TECHNION FOCUS

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Technion—Israel Institute of Technology, Division of Public Affairs & Resource Development, May 2004

Astound the world in 80 years

80 Technion

CELEBRATION!

Skyscraper salute to mark Technion's 80th anniversary

Conceived in 1905 as a twinkle in the eyes of the members of the First Zionist Congress, Israel's oldest and largest Institute of Technology lit up the way – for all Israel's universities, for the shaping of a fledgling nation, for the securing of the State of Israel, all the way to establishing a world-class high-tech economy.

BOARD HIGHLIGHTS, PAGE 10

BRICK IN THE WALL

The Temple Mount's Southern Wall, one of the world's holiest sites, is threatening to collapse.

BY AMANDA JAFFE-KATZ

www.albatross.co.il

If Jerusalem's Western (Wailing) Wall were to fall, the devastation would not only be archeological, but religious and political. So when a bulge appeared on the Temple Mount's southern section, the Israel Antiquities Authority recruited the nation's best to find a solution – Dr. Rina Wasserman of the Technion's National Building Research Institute (NBRI).

continued on Page 4...

TRACKING TERROR

Cutting-edge technology in motion-based recognition is revolutionizing the world of computer surveillance – whether on the battlefield or within the human brain…

BY BARBARA FRANK

Dark glasses and a lowered hood (beep, beep); someone suddenly falls to the ground (beep, beep); an innocent looking hiker hauls a bomb onto a railway track (beep, beep). New Technion systems for recognizing moving figures and raising the alert about unusual behavior are providing the world of security with new tools. Further applications could even help us detect medical dangers within the body.

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COUNTERTERROR PAGES 6-7

FROM THE PRESIDENT

Prof. Yitzhak Apeloig, President

In his book *Altneuland*, Theodor Herzl envisioned the future city of Haifa as a great park, with thousands of white villas gleaming out of luxuriant green gardens… a center of international commerce, with an overhead electric train… a city of public institutions made possible by applied science, engineering and technology.

It was a fantastic dream, because in those days Jews were barred entry from the skilled professions in Europe, and Haifa itself was a small port in the lap of an uncultivated Carmel wasteland. But the powerful vision was followed through by the 5th Zionist congress who called for the founding of a Technikum in Palestine, to give young Jewish pioneers the skills they would need to build a nation.

In 1924, the Technion opened its doors to do just that. The vision has been reaffirmed time and again, most notably by the chairman of the first ever Technion Society, Prof. Albert Einstein. In documents recently uncovered, Einstein calls the Technion "of paramount importance for the development of our young state. Our fate depends on the prospering of the State of Israel to a much greater extent than many would admit today."

So the Technion has evolved through 80 years with a dual but intimately connected vision, to meet the needs of Israel and the Jewish people and also of all humanity. In 2004 from life-saving breakthroughs in nanotechnology and stem-cell research which will revolutionize medical treatments, to ingenious solutions to defend against international terror and high-tech security threats, the Technion's purpose is truly global.

Welcome to Technion on its 80th anniversary. Join me in honoring the legacy of vision which has multiplied and empowered a nation and a future shared by us all. ■

BRIEFS

IT'S ACADEMIC

Distinguished Prof. Jacob Ziv has been elected a Foreign Associate of the National Academy of Sciences. The Academy was established in 1863 by a congressional charter signed by Abraham Lincoln. Ziv, who holds the Herman and Gertrude Gross Chair in Communications in the Faculty of Electrical Engineering, is renowned for the Lempel/Ziv Algorithm – an international standard for data compression – which he developed in conjunction with Prof. Abraham Lempel.

GREAT CHEMISTRY

Prof. Ilan Marek is the 2003 recipient of the Israel Chemical Society's Prize for Excellent Young Chemists. Marek, of the Faculty of Chemistry, received his prize at the 69th Meeting of the ICS, where he presented a talk on "New Directions in Multicomponent Condensation Reactions."

Marek's graduate student Nicka Chinkov was also awarded a prize for excellent students by the ICS.

