



TEL AVIV UNIVERSITY REVIEW



Treeless Paper

Globalizing Mideast Studies

Subatomic Sensations

In
DEFENSE
of the Nation



STOP PRESS

TAU Exhibits at GA

TAU's booth at the General Assembly (GA) of the United Jewish Communities, which took place in Jerusalem this November, showcased the university's overseas programs. The GA was attended by 3,500 professional and lay community leaders, mainly from the United States. During the event, TAU President Zvi Galil took part in a panel on higher education. Two delegations from the GA visited TAU including one from the South Palm Beach Florida Federation. They visited TAU's Faculty of Management—Leon Recanati Graduate School of Business Administration, heard presentations on nanoscience and nanotechnology at TAU, and met with young researchers, students and TAU officials.

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Winter 2008/09

Issued by the Marketing and Donor Relations Dept.
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Cover photo courtesy of the IDF Spokesperson's Unit

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In the **smoke-and-mirrors world of intelligence**, those who tell don't know, and those who know don't tell. This article only **hints** at the breadth of security-related research at TAU that may ultimately **defend Israel** from threatening scenarios both immediate and potential.



Engineering's Prof. Leonid Yaroslavsky and his former PhD student, Dr. Barak Fishbain, demonstrate their video enhancement technology for civilian and military use.

By Gil Zohar

Lifting the Veil of Secrecy





Remember Q, who provides James Bond with laser beam watches and other futuristic gadgets that keep 007's enemies at bay? In real life there's no such glamor in what today is called national security research and development. In the rough and tumble reality of the Middle East, Tel Aviv University is at the front line of the critical work to maintain Israel's military and technological edge.

While much of that research remains classified, several facts illuminate the role of the university. MAFAT, a Hebrew acronym meaning the R&D Directorate of the Israel Ministry of Defense, is currently funding 55 projects at TAU. Nine other projects are being funded by DARPA – the Defense Advanced Research Projects Agency of the US Department of Defense. Seven highly-coveted Israel National Security Prizes have been awarded in recent years to members of TAU's Blavatnik School of Computer Science – more than any other institution in the country. For security reasons, the recipients cannot be named.

"People are just not aware of how important university research is in general, and how much TAU contributes to Israel's security in particular," says TAU President Zvi Galil. "I myself am awed by the magnitude and scientific creativity of the work being done behind the scenes at TAU that enhances the country's civilian defense capabilities and military edge," Professor Galil says.

Unlike in the United States where research is conducted at national labs, Israel has no such equivalent institutions, explains Prof. Isaac Ben-Israel, who heads TAU's Security Studies

Program and the Tel Aviv Workshop for Science, Technology and Security. An expert on Iran's nuclear program, his work has the highest security clearance. Besides his academic credentials, Ben-Israel serves as a Member of Knesset and was a former director of MAFAT. He holds the rank of Major General (res.) in the Israel Defense Forces.

"Military R&D in Israel would not exist without the universities. They carry out all the basic scientific investigation, which is then developed either by defense industries or the army,"



People are just not aware of how important university research is in general and how much TAU contributes to Israel's security in particular.

says Ben-Israel. TAU's Security Studies Program currently has an enrollment of 170 master's students. Ben-Israel's Tel Aviv Workshop for Science, Technology and Security has been running six to eight workshops a year since it was established in 2002. The workshop's goal, implemented through the publication of books, position papers and conference proceedings, is to promote public discourse on security technologies and create interaction between academia, security experts and defense industries.

In 2004 TAU hosted the First International Homeland Security Conference, organized by the Israel National Security Council together with the Israel Export and International Cooperation Institute and *Globes* business newspaper.

Not surprisingly, much of the defense-related research at TAU remains hush-hush, conducted in rooms and laboratories protected by barred windows, multiple locks and office safes. "There are people in this university dealing with very secret

MOLECULAR EXPLOSIVES DETECTION

While military R&D often results in civilian spin-offs, Prof. Doron Shabat's civilian research has shown converse potential for military applications. Shabat, of the Raymond and Beverly Sackler School of Chemistry, Raymond and Beverly Sackler Faculty of Exact Sciences, has been working on novel drug-delivery biomolecules that ferry cancer-killing doses of medication directly to tumor tissue. Using the same technology, Shabat has made a breakthrough in explosives detection. By installing a sensor unit at the head of his carefully engineered molecules, he can use his system to identify explosives such as triacetone triperoxide (TATP).

TATP has become an illicit explosive of choice due to its straightforward synthesis using readily available chemicals such as acetone and hydrogen peroxide. Shabat is able to trace minute amounts of TATP's chemical signature without any special pre-treatment of the sample, e.g., in real field conditions such as at an airport check-in counter.

projects, and they won't talk about it," matter-of-factly notes Dr. Michael Gozin, an expert in organic chemistry and explosives detection, who himself chooses words carefully to describe his work.

Anti-missile decoys

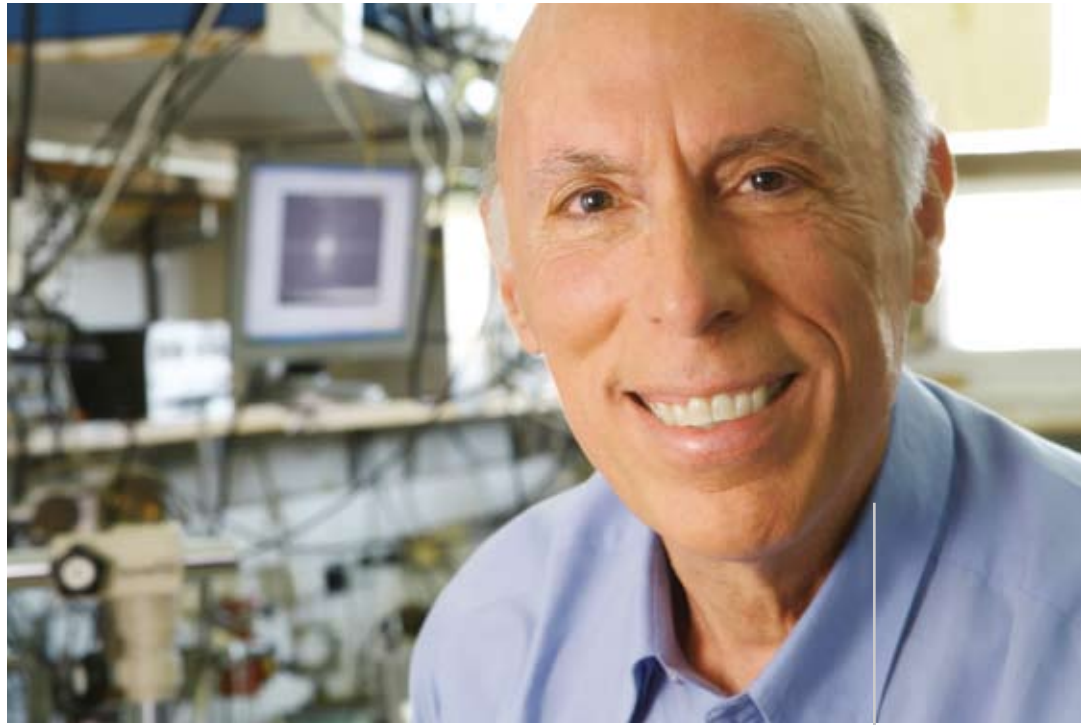
Prof. Ady Arie remembers well what nearly happened on November 28, 2002, in Mombassa, Kenya. As three suicide bombers crashed a SUV into a seaside resort killing 13 and injuring 18, almost simultaneously two surface-to-air missiles were fired at an Israeli charter plane as it took off from Moi International Airport.

The shoulder-launched Strela 2 (SA-7) missiles narrowly missed their target – a Boeing 757 airliner owned by Tel Aviv-based Arkia Airlines carrying 271 vacationers back home from African safaris and Indian Ocean beaches. American intelligence officials reported that another six live missiles were found at the scene.

For two years Arie, who heads the Max and Betty Kranzberg Research Institute for Electronic Devices at TAU's Iby and Aladar Fleischman Faculty of Engineering, has been tasked with designing systems to protect aircraft from missiles. "I think it was luck," he says simply of the near miss in Mombassa.

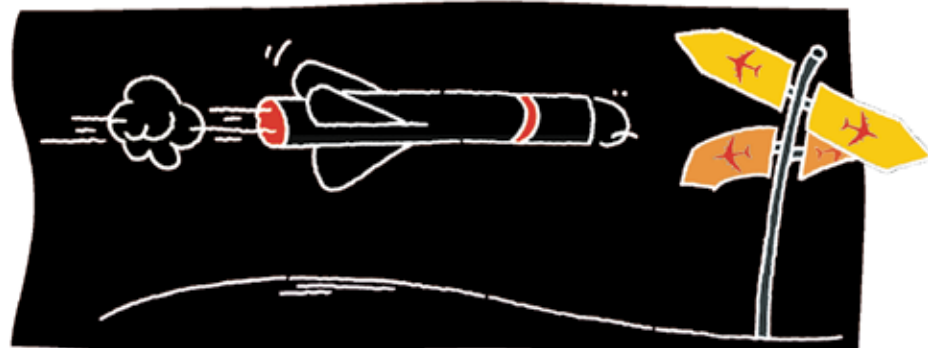
Arie and Dr. Ofer Gayer, a post-doctoral fellow, are at the forefront of the cat-and-mouse game of keeping ahead of missile engineers and terrorist scientists.

Their defense, based on non-linear optics, is to use an intense light source to blind and deceive an incoming missile. These weapons hone in on a jet engine which emits light at a certain wavelength. Arie's solution – being developed in partnership with El Op, part of Elbit, which makes electrical optic defense systems, and with support from the Chief Scientists of the Ministry of Industry, Trade and Commerce – is to take a light source from a near infra-red laser and convert it into a wavelength which the missile is sensitive to. The defense laser he's developed must be compact enough



to fit on a commercial aircraft, he adds. "The market is huge," he says. "Eventually you'll have such a system on every commercial aircraft." Citing the restrictions of classified information – a recurrent theme in researching this article – Arie is unable to discuss his project's budget or the cost of installing an anti-missile defense laser on board an aircraft. "Nothing that goes on an aircraft is cheap," he says obliquely.

But then, how much are the lives of an entire plane's passengers and crew worth?



Prof. Abraham Katzir, Head of the Applied Physics Group at the Raymond and Beverly Sackler School of Physics and Astronomy, Raymond and Beverly Sackler Faculty of Exact Sciences, is also working on a laser-based countermeasure system against shoulder-launched surface-to-air missiles (SAMs). Such a system will protect civilian aircraft, particularly at smaller airports where one could drive to within close proximity of the runway, jump out of a vehicle, aim and fire off a missile before security could react. Thousands of American-manufactured missiles were given to Afghani mujahideen fighting the Soviet invasion of their

country in 1978. Used to great effect against Red Army helicopters, a large number of those unused weapons fell into the hands of rogue states and terrorist organizations.

