “There’s still a lot of investigating to do in looking at the mutations of this protein. We’re still at the beginning of the search.”

The second of Miller’s long-term goals likewise involves the application of chemistry to biological issues. “I want to develop new materials for bio-nanotechnology, which have literally endless industrial applications,” she says.

What links her two goals is the focus on peptides. “They can form biomaterials, and if we can control this

formation, we can develop specific properties for hydrogels, for instance, which are materials that are highly important for industry and for medicine, especially in tissue engineering.”

Recently she received a personal prestigious four-year Marie Curie Career Integration Research grant from the European Union 7th Framework Programme (FP7), and a three-year NIH R01 grant together with Prof. James T. Hynes from the University of Colorado and Prof. Ehud Pines from BGU’s Department of Chemistry.

Born in Jerusalem, Miller grew up in Moshav Eshtaol in the pastoral surroundings of Beit Shemesh. After a post-doctorate at the NIH that took her and her husband and four children to Silver Spring, Maryland, for nearly three-and-a-half years, she relocated to the Negev.

Her twins are too young to think about their future, but her two teenage daughters seem to be following in her direction – one appears headed toward biology and biotechnology, the other is moving in the direction of brain science. But as Miller herself can testify, things can change. ●





Prof. Ohad Ben-Shahar

Seeing the Big Picture

This may not sound like the sort of thing scientists should be doing in their work hours, but Prof. Ohad Ben-Shahar and his research team from the Department of Computer Sciences can now get a computer to do a jigsaw puzzle of 10,000 pieces. They recently published a paper in a scientific journal detailing how their computer did one with 3,300 pieces. “Before that,” notes Ben-Shahar, “the largest puzzle any computer could solve was around 400 pieces, which is well within human range.”

What Ben-Shahar, incumbent of the Ralph Selig Career Development Chair in Information Theory, is doing, of course, is not leisure: it’s a branch of science called computational vision. He explains: “Vision is arguably the most important of all senses, without which our lives would be qualitatively different. For a wide range of applications, from ‘seeing robots’ to the restoration of sight for the blind, it is indispensable to understand vision as an information processing mechanism.”

A member of the Zlotowski Center for Neuroscience and the Paul Ivanier Center for Research in Robotics and Production Management, Ben-Shahar hopes to unravel the visual signals (i.e., images and videos) that provide the biological base for understanding human vision.

“The sky’s the limit,” he says, when looking at applications of computational vision. “Everything you can do with your eyes, everything you need your eyes for, is a potential application for computational vision.”

But that is only one half of the field’s applications. The other is using computational vision to understand biological vision – the vision of humans and animals. In short, the purpose of Ben-Shahar’s research is to make computers “see” better and to use computers to understand how people see. “Vision is one capacity of the human brain, and understanding that part would help tremendously in understanding the workings of the brain as a whole,” he notes.

He started out in this direction, as a branch of computer science, as a boy growing up in Kiryat Bialik, near Haifa. “In the early 1980s I had one of the first home computers; it was called the VIC 20, made by Commodore. I was fascinated by it – it was like exploring a whole new territory, and I just fell in love with the discipline.”

Ben-Shahar describes computational vision as the interface between computer science and behavioral sciences, cognitive sciences and neuroscience. “I’m a computer scientist, that’s my environment, but I branched out to a certain degree toward these other disciplines.”



Vision is one capacity of the human brain, and understanding that part would help tremendously in understanding the workings of the brain as a whole

Computational vision can be thought of as a sub-field of artificial intelligence, which feeds into yet another of Ben-Shahar’s strong interests – robotics. “Most aspects of robotics in computer science deal with interpreting sensory information, including the sense of sight,” he says.

Ben-Shahar, 45, received his bachelor’s and master’s degrees at the Technion – Israel Institute of Technology, then another master’s and a doctorate at Yale University, before coming to BGU in 2004. He lives on Kibbutz Mishmar Hanegev with his wife, Galit, an architect, and their three children. “This is really the first time we’ve gotten to know the Negev, and we’re very happy. I think that living in a kibbutz has helped. It’s wonderful. For us it’s a true sense of community.”

In 2010 he received BGU’s Exceptional Researcher Award from the Faculty of Natural Sciences, and the following year an award for best research work by a supervised student in the Israel Machine Vision Conference (IMVC 2011). He collaborates on research projects in various foreign countries; in Germany, for instance, he’s studying the vision of barn owls.

In all, Ben-Shahar’s research involves both the theoretical and practical. “The mere understanding of nature is a goal in and of itself,” he says. “In my lab, much of what we do doesn’t have immediate application, which is atypical in the field of computational vision.” But ultimately, everything he and other basic researchers learn can be used to improve people’s lives in some way or another.

And like puzzle solving, which has surprising applications in, for example, image editing, voice scrambling and archeology, some of the work in the lab does indeed have immediate practical uses. “For instance, we study what’s called agricultural vision, vision for agricultural applications,” he says. “How do you write an algorithm for a robot to be able to harvest a sweet pepper? How do you write it so the robot can tell if it’s ripe, if it’s diseased or not? How do you write it so the robot can detect a green pepper against a background of green foliage?”

And certainly, computational vision is used in life-saving pursuits. “It’s the basis of assisted driving,” notes Ben-Shahar. “If you want the car to help you prevent accidents, there are already commercial systems that do that, using mainly computational vision to detect pedestrians crossing in the car’s path, warning the driver of oncoming cars before he shifts lanes, alerting him to traffic signs. A more well-known use of computational vision is in face detection for surveillance, which is used in the hope of, for instance, catching suspected terrorists in airports.”

Traffic safety, terror prevention – this is something anybody can appreciate. How to make computers see well enough to achieve these goals – that’s fairly esoteric stuff, so if Ben-Shahar and his associates are working on jigsaw puzzles, it’s safe to assume they have their reasons. ●



Dr. Karine van der Beek



Engine of Growth

Dr. Karine van der Beek of the Department of Economics, a 39-year-old mother of two, admits that from the time she was a child she was “sensitive to the misery and poverty of large sectors of the world’s population.” As she grew older, she would often ask herself: Why are some societies able to provide better economic conditions allowing their citizens to succeed economically, while others fail?

After earning her bachelor’s, master’s and Ph.D. degrees in economics from the Hebrew University of Jerusalem, van der Beek spent a year as a post-doctoral fellow in Pompeu Fabra University in Barcelona before joining BGU in 2007. During the course of her studies, she realized that she was drawn to economic history.

“I believe that we have a lot to learn from the past in exploring the foundations that underlie long-term growth processes,” she says. Her particular focus is on economic growth, “technological change, and on the effect of human capital – the skills and knowledge that make workers productive – on growth patterns.”

Van der Beek explains that since the 1990s human capital has been considered by economists to be a critical factor for economic development. “Technological change is the engine of growth processes and in many growth models we assume that higher levels of human capital – that is a more skilled and educated labor force – increase the rate of technological change. It is usually assumed that higher rates of technological change increase the level of human capital in a country.

“The mechanism behind this is called *skilled-biased technological change*, and it asserts that technological changes increase the demand of employers for skilled workers. Since it takes time for the markets to adjust and supply the larger number of skilled workers in demand, and employers are willing to pay more for these workers, the wages of the skilled workers increase and more people are interested in acquiring human capital,” she explains and gives the example of the recent information and computer technology revolution. “A whole new field opened up in Israel in the 1990s as a result of computers,” she says. “Computerization increased the demand for skilled workers in the new field and this caused wages to rise. The newly created large pool of skilled

workers created new technological inventions, leading to further growth and need for skilled workers.”

Van der Beek is interested in examining whether this mechanism characterizes earlier periods as well. “If our models are right, we should expect them to be applicable to earlier periods, especially the 18th century Industrial Revolution in Britain, which marks the point in history when economic production became industry- and technology-based and countries began to emerge from economic stagnation and experience sustained economic growth.”

Two years ago, billionaire magnate and philanthropist George Soros launched the Institute for New Economic Thinking (INET) to promote changes in economic theory. Van der Beek was chosen by the INET to conduct research on the effects of the technological changes that led to the British Industrial Revolution (1760-1830) and study its effect on the market for skilled workers.

She also received the Israel Science Foundation (ISF) Individual Research Grant and a US-Israel Binational Science Foundation (BSF) Regular Grant to extend her research of human capital and technological change during the Industrial Revolution. She has received the Rich Foundation Grant for the Advancement of Women in the Academy in 2009 and the Arthur H. Cole Grant of the Economic History Association in 2008.

One of the reasons for van der Beek’s focus on the Industrial Revolution is that conventional wisdom has viewed the Revolution as “deskilling,” which is inconsistent with the assumption of skilled-biased technological change and unified growth models.

The technological changes of the British Industrial Revolution are often viewed as deskilling in that they substituted highly skilled artisans for physical capital, raw materials and unskilled labor. “There are no satisfactory quantitative grounds to support this view,” says van der Beek, “The new machines required a whole new sector of skilled workers to construct and maintain them. We know that these so called ‘workmen’ earned three times the wages of the unskilled spinners in the factories of the 1770s.”

When asked about the recent world-wide economic crisis and the criticism directed towards economists and economic theories that did not forestall or even forecast such disasters, van der Beek explains: “It is true that neoclassical economic theory ignores important elements of reality, mainly problems of information, behavior and state politics, which are essential for any understanding of the economic reality. Nevertheless, academic research is very dynamic and these fields have developed enormously. The problem is that while researchers are aware of the limits of their models, policy makers tend to base their work on simplified economic rules and axioms.” ●

I believe that economic historians have an important role in understanding growth and testing economic models by applying them. This allows us to understand both the past and the present in greater detail

Star Gazing

To hear astrophysicist Dr. Uri Keshet tell it, exploring the universe is at once the most pedestrian and the most adventurous pursuit imaginable. “We’re sort of couch astronomers. We sit in the comfort of our office, or even at home in pajamas, and download data taken fairly recently from space,” he says.

The scope of this data enables today’s astrophysicists to learn about the universe in detail and precision their predecessors never dreamed possible. “What I like about astrophysics is that you really have the freedom to study anything in the universe, and there are so many questions that astrophysics concerns itself with: What is the universe made of, how did it all begin, how will it end? How did its structures form, how were stars born, why do they sometimes die in a magnificent explosion? How many earth-like planets are there, and is there intelligent life on any of them besides Earth?” he asks with a genuine look of wonderment.

“All these questions are in the realm of astrophysics now, they’re not merely philosophical daydreaming,” he continues. “We have hard data on these questions, and the rate of the production of this data is expanding so quickly that you can think about things that are completely unobservable now, but in a decade you’ll get data on them on a daily basis. For example, we have identified about 700 planets outside our solar system in just the last few years. Ten years ago we only knew of a few dozen. Twenty years ago we didn’t know of any.”

Keshet, 39, is a newcomer to Ben-Gurion University and the Negev. “I had only visited BGU twice before I decided to come and work here,” he says. He and his wife, Alona, who is doing post-doctoral studies in sociology at BGU, and their children moved to Lehavim, north of Beer-Sheva, last November. They spent six years in the United States, three at Princeton’s Institute for

We have identified about 700 planets outside our solar system in just the last few years. Ten years ago we only knew of a few dozen. Twenty years ago we didn’t know of any





Advanced Study and then three at Harvard's Center for Astrophysics, where he had a NASA Einstein fellowship.

After his military service, Keshet studied for his bachelor's degree at the Hebrew University of Jerusalem in computer science and physics, then narrowed his focus to astrophysics for his master's and doctorate at the Weizmann Institute of Science.

So what brought him to BGU's Department of Physics? "We made the decision that if I get a good offer for my academic work in Israel, we'll come back," he says. "And BGU was the first to give my wife and me an offer we could not refuse. BGU has one of the best groups I know of in plasma astrophysics, which is my field, so this was one of the things that made me happy to come here, but also, BGU made me feel especially welcome and gave me substantial resources with which to do my work – specifically, a large computer cluster." Keshet has also received a European Commission Marie Curie Career Integration Grant.

Hearing Keshet talk about the universe can stretch one's brain beyond its normal dimensions; literally, it's a heady experience. For Keshet, not so much anymore.

"Sure, I started with that sense of amazement and awe at the magnitude of things and my insignificance, and it's still there, but it does diminish over time," he explains. "The galaxy clusters that I work on have become my friends. We talk about them as if they're cards on a table rather than aggregates of hundreds of galaxies, each with a hundred billion suns."

Keshet notes that most of the universe is made of plasma, and the largest objects in it are galaxy clusters, his "friends," his "cards on a table."

"The universe was formed hierarchically; we now know that it started out very smooth, like a soup, then small lumps formed, creating the first stars. Then larger overdensities formed and turned into galaxies, and in the most recent billions of years, the largest of all objects were formed – galaxy clusters," he explains. "In a sense, structure formation in the



Dr. Uri Keshet

Structure formation in the universe is pretty much over – the largest objects we'll ever see are galaxy clusters. They're mostly isolated, like island universes unto themselves

universe is pretty much over – the largest objects we'll ever see are galaxy clusters. They're just huge objects, mostly isolated, like island universes unto themselves. There are about 100 billion galaxies in the observable universe, a substantial proportion of which reside in galaxy clusters. These are the largest objects that ever were or ever will be in the observable universe."