OPTO HONORS

Ten years ago, the Barbara and Norman Seiden New York Metropolitan Region Center for Advanced Optoelectronics was dedicated at Technion. Some 150 academics from around the world participated in the Third International Workshop on Optoelectronics this March, honoring Prof. Elisha Cohen's 65th Birthday. Cohen, who holds the Lidow Chair in Solid State Physics, was the founder of this flagship Center.

PRESIDING PRESIDENT

Technion President Prof. Yitzhak Apeloig was appointed in January to lead the Association of University Heads in Israel for a one-year term. Steep cuts in government funding, necessitated by a struggling economy and the cost of the war on terrorism, coupled with proposed changes in university governance make this a particularly challenging time for the Association and its new leader.

"SPEED-UP" METHODS

Computer Science Prof. Avram Sidi's state-of-the-art monograph on "convergence acceleration," *Practical Extrapolation Methods: Theory and Applications* was recently published by Cambridge University Press.

The direct computation of limits to infinite sequences with acceptable accuracy may be prohibitively time-consuming in most scientific and engineering problems. Clever application of a suitable extrapolation method – some 20 methods are studied by Sidi – speeds the process up. Sidi recommends the volume to mathematicians, applied scientists and engineers, and advanced students in disciplines such as theoretical physics and chemistry, molecular physics, materials and electrical engineering, fluid dynamics and numerical analysis.

CALTECH ON CAMPUS

BY PROF. SHLOMO MAITAL

David Baltimore, president of the California Institute of Technology, has been called the world's leading biologist. In 1975, at the age of 37, he won the Nobel Prize for his 1970 discovery at M.I.T. that is said to have founded modern biotechnology – identification of the enzyme 'reverse transcriptase' and discovery of how cancer-causing RNA viruses infect healthy cells. He has published more than 500 peer-reviewed papers. In March, he spoke at Technion on Biotechnology: An Industry with a Future. *Here are some of his remarks.*

On dark clouds over the industry: "In the United States, health care is the largest single industry, making up 13% of G.D.P. and it will rise to 17% by 2010. Prescription drugs are the largest single component of health costs. The public is tired of spending more and more money on drugs, and health insurance is a growing part of the cost of doing business." [For General Motors, health insurance is said to make up a larger part of the cost of making a car than steel. –S.M.]

On the size of the industry: "We are still at the beginnings of the industry. In the United States, there are 1,500 biotech companies, employing 200,000 people."

On the advantages of being small: " 'Biologics' (new drugs developed through biotechnology) comprise 40% of all new drug approvals. They are developed mainly by small biotech firms, not large pharmaceutical companies. Two things drive biotechnology. 1. Innovation – small companies are creative and nimble. Academics find small companies are more compatible and easier to work with. 2. Demographics – the fastest growing segment of the population in America and Europe is those over 80 years in age, many of them on multiple drugs."

Yosi Shrem

Nobel Laureate and President of the California Institute of Technology, Dr. David Baltimore, takes a close look at Technion's latest advances in the life sciences, during his recent visit to campus.

On biotechnology's one great failure: "In 1982, U.S. Secretary of Health, Education & Welfare Margaret Heckner said 'we will have a vaccine against AIDS in two years.' She was wrong.

"She was confident, because we had success against viruses like polio. But HIV is different from all other viruses for which vaccines were developed. All our HIV vaccine candidates have failed completely." [Dr. Baltimore was appointed to head the National Institutes of Health AIDS Vaccine Research Committee in 1996. –S.M.].

"Today 50m people worldwide have AIDS. Whole countries in Africa are devastated. Other countries do not yet realize what is in store for them. Drugs will not solve the problem. They are expensive, and even when successful will generate resistance eventually. Only a vaccine will deal with AIDS."

On biotech and universities: "Biotech is driven by universities. The first biotech company, Genentech, was founded when a professor had a beer with a venture capitalist – a model followed to this day. Universities have to do more than sit by and license their research. They have to be catalysts for technology transfer. Small startup companies do not have money, but they can give equity to universities. Universities must control their tendency to be greedy. There is a danger. Too much commercialization changes the culture of openness in universities so essential for good research; this kills the goose that laid the golden egg."