"It is assumed that al-Qaeda has 20,000 of them. Some farmer



Prof.
Abraham
Katzir



could carry it on his shoulder,” Prof. Katzir says of the deadly two-meter long weapon. “It’s a disaster waiting to happen.”

Such missiles hone in on the infrared light emitted by a jet’s tailpipe. Besides the uncomplicated weapon’s infrared detection system, it includes a rocket engine and an explosive charge. An unskilled operator only need point the missile in the general direction of the target and squeeze the trigger.

“Our goal is to develop a countermeasure system. Radar systems aboard a civilian plane can detect the incoming missile and the countermeasure system must be able to disable the missile in seconds – before it hits the plane,” says Katzir.

Katzir and his team are developing fiber lasers, based on optical fibers made out of silver halides – once used in photographic film. When a missile is detected, the laser emits a high intensity infrared laser beam in the direction of the incoming missile and blinds it. The misled missile then continues flying without being able to hone in on the tailpipe of the plane, chasing ghost airplanes as it were, until it runs out of fuel, and then plummets to the earth or the sea, exploding with minimal damage.

“There is a race all over the world to develop a defense against shoulder-launched SAMs. We have made significant progress, and we’re close,” says Katzir.

Testing the waters

Another threat of entirely different dimensions is the poisoning of a water supply – either by accident or terrorism.

“Water poisoning is like something out of a John le Carré novel,” begins Prof. Yosi Shacham-Diamand, the former head of the TAU Center for Nanoscience and Nanotechnology

and the incumbent of the Bernard L. Schwartz Chair in Nano-Scale Information Technology. “But it’s a real and immediate danger. It’s not speculation.”

“The issue of water takes on a special resonance,” Shaham continues, “in our arid Middle East, and also in the historical context of anti-Semitism, when it was the Jews who had to fight off accusations in the Middle Ages that they were poisoning wells and spreading the plague.”

“From a scientific standpoint, the major question is ‘Is the water safe?’ We want to answer this fundamental question. We won’t accept ‘I don’t know’ as an answer.”

To provide that answer, Prof. Shacham, in collaboration with Prof. Shimshon Belkin of the Hebrew University of Jerusalem, developed a technique using genetically engineered microbes that generate light when they encounter toxic water and “feel ill.” Optics is used to measure the microbes’ wellbeing.

Microbe-based technology is the basis for a range of practical, portable, low-cost and field-deployable systems. “We developed something that you can give to every soldier or civil defense person to put in their canteen,” says Shacham.



Given that herbicides and pesticides are water soluble, the chance of accidental poisoning is real, he continues, as are industrial negligence and



accidents. For example in the rural community of Walkerton, Canada, unusually heavy spring runoff in May 2000 together with criminally negligent monitoring of the E. coli level resulted in seven deaths and hundreds sickened with diarrhea, cramps and nausea. Many of the survivors will experience severe intestinal pain for the remainder of their lives.

Closer to home, an ammonia leak at a filtration station in central Israel poisoned the local water supply before the Mekorot water authority detected and resolved the problem. Hundreds of afflicted people flooded Tel Aviv area hospitals. “You don’t want hospitals to be sensors for toxicity. That’s too late,” warns Shacham.

The \$3-million research grant for

FOUR-LEGGED SURVEILLANCE

At the Center for Applied Animal Behavior for Security Purposes at TAU, headed by Prof. Joseph Terkel of the Zoology Department, scientists are testing the suitability of various animals to carry out security-related tasks. Some of their findings are now being successfully applied in the field by security forces.

Most defense and security research today exploits sophisticated modern technology. Terkel and his team, in contrast, utilize what millions of years of evolution have led to: survival of the fittest in the animal world, with different species having evolved unique senses specific to their survival needs. Each four-legged animal's abilities and constraints can be used for the benefit of two-legged security personnel. Indeed, there are some tasks that animals are much better equipped to carry out.

It is widely accepted today that no artificial nose can compete with a dog's super-sensitive nose, which is able to sniff and detect one in a million parts of a substance it has been trained to recognize, such as explosives. A dog, cannot, however, both sniff and pant at the same time. When overheated from the effort involved in working, it will pant to cool itself down, which impairs its ability to sniff out an explosive. The dog's handler must be able to determine that the dog is really sniffing when it moves ahead of a patrol.

This problem is being addressed through the doctoral research of Terkel's student Irit Gazit, in collaboration with the IDF's Canine Unit, where Terkel heads R&D. Gazit has developed a device that, when attached to a dog's muzzle, transmits sounds back to its handler via a portable receiver, enabling the handler to know – even at a distance – whether the dog is actively sniffing and searching, or just panting. If the dog is panting, the handler can redirect it back to that specific area to sniff again, thereby ensuring that a hidden explosive is not missed.

In a separate project that is funded by DARPA, Terkel is focusing on the natural advantage of birds – their superb eyesight. He is training birds to respond to visual stimuli for various missions. The advantage of a bird over a mini drone for surveillance purposes is that birds are unobtrusive. Alert enemy forces can spot an unmanned aerial vehicle but will not be alarmed by a bird flying by. In the project, birds are being trained to cover a large area or to remain within a particular site; when the “target” they have been taught to locate appears in their vision, they respond as trained.



Prof. Joseph Terkel

portable water toxicity detection that Shacham received from DARPA in collaboration with Prof. Belkin has proven to be money well-spent. In April, the two founded Canarious Ltd. to produce and market the system they developed, the first of which will be delivered to clients around April 2009.

Having developed an “artificial tongue” to detect poisoned water, the next challenge is to develop an “artificial nose” that can sense toxic gases in the air.

Shacham cites the Japanese doomsday cult Aum Shinri Kyo (Aum Supreme Truth) which released sarin gas on five crowded subway trains in Tokyo in 1995, killing 12 commuters and leaving more than 5,300

ill. “Toxic agents, either in gas or in water, should be detected at very low levels before they cause any damage,” says Shacham.

Sounding the alarm

Detecting toxicity in a major water supply is another research area of Abraham Katzir, who holds the Carol and Melvin S. Taub Chair in Applied Medical Physics and was recently appointed director of TAU's Abramson Center for Medical Physics. Rather than removing samples of water periodically and examining their quality, as is done by most agencies around the world, Katzir and his team are seeking to monitor water quality on-line.

His nightmare scenario is that a terrorist will poison the National Water Carrier, the hydraulic system of canals and pipelines bringing water pumped from the Sea of Galilee south to the center of the country and the Negev, with a commercial pesticide. Highly toxic substances like Parathion, DDVP and Atrazine (the latter is banned in the European Union) are all available in Israel for as little as \$10 a liter, and can be bought without any identification or license. One part per million of any of these substances would sicken an adult, or kill a baby or a senior, Katzir warns.

“You don't need to kill hundreds or thousands of people,” he says. “It's enough to kill 10 and there will be mass panic.”



A variation on the nationwide poisoning scenario is the placing of toxic materials in a Tel Aviv skyscraper or shopping mall. In such large complexes, the water inlet is well protected but the outlet is often vulnerable to the introduction of foreign substances, Katzir explains.

“Our idea is to use infra-red spectroscopy, which measures color in the infrared light range. Many fluids like water, alcohol and acetone are clear and cannot be distinguished from one another by the human eye or by instruments that measure visible light. But in infra-red, each of these materials looks different,” says Katzir. “In the same way, there is a significant difference between the infra-red ‘color’ of pure water and that of polluted water.”

The system developed by Katzir and the Applied Physics Group makes it possible to continuously monitor water quality in a lake, river or water reservoir – or even a large building. The system will sound an alarm if toxic substances such as poisonous chemicals appear in minute concentrations.

Tested in laboratory conditions, the system has proved effective in detecting pesticides and herbicides in concentrations smaller than one part per million. The system has been used in Florida, where blue algae blooms caused by phosphorous tainted the water supply. Similarly, in Californian water, Katzir’s system detected tiny amounts of toxic carbon tetrachloride, formerly widely used in fire extinguishers and for washing airplanes.

“My goal is to create a system both for environmental protection – against accidental poisoning of water by industry, and for national security – against intentional poisoning of drinking water by terrorists,

concludes Katzir, who is currently looking for funding. “In the US and in Israel, many of the water distribution centers are not well protected. It’s scary. But we’re working on it.”

Treading carefully

While Prof. Katzir is concerned about monitoring water quality, for the last four years Prof. Yoram Shapira, incumbent of the Henry and Dina Krongold Chair in Microelectronics, has been obsessed with the covert surveillance of just about everything. He’s developed “smart dew” – the



Israeli version of “smart dust,” which truly seems like an invention from Q’s legendary arsenal.

The size of dew drops, Shapira’s tiny sensors can be scattered across an enclosed space or around the perimeter of an area to detect any intrusion within a range of five to 50 meters. Each “droplet” in this early warning system is sensitive to a single parameter, such as noise, magnetic fields produced by metal in cars or tanks, vibrations, carbon monoxide emissions or light. The droplets communicate via radio frequency to a base station that analyzes the data and issues an alarm if warranted. Such tiny and

wireless communications systems are ideal for protecting security sensitive facilities, as well as airports and prisons. The potential uses are so manifold that Shapira simply says “Leave it to the readers’ imagination.”

How small are Shapira’s dew drops? “Microscopic is stretching it, but we’re talking about millimeters – or about one tenth of an inch. They are sturdy enough to be dropped from an airplane.”

The drops issue a signal every few seconds, allowing an almost instant identification of an intruder, whether mechanical, human or simply a bird flying by.

“Each droplet has its own micro-battery. The sophisticated communication protocol allows the whole system to remain asleep most of the time, thus conserving energy. Its lifetime can be several months.”

Shapira’s team has completed designing and building a prototype, and “now is the right time to transfer the technology to a commercial company that can put it into a product,” he says.

The best part? The system will be low cost, with each droplet costing about 25 cents.

Picking up the signal

“I’m not free to talk about things funded by the Ministry of Defense, naturally,” begins Prof. Anthony Weiss, Head of the School of Electrical Engineering at TAU’s Fleischman Faculty of Engineering. But Weiss is prepared to discuss his work on tracking down the location of transmissions, whether coming from cell phones, smugglers or submarines. The titles of his recent

articles in academic journals, such as “Localization of Narrowband Radio Emitters Based on Doppler Frequency Shifts” or “Maximum Likelihood Position Estimation of Network Nodes Using Range Measurements” suggest why Israel’s defense establishment is interested in his specialized research.