There are many open questions about these galaxy clusters, says Keshet, regarding their structure, composition and stability. "The work we're embarking on is very exciting. For example, we know that most clusters have a dense, bright core, and the great mystery is how the core can survive when it emits so much radiation – it should have cooled and collapsed catastrophically, unless something is feeding it energy."

Which brings Keshet to the work he expects to be doing in the near future – developing his theory that there are huge spiral flows of plasma which feed energy to the core of the galaxy cluster and stabilize it. "This is my thesis, though I don't know if there are many astrophysicists who agree with me. We see that these cores have a distinct structure, and in the past year I became convinced that they are spiral flows, the largest in nature."

"These systems and processes are some of the topics I expect to be studying for the next five years," he says. "As for what I'll be doing ten years from now, that, too, is a mystery to me." ●



Ohad Wormser

students making a difference

A Personal Touch

Ohad Wormser, a first-year student at the Joyce and Irving Goldman Medical School, is considered the black sheep in his family. "My family tends towards engineers," he says, "my father, my uncle, even my grandmother are engineers."

Wormser's interest in medicine began when he was diagnosed with Crohn's disease as a youth. "I had a lot of pain when I was a child, but the doctors weren't able to diagnose my problem. Finally, when I was 17, one doctor took the time and patience to talk to me and listen to me and as a result, she was able to diagnose and help me. I never forgot her caring, and that's when I became determined to follow in her footsteps," he explains. "Medicine," I learned, "isn't only about empirical knowledge, and patients aren't just charts, they are human beings. That's why I chose to study medicine, and why I came to Ben-Gurion University."

One of his favorite experiences so far was participating in a communications workshop on how to get medical history information from patients through a pleasant interview conversation, not just by filling out a questionnaire. He gives the example of a patient who has been hospitalized for five days and does not have slippers or any personal items with him. "The medical staff must be attentive and pick up on these cues: Why doesn't anyone come to visit or bring him personal items from home? What can be done about it?"

Wormser has always been involved with people; from the age of 15, he volunteered in different capacities, and despite his rigorous medical school schedule, he still finds time to volunteer. He is very active in the Aviv Project, under the aegis of the Medical Students' Association of the Negev (ASRAN), in which he and other students from his class volunteer at the Haruv absorption center in Beer-Sheva that houses about 70 Ethiopian families who

have recently made *aliya* to Israel. "I am a Big Brother to one child. I tutor him in his schoolwork, of course, but I also play soccer with him while teaching him how to follow the rules. Sometimes I'll bake a cake with him and teach him how to follow a recipe; sometimes we'll go to the zoo. In addition, I pitch in for community projects like helping the children prepare gift packages for the elderly for Passover and then distributing them."

He is now organizing an extended summer trip for a group of Haruv children. "When I need to recruit additional counselors, I turn to my fellow classmates. That's another advantage of this volunteer work: bonding with fellow medical students who are also interested in contributing to their surroundings."

In addition to being an active member of his class committee, Wormser volunteers in the Good Neighbor project, also organized by ASRN, in which he and his classmates conduct regular activities for a group of people with disabilities that they have "adopted." He also participates in the Desert Speech project, which helps Bedouin students improve their English so that they can pass college entrance requirements; they, in turn, help him to practice his Arabic.

Wormser was recently the recipient of a Lubner Prize for Community Service, made possible through the generosity of Vice-Chairman of the Board of Governors Bertie Lubner of South Africa. "One of the advantages of winning that prize is that they donate to the community project of my choice. I am looking forward to the trip I've been planning for the Haruv children, to be funded from the prize money. I believe in helping people to help themselves – one child who adjusts successfully to life in Israel can then continue the chain of caring and be an example to the rest."

New Dimensions in Diagnosis

Dr. Alberto Bilenca of the Department of Biomedical Engineering and the Ilse Katz Institute for Nanoscale Science and Technology is using one of the most widespread devices in the world – the cell phone – to diagnose one of its deadliest diseases – malaria. Bilenca’s project uses the principles of polarization and speckle optics and cellphone technology to create a low-cost, portable probe that can quickly and accurately diagnose malaria. The diagnostic probe is portable and can be employed in field settings; it is simple to use and inexpensive to produce.

Malaria claims the life of a child every second. About 3.3 billion people – half the world’s population – are at risk of the disease, while those living in the poorest countries are the most vulnerable. Some 90 percent of all malaria deaths occur in Africa, primarily among children under five years of age. Public health experts agree: early diagnosis and treatment of malaria prevents deaths. In contrast to commercially available malaria tests, this device will eliminate the need for blood collection, making for safer, more comfortable and quicker testing.

“You just hold the cell phone and image the tissue you would like to test,” says Bilenca. “By looking at the blood flow speed (perfusion) and the malaria pigment images, we hope to be able to diagnose and monitor the severity of this terrible disease,” he continues. Currently, the probe noninvasively obtains finger and retinal blood perfusion images with excellent spatial resolution within less than a second.



Dr. Alberto Bilenca

This probe promises multiple uses. Besides being non-invasive, it is based on a cellphone and thus can be incorporated with telemedicine

Bilenca explains that in malaria, parasites attack red blood cells, changing their properties and making them stiffer, which prevents them from entering small capillaries. The disease also causes the red blood cells to stick to vascular walls. Both these changes occlude vessels and impede blood flow.

“In small children, cerebral malaria blocks the tiny blood vessels in their brain, resulting in brain damage,” says Bilenca. “We check the eye for changes in blood flow speed to gauge what’s happening in the brain. Also, in malaria, parasites enter the cell and produce waste that goes into the bloodstream. This waste takes the form of tiny crystals, called hemozoin or ‘malaria pigment.’ If this is present, you can diagnose malaria.”

Can this probe be applied to other diseases? “Yes,” replies Bilenca, “to any disease that modifies blood flow or adds something to the blood, making changes that can be detected when light goes through it.” Diabetes, which changes blood flow and can be detected in the patient’s eye, is one possibility.

“This probe promises multiple uses,” says Bilenca. “Besides being non-invasive, it is based on a cellphone and thus can be incorporated with telemedicine, as data can be transmitted through a cellular network to medical personnel anywhere. Furthermore, the tester doesn’t need to be a doctor.”

For his pioneering work, the Bill & Melinda Gates Foundation last year awarded Bilenca a grant of \$100,000. He and another 87 winners were chosen from 2,500 proposals in approximately 100 countries. The prize acknowledged their exploration of “bold and largely unproven ways to improve global health.” In addition to the Gates grant, he has been awarded a Marie Curie Career Integration Grant from the European Union, a German-Israel Foundation prize and an Israel Science Foundation grant.

Bilenca’s other projects include working with nano-optics to improve visualization of biological matter at the nanoscale. Creating both the hardware and software, Bilenca is building an actual instrument, which he believes will help elucidate the molecular mechanisms of various diseases.

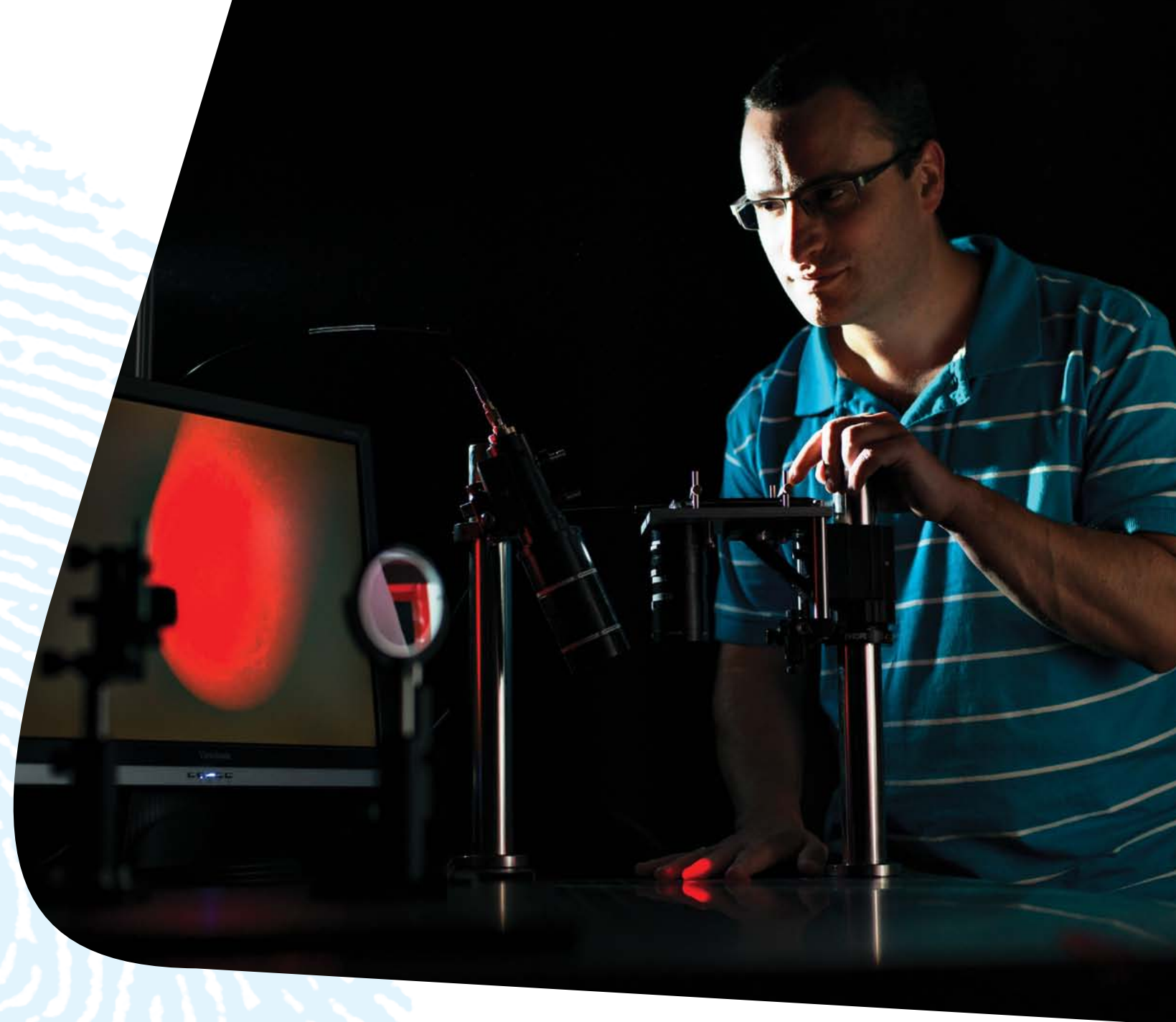
“Today, people can section only small and shallow cell or tissue samples, since as you go deeper, you lose resolution,” he explains. “Uniquely, my device will allow researchers to reach new dimensions of depth in large biological organisms (hundreds of microns in size) at nanometric resolution.”

Born in Argentina, Bilenca immigrated to Israel with his family in 1973. He earned his B.Sc., M.Sc. and Ph.D. in electrical engineering at the Technion – Israel Institute of Technology before going on to post-doctoral work at Harvard Medical School. “I wanted to do research that would impact people’s lives,” he says, admitting that medicine was never an option. Despite

his medical pedigree – his father is a gynecologist, his mother works at a blood bank – Bilenca can’t stand the sight of blood.

Married, with one child, he joined the BGU faculty in 2010. “BGU has a nice environment and excellent students. In addition, the students here have ideals, like settling the Negev,” he adds.

And while he had other offers, Bilenca found that people at BGU “made me feel how much they cared about me and my research, and wanted me here. BGU invested a great deal in renovating a lab for me,” he continues. “The University understands that to bring young scientists, it must invest in them. This is how you build solid research.” ●





Dr. Catherine Rottenberg

Minorities Report

For Dr. Catherine Rottenberg of the Conrad and Chinita Abrahams-Curiel Department of Foreign Literatures and Linguistics, fiction is no less than a passion. She nearly sends off sparks when she speaks of her love for African-American and Jewish-American literature of the 1920s.

This period marked a turning point for both minorities, she says, explaining the context. For black Americans, it was the time of the great migration from the south to northern urban areas. At the turn of the 20th century, masses of Eastern European Jews were arriving at the US shores.

In her work on early 20th century African-American and Jewish-American fiction, Rottenberg, who also teaches in the Gender Studies Program, focuses on issues of gender, race and class. “In the 1920s was the Harlem Renaissance, during which there was a flowering of African-American fiction and poetry. At the same time, this period saw the first generation of Jewish-American novelists to write in English,” she says. According to Rottenberg, there are many bases for comparison between Black and Jewish writers who documented assimilation into a mainstream culture within a climate of discrimination. Both groups had, in the past, been marginalized as slaves, aliens, unbelievers, or in some cases as not fully human. Both were often excluded from mainstream life.

Nevertheless, says Rottenberg, “in the States, the Black-White divide has always been stronger than that caused by anti-Semitism. Whereas Blacks “wear” their color, Jews could more easily merge and rise in society. The Jews first settled on the Lower East Side of New York, then were able to move out to the suburbs. African-American literature often refers to Jews as being in an intermediate state of being, between Black and White,” she says.

The city, says Rottenberg, “has special significance to both groups, offering a crucial category through which we can view the literature of African- and Jewish-Americans.” She points to the sociologist Robert Park, a major figure in the Chicago school of sociology, which was active in the early 1900s. Park spoke of the city as a special modern site that gives individuals the anonymity necessary for exploration, and lays the foundation for plurality, explains Rottenberg, adding, “People go in and out of the city, bringing sets of expectations that may conflict with normative expectations. This clash is crucial for opening up new possibilities.”