On genetic engineering: "Surprisingly little so far has emerged from the library of 30,000 genes. The two genome companies Celera and Human Genome Science are both trying to discover new drugs and are finding it very difficult."

On Israel: (in response to the question – "Israel has strong world-class life science research but weak biotech industry. What advice can you give us?") "Two things: 1. Make it much easier for scientists to do technology transfer; help them do it. 2. Develop sources of venture capital. There are a number of U.S. venture funds that invest in Israel." ■

MATRIX REVELATIONS

Oscar® winning team member George Borshukov, Visual Effects Technology Supervisor at ESC Entertainment, demonstrated the making of the "Matrix" cult movies (pictured above) using mental ray® technology to an enthralled Technion audience. The March meeting was sponsored by mental images® – the recognized international leader in rendering software. The Berlin-based company recently joined the Technion's Industrial Affiliates Program – the first international company with no representation in Israel to do so. Present at the event, the company's executive VP Ludwig von Reiche, said, "We're very impressed with what we've seen at Technion today and look forward to collaboration."

SPIDER-ROBOT TO THE RESCUE

In the absence of real superheroes, Technion robotics labs have created one – he has x-ray vision, remote sensors and can rescue survivors from perilous places. Step back, its Spider-robot!

BY ROBERTA NEIGER

Terrorists detonate a car bomb next to crowded shopping mall. The powerful explosion topples the structure, instantly killing hundreds. Others, still alive, are trapped under tons of rubble. What remains of the massive structure is unsteady, and rescue units can enter only at great risk. Their digging would be random, wasting precious time.

Enter the Technion Spider-robot: equipped with life-detecting sensors. Pushing, pulling and maneuvering its three legs through the rubble it sends back crucial images of structural damage and location of survivors. While premature, the depth of interest shown in the spider-robot project by the Israeli Home Front Command indicates that this mechanical superhero could be the immortal first-responder of tomorrow.

Having conceived the basis for Spider-robot, researchers at the Faculty of Mechanical Engineering's Robot Navigation Laboratory have now developed a working prototype. "This robot was designed to move within an area filled with obstacles and clutter, like a damaged building," says 32-year old Project Manager Dr. Amir Shapiro, who holds three degrees from Technion, and has spun off two generations of spider-robots since 1998. "It is suited for work in disaster conditions, where the environment is unstructured and complex, and where stability is necessary. The robot can hold itself stable, and even if the walls are slick or covered with dust it can advance."

The spider robot has many applications. Besides functioning in man-made or natural disasters, the robot could be used in dangerous places like nuclear plants, underground mines or buildings rigged with explosives. It could even be used in space stations.

And in a nano version, Shapiro envisions a mini spider-robot entering blood vessels to make diagnoses, deliver medicines or conduct surgical procedures.