Weiss uses a variety of techniques to pinpoint distant transmissions – to within 50 meters – including intercepting signals at multiple points, and measuring signal strength as it attenuates while passing through the atmosphere. All his techniques are passive, he notes, making it impossible for the party transmitting to know they’ve been detected. Moreover, his techniques work with equal efficacy in the air or water.

What about counter-intelligence methods to mask the point of transmission?

“I’m not sure I can say anything about that,” Weiss clams up.

Sharpening the focus

Like Prof. Weiss, Prof. Leonid Yaroslavsky of the School of Electrical Engineering and his former PhD student, Dr. Barak Fishbain, are also interested in intelligence gathering. In 2007 the pair completed a three-year project initiated by the IDF Intelligence Corps on how to enhance and stabilize video images shot from a long distance, about a dozen kilometers (seven miles) or more.

As anyone who has hiked in the desert on a summer day can attest, heat “bends” light, causing a rippling visual effect for far-away objects. This turbulence effect rapidly becomes fatiguing for someone viewing and monitoring video transmissions. Illustrating his point, Yaroslavsky shows a wavy clip of military footage shot from 15 kilometers distance.

“If you watch this for a long time, your eyes become insensitive to real

motion,” he says, as I fail to detect a person walking by on screen.

Yaroslavsky’s algorithms filter out the visual “noise” to produce a stable scene with enhanced resolution of the significant elements. Thus in the civilian traffic application on which he is now working, the background of the highway will be removed to focus exclusively on the movement of the vehicles.

ELOP, a daughter corporation of Elbit, recently licensed the technology from Ramot, the technology transfer arm of TAU. Yaroslavsky predicts his optical enhancement system will become a standard feature in consumer electronics in the coming years.

Sweating out the truth

Research by Dr. Michael Gozin is also likely to be widely adopted in the coming years, if not commercially then certainly by police and intelligence agencies. The Belarus-born Gozin is researching enhanced identification techniques based on perspiration.

“A lot of organizations, including the FBI, are looking at sweat residue as an alternative to fingerprint identification. Sweat contains a very complex mixture of small, organic molecules and larger bio-molecules – proteins and peptides. It is possible that these proteins and peptides are specific to every individual,” Gozin explains.

“An advanced biochemical analysis could create a sweat pattern unique to an individual,” he theorizes.

Moreover, unlike a fingerprint which might be useless if incomplete, a miniscule residue of sweat could provide personal identification with a very high percentage of certainty, he says.

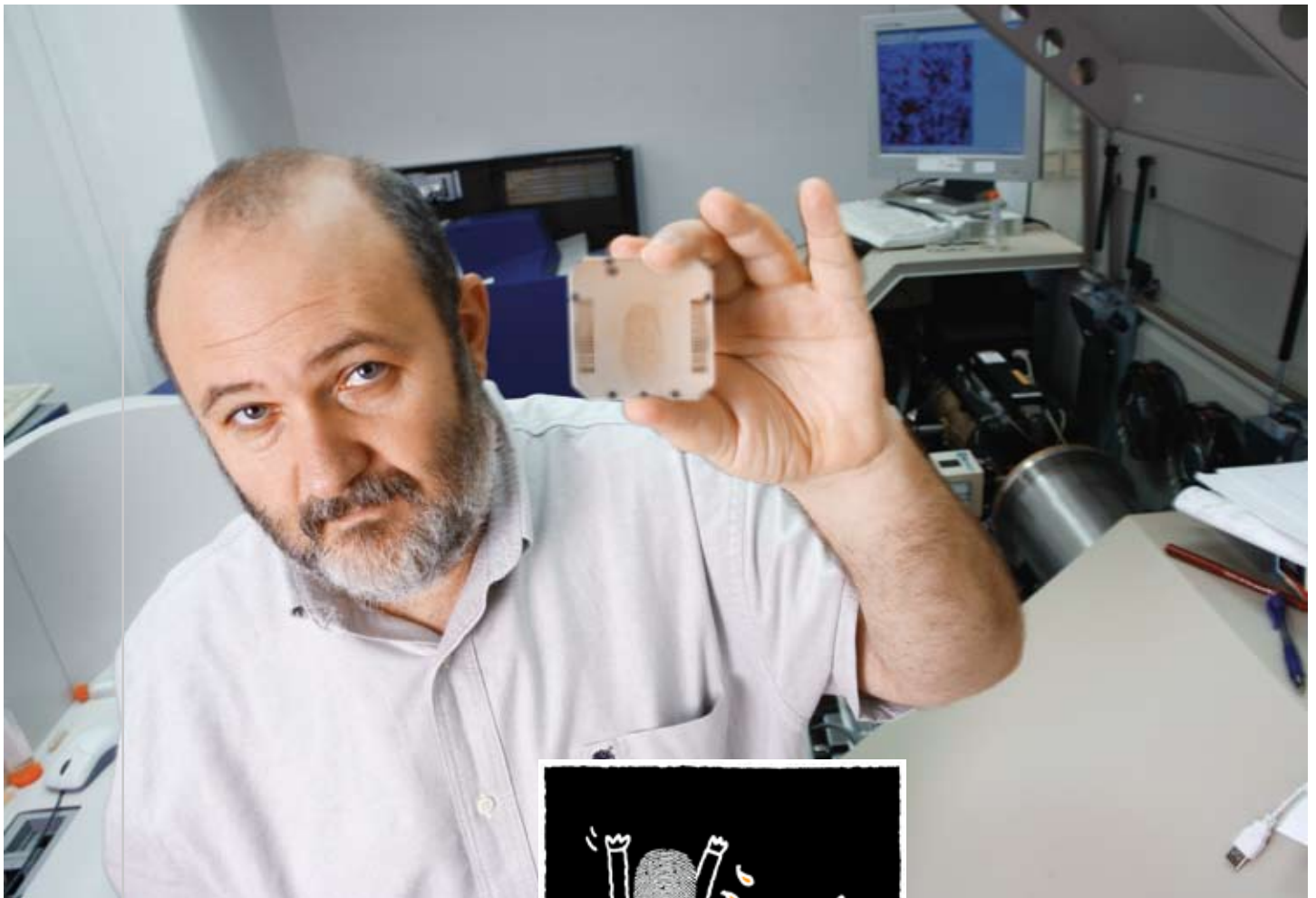
A dog can distinguish between the scents of different individuals, but there is currently no scientific way

MINING FOR SUSPICIOUS ACTIVITY

With implications for intelligence gathering, Prof. Oded Maimon of the Fleischman Faculty of Engineering mines cyberspace in a project funded by the European Union, Israel’s Ministry of Science, and General Motors.

Using sophisticated algorithms, Maimon reads millions of e-mails and identifies those that are suspicious or important. His data mining software identifies 98 out of 100 hits that are relevant to search criteria, whereas other search engines yield only a small portion of the really interesting messages. Maimon, the author of 10 books on data mining, is the winner of the Israel Government Prize and the incumbent of the Chair in Industrial Engineering.

Dr. Ran Bachrach, a new faculty member at the Department of Geophysics and Planetary Sciences, Raymond and Beverly Sackler Faculty of Exact Sciences, is engaged in a different kind of mining. An expert on tunnel detection technology, he uses seismic waves and remote sensing technologies. His non-destructive seismic wave testing techniques work for subsurface monitoring of near surface tunnels. It’s the type of research that may finally stop the flourishing underground trade between Gaza and Egypt, and protect IDF border units from being ambushed by tunnel-digging terrorists.



 Prof. Michael Gozin

to measure that. Looking over the horizon, Gozin envisions devices at airports and other strategic locations that recognize scents and identify suspects.

Those future devices will likely be based on advanced mass spectrometers capable of analyzing a person's sweat biomolecules and identifying him.

If that project sounds like something out of *The Matrix*, Gozin continues in this futuristic vein by describing – elliptically – his other research projects funded by MAFAT. Characteristically, MAFAT denied Gozin permission to speak in all but generalities about his research into the detection of “green explosives” – next generation munitions based on multiple nitrogen atoms in the molecule.

“In contrast to what we’ve experienced until now in Judea and Samaria,” he explains, “the Second Lebanon War clearly showed that we need to have superior technology both on the ground and in the air.

“The creation of new chemistries is extremely important for the technological superiority of our troops. Yet at the same time, whatever is developed for the military market will ultimately end up in the hands of terrorists. So, we need to be ready. We would like

to match the development of novel explosives and propellants with the development of appropriate detection technologies, so that if these materials should ever make their way to the market – and they will – we’ll be able to detect them, and not be stuck with unanswered questions,” Gozin says.

Emulating the dragonfly

Prof. Avi Seifert leads a team that is performing novel experiments with wind tunnels for civil and security applications, including for improved aerodynamics of drones.

Seeking, for instance, to improve the range and flying time for unmanned aerial vehicles (UAVs), which are often used for intelligence gath-



ering, he is investigating the flight mechanism of dragonfly wings, the odd shape of which generates vortices that enhance lift and reduce drag at small sizes and low flight speeds. Together with his PhD student David-Elie Levy, Seifert, of the TAU School of Mechanical Engineering, seeks engineering solutions that will integrate the positive aspects of dragonfly aerodynamics but without the typical wing flapping of small insects and birds.

An additional study conducted at TAU's Meadow Aerodynamics Laboratory has yielded a new control mechanism which, when placed on regular UAVs, work at least ten times faster than conventional ones, reducing turbulence.

Mimicking the "hingeless maneuverability" of dragonfly wings, the new control system produces a UAV's yaw, pitch and roll motions (the three possible axes of movement), without utilizing flaps, allowing for remote intelligence gathering in gusty conditions. Very recently, the system was tested during three successful flights. In one of them, a drone was landed solely by the new system, a first in aviation history.

"Minimizing turbulence and passenger discomfort has obvious benefits for military and civilian aircraft," Seifert says.



What Seifert's research is to the skies, Prof. Touvia Miloh is to Poseidon's realm. His Underwater Studies Research Center is a joint initiative of MAFAT and the Israeli Navy. Miloh, a member of the Department of Fluid Mechanics and Heat Transfer at the Fleischman Faculty of Engineering, the former dean of the faculty and the incumbent of the Lazarus Brothers Chair of Aerodynamics, is at the cutting

NEW CHECKPOINT INSTITUTE FOR INFORMATION SECURITY

New faculty recruit Prof. Ran Canetti, brought from Boston's MIT, will head TAU's newly launched Check Point Institute for Information Security at its Blavatnik School of Computer Science. The institute will research all areas of cryptography and information security, including theoretical foundations, cryptographic algorithms and protocols, the building of secure systems and applications, information privacy, and economic, social and legal aspects of information security. The institute was established by Check Point Software Technologies Ltd., the California-based giant in Internet security, whose CEO and Chairman of the Board is Israeli Gil Shwed, a TAU Governor and the recipient of TAU's Hugo Ramniceanu Prize in Economics.

edge of research in the fields of underwater acoustics and sonar technology. With the participation of TAU's former Vice President of Research and Development Prof. Hagit Messer-Yaron, Dean of Engineering Prof. Ehud Heyman and Prof. Gregory Zilman of Engineering, the research center supports applicative industrial research and development, and trains qualified manpower to join industry in the field of underwater acoustics.