In her recent research, Rottenberg has turned her attention to women protagonists in African-American fiction from the 1920s. “I take an interdisciplinary approach and use tools of critical geography and the theoretical insights of feminist urban studies to look at literary texts,” she says. “The city is a place that allowed women to rise, but did that apply to Black women as well? It offered opportunities, but it also reinforced certain dominant norms. This is an interesting take-off

In the 1920s there was a flowering of African-American fiction and poetry. At the same time, this period saw the first generation of Jewish American novelists to write in English

point for looking at how we can create more spaces that allow discriminated groups to change.”

Specifically, Rottenberg explores the notion of the “new woman” in the early 20th century, which was closely tied to urban settings. It was also sharply differentiated from the idea of the “new Negro woman,” she says, explaining that the “new woman” had a presence in the public sphere and economic independence, as jobs outside the home were opening up to her. As an anonymous city-dweller, she was also free to engage in sexual experimentation. While the “new Negro woman” also had public presence, she was working hard to gain legitimacy, and for her, sexual liberation was taboo.

Born and raised in the US, Rottenberg did her undergraduate work at Brown University, where she originally started in pre-med. After spending a year in Israel, she decided to leave medicine – and her country of birth – and returned to study her first love, literature, in Jerusalem.

Rottenberg and her husband, who also teaches at BGU, made a conscious decision to move to Beer-Sheva from Jerusalem. “We wanted to live in Beer-Sheva and become an active presence here,” she says. Taking a major role in the creation of the “Arab-Jewish Bilingual School for Equality,” she has done just that. “I am part of a group of parents who came together seven years ago to create an alternative educational opportunity in Beer-Sheva,” she relates. “We started with five Jewish and five Arab families and have expanded to include 180 kids from first to fourth grades. The school is based on multi-cultural, progressive education, and is now considered one of the best schools in the area. We have a waiting list of families from all sectors and socio-economic groups, and plan to keep growing.”

Rottenberg is no less excited about BGU. “The atmosphere here is wonderful,” she says. “When I walk around campus I feel so glad and lucky to be at such an alive, activist university.” ●



students making a difference

Emergency Response

Carolina Tannenbaum-Baruchi, now completing her master’s degree in the Department of Emergency Medicine, worked as a nurse and had three children before pursuing her dream of studying emergency medicine. And when she finally did, she decided to join the relatively small number of students who choose to do a research project and thesis for their degree. After her advisor and mentor Dr. Paula Feder-Bubis advised her students to “find a topic close to your hearts,” Baruchi decided to research the coping of deaf people during Operation Cast Lead in 2009.

Baruchi grew up as the child of two deaf parents so she was very familiar with the unique issues faced by the deaf community when interfacing with the hearing world. Her own parents had been dependent on her to escort them to physicians or to the bank, acting as their translator. When she fell as a child, she knew to run to her mother for help because she wouldn’t hear her cries. Thus Baruchi asked herself: when rockets and Grads rained down on the South, how did the deaf residents cope? How does someone know to respond when you can’t hear the sirens? Baruchi’s qualitative study revealed, unsurprisingly, that the “usual” communication problems experienced by the deaf were aggravated during the Cast Lead period. Although government authorities distributed special pagers to the deaf population that would send text messages about imminent missile attacks, the warnings sometimes arrived too late due to technical glitches. Thus, deaf persons asked their hearing parents, children, friends and neighbors to open their doors during an alert, or send text messages to their cell phones. “In one case, the person’s grandmother in another city would send text messages,” Baruchi says.

This study opened up a whole new research field to Baruchi, who found that interviewees were more likely to trust and

open up to her precisely because she was the child of deaf parents. “Many of the study participants literally begged me, ‘Please do something to help us.’ This cry for help wasn’t only about Cast Lead and sirens; this had to do with lack of communication, even under ordinary circumstances, with physicians, social workers, even mental-health professionals.

“Dr. Limor Aharonson-Daniel, head of the Department of Emergency Medicine and head of the PREPARED Center for Emergency Response Research, encouraged me to broaden my research to include a wider mapping of the barriers to services for the deaf. In the pilot study, I revealed gaps in access to care – for example, deaf people reported paying far fewer visits to doctors than the hearing population, due to communication problems.”

What to do? Baruchi holds up a sign-language phrase book or conversation manual for first responders – physicians and emergency rescue units. Called *Sichon* – cooperatively produced by the Institute for the Advancement of Deaf Persons in Israel and the Community Stress Prevention Center – the manual offers simple pictures that demonstrate basic sign language for phrases such as “I am a doctor” or “Where does it hurt?” Baruchi dreams of mandatory workshops for medical and nursing students on how to master the rudiments of sign language as demonstrated in the *Sichon*. “If we do this, then the next generation of health-care givers will be better able to serve the deaf community and take them out of their isolation.

“For deaf people, the problem is not only lack of hearing,” concludes Baruchi, “It’s about the difficulty of communicating with others.”

Carolina Tannenbaum-Baruchi



students making a difference

For the Good of Society

Growing up in the Negev town of Rahat, Osama Abuganem always noticed the social workers.

“People would talk about them, sometimes good things, sometimes bad, but they were always important,” the 22-year-old second year student in the Charlotte B. and Jack J. Spitzer Department of Social Work says.

“My worry is about the Bedouin in the Negev. There are houses without water and electricity. That is my priority. I am studying social work so I can go back and help the people I love in the city that I love,” he continues.

Abuganem was born in an unrecognized village near the Nevatim air force base, the eighth child of eleven. When he was two, his parents moved to Rahat, where his father is a private minibus driver and his mother takes care of the family at home.

It wasn’t until he transferred to a kibbutz school in 7th grade, that he was diagnosed with learning disabilities. “If I had stayed in the Arab school system, I’m not sure where I would have ended up,” he says.

While his father left school at age eight to begin working, education and service were clearly high priorities in the Abuganem household. Abuganem’s siblings have grown up to be policemen, paramedics, medical students and engineers with the Agriculture Ministry.

Abuganem has been able to take his exams orally and has maintained an excellent academic record in high school and at BGU. He did a year of national service after high school working with AJECC: Arab-Jewish Center for Equality, Empowerment and Cooperation and continues to volunteer there as a student of social work.

Abuganem describes his year of national service: “It’s called the year for the community, and there are nine volunteers from the Scouts Movement, and nine Arabs after 12th grade. Three days a week we

volunteered in schools in unrecognized villages. We taught math and Hebrew one day in the schools in Beer-Sheva, and one day we spent focusing on Palestinian-Israeli cultural and political issues such as seeing the holy places and the separation barrier,” he explains.

Abuganem originally planned to attend the Tel Hai College, which has a good program about learning disabilities. However, it was too expensive for his family. Ultimately, the Tel Hai administration turned to BGU on Abuganem’s behalf.

“They wrote a letter and the next thing I knew, I was accepted at BGU,” he says. He receives financial assistance from the Office of the Dean of Students as well as assistance from Jamal al-Kirnawi, the liaison to Arabic-speaking students.

Abuganem is active in BGU’s Student Union. He represented Israel at the Mediterranean Youth Meeting “Me-You-Me” in Italy, where representatives from Europe and the Arab world came to discuss a better future.

Speaking alongside a Palestinian from Gaza, Abuganem told the delegates about his life.

“I told them that my situation in Israel is much better than an Arab in an Arab country, although I don’t know what the Arab Spring will bring,” he says.

Closer to home, he recently organized an event to paint elderly people’s houses in Beer-Sheva. During the nationwide annual “Good Deeds Day,” he and another social work student organized volunteers to paint 12 houses in two neighborhoods.

Rising above his disabilities, Abuganem is determined to go back to Rahat and make life better for his family, his neighborhood and his city, and plans to make the next generation speak of social workers solely in glowing and reverential terms.

Osama Abuganem

Dr. Ephraim Shoham-Steiner



It's No Marginal Matter

All religious groups, ethnicities and tribes have members who live on the periphery, and the Jews are no exception. While historians have written volumes about major institutions in Jewish life like the synagogue, marriage and family, the margins of society are an understudied area. This is precisely what drew medieval social historian Dr. Ephraim (Effie) Shoham-Steiner to his subject.

"There were historians who did research on the periphery of life among majority groups, and I started to think: but what about those living on the margins of Jewish life?" says Shoham-Steiner, former incumbent of the Norbert Blechner and Friends Career Development Chair in East European Jewish Culture. His book, *Involuntary Marginals: Marginal Individuals in Medieval European Jewish Society* (Zalman Shazar Center for Jewish History, Jerusalem 2008, in Hebrew), explores the lives of those whose mental or physical disabilities placed them on the margins of society.

"There has always been diversity," he continues. "And in the Jewish community, like all groups, every element of society existed. It's time we looked at our past with open eyes. By examining the margins of society we gain an understanding of the cohesive forces within a given society and we may challenge existing myths and misconceptions concerning these forces." Social history deals with the history of ordinary people and their strategies of coping with life. In researching the Middle Ages, the social historian obviously cannot conduct field interviews, and must extract social data from other sources. Luckily for Shoham-Steiner, Jews have produced an extensive body of written material over the years.

Shoham-Steiner's "lab" is in the National Library in Jerusalem. David Ben-Gurion came up with the idea that the library should have a copy of every existing Jewish manuscript. From this huge collection, Shoham-Steiner relies largely on medieval *Responsa* literature, which consists of the answers of Jewish legal officials

or rabbis to questions about legal cases. These records are very revealing, he notes, as they provide a detailed record of what happened.

Shoham-Steiner is an observant Jew with a solid background in Jewish sources and studies. Upon completing his Ph.D. at the Hebrew University of Jerusalem, he received a Kreitman Post-Doctoral Fellowship at BGU. He then traveled with his family to Boston for a post-doc at Harvard as a Fulbright Fellow before returning to BGU's Department of Jewish History.

"In my research, I put my forte to work," says Shoham-Steiner. "This kind of work is easier for a person with a broad background knowledge in Talmudic studies. This can be like a secret language or code in which the real meaning is lost on the uninitiated. These writings have more than meets the eye. My most important task is to train my students to be sensitive to these intricacies and 'decipher' the texts so that they tell us a more nuanced story."

In reconstructing history from medieval sources, Shoham-Steiner sees repeated patterns. He has found that the authorities were often creative, humane and flexible in their judgments.

"One amazing *Responsa* dealt with an inheritance case involving a man with leprosy," he recalls. "One of the potential inheritors in an affluent family was a leper. The Talmud states that a leper is 'as good as dead,' and the family thought they could easily exclude their ill brother from the inheritance, leaving more for the other siblings. The legal authority before whom the matter was presented said 'no way' – leaving out this man would be inhumane and improper."

Another such example comes from Shoham-Steiner's current project, a book on Jewish criminality in the Middle Ages. The researcher found no direct references to prostitution in the *Responsa* literature, but did come upon a related case. Here, a 14th century Italian rabbi deviated from the Talmudic law to permit a Jewish single mother who was still nursing her baby to marry, thus preventing her descent to prostitution. The woman had



By examining the margins of society we gain a more nuanced understanding of the cohesive forces within a given society

been trafficked from Germany under the false pretenses of a job with an Italian family. She had "fallen," gotten pregnant and had her child alone, without the support of family or community. The Italian rabbi ruled that if he did not allow her to marry, she would be forced to sell herself.

In the case of divorce, Jewish law could facilitate a divorce only with the consent of both spouses. By the 16th century, legal authorities had come up with an original solution: the husband could remarry but he had to provide for the upkeep of his spouse. This solution has been used ever since.

In his book about the medieval Jewish underworld, Shoham-Steiner came upon numerous unexpected twists and turns, including one incident of rather unorthodox interfaith cooperation. In the 11th century in Mainz, Germany, Jewish legal authorities were consulted in a case in which two businessmen, one Jewish, one Christian, maintained a ring of thieves that would steal goods for resale.

In researching this book, Shoham-Steiner relies mostly on legal sources, an interest he shares with his wife, a ninth-generation Jerusalemite and criminal prosecutor in the Israeli capital. "Yes, we spend a lot of time talking shop at home," offers the researcher. Aside from discussing the nuances of medieval Jewish law, the Shoham-Steiners have their hands full, caring for their five sons.