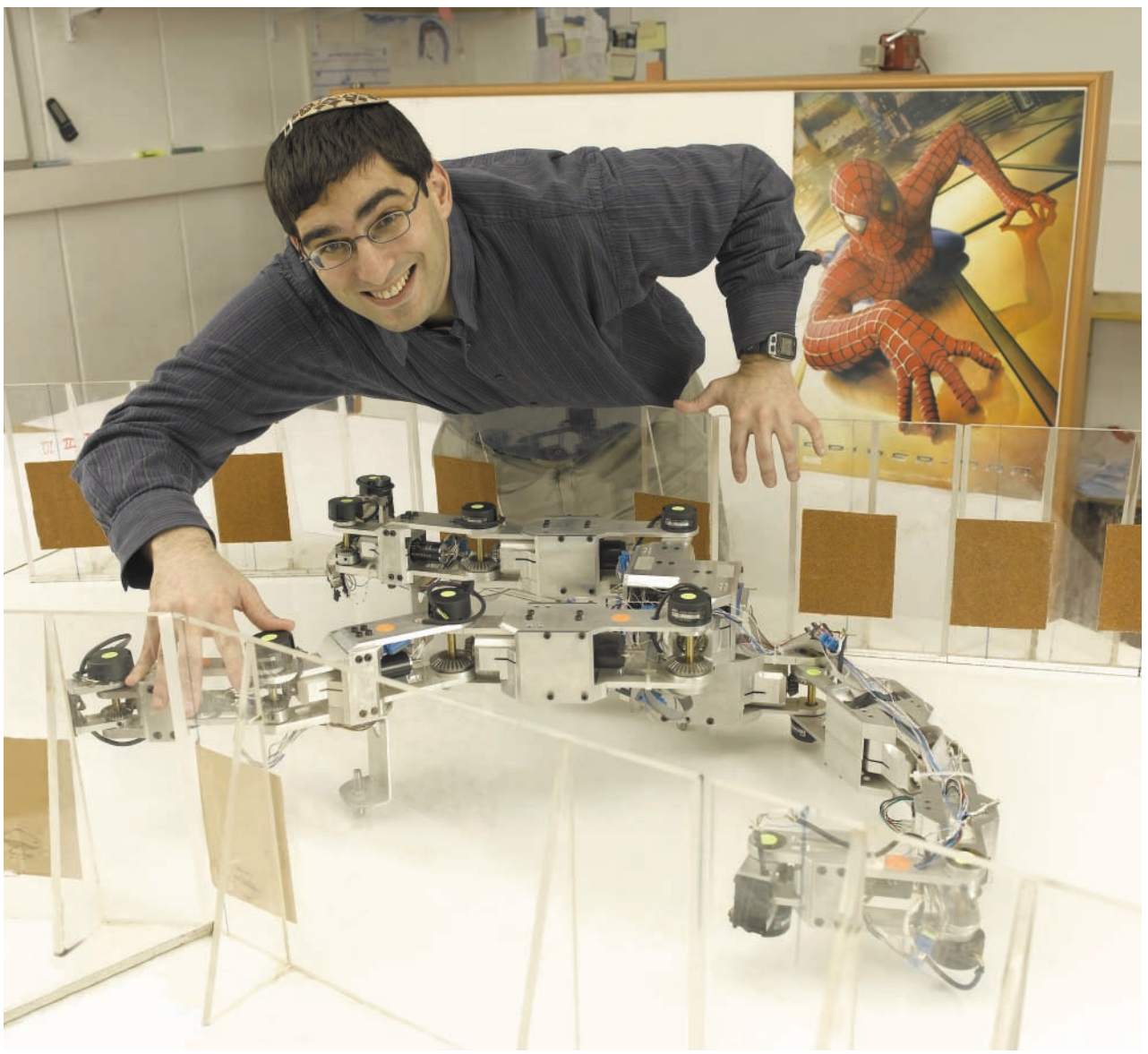
While most mobile robots avoid obstacles, the spider-robot engages them. "Cables, pipes and other obstructions bother most robots, but not this one," says Dr. Shraga Shoval who co-directs this research with Prof. Eilon Rimon. "The spider-robot's movement depends on contact with the environment." Gaining stability by interacting with objects, the robot braces itself, pushes, and advances. It seeks points of contact along a path that require a minimum number of steps, and allow for optimal – faster and most effective – movement. With a wide range of movement, the robot currently requires a passageway, flanked with walls, to progress. It is functional in what Shoval terms, "two and a half dimensions," that is, it can climb slopes.

Spider-robot is composed of a central body, and three articulated limbs. The theory underlying the robot's function is flexible, and can be applied to devices of undetermined leg number and size. Shapiro stresses that the 1.5-meter long, 24 kg prototype they've constructed is just a model for illustrating theories.

"This robot was designed to move within an area filled with obstacles and clutter, like a damaged building."

In the more immediate future, the robot will walk on any terrain without walls, a great challenge in the world of robotics. This type of motion is completely different and movements need to be planned according to the robot's center of gravity, not just its configuration. "The robot will move like a rock climber," says 30-year old Ph.D. student Yizhar Or. "It will be able to walk on almost vertical walls, and its limbs will leave only when it has a firm hold. This will make it far more flexible and robust."

Asked when the project will be completed, the researchers are quick to answer: "Never. We can build robots now, but theoretically, there will always be room for improvement," says Shapiro. "We want to know why and how things work and then, to better them." ■



Miki Koren

A step toward walking machines: Dr. Amir Shapiro and his prototype of the spider robot, designed to operate in disaster settings.