Predicting new trends

Dr. Yair Sharan, Director of TAU's Interdisciplinary Center for Technology Analysis and Forecasting (ICTAF), has perhaps the most holistic view of anyone about the national security and defense projects involving TAU. The center's studies of novel technologies form the basis for numerous defense R&D projects in Israeli industry.

Sharan is interested in how emerging technologies still not integrated into everyday life could be exploited by terrorists, for example nanotechnology, robotics and brain research à la the Manchurian Candidate.

This interest has resulted in a series of recommendations for countermeasures and defense policies, as well as cooperation with the EU Security Research Program involving broad technology forecasting and future threats scenarios. The center has also advised the Pentagon on the potential threats of terrorism.

Sharan is not free to discuss his current work with Israeli defense agencies including MAFAT, the counterterrorism unit in the Prime Minister's Office (MALAL), the Ministry of Defense and the police.



If Dr. Sharan's work seems opaque, it's almost transparent compared to the quantum computing and encryption work being done by Dr. Julia Kempe, Prof. Oded Regev and Prof. Amnon Ta-Shma of the Blavatnik School of Computer Science, Raymond and Beverly Sackler Faculty of Exact Sciences. Their work is theoretical since a quantum computer doesn't exist yet, and it may take a decade for reality to catch up with theory.

The basic principle of quantum computing is that quantum properties can be used to represent and structure data and that quantum mechanisms can be devised and built to perform operations with this data.

Along with many national government and military funding agencies, Kempe and Regev are interested in quantum computing because, though still in its infancy, such a computer will revolutionize cryptanalysis.

"If this beast is built, it will break every cipher and code in use today," Kempe predicts of a radical new

KEEPING THE SKIES SAFE

Senior officers in the Israel Air Force (IAF) estimate that Dr. Yossi Leshem of the Department of Zoology, George. S. Wise Faculty of Life Sciences, has saved the State of Israel \$760 million and reduced collisions between IAF jets and birds by 76 percent since he started his TAU doctoral studies on bird migrations in 1984. In the decade before Israel's 1982 withdrawal from the Sinai Peninsula – which served as the main training zone of the IAF after 1967 – five aircraft were lost and one pilot killed due to birds, while 35 severe collisions cost over \$1 million each, he notes.

Israel, situated between the sea and desert, is a busy hub for birds on their migration route between summer nesting grounds in Europe and Asia, and winter territory in Africa. Twice a year, some 500 million migrating birds crowd into Israel's skies, to the delight of bird watchers – and the dismay of every pilot.

Leshem has flown with the migrating flocks in a motorized glider for 272 days, and sent up UAVs to monitor them – “the first time ever in the world that drones were used for a positive purpose.” The Russian-built radar station that Leshem has set up at Latrun, operated by Dr. Leonid Dinevich, a new immigrant scientist, provides pilots with real-time warning of the location of migrating flocks so that they can alter their course or change training flight plans.

At Leshem's behest, a second radar station was set up by the IAF in the Negev in 1992. Leshem hopes to establish a network of such bird migration monitoring radar stations across the Middle East.

“Migrating birds know no political boundaries,” he smiles.

The data are shared with scientists from Russia, the US, Turkey and Jordan, he notes. The success of TAU research applied by the IAF has become a case study taught in many air force academies around the globe.

“If you say safety is too costly, try an accident,” concludes the Bird Man of Israel.



Dr. Yossi Leshem

technology which, though hardly yet practical, is becoming too interesting to ignore.



In addition to defense-related research throughout the TAU campus, TAU is intensively engaged in preparing young scientists for the field, emphasizes Prof. Haim Wolfson, Dean of Exact Sciences.

“One of our great contributions to defense and national security is in training skilled manpower for these

industries, as well as taking in 85 students a year in the Israel Defense Forces Academic Reserve Program. This program, which trains extremely bright undergraduate students prior to their regular military service, supplies them with an open-minded academic approach, skill set, and expertise for key research posts in the army,” Wolfson says. “In addition, dozens of MSc and PhD students graduating each year from our labs form the backbone of the Israeli high-tech defense industry.”

TAU Vice President of Research and Development Ehud Gazit concludes: “We now understand that investing in our universities is crucial for Israel's economic development and national security. A thriving academia will result in a stronger and more secure State of Israel.”

Sometimes a revolution can take a form as innocuous as a roomful of plants – in this case a small laboratory filled with the fibrous kenaf plant. Professors Roni Aloni and Adi Avni together with Aloni's graduate student Jonathan Dayan of the Department of Plant Sciences, George S. Wise Faculty of Life Sciences, hope to replace trees with kenaf as a viable source of pulp for paper.

Billions of trees are cut down every year worldwide. Even if forests

are deactivated after a time so that the fibers don't grow very long. The TAU researchers revealed the sequence of the kenaf gene that deactivates the hormone. Once the gene is silenced, the gibberellin continues to be active resulting in a substantial increase in fiber yield and activity.

This process of genetic engineering is environmentally friendly and doesn't require the use of sprays. "Normally gibberellins are sprayed on the plants," says Dayan. "With

are required to convert wood into pulp. And unlike wood-based paper, which is bleached with chemicals that include chlorine, the production of kenaf paper doesn't require these chemicals.

Aloni says that the kenaf plant could also serve as a source for biofuel. He explains that while the outer fibers of kenaf are longer and therefore excellent for paper-making, the core fibers are shorter and less important for paper. "So we have suggested that companies use the outer fibers for paper and the core fibers to produce ethanol for biofuel," says Aloni.

Multinational companies like Gap and J.C. Penney are already using kenaf paper for their catalogues, and US farmers consider its fibers to be the best in the world. Until now,

Seeing the Forest for the Trees

The fast-growing kenaf plant could help save trees by providing pulp for the paper industry

are planted anew, they take decades to grow, and the natural habitats of many species of plants and animals are destroyed in the meantime.

The solution to this dilemma may lie in kenaf (*Hibiscus cannabinus*) – an exotic plant with origins in Africa and Asia that is now in the running as an alternative to wood pulp for the manufacture of paper and other products. Aloni, Avni and Dayan have discovered a way to grow kenaf so that it produces 50% more fibers per crop – and those fibers are longer and thicker than before. The technology has been patented by Ramot, TAU's technology transfer arm.

The major advantage of kenaf is that it takes only up to six months to grow before it is ready to be harvested for pulp. Trees, on the other hand, take 20 to 30 years to grow. Economically it may make sense to use kenaf, which is a far more renewable resource than trees.

The growth of kenaf fibers is facilitated by the hormone gibberellin, but in nature this hormone is usually

our new technology, we don't need to spray anything."

The production of kenaf paper is also more environmentally friendly than the manufacture of wood-based paper. Wood pulp factories are notorious for their pollution, a result of the massive amounts of energy that

kenaf paper has been more expensive than wood-based paper because it is rarely grown. But now that a kenaf crop has the potential to double the yield with higher quality fibers, the commercialization of kenaf as a wood alternative might be just around the corner, notes Aloni.



By Ilana Teitelbaum



Prof. Roni Aloni and Jonathan Dayan

The gated housing complexes that are springing up in Israel's major cities reflect the desire of a particular group – usually the affluent – to “barricade” itself off from the rest of the community,” says architect Hillel Schocken, former head of TAU's Azrieli School of Architecture. “The gated community turns it back on the city and its residents and denies them access to public space,” he says.

To Schocken this phenomenon breaches the basic right to human survival. “Human survival depends on social interaction,” says Schocken. “The key to building relationships depends on the extent to which our immediate environment facilitates chance encounters between strangers,” he says. “Access to public spaces is a major factor in the exercise of this human right.”

Schocken is the author of the original urban theory of “intimate anonymity,” according to which a successful city is “a human habitat allowing human beings to form relationships with others at various levels of intimacy while remaining entirely

The Piazza del Duomo in the center of Milan is a crossroads for large numbers of people heading in different directions



anonymous.” Public open spaces such as streets, squares and parks should be designed to promote human interaction. Their physical dimensions should be determined according to the number of people expected to pass through them randomly, he says.

Schocken illustrates his idea by comparing two sites in Milan, Italy: the Piazza del Duomo and the main plaza at the new University of Milano-Bicocca by Italian architect Vittorio Gregotti. The Piazza del Duomo is located in the center of town and is at a point of intersection for large numbers of people headed in different directions. The Bicocca Plaza on the other hand, is on the outskirts of town and attracts few random visitors. The Bicocca Plaza's large spaces, says Schocken, are therefore empty of people and life. The result is a campus that excludes “undesirable populations” from a community of identical people.

Spatial planning is never neutral

Schocken presented his position on gated communities at a conference of TAU's Azrieli School and Minerva Center for Human Rights of the Buchmann Faculty of Law. The discussion flowed from two basic premises: first, with regard to human rights, there is always a clear-cut distinction between those who enjoy human rights and those who are denied

Taking Refuge behind the Gates

them; and second, that the design of a space or architectural structure is never neutral, but rather reflects the power relations – gender, social, economic and cultural – in a given society, whether at the level of neighborhood, street, city block, or the city itself.

Dr. Neta Ziv, Director of the Elga Cegla Clinical Education Program at the Buchmann Faculty, said that gated communities represent the desire of a group of people to segregate itself into a separate sub-community. A gated community may be for a defined population determined by an admissions committee or a municipal project offering privileges to “locals,” she noted.

According to Ziv, critics of gated communities are condemning the trend toward voluntary segregation.

Hillel Schocken of TAU's Azrieli School of Architecture





The phenomenon of the gated residential community reflects an increasing polarization between rich and poor and the erosion of social solidarity in the West, finds a TAU conference on architecture and human rights. Those inside the gates generally want to prevent outsiders from entering, while those on the outside question the right of insiders to determine who may enter and who may not.

“In a healthy society it is not acceptable for the strong or for majority groups to ‘flee’ the problems afflicting the entire system and come up with private solutions,” said Ziv. “Gated communities are segregationist solutions with a strong emphasis on the private dimension. They call into question issues of social solidarity,” she said.

Walled cities not new

According to Schocken the roots of gated communities lie in the ancient walled cities of Israel and elsewhere; over the last fifty years the trend has spread to the West and to the US in particular. He notes that in the Netherlands an entire neighborhood for politicians was built to resemble an ancient fortress with a moat.