"I love the University, I love teaching and I love my students," states Shoham-Steiner. And his full classes, attended by Jewish – both religious and secular – Arab, and Bedouin students, mirror his commitment, his professional expertise and the diversity of Israeli society. ●

in the gallery

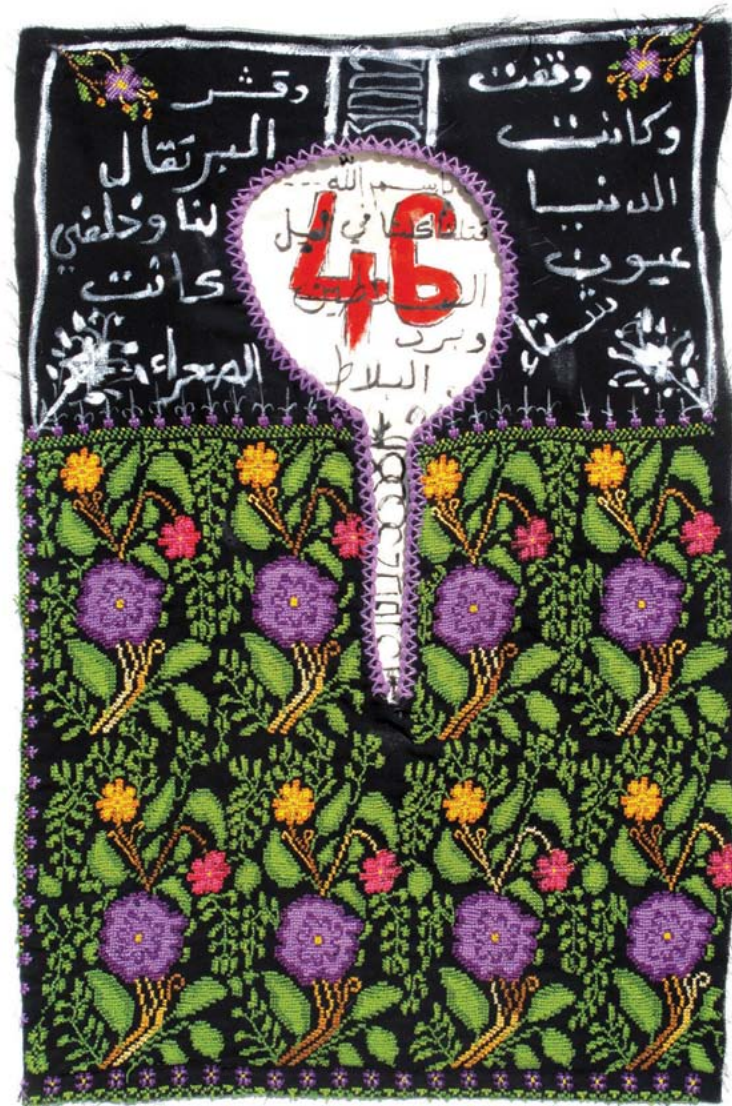
Portraits of Cain

Representations of Others in Israeli Contemporary Art

The exhibition, curated by Prof. Haim Maor and students in the Curatorship Course of the Department of the Arts, featured some 100 works – videos, photos, paintings, prints and sculpture by 28 Israeli artists, past and present. It explored how the artists related to the concept of the “Mark of Cain” (stigma) and broader contexts. The concept was examined with regard to representations both as the aggressor and as the victim in art and in the contemporary media.

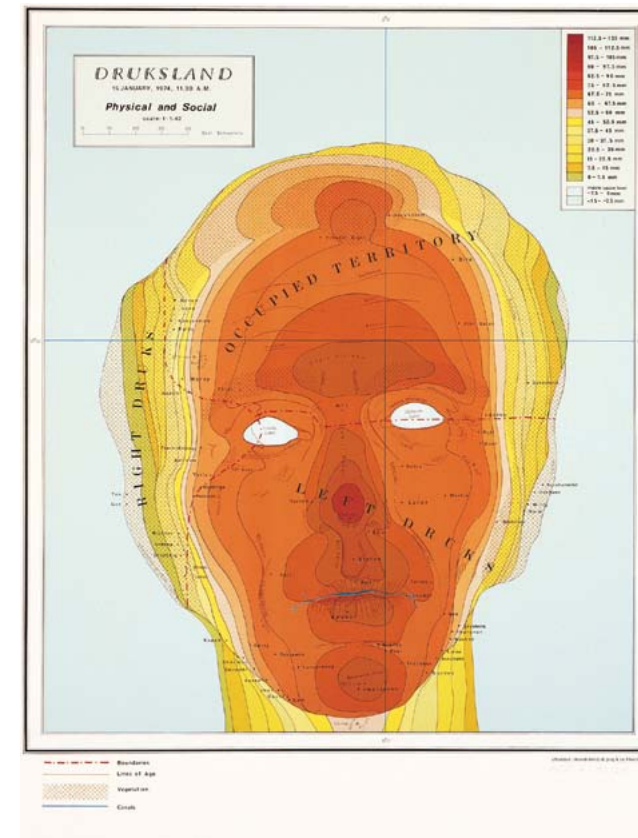
As a concept, the Mark of Cain is the archetypal mark of disgrace or shame stamped or inscribed on one’s forearm, forehead, back of the neck, chest, or back or attached to body parts or clothes of the marked Other. The current interest in the biblical story and its exegeses is by no means accidental. It is contingent on and responds to universal and Israeli social, political, religious and legal conditions. Thinkers, researchers and artists look at the Others and react to society’s various modes of marking people, animals and even objects. The act of marking is a preliminary means of excluding, ostracizing, banning, humiliation and also expelling and eliminating the marked Others.

A partial list of the artists includes: Eyal Adler Kelner, Vered Aharonovitch, Gaston Zvi Itzkovitz, Micha Bar Am, Paul Goldman, Ken Goldman, Michael Druks, Khader Oshah, David Tartakover, Nurit Yarden, Erez Israeli, Vardi Kahana, Sarah Katz, Boaz Lanir, Liav Mizrachi, Motti Mizrachi, Natan Nuchi, Adi Nes, Michael Segen Cohen, Asad Azi, Miki Kratsman, Micha Kirshner, Arnon Rabin, Haya Ran-Gertz.

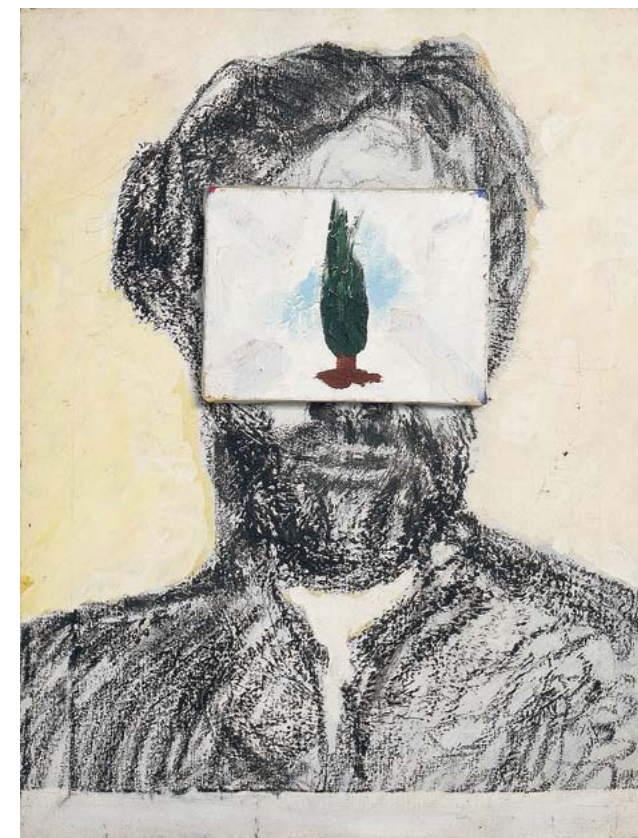


Khader Oshah, **46** (from **Hagar Series**), 2008
Embroidered ready-made fabric, lamb skin, colored ink, 82.5x57.5
Artist’s collection (dress from the Hebron area, inscriptions in Arabic: outer part – extract from a poem by Mahmoud Darwish; inner part – extract from “Eastern Gate” by Nidaa Huri)

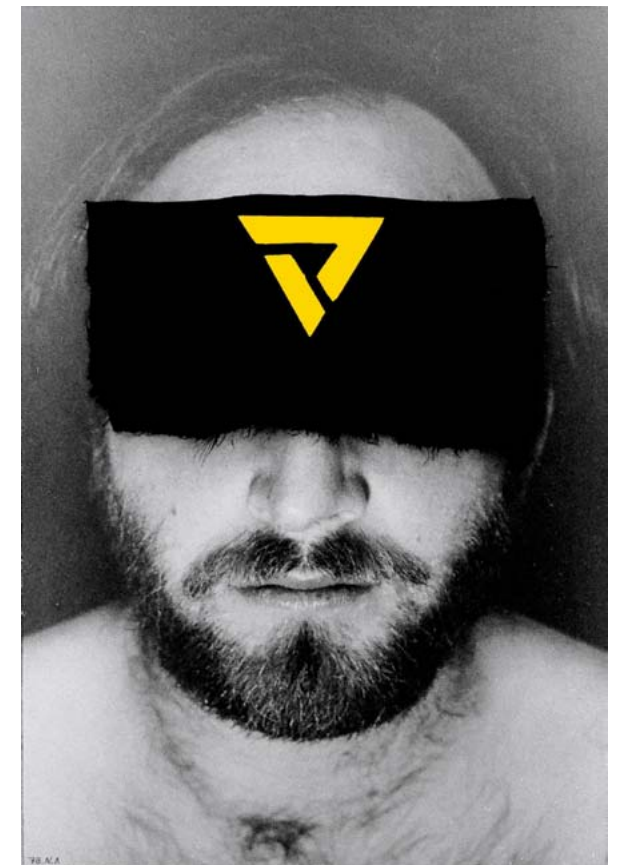
Adi Nes, **Untitled (Abel)**, 2004
Color photograph, 140x140
Sommer Contemporary Art, Tel Aviv



Michael Druks, **Druksland**, 1975
Offset print, 43x34, Gordon Gallery, Tel Aviv



Michael Sgan Cohen, **Spaces Self Portrait with Cypress**, 1980
Acrylic on canvas, 45x60, Artist’s family collection



Haim Maor, **The Mark of Cain**, 1978
Industrial paint, plywood and fabric on gelatin silver print mounted on plywood, 59x40
Private collection, Herzliya



Vardi Kahana, **Three Sisters**, 1992
Lambda print, 73x73, Arni Druck’s collection



Dr. Louisa Meshi

Solving New Structures

T imagine being able to observe a detail as tiny as a single column of atoms, even smaller than the smallest object that can be seen in a light microscope. The window into analyzing that nano-sized world uses a special technique called Transmission Electron Microscopy (TEM).

Dr. Louisa Meshi from the Department of Materials Engineering and the Ilse Katz Institute for Nanoscale Science and Technology has been using TEM to understand the structure of inorganic, crystalline materials. Her electron crystallography lab is among the few in the world that have succeeded in solving the atomic structure of complex intermetallic compounds by using only electron diffraction in TEM.

Meshi is quick to explain that TEM is not a new technology in and of itself. She is simply using it differently, the result of combining several techniques. “Using TEM you can get a complete analysis of nano-sized particles: their composition, crystal structure and image at the level of atomic resolution.”

Scientists once believed it impossible to employ electron diffraction in TEM, that is, observing what happens when an electron wave encounters an obstacle, such as an atom, in order to study the atomic structure of new materials.

Meshi’s major contribution to the field – for which she has won several prizes – is the use of TEM in general and precession electron diffraction in particular, for the structural solution of intermetallic phases (compounds with two or more metals).

“Many researchers tried to test this, but nobody was able to use this technique to solve the structure of intermetallic materials by using only novel electron diffraction techniques,” she explains.

Meshi’s group, which is made up of graduate students in materials engineering, managed to solve the problem. “We took unknown aluminum-based intermetallic compounds and solved their structure. We are the only lab in the world that has succeeded in doing this, using solely this particular method to analyze the structure of alluminides. This is the advance that we contributed to the science.”

A chief practical application of this technique is the ability to analyze the properties of new materials. “A new compound won’t appear in any database; you

have to analyze the structure and see how the atoms sit inside this particular material. Then once you’ve understood its properties you can decide whether you want this particular compound inside your alloy or to eliminate it.”

Some of Meshi’s students are currently working on the characterization of structural defects, while others are employing electron crystallography techniques in TEM under cryogenic (frozen) conditions.

Meshi came to Israel with her family from the Ukraine at the age of 13. When she began her studies at BGU she decided almost immediately that the field of crystallography was for her.

“Everything I do in my life is the result of love at first sight,” she declares, “just like my husband whom I met when I was 16 and married at 18.” The very first lecture she attended was an introduction to materials science given by (now Emeritus) Prof. Michael Talianker, who was explaining the science of crystallography – describing how atoms relate to each other. “I told my friend who was sitting with me at the lecture that this is what I’m going to study and I’m going to do my project with Talianker.” Her prediction was correct. She would eventually do her doctoral thesis on this subject with Talianker, who became her mentor.

Earlier this year, Meshi was awarded the prestigious Wolf Foundation’s Krill Prize for Excellence in Scientific Research. She also won the Wolf Prize for Excellence in Doctoral Research in 2003, as well as a Rich Foundation Grant for the Advancement of Women in the Academy. Her current research is funded in part with grants from the Council for Higher Education – a joint research project with the Nuclear Research Center; the Israel Science Foundation and the German-Israeli Foundation.

Meshi is an active member of several professional committees, including the Israeli Society for Microscopy. She is also very involved in European organizations, especially the International Union of Crystallography and the European Crystallographic Association, as well as in setting up and directing international electron crystallography schools abroad. ●



A new compound won’t appear in any database; you have to analyze the structure and see how the atoms sit inside this particular material



Drop by Drop

Maximizing water use to grow plentiful amounts of food in arid lands has long been a key focus of research and innovation



ne of the planet's most challenging problems is how to grow more crops from fewer resources. With climate change and increased droughts in many areas, the problem of producing food in arid lands grows ever critical in the world today.