AUTONOMOUS TECHNO-DANCE

Step aside, John Travolta. ROMES1, the Technion's dancing robot is about to hit the dance floor. Designed by students from the Faculty of Industrial Engineering and Management (IEM), and comprised of parts made at the Faculty of Mechanical Engineering, this machine is the world's first automaton with rhythm. Unlike other dancing robots, programmed to dance to one piece of music only, ROMES1 can get down to any tune written in an electronic style.

Not just a fancy dancer, ROMES1 is a highly sophisticated machine. Incorporating movement planning, data processing, multitasking programming, systems integration and large-scale management, the robot presented students with unusual challenges. "How do you get a machine to find the pattern in the music, to identify its rhythms?" says Project Advisor Dr. Amir Shapiro. "This involves pattern recognition – the robot must recognize the structure of the beats, and the changes in the timing between them – in order to anticipate when the next beat will come.

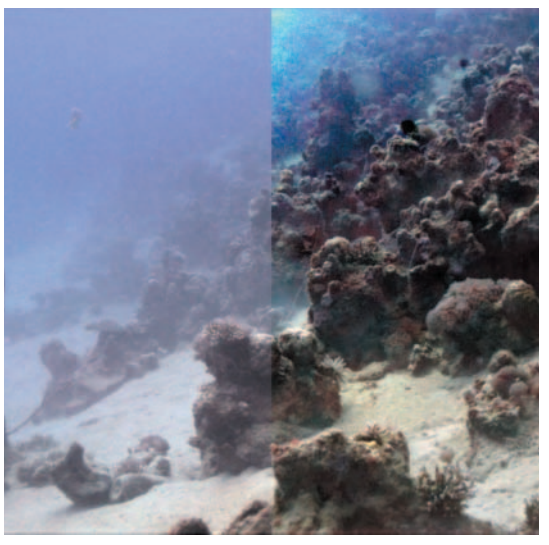
Initiated by Igal Lowevsky, a fourth year IEM student, who works as party organizer, the dancing robot promises to have commercial value in night-clubs of the "techno" era. Several clubs and one of Israel's best-known DJs are already dancing to the ROMES1 beat.

I C UNDERWATER

Dr. Yoav Schechner and master's student Nir Karpel of the Faculty of Electrical Engineering have developed a method that dramatically improves the quality of underwater photography. The technique, the first of its kind in the world, has great potential application in a variety of fields, including checking underwater pipes and cables and sailing vessels. It can assist both scientific research (marine biology, archeology and mapping), and amateur underwater photographers, who until now could only get good results using close-ups.

The researchers achieved excellent results by connecting a specific filter to a camera and applying a mathematical algorithm they developed. The pictures the two photographed, at a depth of 26 meters in the Gulf of Eilat, were of significantly better quality than images taken without using the filter and the algorithm. Objects that previously appeared blurred and out of focus – or were not seen at all – are clearly visible. With this innovative method it is also possible to estimate distances underwater and to give the photos three-dimensional depth. ■

Dr. Yoav Schechner is a Landau Fellow in the Leaders of Science and Technology Program.



Out of the Blue. Left panel, "pinkish" image that has had the standard algorithm of white balance applied; right panel, Schechner and Karpel's improved image.