“In modern Israel gated commu-

nities began with the old ‘tower and stockade’ settlements and kibbutzim that were built as strongholds to withstand Arab attacks,” says Schocken. “Some claim, and with a certain degree of justice, that the separation fence is turning the entire State of Israel into a gated community,” he adds.

Schocken believes that Israel’s academic institutions are also forms of gated communities, albeit mainly for security reasons. He points to the examples of New York University in Manhattan and the Sorbonne in Paris – universities whose buildings are scattered throughout the city – as successful examples of universities “that enrich the fabric of communal life.”

Public spaces devoid of human life

The phenomenon is also spreading to the high-tech sector through

the proliferation of gated technology parks. In one example, the Malha Industrial Park in Jerusalem, which houses high-tech firms and private consultants and attorneys, the site’s public space is full of outdoor sculptures but “devoid of human life,” says Schocken. Another planned residential community in Tel Aviv will consist of two 30-storey towers for high-tech personnel only. “It’s not enough for them and their offspring to spend their daytime hours in an exclusive club; even after work and school they have to segregate themselves in an enclosed residential setting,” protests Schocken.

“This trend is the result of the erosion of social solidarity in the West, the growing polarization between rich and poor, the weakening of mutual responsibility, and the tendency of governments to transfer their responsibilities to nongovernmental organizations,” says Schocken. “The result is that people feel threatened and are seeking solutions that will improve their sense of personal security – within the warm enclave of the gated community.” He cautions that this is a false sense of security. “By gathering together in these pre-defined communities, people deprive both themselves and others of the right to public space. Their very affluence is depriving those less fortunate of the basic right to exist.”



The Biccoca Plaza, Milan, is on the outskirts of town and attracts few random visitors

By Talma Agron

Middle East Immersion

TAU's English-language master's program in Middle Eastern history brings together some of the best experts in the field with the firsthand experience of life behind the headlines



From left: Zhyi Zhu, Katya Salganick and Jason Hillman

Zhyi Zhu, an ambitious 25-year-old from Beijing, knows Chinese, English, Arabic and Hebrew, and is studying Persian. He is in the process of completing a master's degree in Middle Eastern history at TAU's School for Overseas Students, and he has big plans for the future: Zhu wants to get a job with China's foreign ministry and play a role in formulating Chinese policy on the Middle East.

Zhu hopes to expand Sino-Israeli ties and to get more students from the Far East to study in Israel, just as he is doing.

"This is a very good program, with a lot of expertise and knowledge from all aspects of this region," says Zhu, who had never met any Jews before beginning his studies at TAU in 2006. "If you want to know this region, Tel Aviv is a good place to live and a good place to learn about it."

The TAU master's in Middle Eastern history is a two-year program taught in English that enables students from around the globe to study with leading authorities in the field as well as experience life in the Middle East firsthand.

Students study Hebrew and Arabic, write a thesis and take compulsory seminars on the modern history of the Middle East, Islamic history and the history of the Ottoman Empire.

“It has become a very important program, well-known in the world,” says Prof. David Menashri, Dean of Special Programs. An internationally recognized expert on modern Iran who directs TAU’s Center for Iranian Studies, Menashri has been a visiting Fulbright scholar at Princeton and Cornell Universities and lectured in numerous universities worldwide.

Menashri is one of several lecturers at the overseas school who are also research fellows at TAU’s Moshe Dayan Center for Middle Eastern and African Studies, which the Philadelphia-based Foreign Policy and Research Institution has ranked in the top five percent of the world’s think tanks. Some of the center’s teachers and alumni are actively involved in briefing government leaders, making policy and conducting diplomatic negotiations, and include former ambassadors to Jordan, Egypt, Turkey and the United States.

Middle East’s largest archive

The lecturers’ affiliation with the Dayan Center also means they have easy access to its extensive database and archive, which include the region’s largest collection of press and journal clippings in Middle Eastern languages. In addition, the center publishes particularly high-quality master’s theses coming out of the overseas master’s program, says Dr. Meir Litvak, a Dayan Center research fellow who also teaches in the program.

Dr. Uzi Rabi, who teaches about Iran and the Persian Gulf and is the incoming chairperson of TAU’s Department of Middle Eastern and African History, says that “studying the Middle East at TAU is vastly different from learning about the region from afar.

“Being here in Israel, where you can feel the pulse of the Middle East from up close, is something unique that greatly enriches the stu-

dents,” says Rabi, who saw the difference firsthand when he taught at an American university as a visiting professor in 2004-05.

Behind the headlines

The master’s program can be particularly useful for students interested in pursuing careers in government, diplomacy, international business, academia or the media – although some have other fields in mind, like 26-year-old Alon Lyons from Toronto, who plans to work as a tour guide in Israel. The studies help the master’s students – of whom there will be 40 next academic year – understand the deeper background behind the day’s breaking news, says Rabi.

For instance, while newspapers talk about international sanctions on Iran in an effort to keep Tehran from pursuing its nuclear program, the master’s students delve deeper than the present-day fracas. They examine the history of Iran and the difference between the Islamic republic and the pre-revolutionary leadership, “and then we try to understand what’s happening now within the greater historical and cultural context,” says Rabi.

Beyond the classroom

From the vantage point of Tel Aviv, where the city’s bars and dance clubs rub up against the ancient Jaffa port, students can grasp the mix of past and present that helps make the Middle East such an intriguing and contradictory region.

TAU’s location in the center of the country also makes it easy to get a closer look at the reality that hides behind terms like “peace talks” and “the territories” that are so readily bandied about. The overseas school offers guided trips to the Negev, the Galilee and Golan, and Jerusalem, allowing students to see the region’s complex human and geographical mosaic with their own eyes.

Master’s student Katya Salganick, 26, who plans to study international peace and conflict in law school in the United States, is convinced that firsthand exposure to other cultures is truly necessary. The San Diego resident’s time in Israel has made her more aware of how she views others and has led her to recognize that “religion and culture are a little more complicated than what they’re made out to be.”

Grappling with complex issues

A trip to the Golan Heights made Jason Hillman, a Lebanese Christian from Nebraska who began the master’s program in 2006, realize that while politicians may blithely talk about Israeli-Syrian peace, returning the Golan is not as easy as it might sound.

“I realize now that the academic world and the actual real world are not always congruent,” says Hillman, 24, who is considering working as a research assistant in Egypt next year. “When we talk about border delineation in the Israeli-Arab conflict, this involves real people, and real populations are going to have to move.

“I was up in the Golan recently, and you see these towns that are established, and nobody looks like they’re going to go anywhere, but they will have to if this peace deal is going to be done,” he says. “And you just have to wonder after a while: Is it really going to happen? It will take some serious changes on the ground.”

Hillman, who studied history as an undergraduate in Iowa and the Netherlands and spent last summer in Egypt studying Arabic, notes that for all that his courses and his reading have taught him, book learning is inherently limited.

“I’ve been to the territories, seen the complexity of everything, and it’s not so black and white to me anymore,” he says. “There’s a lot of gray area in Israel, and I think you only see that once you come here.”

Birds do it, bees do it, but mushroom stony corals do it both ways, according to TAU ecologist Prof. Yossi Loya. The corals switch sexes repeatedly in order to maximize their reproductive capacity throughout their lives.

The findings were the result of a study by Loya and his Japanese colleague Prof. Kazuhiko Sakai following their discovery in 2004 that mushroom corals in the reefs of Okinawa, Japan, had amazing survival capabilities. In the summer of 1998, some 85% of other coral species in the region had been destroyed by

male to female and vice versa. During the fourth and final year of the study, 80% of the specimens reverted to their original sex.

The bi-directional sex changes help the species maximize its potential number of offspring, believes Loya. “This was a major discovery for ecology and evolutionary science,” he says. “During the last 40 years, the reproductive cycles of over 500 species of corals have been studied, but the sex change phenomenon was not discovered until now.”

The scientists found a correlation

Loya compares the sex change phenomenon in mushroom corals to that of certain types of plants, for example orchids, which change sex when switched from shady (stressed) to sunny (favorable) areas and vice versa. “This is an important study for understanding sex change in general in both flora and fauna in response to environmental constraints,” he says. He further suggests that long-term studies of sex-changing animals will show that they employ a greater variety of sex-allocation strategies than has previously been recognized.

The Amazing Sex Life of Corals

In a breakthrough for coral research, a TAU scientist found that repeated sex changes of the mushroom stony coral allow it to adapt to harsh environmental conditions

Prof. Yossi Loya holding one of the corals



between a coral’s size and weight and its sexual identity. Apparently, the corals only switch sexes until they reach a particular size, and from then on they remain female for the rest of their lives. This allows the mushroom coral to conserve energy resources because the female reproductive system requires far more energy than the male one, says Loya. “A middle-sized coral on a growth spurt apparently requires far too much energy to maintain itself as female. Therefore, to continue growing, it switches to the male sex to conserve energy until its next reproductive season, when it turns back into a female. Mushroom corals appear to change their sex repeatedly until they reach a size where their growth rate decreases significantly. At this point they can afford the energy needed to remain female, he explains.



The research was published in the British journal, *Proceedings of the Royal Society of Biological Science*.

The mushroom stony coral during the release of eggs that takes place after the full moon from June to August

Dimming the Sun's Rays

Human activity in urban areas blocks solar radiation, say TAU scientists

A direct correlation between the extent of people's activity in urban areas and the intensity of solar radiation has been found by TAU scientists Prof. Pinhas Alpert and Dr. Pavel Kishcha of the Department of Geophysics and Planetary Sciences, Raymond and Beverly Sackler Faculty of Exact Sciences.

While studying the phenomenon known as global dimming – a decrease over the years in the amount of radiation reaching the Earth from the sun caused by the accumulation of aerosols in the atmosphere from pollution – the scientists discovered that this was a local, rather than global trend, characteristic of urban areas.

The innovation in their research, which was published in *Geophysical Research Letters*, lies in the direct rela-

tionship established between the human factor and the process of global dimming.

The researchers examined the level of radiation penetrating the atmosphere at 317 measurement points around the world. Data gathered in large cities, including Tel Aviv, Shanghai, Hong Kong, Cairo and Caracas, showed that solar intensity was 8% lower there than in rural areas. "This illustrates the impact of human pursuits on the Earth's climate and the fact that we are moving further away from our natural environment," notes Alpert. However, he clarified that the dimming has only been observed in certain regions, covering about 10% of the Earth's total area.

Whereas experts have argued that global dimming may help offset global



warming, Alpert, who heads TAU's Porter School of Environmental Studies, believes that the reduction in the intensity of solar radiation is not sufficient to affect the Earth's warming or to keep ice caps from melting. He believes, rather, that the general rise in temperatures can be expected to continue and notes one negative aspect of global dimming: a drop in land surface evaporation in urban areas that may result in less rainfall.