"There are seven billion people on the globe today and, in a worse-case scenario, there could be nine billion in 2050, and we have to keep up with growing population and produce more food," hazards Dr. Naftali Lazarovitch, a specialist in irrigation at the French Associates Institute for Agriculture and Biotechnology of Drylands, part of the Jacob Blaustein Institutes for Desert Research at the Sede Boquer campus.

"Diets are changing; we want to improve the quality of the food as well, with a greater variety, which is more nutritious. And all this will have to be done with fewer and fewer resources, less soil and less water available for irrigation."

Irrigation of crops in this region has, of course, been around for a long time, Lazarovitch points out. "Though today we have better methods and devices, maximizing water use to grow plentiful amounts of food in arid lands has long been a key focus of research and innovation for BGU. What we're doing now is constantly improving the efficiency of this system, so that with the same amount of already very limited supplies of water and fertilizers we can produce more."

Using stunning technological advances, researchers and farmers have created a successful network of agriculture in the midst of harsh desert conditions in the Arava, producing with an extremely limited supply of water mouth-watering vegetables and fruit that have captured global markets.

One has only to see and taste the colorful array of juicy and delicious bell peppers to understand why. The peppers are grown in an unlikely soil-less culture made of a mixture of gravel, coconut powder and volcanic ash material.

To accomplish this, Lazarovitch and his colleagues have developed a hi-tech system with sensors that constantly monitor the plants to make sure their needs are met. He carries out much of his experimentation at the Zohar Research Station near the Dead Sea, where there are hundreds of acres of greenhouses covered in plastic sheets rendering them virtually sterile zones. In addition to the giant bell pepper, fat red tomatoes, cantaloupes and sweet basil are cultivated in the



Dr. Naftali Lazarovitch

greenhouses. "Our goal," he says, "is to make more crops with less drops."

The crops are irrigated with pipes that dispense water one drop at a time. If it is saline water, the situation particular to the Arava and Negev desert, this means more water is needed to flush out salts that accumulate in the soil, which at a certain level become harmful for the plants. On the other hand, these salts are transported below the root zone together with other agrochemicals and might contaminate the groundwater. "The problem can be dealt with by employing different drip irrigation regimes, such as high frequency irrigation, even 50 times a day, and thereby increase the efficiency of the system."

The multidisciplinary nature of irrigation science requires collaboration in various fields. Lazarovitch is currently collaborating with researchers from institutes in Israel and abroad, including Prof. Uri Shani from the Hebrew University of Jerusalem, Dr. Alon Ben-Gal from the Volcani Institute – Agricultural Research Organization and Prof. Jirka Simunek from UC Riverside. Together they tackle some of the complex issues regarding water flow and solute transport in the root zone of irrigated fields. "Collaboration and partnership between researchers and institutes is giving us superior conditions when approaching complex systems," he explains.

Lazarovitch, who received the Division S-1 Early Career Award of the Soil Science Society of America and the University's Toronto Prize for Excellence in Research, is the co-incumbent of the Gerda Frieberg Career Development Chair in Agricultural Water Management. He has published his work in more than 25 professional journals and over 60 papers at conferences and meetings.

He lives with his wife Keren and their four daughters in Sede Boquer, adjacent to the BIDR campus. "You need to like the desert in order to live here," he says.

In addition to his research projects, Lazarovitch teaches several graduate courses at the Albert Katz International School for Desert Studies, which just introduced a new program for irrigation and plant environment. "The students here create an added dynamic," he says. "They come from all over the world, and they're a very big part of our work here. They really help push us forward." ●



A Journey to the Desert



r. Idit Liberty is the product of a modern Jewish journey. Today she lives in Yerucham, one of the most distant Negev “development towns” with her husband, Uri, and their four children. She is a teaching coordinator in internal medicine specializing in diabetes control in BGU’s Faculty of Health Sciences and is a senior physician in the Department of Internal Medicine at the Soroka University Medical Center.

She was born in Jerusalem a year after her parents made *aliya* from the United States. Their respective journeys had taken them to Chicago and New York, beginning for Liberty’s mother when her family fled Eastern Europe, and for her father when his family fled Germany after Kristallnacht.

Liberty left Jerusalem with a Bnei Akiva group from her high school graduating class to combine

army service with volunteer work in Yerucham. “This was in 1983, and the town had serious socioeconomic problems,” Liberty recalls. “Our idea was to become part of the permanent population, to work and put down roots there. A lot of people from our volunteer group stayed – I met my husband in the group. After the army I was accepted to medical school at BGU and Uri studied behavioral science there.”

Now, 30 years later, Yerucham has doubled in population, to close to 10,000 people. “I believe my kids are getting a very good education and did not miss out on anything by living in the periphery. On the contrary, they are exposed to complexity and this actually elevates their level of understanding. It’s not that I feel so much like I’m doing a great mitzvah by being here – I simply enjoy living here very much. It’s a great place, small and very friendly,” Liberty says. “My mother once went up to the mayor and told him her grandchildren were getting a better education in Yerucham than her own children got in Jerusalem.”

The work Liberty does, however, qualifies without doubt as a great mitzvah. Her focus is on prevention of complications from diabetes among hospitalized patients. Diabetes, Liberty notes, is one of the most widespread, debilitating diseases of modern times – a disease that has been exacerbated greatly by the conditions of modernity.

“We’re seeing more and more patients admitted with diabetes. In the Negev we see it particularly with the Bedouins and Ethiopians. This is most likely because they’re the poorest population groups, so they’re eating cheaper, starchier food and fewer salads and vegetables. Also, the Bedouins have changed their life style. They’re not working the fields so much. You don’t see many Bedouin women out working or involved in sports. It’s part of a worldwide trend that’s driven by a sedentary lifestyle and fast food, which leads to obesity and diabetes. We see it acutely here in the Negev because of the degree of dire poverty.”

When she started out in medical school, Liberty wasn’t thinking about diabetes, but about becoming a cardiologist. A stint in the cardio intensive care unit changed her thinking. “What I decided is that I wanted to do something that might prevent people from landing up in the ICU. I started to look at all the risk factors that lead to heart disease with an eye toward treating them, and diabetes just seemed like a natural avenue. People with diabetes usually have other risk factors related to



Dr. Idit Liberty

“Our idea was to become part of the permanent population, to work and put down roots there”

heart disease, such as obesity, hypertension and high cholesterol, and this is what got me enthusiastic about diabetes prevention.”

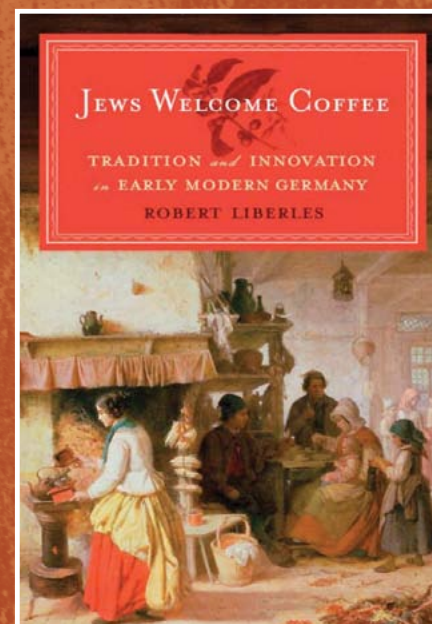
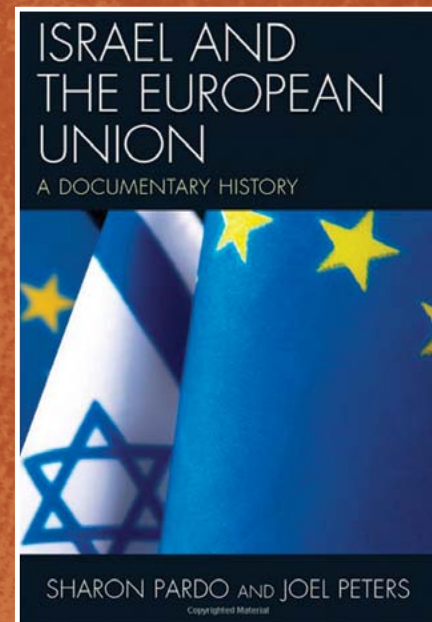
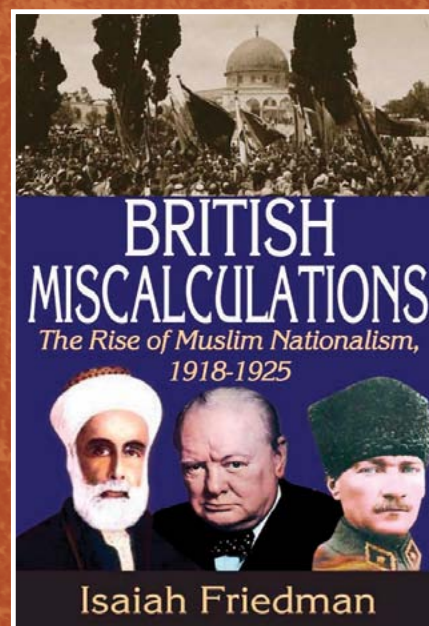
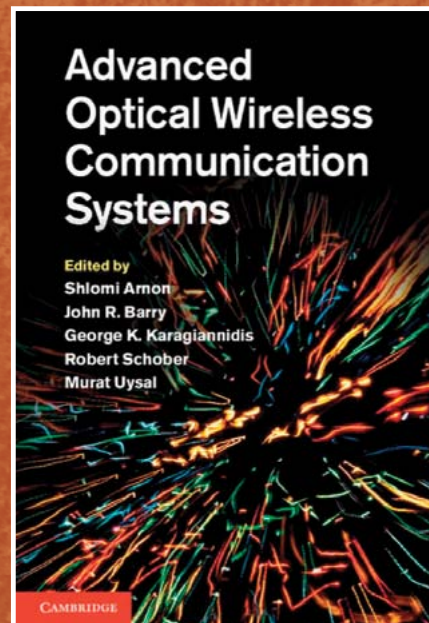
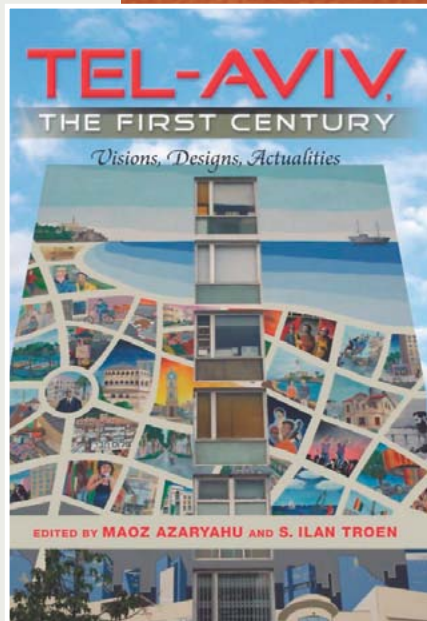
Between 2003 and 2005 she did a fellowship at the University of Southern California, Los Angeles, working with Prof. Richard Bergman, who was investigating the issue of insulin resistance. “My involvement was in the impact of AIDS drugs in the development of insulin resistance and diabetes,” she says. “I was also a partner in research on the physiology of a hormone called GLP-1, which is considered very important in the physiology of sugars in the body.”

Liberty has received a number of prizes and research grants for her work, including the Menachem Ronen Award for excellence in residency at Soroka, and the Aventis Metabolism Scholar Award in Carmel, California, for a research paper she published. She has recently received a grant from Clalit Health Services to support a research project at the Soroka University Medical Center, which involves collecting data from thousands of patients to try and predict their chances of developing severe complications during their hospital stay and thereafter.

“We’re trying to determine who are the patients at greater risk and how we can identify them before those risks become actualized,” says Liberty. “If we know the predictors for high-risk patients, then every time someone is hospitalized we can figure out if he’s likely to be in danger of developing complications related to high blood sugar and then we can be more aggressive in preventative treatments.”

She says she has no plans to leave Yerucham, the Negev, Ben-Gurion University or Soroka; wherever else she may find herself, it would be temporary. Her Jewish journey has taken her to the desert, and for Liberty and family, this is home. ●

On the Bookshelf



Israel and the European Union: A Documentary History

Sharon Pardo and Joel Peters

Lexington Books, 2012

Israel's relations with the European Union stretch back to the early days of the European Community and the signing of the Treaty of Rome in 1957. From that point onward, Israel and Europe have developed an increasingly strong network of political, economic, scientific and cultural ties. These relations have, however, consisted of a number of conflicting trends. Even while the EU has become Israel's most important trading partner, the political relationship has been marked by disappointment, frustration, and, at times, even anger. Prof. Sharon Pardo from the Department of Politics and Government and Prof. Joel Peters from Virginia Tech, trace the history of these complex relations by bringing together over two hundred documents in one volume. The documents contained in this book are divided into five time periods: i) 1957–1966, Israel Looks to Europe; ii) 1967–1979, Between War and Peace; iii) 1980–1991, From Venice to Madrid; iv) 1992–2003, From Oslo to Barcelona; and v) 2004–2011, A Renaissance Cut Short? Each section is preceded by a short essay outlining the major themes of Israeli-European Relations during those years. The authors have not added any commentary to the documents themselves and instead have allowed the documents to speak for themselves.

Advanced Optical Wireless Communication Systems

Shlomi Arnon, John R. Barry, George K. Karagiannidis, Robert Schober and Murat Uysal (eds.)