BRICK IN THE WALL

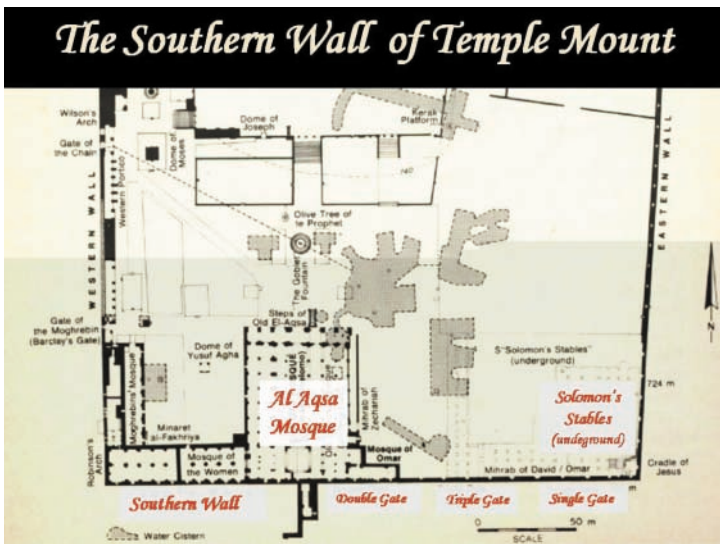
...continued from Page 1

Wasserman is already highly regarded following her unique testing of the Historical Masonry Sea Wall in the Old City of Acre, declared a World Heritage Site in 2001. Now, she has solved the riddle of the deterioration on a site sacred to three world religions – the British did it.

Four months of testing – including X-ray fluorescence and diffraction, quantitative wet chemical analysis, oven-drying and saturation – revealed that the core of the suspect part of the wall comprises four different sections. The front two sections – the first 30-40 cm – were very different in composition from the other two.

"To understand the past is the key to the future."

"In most mortars you can see black spots which are traces of charcoal or wood dust, a by-product of the kilns working on wood firing or charcoal burning. From the 1930s, the world production methods changed, relying on oil or gas. This was true also of Palestine under British mandate. So mortars made after this time are conspicuous by the absence of such traces. And this is what I found here. I asked myself, 'Why would this section be dated in the last century'?"



The answer: in 1927, a major earthquake hit the Holy Land, including the Temple Mount. Apparently, during their mandate, the British made repairs using inappropriate materials. The discrepancies in material performance between the original and new masonry, Wasserman concluded, seems to have led to the appearance of the bulge.

"To understand the past is the key to the future," Wasserman explains. Because building methods are very conservative, "Today's structure may be tomorrow's ruin, if we use inappropriate building materials for repair." The inner part of the wall, not tested by Wasserman, dates back about 2000 years to the Herodian period.

"We seek to provide engineering solutions with authentic materials and nondestructive methods."

Presented with a core some 120 cm in length and 12 cm diameter in October 2002, Wasserman had mixed feelings about handling it. "After all, this core came from a holy place, therefore it too is holy," she considered.

"We seek to provide engineering solutions with authentic materials and nondestructive methods," Wasserman says, describing the conservation issues which guide the protection of cultural heritage.

Wasserman is the first researcher in Israel to explore archaeometry in conjunction with building materials. Archaeometry is the interface between the exact and applied sciences and archaeology; it requires interdisciplinary research among historians, archaeologists and sometimes art historians who represent the humanities, and scientists from the diverse fields of geology, physics, chemistry, civil engineering, and architecture.


Dr. Rina Wasserman of Technion's National Building Research Institute applies a method called Digital Imaging Analysis and Monitoring to ancient and modern masonry.

Gustavo Hochman

External stone can also be very badly affected by air pollution: elsewhere in the world the effects of acid rain can be felt. "Accelerated weathering and deterioration of the ancient and historic limestone structures exposed to the polluted urban environment is an acute and common problem throughout the world," stresses Wasserman.

Wasserman presented her Temple Mount findings to the 4th Symposium on Archaeometry of the Hellenic Society of Archaeometry, in May 2003.

As an *olah* (new immigrant) chemical engineer from Kiev, Wasserman came to Technion in 1990 to pursue her doctorate under the supervision of Prof. Arnon Bentur, who holds the Edwards Chair in Engineering in the Faculty of Civil and Environmental Engineering. After postdoctoral research at the Technical University of Munich, she returned to Technion as a Research Fellow in 1997 at NBRI, where she also fills the function of Coordinator of the Knowledge Dissemination Unit. ■

SKIN DEEP

"The stone's skin could serve as an indicator of the internal 'disease' in the whole structure," says Dr. Rina Wasserman.

Wasserman has applied a method called Digital Imaging Analysis and Monitoring to ancient and modern masonry. Previously used for testing museum samples and paintings, Wasserman believes in the adage, "First of all, know the material you are working with." Digital image analysis (DIA) is one of a group of techniques, known collectively as *remote sensing*, in which information about the object is recorded from a distance.