Common sleeping pills help people fall asleep at night but can result in poor functioning and grogginess during waking hours, and an increased risk of memory blackouts, falls and driving accidents. Now, a unique treatment that can both enhance quality of sleep and improve daytime functioning is being brought to the marketplace based on the research of a TAU scientist.

The pill, Circadin, which was developed by Prof. Nava Zisapel of the Department of Neurobiochemistry, George S. Wise Faculty of Life Sciences, and marketed globally by the multinational pharmaceuticals companies H. Lundbeck, Nycomed and Teva, is the first treatment of its kind to be granted marketing approval by the European Union for patients age 55 years or older.

The drug works through the pro-

Targeting Quality of Sleep



A sleeping pill with double action – improving both quality of sleep and daytime functioning – has been developed by a TAU scientist

longed release of melatonin, a naturally occurring hormone that plays a pivotal role in the regulation of a person's circadian rhythm, the 24-hour activity cycle that includes sleep. Melatonin is

continuously secreted through the night and acts as a "signal of darkness" in humans. However, the natural production of melatonin declines in people age 55 or over. The TAU-developed drug corrects this deficiency, mimicking the physiological pattern of melatonin excretion during the night and helping synchronize the biological clock with the day/night cycle.

The new drug improves quality of sleep without impairing morning alertness, driving performance and memory, notes Zisapel. "Moreover, whereas traditional treatments can cause drug dependency, Circadin has no discernible withdrawal symptoms," she notes.

The EU approval concludes 15 years of basic preclinical and clinical research. TAU will receive royalties on the sales of the product through its technology transfer arm, Ramot.



By Michael Green

Building Trust Across the Israeli-Arab Divide

A TAU study examines how Jordanian and Israeli business partners build trust despite former enmities

What makes people trust each other? This is a vexing question at the best of times, but much more so when dealing with former enemies in the Middle East. Yet it was trust – sometimes pushed to its limits – that kept the politically-charged environment of a joint Jewish-Arab business venture from the brink of collapse, according to an award-winning TAU study.

The study, which was published in the *American Sociological Review* and won the Clifford Geertz Prize for the best article in cultural sociology for 2008, was conducted by a team of TAU researchers led by Prof. Nissim Mizrachi. They explored the trust relations between Israeli and Jordanian managers at the Jordanian plants of the Israeli-owned textile company, GlobeWear. Due to the outbreak of

the Second Intifada during the course of the research, the researchers were able to expand their aims to include an examination of how trust fluctuates in direct response to political unrest.

“Trust, always tenuous in multinational corporations, posed formidable challenges to the fragile relationship between former enemies,” says Mizrachi, a member of the Department of Sociology and Anthropology, Gordon Faculty of Social Sciences.

Calculative vs. normative trust

In the early days of the business venture, during a period of relative calm in the region, both nationalities conformed to cultural stereotypes. The Israelis’ trust-building was based on what sociologists call “calculative trust” – a rational, professional ap-

proach associated with western cultures. For the Israelis, trust was based solely on the Jordanians’ performance and whether they met production schedules.

In contrast, their Arab colleagues displayed “normative trust” – typical of more traditional societies and based on honor, informality, and a blurred boundary between work and play. This included inviting the Israelis to family celebrations and touring the country with them. For the Jordanian plant manager E’yad, who was interviewed for the study, trust is heartfelt: “When I offer my friendship and hospitality, I have strong feelings for you, and my heart tells me to trust you. Sometimes I know that I shouldn’t, but nevertheless I trust my Israeli friends.”

Reversal of roles

These bonds were put to the test midway through the study, however, with the outbreak of the Second Intifada in October 2000. According to Mizrachi, the roles of the Israeli and Jordanians became “completely reversed.” The Israeli managers’ three-hour drive to the factory in northern Jordan became a perilous task due to heightened tensions in the region, and they were forced to transfer many of their responsibilities to their colleagues across the border. “The Israelis basically lost control over the production process. It was the Jordanians who now talked in terms of efficiency,” says Mizrachi.

The Israelis turned to forms of normative trust as their power was devolved to the Jordanians whom they now depended upon for both economic and personal security. “The Israelis played the role of the Arabs, relying on the values of honor, friendship and tradition,” explains Mizrachi.

As for the Jordanians, they went from extending hospitality to the Israelis to behaving much more for-

mally and recoiling from the personal friendships they had cultivated during the period of “normalization,” effectively mimicking their Israeli counterparts’ calculative trust. The Jordanians’ approach became “purely professional, just about business,” says Mizrachi.

Rising tensions

The previously warm relations the Jordanians cultivated with their Israeli counterparts rapidly became a

social liability as growing anger in the Arab world led to calls for the plants to be closed. Staff members were expelled from the Jordanian Engineers Association and one manager, Shaher, living in a Palestinian refugee camp, was urged to quit his job by family and neighbors. Facing rising pressure against normalization with Israel, calculative trust became the Jordanians’ tool for depoliticizing their work.

According to Mizrachi, the TAU study challenges widely held theoretic-

cal assumptions about trust behavior. The study showed that instead of conforming to cultural stereotypes, the multi-ethnic staff at GlobeWear actively switched between modes of trust according to the needs of the situation. That both the Jordanians and Israelis could shift between forms of trust and neither side was tied to cultural modes demonstrates the study’s finding that individuals can pull out different types of trust from their cultural toolkit.

Amdocs, Teva, Ormat and Israel Chemicals, four of the largest multinational enterprises in Israel, are among the fastest growing in the world, grabbing the slot filled until recently by US and Japanese companies.

The finding appears in a comparative international study of the economic and business activity of Israeli companies, conducted by TAU’s Faculty of Management—Leon Recanati Graduate School of Business Administration, the Israel Manufacturers Association, the Hebrew University of Jerusalem and Columbia University.

The goal of the survey is to monitor the international business activity of firms from countries defined as “emerging economies,” examine their integration in the globalization process and provide researchers and policy makers in participating countries with comparative findings. Data were initially published on Russia, Slovenia, Brazil and Israel and will soon be available on India, South Korea and Singapore.

Prof. Seev Hirsch of TAU’s Faculty of Management says that the survey, which he coordinates, “makes it possible to evaluate the contribution of local companies to the globalization process, for example, the benefit of international investments by compa-

nies such as Teva or Amdocs to the economy of the parent country and not just to stockholders.”

Only 15 firms were included in the survey. Combined, these firms employed 63,000 persons abroad, their international sales exceeded \$21 billion and their foreign held assets reached \$7.5 billion. Four firms, Amdocs, Teva, Ormat and Israel

a change in this trend with the international activity of companies from other countries, including Israel, expanding considerably. The findings make it possible to evaluate the involvement of Israeli firms in this fascinating process.”

The fifteen Israeli companies that were part of the survey included Strauss-Elite, Ness Technologies, Elbit

Bucking a Global Trend

Israeli multinationals are growing at a faster rate than the world’s 25 largest companies, finds an international survey conducted jointly with TAU



Chemicals, controlled 77% of all foreign assets held by the 15 firms included in the study.

Until recently, Hirsch says, “it was mainly companies from industrialized countries that participated in the globalization process, headed by the US, EU countries and Japan,” says Hirsch. “In recent times, there’s been

and Delta Galil. Most of the companies are public corporations who issued at least part of their share capital in stock exchanges abroad, mainly on the NASDAQ index. Most of their senior executives are Israelis. These firms comprise 305 branches, mainly in Europe and North America, and are gradually spreading to Asia as well.

Researchers at TAU's Raymond and Beverly Sackler School of Physics and Astronomy, Raymond and Beverly Sackler Faculty of Exact Sciences, are bringing the mysteries of the universe down to earth. Instead of using astronomy to learn about densely packed neutron stars – the remains of massive stars that have exploded – they are studying the components of ordinary

The research also found that when it comes to pairing off in the nucleus, like does not seek like. Protons and neutrons create the most prevalent pairs, leaving proton-proton and neutron-neutron pairs behind in the dust.

“It shows, for the first time in a very clear and unambiguous way, the fact that the rapidly-moving nu-

of how some of the nucleons get to be so fast.

“We’ve known for a long time that there are nucleons that move very quickly in the nucleus. It’s a kind of puzzle in nuclear physics, how these fast nucleons acquire their high velocity,” said Piasetzky. “The experiments show that the high-velocity nucleons in nuclei are due to the short-range correlation,” he said, referring to the brief pairing between the nucleons. “The fact that two get close is the main reason for achieving high-momentum nucleons in nuclei.”

These findings help scientists understand not only the atomic nuclei they are studying in the lab, but also what remains of massive stars that have exploded, which they cannot access quite as readily.

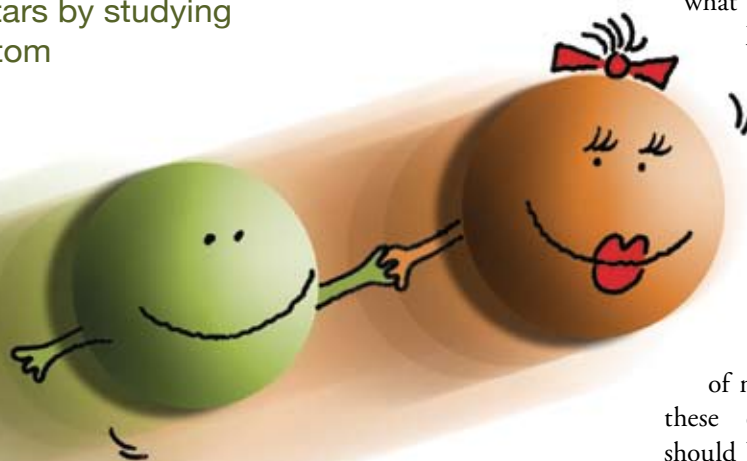
“When the nucleons are close, the matter density is high, comparable to the matter density in the core of neutron stars,” said Piasetzky. “We can learn about the interaction of nucleons at high density from these experiments. Our findings should be relevant for understanding neutron stars that we cannot approach and study directly.”

The nuclear matter found in the core of neutron stars is so condensed that if you could put it in a matchbox, it would weigh about as much as the Eiffel Tower, said Ran Shneor, a TAU doctoral student involved in conducting the experiment and analyzing the results, under Piasetzky’s supervision.

“Our research helps explain how matter behaves in neutron stars and how, in turn, these stars function,” said Shneor. He said it could also help scientists resolve yet another mystery of the heavens: why some stars become neutron stars while others turn into black holes.

Reaching for the Neutron Stars

TAU physicists are learning about the remains of exploded stars by studying the ordinary atom



atomic nuclei, which approximate the density found in the core of a neutron star when the protons and neutrons briefly come together.