Cambridge University Press, 2012

Optical wireless communications is a dynamic area of research and development. Combining fundamental theory with a broad overview, this book, co-edited by Prof. Shlomi Arnon from the Department of Electrical and Computer Engineering, is an ideal reference for anyone working in the field, as well as a valuable guide for self-study. It begins by describing important issues in optical wireless theory, including coding and modulation techniques for optical wireless, wireless optical CDMA communication systems, equalization and Markov chains in cloud channels and optical MIMO systems, as well as explaining key issues

in information theory for optical wireless channels. The next section describes unique channels that could be found in optical wireless applications, such as NLOS UV atmospheric scattering channels, underwater communication links and a combination of hybrid RF/optical wireless systems. The final section describes applications of optical wireless technology, such as quantum encryption, visible light communication, IR links and sensor networks, with step-by-step guidelines to help reduce design time and cost.

British Miscalculations: The Rise of Muslim Nationalism, 1918-1925

Isaiah Friedman

Transaction Publishers, 2012

In the aftermath of World War I there was furious agitation throughout Islam against the dismemberment of the Ottoman Empire. Coupled with the powerful effect of the principle of self-determination, British indifference to Muslim sentiments gave rise to militant nationalism in Islam – which became *de facto* anti-Western. This detailed account by the late Prof. Emeritus of the Department of General History Isaiah Friedman describes British indecisiveness, policy contradictions, and how militant nationalism was aggravated by the Greek invasion of Smyrna and its ambition to create a Hellenic Empire in Anatolia with Britain's connivance. Immediately after World War I there was a fair chance of mutual coexistence and good relations between Arabs and Jews in Palestine. But this possibility was nipped in the bud by the military administration (1918-1920) responsible for the anti-Jewish riots in Jerusalem in April 1920. High Commissioner Herbert Samuel's misguided support for the Arab extremists complicated the situation further. The appointment of Hajj Amin al-Husseini to the exalted post of Grand Mufti of Jerusalem and subsequently to the presidency of the Supreme Muslim Council of the Palestinians, proved fatal to Arab-Jewish relations and to the possibility of peace. As the book shows, the British administration of Palestine bears a considerable share of responsibility for the Arab-Zionist conflict in Palestine. Against this diplomatic background Arab-Jewish hostilities thrived, with consequences that endure today.

Jews Welcome Coffee: Tradition and Innovation in Early Modern Germany

Robert Liberles

Brandeis University Press, 2012

Tracing the introduction of coffee into Europe in the sixteenth and early seventeenth centuries, this book, by the late Prof. Robert Liberles from the Department of Jewish History, challenges long-held assumptions about early modern Jewish history and shows how the Jews harnessed an innovation that enriched their personal, religious, social and economic lives. Based on hitherto unused archival data, Liberles focuses on Jewish society in Germany in the seventeenth and eighteenth centuries, and – using coffee as a key to understanding social change – he analyzes German rabbinic rulings on coffee, Jewish consumption patterns, the commercial importance of coffee for various social strata, differences based on gender, and the efforts of the German authorities to restrict Jewish trade in coffee, as well as the integration of Jews into society.

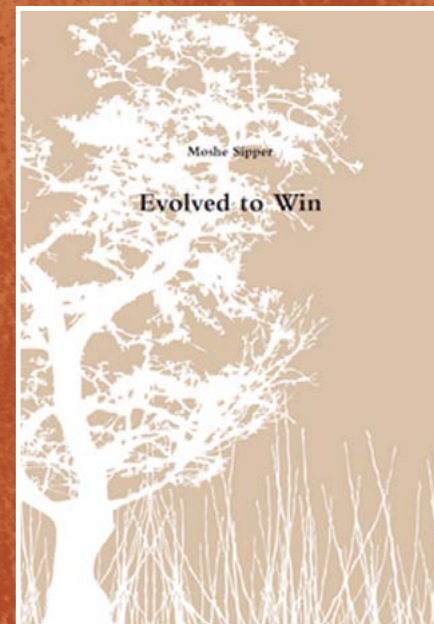
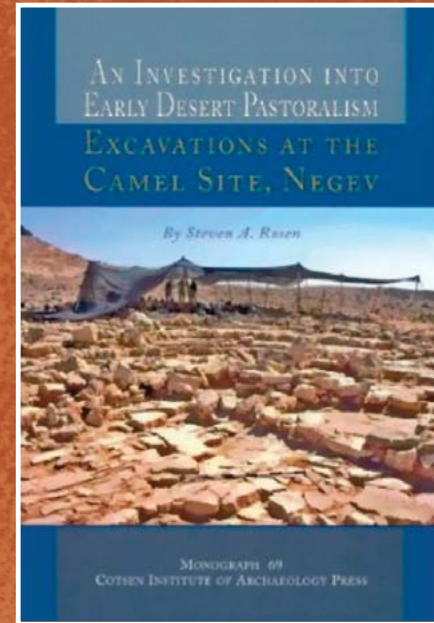
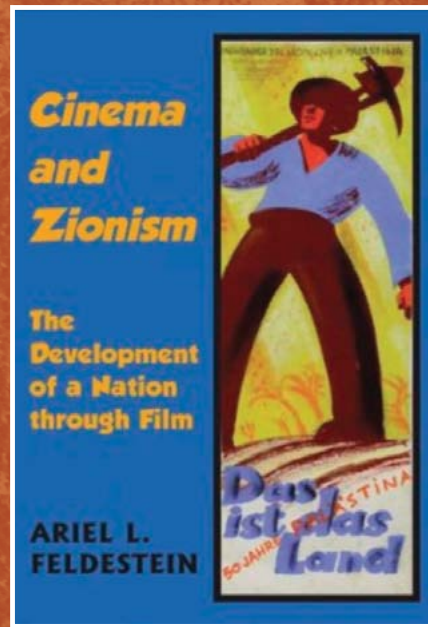
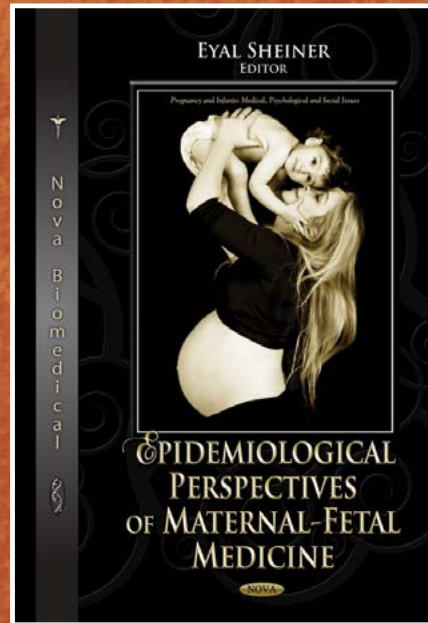
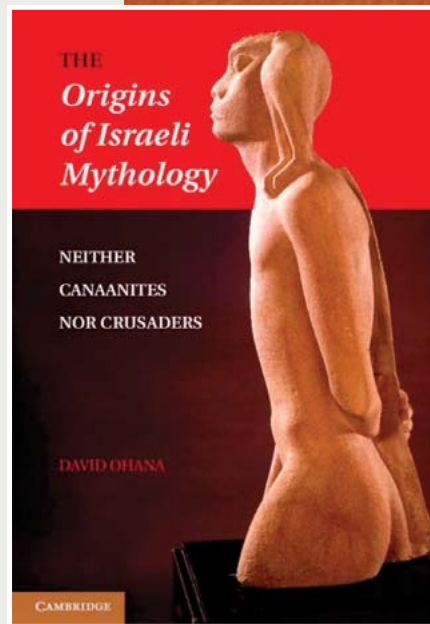
Tel Aviv: The First Century: Visions, Designs, Actualities

Maoz Azaryahu and S. Ilan Troen (eds.)

Indiana University Press, 2011

Prof. Emeritus Ilan Troen from the Department of Jewish History and Prof. Maoz Azaryahu from the University of Haifa are editors of a book that brings together a broad range of disciplinary approaches and cutting-edge research to trace the development and paradoxes of Tel Aviv as an urban center and a national symbol. Through the lenses of history, literature, urban planning, gender studies, architecture, art and other fields, these essays reveal the place of Tel Aviv in the life and imagination of its diverse inhabitants. The careful and insightful tracing of the development of the city's urban landscape, the relationship of its varied architecture to its competing social cultures, and its evolving place in Israel's literary imagination come together to offer a vivid and complex picture of Tel Aviv as a microcosm of Israeli life and a vibrant modern global city.

On the Bookshelf



The Origins of Israeli Mythology: Neither Canaanites Nor Crusaders

David Ohana

Cambridge University Press, 2012

In this book, Prof. David Ohana from the Department of Jewish History examines the intellectual archaeology of Israeli mythology as it reveals itself through the Canaanite and crusader narratives. He proposes that Zionism as a meta-narrative has been formed through contradiction of these two alternative models. These narratives are the most daring and heretical assaults on Israeli-Jewish identity, which is intrinsically connected to Zionism. The Israelis, according to the Canaanite narrative, are from this place and belong only here; according to the crusader narrative, they are from another place and belong there. On the one hand, the mythological construction of Zionism as a modern crusade describes Israel as a Western colonial enterprise planted in the heart of the East and alien to the area, its logic, and its peoples, whose end must be degeneration and defeat. On the other hand, the nativist construction of Israel as neo-Canaanism, which defined the nation in purely geographical terms as an imagined native community, demands breaking away from the chain of historical continuity. Those are the two greatest anxieties that Zionism and Israel need to encounter and answer forcefully.

Epidemiological Perspectives of Maternal-Fetal Medicine

Eyal Sheiner (ed.)

Gazelle Distribution, 2011

This book, edited by Prof. Eyal Sheiner from the Faculty of Health Sciences and professor of Obstetrics and Gynecology at the Soroka University Medical Center, was written to satisfy the rising need for epidemiology-oriented clinicians. It focuses on essential aspects of perinatal medicine and gives the epidemiological perspectives on maternal and fetal morbidities in addition to peripartum and neonatal complications. Chapters discuss epidemiology of diabetes mellitus during pregnancy, hypertensive disorders, ectopic pregnancy, preterm delivery, placental problems, the epidemiology of obesity during pregnancy, intra-uterine growth restriction and maternal and perinatal mortality. Written by

international experts, this guide draws on evidence-based data in perinatal medicine and is a valuable resource for a broad spectrum of clinicians and healthcare professionals dealing with perinatal medicine. Medical and nursing students, as well as residents in obstetrics and pediatrics, may largely benefit from this book at various stages of their training.

Evolved to Win

Moshe Sipper

lulu.com, 2011

Recent years have seen a sharp increase in the application of evolutionary computation techniques within the domain of games. Situated at the forefront of this research, Prof. Moshe Sipper from the Department of Computer Sciences and his group have produced a plethora of award-winning results in numerous games of diverse natures, evidencing the success and efficiency of evolutionary algorithms in general, and genetic programming in particular. They specialize in producing top-notch, human-competitive game strategies. From classic chess and checkers, through simulated car racing and virtual warfare, to mind-bending puzzles, this book serves both as a tour de force of the research landscape and as a guide to the application of evolutionary computation within the domain of games.

An Investigation into Early Desert Pastoralism: Excavation at the Camel Site, Negev

Steven A. Rosen

Cotsen Institute of Archeology Press, 2011

Prof. Steven Rosen from the Department of Bible, Archeology and Ancient Near Eastern Studies and incumbent of the Canada Chair in Near Eastern Archeology focuses on two primary purposes, one theoretical/methodological and the second substantive. His book comprises a case study of excavations at an early (ca. 2800 B.C.E.) pastoral site in the Negev, providing detailed analyses and a synthetic overview of a seasonal encampment from this early period in the evolution of desert pastoral societies. It thus both demonstrates the feasibility of an archeology of early mobile pastoralism and grapples with the basic anthropological and methodological issues surrounding the subject.

Substantively, both the architectural and material culture assemblages uncovered constitute the first detailed analysis of this early desert culture and include materials previously unreported for the region and period. Historically, the Camel Site is placed in the larger perspective of the beginnings of multi-resource nomadism in relation to the rise of complex societies.

Cinema and Zionism: The Development of a Nation through Film

Ariel L. Feldestein

Vallentine Mitchell, 2012

This book by Prof. Ariel Feldestein, currently the University's Academic Secretary, is concerned with the history of the Jewish people returning to its homeland, as it was depicted on celluloid. It examines the connections between the cinema of the Yishuv (Ottoman and Mandatory Palestine) and the Zionist idea. The period explored here extends from the British occupation of Eretz Israel in 1917 during World War I, to the beginning of World War II in September 1939. The author follows the plans to create the figure of the New Jew in Eretz Yisrael and explores the figure and traits of the pioneer. He also examines how cinema has presented the Zionist idea, analyzing the plots, modes of expression, themes and ideological elements that typify these films, and positions them within the structure of the time. The book explores the connection between Zionism and movies through a discussion of the cinematic endeavors and the relationships between the filmmakers and national institutions. The correlation between the two histories is revealed with all its complexity and depth. It sheds light on a distinctive perspective in the narrative of Eretz Yisrael – that of the creation and consumption of a new culture. The stories about how the films were produced, and their ultimate reception, are interwoven with outlines of the films themselves. Together, they create a portrait of an ideological society that distilled events and incidents into myths aimed at forging the Zionist outlook and instructing pioneers toward fulfilling its goals.

A Model for Global

Leadership



“It is very hard to lead people from your own nationality, but it is much more complicated to lead people from other countries”



It may seem an anomaly that Dr. Alon Lisak from the Department of Management in the Guilford Glazer Faculty of Business and Management, whose expertise is leadership, grew up on a kibbutz, the symbol of egalitarianism. But for Lisak, who emigrated with his family from Buenos Aires when he was six and grew up on Kibbutz Matzuva near the border with Lebanon, his upbringing and his chosen field only complement one another.

“I had a very fortunate, interesting childhood,” says Lisak, 38, who lives with his wife, Tal, and their three children in Karkur, near Hadera. “I learned a lot from growing up on a kibbutz. It’s very demanding, you go to work very early, you live mainly with your peers, you work with other people, sharing, and you take on a lot of responsibilities. When I was going to college, I picked apples to pay for my tuition. Hard work, team work and responsibility are values that leaders have to have and have to inspire in their employees,” he continues.

“What’s widely considered the leadership model today is the charismatic or transformational leader – someone who can inspire his followers to perform beyond their expectations. These leaders are conducting a very deep psychological process with their employees – they inspire them, they give them a lot of individual consideration, they can articulate a very clear goal, at some levels of leadership even a vision, in a way that their followers can be connected to it,” Lisak says.

One of his two main areas of research is multicultural and global leadership – a field that couldn’t be more relevant in the real world today.

“It is very hard to lead people from your own nationality, and even more complicated to lead people from other countries and cultures,” Lisak continues, explaining some of the differences between American and Israeli leaders and American and Israeli “followers.”

“The respect that American followers give to their leaders is much greater than that which Israeli followers give to their leaders. Israeli employees think it is their duty to argue if they don’t think the leader is correct; they will ask the leader why, and most of the time the leader has to convince them that this is the right way to do it. Americans are much more polite and less direct. Where an Israeli would say, ‘I think you are wrong,’ the

American might say, ‘I’m not sure I understood, are you perhaps saying such and such,’ and will try to gently steer in a different direction,” says Lisak.

The challenge in global leadership, when the multi-cultural team may be made up of followers from a half-dozen countries, is how to find a common language. “Scholars in the last decade have been trying to understand the important values that a leader can impart in a global work environment. In my doctoral research at the Technion – Israel Institute of Technology on multicultural teams, we found that effective leadership in a global environment emphasized the value of openness to cultural diversity – seeing the diversity of the team as a great stimulus, an asset, an opportunity, a privilege, instead of as an obstacle to be overcome. Additionally, we found that an important value that a capable global leader can convey is a collective sense of global identity, that it’s an honor to be part of the unit, that everybody has something unique to offer and that part of what they bring are the strengths of the culture they come from. This is the leadership approach that can create a strong team identity among employees from different countries, languages or cultures.”



Dr. Alon Lisak

The other main direction in Lisak’s research is an exploration of what makes a good leader – the “leadership emergence” field. “Is there an equation for leadership? Can you predict the person who is likely to become a leader?” Lisak asks. While studying for his master’s degree at the University of Haifa, he was part of a team that researched this question in infantry basic training platoons in the Israeli army. They asked the recruits and their commanders who among them seemed to make the best leaders and who not. “Those who were picked as potential leaders were optimistic, they attributed success and failure to personal performance, not fate or luck, and they had a lower level of anxiety.” The team interviewed these people and found that their childhood was different from those of the non-leaders. “They were given more responsibility at school and there were very clear expectations of them from their families.”

A noted young leader himself, Lisak recently won a Dan David Prize for doctoral and post-doctoral research. “Not the \$1 million prize, but the \$15,000 prize,” he laughs.

A lecturer at BGU since 2011, Lisak says he likes the dynamic atmosphere of the campus. “There’s a lot of respect here between faculty members, people want to give you the tools to develop. In academic life, it’s not something that’s guaranteed. Here, I can focus on research and teaching.” ●



Dr. Golan Bel

The Way the Wind Blows

What does a physicist see when he looks at the wind? Or the roots of a tree, algae or sand dunes? “Overall, my goal is to understand nature in a better way than we do now,” explains physicist Dr. Golan Bel of the Swiss Institute for Dryland Environmental and Renewable Energy Research at the Jacob Blaustein Institutes for Desert Research in Sede Boqer. A specialist in stochastic (random) processes, Bel is now training his analytical skills in physics on processes relevant to the environment.

Recruited from the famous Los Alamos National Laboratory in New Mexico to Sede Boqer, Bel is the newest member of the Department, a highly unusual interdisciplinary research group. They approach environmental studies by integrating geography, meteorology, mechanical engineering, applied mathematics, chemistry and physics. Bel is involved in several projects dealing with the environment and natural phenomena in a rather novel way.

“Think about the wind over the ocean,” he suggests, “which can change its speed and direction very quickly.” This seems to be random, but, explains Bel, it’s possible to describe the statistics of the process to predict the effect of changing winds on ocean currents. “The current doesn’t respond immediately, but if pushed in the same direction for a long time, it will respond and move. The naïve assumption would be that the longer the correlation time – the time over which the wind stress remains the same – the larger the amplitude of the currents. In contrast, we found that due to the rotation of the earth there is some finite correlation time for which the maximal amplitude of the currents is obtained.”

Together with fellow physicist Prof. Yossi Ashkenazy, Bel devised a mathematical model that describes the dynamics of wind-driven open ocean currents, which can have significant practical applications for one source of green energy: underwater turbines that are driven by currents. “You need to know where the most powerful and stable currents are in order to position these turbines,” he says. “Our study will help to identify locations with potentially high sources of current and wind energy. This knowledge can also help plan any shoreline devices producing energy or marine ➡



Think about the wind over the ocean ... The current doesn’t respond immediately, but if pushed in the same direction for a long time, it will respond and move



All processes in nature are the same, subject to the same fundamental forces

constructions where the amplitude of the current is critical.”

Another weather-related project Bel is pursuing is adapting mathematical models from game theory to minimize uncertainties in predicting the climate. The weather is famously chaotic: a change in one part of the system produces complex effects in other places. One of the biggest problems in climate prediction is its uncertainty. What can game theory, already applied in economics and political science to describe how groups of people interact, tell us about the climate system? Bel hopes to apply forecasting methods from game theory to establish weighted ensembles of climate models, ideally reducing climate prediction uncertainties.

Desertification is one of the burning issues of our times, and one that is the focus of many pioneering practical and theoretical projects at the Blaustein Institutes. Bel has been analyzing the patterns of desertification which, he explains, occurs gradually, not necessarily abruptly, as previously thought.

It has long been understood that land cover doesn’t move from a uniformly vegetative stage to bare soil at once. In the intermediate stages there are some patterns of vegetation. But once you’ve reached the bare soil there is no way back. Previously, the transition from the patterned state of the vegetation to bare soil was considered to be a catastrophic regime shift. However, Bel and his colleagues found that the existence of stable localized states – in addition to the patterned states – may cause a gradual regime shift rather than a catastrophic one. This means that even if the process of desertification has begun, some preventative measures may be taken to try to reverse it.

The challenge, Bel says, is how to determine that an area is indeed approaching real desertification and not just a temporary reduction in the amount of vegetation. Using mathematical models, he and colleagues Prof. Ehud Meron and Dr. Hezi Yizhaq from the Blaustein Institutes, and Dr. Aric Hagberg of the Los Alamos National Lab are studying these gradual transitions and their early warning signals.

“We have students and researchers coming here from Africa, many of whom have terrible problems of desertification in their countries, like Eritrea and Sudan, with not enough food or jobs,” relates Bel, who also teaches graduate courses in physics at the Albert Katz International School for Desert Studies. “It is very important to identify the processes early on so we may be able to take action.”

Another of Bel’s interdisciplinary research projects involves

the production of algae or “seaweed,” which is much in demand both as an alternative energy source and a source of protein. But growing algae is a slow business. Bel, together with colleagues at Brooklyn College, New York and BGU, is testing schemes to boost the growth rate and make the whole process more efficient.

Bel looks much like the young trekker he once was. His long journey from the desert of New Mexico to the Negev was, in fact, a roundtrip. Born in Beer-Sheva in 1973, he was orphaned at a very young age and adopted by a family in Kibbutz Kvutzat Yavne near Ashdod, where his main interest, he recalls, was driving tractors. After his army service he went to Africa for a year and when he returned to Israel he decided that he wanted to study. He was accepted at Bar Ilan University to study physics. There he earned several awards and eventually wrote his Ph.D. dissertation on “Topological defects in unconventional superconductors.”

While working on his post-doctorate at the University of California, Santa Barbara, Bel was offered a position at Los Alamos. “I wasn’t crazy about California,” he admits, “but I fell in love with New Mexico and the desert. When I decided to return to Israel I knew it had to be somewhere south of Beer-Sheva.” He now lives in Sede Boquer with his wife and two small daughters.

Bel is the recipient of a German-Israel Foundation for Scientific Research and Development Young Scientist Award and the Marie Curie Career Integration Grant awarded to young scientists “who show the most promise for making meaningful contributions to the European Research Arena in the years ahead.”

On marrying physics with environmental studies, Bel believes that a good physicist is able to approach a problem in almost any field. “I think it’s the ability to think in a quantitative way, to take a problem, formulate a model and analyze it quantitatively. Physicists are trained to believe that there are very few fundamental forces acting in nature; in general, we don’t want a different narrative for a different phenomenon. At the end of the day, all processes in nature are the same, subject to the same fundamental forces.” ●



Ayala Azulay

students making a difference

Providing those Special Needs

Ayala Azulay, a 24-year-old second-year student in the Departments of Psychology and Education, feels that her university studies and volunteer community work complement each other perfectly. While some college students choose to skip occasional classes when their lives get hectic, Azulay won’t hear of it. “I love my classes in both psychology and education,” she says simply. “I drink in every word and appreciate all the knowledge I’m receiving. I find that it helps me a great deal in my community service work.”

Azulay is a recipient of the Lubner Prize for Community Service. She is committed to her volunteer work in the Beer-Sheva branch of “Krembo Wings,” Israel’s only youth movement for children and young adults with special needs.

“The first time I visited the place, I was amazed and fascinated by what I saw. Here was a group of children and teenagers with all kinds of disabilities and special needs, doing what other Israeli kids do in their youth movements – singing their theme songs, playing drums, engaging in group discussions. The chemistry – both between the kids and their counselors and between the kids themselves – was palpable. I was hooked immediately.”

While formal day-care settings are available for various categories of special-needs children in Israel, Krembo Wings is unique in that it accepts all special-needs children (ages 7-21) to its after-school activities, as diverse as they may be: including kids with cerebral palsy and physical disabilities, and those on the autism spectrum and with all kinds of cognitive disabilities. But how does that work in practice?

Azulay explains that each child has two able-bodied counselors who act as mediators to make each specific activity accessible to the child. “For example, we held an activity in teaching the children to play on *darbukas* (special drums). Since one of the children has two paralyzed arms,

the counselors taught him to use his feet instead.” And that is, precisely, the secret behind the Krembo Wings’ successful approach: solutions can always be found to make each activity accessible to all. The counselors themselves are high-school youths, often the same age as their charges; this contributes to the strong camaraderie that is formed between all the people in the group. Azulay is coordinator of the entire branch. She emphasizes that the main goal of Krembo Wings is combating discrimination and intolerance toward individuals with disabilities.

“My studies in psychology and education give me the knowledge to understand these children’s backgrounds and special needs. For example, children with cerebral palsy have physical limitations but are of normal intelligence, as opposed to those on the autism spectrum. Once you understand the disability, the barriers and stigmas fall and you can communicate directly with the child.”

Azulay uses this same approach in another forum: her volunteer work in Beer-Sheva’s Mental Health Center, where she works half a day once a week. She believes that listening and paying attention to the patients is key. “People need to talk, they need conversation, and I believe that you can communicate with everyone,” she explains. Here, too, she finds her classroom studies in psychology to be critical. “Mental illness is, first and foremost, an illness, and we all have illnesses. Once you understand the illness – such as schizophrenia – then you let those barriers fall to learn how to communicate with the person. Just as we accept the limitations of a child with CP in a wheelchair, so we accept the limitations of people with mental illnesses, and move on from there.”

Azulay hopes to pursue her dream of earning a master’s degree in educational psychology and finding her professional place in the field.



Dr. Anastasia Gorodzeisky

Working their Way Up

Dr. Anastasia Gorodzeisky was born in the Ural Mountains of Western Russia, and as a child lived in Uzbekistan, Kazakhstan and Kirgizstan. Should it surprise us then that this member of the Charlotte B. and Jack J. Spitzer Department of Social Work focuses her research on subjects such as cross-national sociology and relations between a majority population and ethnic minorities and newcomers?

“I lived in so many places, and through that, learned about different cultures and developed a total lack of tolerance for racism in any form. I cannot even bear to hear ethnic jokes,” says Gorodzeisky. “Wherever we lived, we were close with so many different people: Russians, Jews, Greeks, Uzbeks and Koreans. This type of life gives you a healthy respect for diversity.”

She started her career as a journalist in Russia, made *aliya* in 1995 and chose to study sociology. “My interest in immigration did not stem from my own experience, but from a broader place,” says Gorodzeisky, who earned her master’s and Ph.D. degrees in sociology in Israel and completed her post-doctoral work in Madrid, Spain.