Like bumper cars that collide and rapidly bounce back apart, protons and neutrons in the nucleus – known collectively as nucleons – briefly pair up and split apart, a process that results in nucleons zooming around the nucleus at high velocity. Prof. Eli Piasetzky, along with colleagues from TAU and 30 other institutions, found a way to study these pairs in an experiment that was recently published in *Science* magazine.

cleons in nuclei are coming in pairs,” said Piasetzky. “And they’re coming mainly in proton-neutron pairs.”

TAU researchers helped design the experiment and built some of the detectors – a type of camera used to capture the protons and neutrons. The detectors were shipped to the Thomas Jefferson National Accelerator Facility in Virginia where the experiment, which was based on a theoretical prediction by TAU’s Prof. Leonid Frankfurt and Penn State’s Prof. Mark Strikman, took place.

The research has helped physicists resolve the longstanding conundrum



collisions that take place every second in the collider. “There is no storage disk space in the world big enough to hold all the data, making the trigger system a key component in the success of the LHC,” says Etzion.

The collider, which is the world’s most powerful atom-smasher, was designed to explore the tiniest particles, to improve our understanding of the fundamental forces and interactions between particles of matter, and to explore new physics signals beyond current knowledge. “For many years our understanding of the universe was limited by the energy acceleration reached by previous particle accelerators,” says Etzion. “The LHC’s increased acceleration will bring us closer to reenacting the Big Bang, the colossal explosion accepted as the origin of the universe.”

The Israeli scientists were part of one of the greatest collaborative efforts ever attempted in the physical sciences – the result of more than a decade of work and \$8 billion in funding – which included over 6,000 scientists from over 80 countries, and half of the world’s particle physics researchers.

It will take much work to analyze the data collected by the LHC’s particle detectors, so producing scientific results will take months and in some cases years. Nonetheless, the ultimate hope is that the findings will help explain the foundations of particle physics and shed new light on the basic forces and building blocks of nature.



The big wheel of the ATLAS detector, one of six built through a Japanese-Chinese-Israeli collaboration.

The TAU team at CERN: From left: Dr. Yan Benhammou, Dr. Jony Ginzburg, Dr. Meny Ben-Moshe and Prof. Erez Etzion



TAU Makes Big Bang

Scientists from Tel Aviv University made a huge contribution to the success of the experiment to simulate the Big Bang that took place at the Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN) in Switzerland recently. A team of seven physicists and 12 graduate students from the Raymond and Beverly Sackler School of Physics and Astronomy, led by

Prof. Erez Etzion, has been working together with scientists from other Israeli universities for the past ten years as part of the ATLAS team. The team has designed and constructed trigger chambers – which quickly measure the paths of particles – for the giant detector. These critical pieces of the detector determine what on-line data to record and what data to discard from the 1 billion subatomic

 Kiran Pasricha, Deputy Director General, Confederation of Indian Industry, and Gary Sussman, TAU Vice President

Passage to India

A TAU workshop plays a key role in strengthening India-Israel economic relations

TAU's Harold Hartog School of Government and Policy joined forces with the Confederation of Indian Industry to hold a two-day workshop in New Delhi aimed at strengthening trade ties between India and Israel. Leading Israeli and Indian government officials, diplomats, academics and businesspeople gave presentations at the workshop on bilateral cooperation in high technology, water and waste management, medicine and health care, academia, telecommunications and life sciences, among other sectors.

Stanley Bergman, CEO and Chair of Henry Schein Inc. and Chairman of the Board of the Hartog School, expressed hope that the forum would become an annual event.



Stanley Bergman (left) and Indian Minister of State for Industry Ashwani Kumar

TAU Vice President Dr. Gary Sussman, co-organizer of the workshop, envisages the gathering as the precursor to greater engagement of TAU with India.

The forum was addressed by Indian Minister of State for Industry Ashwani Kumar, who said that India and Israel have been on the same side of the global order for quite some time, even before formal diplomatic ties were established in 1992. Noting that both countries celebrate democratic traditions and pluralism, he said the forum would strengthen bilateral collaborative efforts of the two growing economies.

Israeli ambassador to India Mark Sofer said the Israeli delegation to the forum was the highest ranking of its kind to visit India. He noted that bilateral trade between the two countries, which is currently at \$3.5 billion, could increase to \$12.5 billion in four years should the countries enter a financial trade agreement. India is the second biggest purchaser of defense equipment from Israel, added Sofer.

Mutual admiration

Sofer said that one of the reasons behind the improvement in relations between the two countries is the fact that admiration in India for Israeli advances is matched only by the awe in Israel for all things Indian – culture, mentality, depth of thought and modernization.

Rajendra Abhyankar, former Indian Ambassador to the EU, said that promising areas of cooperation for India and Israel are clean technologies, defense, space applications, software development, pharmacology, and medical devices, among others.

Academic exchange

Prof. Nili Cohen of the Buchmann Faculty of Law, a former TAU Rector, emphasized the need to set up a bilateral fund to promote the exchange of academics and students between the two countries.

This was reiterated by Kapil Sibal, Indian Minister for Science and Technology and Earth Sciences, who promised ministry support for educa-

tional initiatives and PhD and post-doctoral studies. He urged Indian and Israeli entrepreneurs to work jointly to develop suitable and affordable technologies for the Indian market.

Prof. Gadi Ariav, Director of the Max Perlman Center for Global Business at TAU's Faculty of Management—



Leon Recanati Graduate School of Business Administration, said Israel's strength in production innovation and India's strength in process innovation would bring formidable results when combined.

The forum was co-chaired by Stanley Bergman; Aharon Fogel, Chair of the Board, Ness Technology and Migdal Insurance; Jamshyd N. Godrej, Chairman and Managing Director, Godrej & Boyce Manufacturing Ltd.; and Tarun Das, Chief Mentor, Confederation of Indian Industry. Also attending was Amos Shapira, President and CEO of Cellcom and President of the Israeli Friends Association of TAU.

The event was supported by the Pears Foundation, Gilad Hayeem, Berwin Leighton Paisner LLP, the Aimwell Trust and the Godrej Group.

Professorship Launched

The Department of South East Asian Studies at TAU's Entin Faculty of Humanities has signed an agreement with the Indian Embassy to establish a visiting professorship in Indian studies at TAU. The professorship will bring an eminent professor from India each year to give courses in the humanities and social sciences. Department chair Prof. Zvika Serper said that Indian studies were increasingly popular at TAU and noted that the university has the largest number of students learning Hindi and Sanskrit in Israel.

new faculty recruit

Dr. Saharon Rosset, a young faculty member at TAU's Raymond and Beverly Sackler School of Mathematical Sciences, has two passions: statistics and genetics. He began combining the two while working at the IBM Research Center in New York, but the academic freedom he now enjoys at TAU is allowing him to explore the field in new and exciting ways.

His study of ancient human migration patterns led to the discovery that the human race was divided into separate groups within Africa for as long as 100,000 years. The reasons for the separation are climate change, reduction in populations and harsh conditions. Rosset crunched numbers and did the essential statistical analysis of African DNA for the study together with Doron Behar of the Rambam Medical Center.

Rosset says the study, which was carried out within the framework of the National Geographic Society's Genographic Project, a worldwide study of human genetic diversity,

provides insight into the demographic history of early humans before they moved out of Africa. "These early human populations were small and isolated from each other for many tens of thousands of years," he says.

Researchers believe that about 60,000 years ago, modern humans started their epic journeys to populate

Mining Both Worlds

A new faculty member at the Department of Statistics is using his expertise in data mining and genetics to predict how the ancient world was populated



Dr. Saharon Rosset

the world. Until now, this time period has been the primary focus of anthropological genetic research; however, relatively little was known about the demographic history of our species over the previous 140,000 years in Africa. The current study returns the focus to Africa and thereby refines the understanding of early modern *Homo sapiens* history, says Rosset.

Second generation in TAU

Rosset, who was born in the United States but grew up in Israel, is TAU trained: he completed his bachelor's

degree in mathematics and master's degree in statistics at TAU before going on to PhD studies at Stanford University. His father is a recently retired mathematics professor from TAU.

Rosset says that when he and his wife made a decision to return to Israel, he also decided on a career path that would lead him from industry to

academia. "It was a natural step for me to join TAU," he says.

Now, at the end of his first year at TAU, Rosset says he enjoys teaching students and is proud to be part of a school of mathematical sciences that is one of the top twenty in the world. The two-time winner of the prestigious KKD Data Mining Cup says he is now looking forward to exploring problems in genetics that combine interesting questions about human history with statistical challenges. Among these is a study of the genetic ancestry of the Jewish Diaspora.

ART GOES DIGITAL



Reuven Rubin, Tiberias, 1926.

TAU's collection of 130,000 slides of visual works of art from prehistoric to postmodern times – the largest in Israel – is now being digitized through the Fred Simmons, Trustee, Digitization Arts Project at the Department of Art History, Yolanda and David Katz Faculty of the Arts. The project, headed by Jeanne Palevski, will en-

able students and faculty members to access online images of works of art via the internet. It will also be used to help faculty members build course materials.

Dean of Arts Hannah Naveh says, "The digitization of visual materials greatly enhances the learning experience and is therefore a very high priority of the Katz Faculty."

The project was established by Fred Simmons of Los Angeles, a lawyer by profession and a poet and playwright by avocation whose support for TAU includes projects in biblical archaeology, poetry, theater arts and film.

The computational aspect of the project is supervised by Rose Feldman, head of the computer team at the Katz Faculty.

Boost for Biophysics

The Raymond and Beverly Sackler Institute of Biophysics, Raymond and Beverly Sackler Faculty of Exact Sciences, received a donation toward the purchase of a nuclear magnetic resonance (NMR) instrument from the Raymond and Beverly Sackler Foundation. The NMR spectrometer will be used to study the structure and dynamics of proteins and other complex biological systems that will benefit the pharmaceutical industry, medical community and structural biologists. The instrument will be supervised by Head of the Sackler Biophysics Institute Prof. Yoram Cohen, together with Dr. Amir Goldbourt of the Raymond and Beverly Sackler School of Chemistry.

Elie Wiesel Joins Roth Institute's Public Council

Nobel Peace laureate Prof. Elie Wiesel was appointed Honorary President of the Public Council of the Roth Institute for the Study of Contemporary Anti-Semitism and Racism, joining 19



Prof. Dina Porat and Prof. Elie Wiesel

other members including human rights lawyer and Canadian parliamentarian Prof. Irwin Cottler and TAU Governor

and honorary doctor Dan David. Prof. Wiesel, a leading spokesman against anti-Semitism, was awarded a TAU honorary doctorate at the 2008 Board of Governors meeting.