Most of Gorodzeisky’s work centers around discriminatory attitudes, specifically toward immigrants. She also examines immigrants’ incorporation into the labor market of host societies. “I use the theoretical framework that comes from sociology and social psychology to look at relationships between the majority group and ethnic minorities and foreigners under the umbrella of in-group and out-group relations: the relations between ‘us and them,’” she says.

Gorodzeisky wrote her master’s thesis as part of an international project on Filipino immigrants throughout the world. She investigated economic mobility and professional change among Filipino overseas labor migrants in various countries. “I found that these migrants, who generally send a large portion of their income to family left at home, pay a high price in terms

of occupational status and educational level. Most of them take jobs of lower status and lower prestige than the jobs they had in the Philippines. In terms of education, they are usually overqualified for jobs they have in the host countries,” she adds.

This led her to investigate how host countries perceive migrants and to subjects of stereotypes and discriminatory attitudes toward migrants.

Her article, “Who are the Europeans that Europeans prefer? Economic conditions and exclusionary views toward European immigrants,” in the *International Journal of Comparative Sociology*, yielded unexpected results. Using data from the European Social Survey for 21 countries, Gorodzeisky found that people’s inclination to exclude an “out-group” population is dependent on their country’s economic standing. This, in itself, is not surprising. More interesting was that exclusionary attitudes toward European foreigners from poorer countries were less pronounced in prosperous places, while exclusionary attitudes toward those from richer countries were less marked in economically depressed nations.

In other words, those from more affluent countries were more accepting of those from poorer nations, who they viewed as a source of labor for low-paying menial jobs and did not compete with natives for jobs or social status. Europeans from relatively poor countries were more accepting of migrants from affluent countries, probably since they are less likely to be viewed as a burden on the welfare system of the host society and more likely to be viewed as contributing to the development of the host economy.

Gorodzeisky’s research (co-authored with Prof. Moshe Semyonov from Tel Aviv University) on professional and economic mobility among Russian immigrants in Israel also yielded surprising results. She compared the professional and economic achievements of Russian immigrants who arrived in



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Israel in 1989-1991 at age 25-50 with four Jewish groups: first and second generation Ashkenazi (European/American) immigrants and first and second generation Mizrahi (Asia/Africa) immigrants.

“With time, the occupational status and income of those from the former Soviet Union did rise, but despite their high level of education, 15 years after arrival, FSU immigrants still earn on average significantly less than all other Jewish groups,” she says. “These immigrants came in huge numbers, and the marketplace was saturated. The gaps began to close when they reached ages that don’t allow for further advancement.”

Gorodzeisky’s future plans include a look at the influences of immigration on people of different ages. “I want to find out the most problematic age for immigration among children and youth that may have negative effects not only on immediate educational achievements but also on future occupational incorporation.”

A newcomer herself to BGU, Gorodzeisky notes that, “I was so warmly received by the Spitzer Department, which brings together social workers, psychologists, demographers and legal experts. I love this interdisciplinary atmosphere and I enjoy interacting with my students, who are very curious and communicative.” ●

Marching to a Different Dune

For 11 years, Dr. Joel Roskin, now a post-doctoral researcher in the Department of Geography and Environmental Development, was head of terrain research in the Israel Defense Forces' Southern Command, based in Beer-Sheva. With a master's degree in geology from BGU, he served as an advisor on the effect of the desert terrains on vehicle and troop movements, as well as on underground weapon-smuggling tunnels from Egypt into the Gaza Strip – "all the aspects of how terrain affects military operations," he says.

In 2009, he retired from the army and returned to BGU to complete his doctorate. On successive days this last May, both he and his wife, Nitza, were notified that they had been accepted for post-doctoral studies. Nitza, a staff member at the Mandel Center for Leadership Development in the Negev, has been teaching in BGU's Department of Education for the last ten years. It was a happy time for the couple, and for Joel it marked another milestone in a far-flung, adventurous career whose focus was always, in the most literal sense, on the land of Israel, and which currently is on processes pertaining to sand and dust in the Negev desert.

Roskin came here for the first time at the age of eight and officially made *aliya* from Chicago with his family before his bar mitzvah. As a young man, he became a navigation club counselor for the Society for



Dr. Joel Roskin

The regional windy climate driving the dunes was probably related to glaciation changes in Europe, so it's unlikely that the dunes will remobilize in the future unless an ice age comes along

the Protection of Nature in Israel and began writing Israeli hiking guides. "I saw there was an absence of hiking books in English – this is going back 25 years – so I wrote *A Guide to Hiking in Israel* and *Water Walks in Israel* (published by *The Jerusalem Post*), and they became quite popular. I always loved hiking and the outdoors, so I was motivated to understand the unique landscape of Israel and to give comprehensive explanations in this regard," he recalls.

This led him to study for a bachelor's degree in earth sciences at the Hebrew University of Jerusalem and then his master's at BGU, where he took a course under one of the world's leading experts on sand dunes, Prof. Haim Tsoar, who ignited his curiosity and passion for this particular field. "One day he brought an aerial photo for an exercise – and in the photo was my grandparents' home south of Lake Michigan in Indiana. A few years later Tsoar suggested an idea for a doctoral dissertation that unexpectedly was related to the work I was doing in the army, trying to understand the difference in the shapes of the Negev sand dunes."

For his Ph.D., Joel studied the Sinai-Negev sand sea stretching from the Nile Delta to near Ramat Hovav south of Beer-Sheva. "My first purpose was to understand the development stages of this relatively recent land form," Roskin says. "The sand dunes are very dynamic and sensitive to climate- and human-induced changes." This spring, he notes, there was a terrible traffic crash near Nitzana that was caused, at least in part, by a local sand and dust storm, so these are forces not to be trifled with.

"The goal of my work is to understand the future implications of climate fluctuations and increased human pressure on the desert in Israel and the rest of the world," he explains, noting that about half of Israel is desert. "To do that, we have to understand what happened to the desert in the past, and what forces affected movement and change in the sand." Here he comes to a recent discovery that flies in the face, so to speak, of popular thinking about the effects of global warming.

"It was thought that global warming would make the sand more mobile, which sounds reasonable enough to the layman – the drier the sand, the more dunes are

going to move – and this fits previous paradigms about changes between dry and wet climates.

"But we found that after the end of the last glacial period 10,000 to 20,000 years ago, the sand dunes in the Negev were highly active due to powerful winds, but since that period, the invasion of the dunes virtually stopped. So if we see increased global warming in the future, we don't have to fear that the Negev sand will start marching further east. Global warming will not have a very strong effect on the dunes," he says. "The regional windy climate driving the dunes was probably related to glaciation changes in Europe, so it's unlikely that the dunes will remobilize in the future unless an ice age comes along."

For his doctoral studies Roskin received a grant from the US-Israel Binational Science Foundation (BSF) and for his post-doctoral studies a fellowship at the Kreitman School of Advanced Graduate Studies. This past year he was awarded the Faculty of Humanities and Social Sciences Mahar Prize for an outstanding academic article published in *Quaternary Science Reviews*.

"One of my long-term goals is to connect my academic research with my background in the army and security establishment – to improve the understanding of the different implications of terrain on Israel's defense and military needs," he says. "Ultimately I want to help make the military more professional, more effective, more cost-effective and safer, for the sake of Israel's security and saving lives on both sides."

Asked what it's like to be pursuing an academic career alongside his wife while raising five children and commuting the last three years from his home in Gush Etzion to BGU, Roskin says: "For one thing, it gives us a common purpose and goal in life. On the other hand, though, it fills up every cavity of time – we're always trying to balance work and family."

"Quite a few people in Gush Etzion commute to Beer-Sheva, many by carpool," he continues. "We lived in Beer-Sheva for eight years and in nearby Meitar for five. We moved to Gush Etzion to get a diversified religious education for our kids and to be closer to our family, but to a great extent, our hearts are still in the Negev." ●



Medicine from the Heart



r. Chaim Yosefy,
professor of
cardiology at

BGU's Faculty of Health Sciences
and director of the Non-Invasive
Cardiology Unit at the Barzilai
Medical Center in Ashkelon,
remembers well the experience that led
him to become a doctor.

"I was 16, and my brother and I were
at a dormitory school in Jerusalem
– there wasn't enough room for us
at home to study like we should – 48
square meters for my mother and
six children in not one of the more
promising neighborhoods of Ashkelon,"
he recalls. "I had to go to the school
doctor for tonsillitis, and it was amazing –
the physician did not treat me in any way
as a person, he just asked what my problem
was, checked my throat, wrote something
down on a piece of paper, handed it to me
without a word, and I left.

"I went back to my room and wrote a
full page for the school newsletter on how I
thought a physician should conduct himself
with patients. I didn't know it then, but I was
talking about empathy. It wasn't more than
a month afterward that I decided to become
a doctor. And in 30 years of practice, I don't
think I've had a single patient come into my
office for whom I didn't get up from my desk
and open the door, and didn't walk him to the
door and make sure he understood exactly
what I'd told him to do before I let him leave."

Yosefy, 52, married to Mina and a father
of four children, still lives in Ashkelon. He
has two specialties in medicine – cardiology/
echocardiography, or treatment of heart disease



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leave**



using a kind of three-dimensional heart
ultrasound, and cardiovascular risk
factor management, with an emphasis
on public education. The first involves
the most state-of-the-art, esoteric medical
technology, while the second focuses
heavily on communicating with the public
to get people to change their behavior
and start living healthier lives. Yosefy
has combined scientific expertise and
people skills into one unusually successful,
rewarding career as a physician and educator.

It was a long road getting there. "My father
died of stomach cancer when I was six. My
mother didn't know how to read or write, but
she knew how important it was for us to get a
good education, to go as far as we could. Today
one of my brothers is a judge in the Beer-Sheva
Labor Court, and my other brothers and sisters
are engineers and school principals.

"When I was accepted to BGU, I felt my
dreams had come true. I had long way to go
and I had to work and study at the same time in
order to get the money I needed. At this point
I met Caroline Simon, who was working in the
Faculty of Health Sciences, and who became my
second mother. She became involved economically
and emotionally in every step of my studies, and
later during my period of residency and fellowship.
Caroline was the one I consulted when I decided to
get married. Her impact on my and my family's life is
the most wonderful thing that has happened to us."

Yosefy's career, which took him around the United
States and Europe, brought him to Boston eight years
ago for a fellowship at Harvard Medical School's
Cardiology Division at Massachusetts General Hospital.
Along with the man he calls his "mentor," Prof. Bob
Levine, he went "house to house in the Boston-area Jewish
community to raise \$250,000 for an echocardiography ➔



Dr. Chaim Yosefy

// Patients have to be full partners in the treatment, as ultimately they are the ones who have to make the changes //

machine. It was a completely new direction for Israel at the time, and I knew I would never get the money here. So I got the money in Boston, purchased the machine and brought it to Barzilai – the first echocardiography machine in the country.”

Yosefy calls echocardiography the “future of heart treatment.” By giving a 3-D image of the heart, it allows cardiologists to “get the maximum efficiency from devices implanted in a patient’s heart. In 70 percent of cases, the standard method works, but in 30 percent of cases, an expert in echocardiography is needed to come in and optimize the implanted device. The result is that the patient feels much better. I have patients who couldn’t walk more than 10 meters before running out of breath, but with the help of the echocardiograph in raising the efficiency of the heart implant, he or she can walk 200, 300, even 400 meters. This method has a tremendous effect on patients’ quality of life,” he explains.

It’s still a very young field; in the whole world there are “maybe 20 or 30 people who can be called experts,” he says. “I’ve been teaching it in Europe and the United States at least twice a year, and I’ll have classes of 60 or 70 cardiologists who now use echocardiography.”

Yosefy’s other specialization, hypertension and public awareness of it, is connected to echocardiography; in fact, he calls his work, “preventive cardiology.”

“This is something I started as a medical student at BGU,” he says. “I was one of the students who started ‘Perach Chalav’ (Perach Health Education) in which medical students teach preventive medicine to kids in schools. We ran the program in Beer-Sheva and all over the country; it won the prize for public health initiatives from the Ministry of Health.”

Today Yosefy chairs the Israel Heart Society’s working group on preventive cardiology and is among a select group writing the national guidelines for hypertension management, which are to be adopted by hospitals, clinics, schools and all other institutions that deal with public health. “Cardiovascular risk factors such as hypertension have to be treated as soon as possible to get the best results,” he says.

“I believe in targets for treatment – patients should know their blood pressure target and how to maintain it, and should know that hypertension is only one of the risk factors, along with high cholesterol, diabetes mellitus, obesity, smoking, sedentary lifestyle and stress, which must be handled in the same way – by setting targets for treatment. It should be taught by the community and by the medical profession, and everybody has to be on the same page, working according to the same guidelines so the patient doesn’t get different advice from different ‘experts.’”

He says that in Israel, the message is catching on. “In the last 10 years we’re seeing great improvement in compliance with ‘doctor’s orders’. Patients have to be full partners in the treatment, as ultimately they are the ones who have to make the changes.”

Yosefy says he learned this approach to medicine most profoundly from the late Prof. Aharon Antonovsky, an American immigrant to Israel and medical sociologist who was among the founders of BGU’s Faculty of Health Sciences. “He taught us that the doctor-patient relationship must be one of parent to parent, not parent to child,” recalls Yosefy. This is one reason he has such warm feelings toward the University. “BGU is my home,” he says. ●

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