In a separate event, the Roth Institute celebrated its 10th anniversary, as well as the 15th anniversary of TAU's influential publication, *Anti-Semitism Worldwide*. The event also concluded the Institute's 9th International Seminar, a biannual workshop that brings together experts in anti-Semitism from around the world.

Addressing the event was Isaac Herzog, Minister of Welfare and Social Services and Minister of the Diaspora, Society and the Fight against Anti-Semitism. He lauded the Roth Institute for its pivotal role in combating anti-Semitism and said the Israeli government is active in formulating international agreements and treaties and attempting to introduce the topic of anti-Semitism into countries' study curricula. "There are far too many people who remain ignorant of the facts," said Herzog, who recalled the historic moment in the 1970s when his father, Chaim Herzog, then Israeli ambassador to the UN, tore up the notorious UN resolution equating Zionism with racism.

Head of the Institute, Prof. Dina Porat, gave a lecture on "Anti-Semitism as a Worldview Revisited." In her lecture, Porat spoke of the strong impact of negative depictions of Jewish protagonists in novels by great authors.

As a measure of its research excellence, TAU was ranked 21st place in the world by *The Times Higher Education Survey* in the number of article citations per faculty member, tying for the spot with Yale University and the University of Geneva, Switzerland. Citations, evaluated to take into account the size of an institution, are the best understood and most widely accepted

Getting Ahead in the World

measure of research impact.

In a separate survey, the university was cited as the most sought after institution in Israel, with 11,514 admissions applications, out of which 4,421 were accepted.



OUTSTANDING RESEARCH POTENTIAL AWARDED



Karen Avraham

Prof. Karen Avraham of the Department of Human Molecular Genetics and Biochemistry, Sackler Faculty of Medicine, received the Michael Bruno Memorial Award for

young, promising researchers from the Rothschild Foundation for her pioneering work in the genetics of hearing disorders. Her research has led to the identification of several genes responsible for human hearing loss. In the past, Avraham's scientific collaboration with Palestinian professor Moien Kanaan of Bethlehem University led to the establishment of a graduate program in genomics for Palestinian students at TAU.

Prizewinning Student Essays Focus on Danish-Israeli ties

Four TAU graduate students participated in a ten-day study tour of Denmark as part of the prizes they won in an essay competition sponsored by the Danish Embassy in Israel. The competition, entitled "How Small Countries Globalize: Denmark and Israel," was open to students at TAU's Gordon Faculty of Social Sciences and was run in cooperation with faculty Dean Noah Lewin-Epstein.

In their essays, the students – Olena Bagno, Shay Gurion, Dan Sobovitz and Einat Weiss – compared Israel and Denmark, focusing on the question of how small countries handle the challenges posed by globalization.

Then Danish ambassador to Israel, A. Carsten Damsgaard, said at the award ceremony that Denmark and Israel were both leading small

economies in science and technology. He said the prize represented an opportunity for Israeli and Danish students to interact and hoped the TAU students would become goodwill ambassadors for Denmark in Israel.



In his prizewinning essay, Dan Sobovitz wrote: "Both Denmark and Israel have proven throughout history how passionate and uncompromising we are in standing up to defend our values from external threats. Nevertheless, being small makes us weak in the global village and obliges us to support one another."

From left: Dan Sobovitz, Einat Weiss, Ambassador A. Carsten Damsgaard, Olena Bagno and Shay Gurion

Prize Recognizes Excellence in Brain Research

Anat Frydman-Marom, a PhD student in the laboratory of Prof. Ehud Gazit of the Department of Molecular Microbiology and Biotechnology at TAU's George S. Wise Faculty of Life Sciences, has won a prize from the Swiss Empiris Foundation for her contribution to Alzheimer's disease research.

Working together with Prof. Gazit and his team, Frydman-Marom discovered a method of inhibiting the defective protein folding mechanism

that causes neuronal cell destruction in Alzheimer's disease. The team successfully used the method to improve cognitive functioning in laboratory models with Alzheimer's genes.

The research was cited as one of the 100 leading academ-



ic innovations in the 2008 Better World Report on technology transfer by the Association of University Technology Managers and was published in *Angewandte Chemie*, one of the leading journals in chemistry.

Frydman-Marom has won numerous prizes including scholarships from TAU's Center for Nanoscience and Nanotechnology, Marian Gertner Institute for Medical Nanosystems, Joan and Jaime Constantiner Institute for Molecular Genetics and Manna Center for Plant Sciences.

Anat Frydman-Marom



community

A NEW TRACK TO SUCCESS

A highly successful admissions program for students from outlying cities and towns in Israel has been expanded from the TAU law school to the entire university. The Legacy Heritage Scholars Program takes promising students from the country's geographic periphery and admits them to academic studies based solely on their high school performance rather than on the results of nationwide psychometric tests.

Regular university admissions criteria place students from Israel's economically distressed communities at a disadvantage in comparison with students from the wealthier central region of the country. By contrast, the Legacy Heritage Scholars Program recognizes pupils' achievements relative to peers in their own high schools.

The program offers hope and incentive to students whose chance of gaining admission to university, and to the most sought after departments in particular, would otherwise be low. As such, the program sends a clear message: pupils who excel scholastically despite an unsupportive environment should be nurtured through the higher education system.

The periphery admissions program was first established in 2005 at TAU's

Buchmann Faculty of Law by then Dean Prof. Ariel Porat. Since then several of the students have ranked among the top in their class, notes Porat.

The majority of the students receive full living and tuition scholarships as well as tutoring and psychological and career counseling. According to TAU Academic Secretary Sara Kinel, students in the program represent a cross-section of Israeli society, including minorities, the ultra-Orthodox and new immigrants. "The goal of this program is not only to admit students to university, but to guide them through their studies and ensure their future success by helping them find work," says Kinel.

Despite this, she notes that the program has strict requirements: students must achieve a higher than average GPA each year, take courses in Jewish heritage and take part in social involvement activities. "We expect no less of them than of their fellow students," says Kinel. "We monitor them and support them so they don't fall by the wayside. Most of them succeed, and some prove to be outstanding students."

The program is funded in part by TAU's Amiram Sivan Center for Community Initiative.

people

Pharmaceutical delegation

A high profile delegation from the global pharmaceutical company Bristol Myers Squibb was hosted at TAU. Dr. Elliott Sigal, Executive Vice President, Chief Scientific Officer and President of R&D; and Dr. Jeremy Levin, Senior Vice President of External Science, Technology and Licensing, were greeted by TAU President Zvi Galil and heard presentations on technology transfer at TAU.

Santiago Calatrava Lectures at TAU



TAU Honorary Doctor Dr. Santiago Calatrava SA, who designed the recently completed "Bridge of Strings" in Jerusalem, delivered a lecture on his working methods to a packed audience at TAU's Azrieli School of Architecture. He also gave a presentation to students while at the school. The Spanish-born architect, artist, sculptor and engineer created the Athens Olympic Sports Complex and was designated by *Time Magazine* as one of the 100 most influential people in the world.

Prof. Ehud Gazit Appointed Vice President for Research and Development



Professor of Biotechnology at the Department of Molecular Microbiology and Biotechnology, George S. Wise Faculty of Life Sciences, Ehud Gazit, has been appointed Vice President for Research and Development. Prof. Gazit is also a member of the managing board of the TAU Center for Nanoscience and Nanotechnology. He has been a faculty member at TAU since 2000, after completing his postdoctoral studies at MIT, where he still holds a visiting appointment.

Gazit is the recipient of numerous awards and grants, and his technology transfer achievement in the area of Alzheimer's disease was recently acknowledged in the Association of University Technology Managers' 2008 list of top 100 innovations worldwide. His research is directed toward the study of protein folding, misfolding and self-assembly.

Among other international roles, Prof. Gazit serves as a Strategic Research Program (SRP) Leader of the EU Nano2Life Network of Excellence. He is on the editorial board of several journals including the *Journal of Bionanoscience*, *Nanomedicine*, *PLoS ONE*, *Amyloid* and *Current Chemical Biology*.

Prof. Thalma Lobel Elected to Executive Council



Prof. Thalma Lobel of TAU's Department of Psychology, Gershon H. Gordon Faculty of Social Sciences, has been elected a member of the University's Executive Council. Prof. Lobel served as Chairperson of the Psychology Department and is a former Dean of Students who took charge of many social involvement programs aimed at reducing the gaps in Israeli society.

Honors: Lifetime Achievement Award for Environmental Protection, **Prof. Amotz Zahavi** and **Dr. Yossi Leshem**, Life Sciences • ERC Advanced Grant 2008, **Prof. Abraham Nitzan** and **Prof. Noga Alon**, Exact Sciences • ECS Henry B. Linford Award for Distinguished Teaching, **Prof. (Emeritus) Eliezer Gileadi**, Exact Sciences • 2006 Rosabeth Moss Kanter International Award for Research Excellence in Families and Work, **Prof. Moshe Semyonov**, Social Sciences • ISH Stevo Julius Award supported by Novartis for 2008, **Prof. Talma Rosenthal**, Medicine • Bialik Prize for significant accomplishments in Hebrew literature, **Prof. David Vital**, Humanities

EMET Prizes

Prof. Joshua Jortner, Raymond and Beverly Sackler School of Chemistry, Raymond and Beverly Sackler Faculty of Exact Sciences; **Prof. Sasson Somekh**, Department of Arabic Language and Literature, Lester and Sally Entin Faculty of Humanities; and **Prof. (Emeritus) Yitzhak Sadai**, Buchmann-Mehta School of Music, Yolanda and David Katz Faculty of the Arts, are the recipients of the 2008 EMET Prize sponsored by the AMN Foundation for the advancement of Science, Art and Culture in Israel. The prestigious national prize is given annually by the Israeli Prime Minister's office for excellence in academic and professional achievements that have far-reaching influence and significant contribution to society.



Prof. Joshua Jortner



Prof. Sasson Somekh



Prof. Yitzhak Sadai

Appointments: **Dr. Nurit Guttman**, Social Sciences, Head of the Chaim Herzog Institute for Media, Politics and Society • **Prof. Marcelo Dascal**, Humanities, incumbent of the Laura Schwarz-Kipp Chair of Modern Philosophy • **Prof. Jonathan Gershoni**, Life Sciences, incumbent of the David Furman Chair in the Immunology of Cancer • **Prof. Abraham Hefetz**, Life Sciences, incumbent of the Norman and Rose Lederer Chair of Biology • **Prof. Martin Kupiec**, Life Sciences, incumbent of the Gol Family Chair for Applied Microbiology • **Prof. Zvi Naor**, Life Sciences, incumbent of the Abraham E. Kazan Chair in Structural Biology • **Prof. Reuven Stein**, Life Sciences, incumbent of the Harry and Abe Sherman Chair of Neurobiochemistry

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