Wasserman recently took part in a workshop in Germany to discuss ongoing and future research projects on the use of nondestructive techniques to study degradation, corrosion or weathering processes. She is an Assistant Coordinator of the Working Group of Stone and Ceramic Deterioration within the frameworks of COST ACTION G8 'Non-destructive analysis and testing of museum objects'. (COST is the intergovernmental framework for European Cooperation in the field of Scientific and Technical Research).

MAKING DREAMS CONCRETE

BY RUTH EBENSTEIN

It took a postdoctoral fellowship in Delaware for Dr. Oded Rabinovitch to discover the depth of his commitment to Israel. Rabinovitch says, "I know how much this place is my home."

Coming back to the Technion – where he had studied for three degrees between 1992 and 2001 – was a true, unadulterated joy. Says Rabinovitch, smiling broadly, "I felt like coming back home to the only place where I really belong."


Dr. Oded Rabinovitch (l) with Maj. Gen. (Res.) Amos Horev

Shaul Vitis

Meet one of the newest additions to the Faculty of Civil and Environmental Engineering, an understated and affable man with three earrings and a resumé piled with top awards for excellence in teaching and research.

Rabinovitch researches the strengthening and rehabilitation of concrete structure with composite materials, a field that combines classical civil engineering with modern materials developed from the aerospace industry. "I study the strengthening of existing buildings, which is done by adhering structural elements to their external facing."

Rabinovitch's versatility as a scientist and thinker was evidenced by the switch he made for his postdoctoral fellowship at the University of Delaware's Center for Composite Materials – researching the development and design of an active structure.

"Active structures know how to sense their environment and adapt themselves accordingly," he explains. "For example, there are wings on a plane that modify their shape according to the air conditions."

Because the Technion offered Israel's only civil engineering department, his exposure in the United States to a different genre and an additional approach was critical.

"I discovered that while the laboratories in the US are a dream, the technical support staff at the Technion is much better," he says.

Acclaimed as an instructor, Rabinovitch is teaching two classes this semester: "Strength of Materials 2", with 50 students, and co-teaching a workshop on structural design, with 60 students. The design workshop is a unique course, he explains, encouraging participants to think out of the box and expand their horizons.

"It's thanks to the Technion that I am here."

A student knocks on the door. Somewhat sheepishly, he asks to turn in his project one day late. Trying to be stern, Rabinovitch accepts it. When the door closes, he returns to his comfortable posture. "I'm trying to make it easier for them," admits the young lecturer. "Times are hard enough!"

Rabinovitch knows this firsthand. Since returning to Israel, he has been regularly called up to reserve duty in the navy. And when they call again, he'll go.

Currently, in addition to his undergraduate teaching load, Rabinovitch is advising two master's students and two doctoral candidates. His slight trepidation is coupled with confidence that the department is available to offer a helping hand. "My reception here has been outstanding," he says.

Future plans include a career in the academy – but only in Israel. "This is our home. You can live overseas, but you are always a guest."

Looking back on his achievement, he points to the Technion as one of the keys to his success. "I thought I could give 100 percent, but the Technion always squeezed 120 percent out of me," he says. "It's thanks to the Technion that I am here." ■

Dr. Oded Rabinovitch is a Horev Fellow in the Leaders in Science and Technology Program.

Rock Bottom

Dead Sea Sinkholes Threaten the Familiar Landscape

By Amanda Jaffe-Katz

This is the lowest point on Earth: at more than 400 meters (1300 feet) below sea level, the mineral-rich Dead Sea has a depth of mystery and power unrivalled worldwide. Its healthy atmosphere is both rich in oxygen and naturally filters out harmful UVB rays. It is a singular sanctuary for travelers, but Technion's Dr. Mark Talesnick of the Faculty of Civil and Environmental Engineering is here on the job, researching the growing and disturbing appearance of sinkholes in the area.

"Strange situations usually require strange solutions."

Sinkholes started forming around the Dead Sea 20 years ago. They appear suddenly in the ground, and can be as wide as 25 meters and 20 meters deep. They 'consume' a daily diet of some three cubic meters of dirt. Canadian-born Talesnick cautions that the Dead Sea sinkholes "are definitely going to spread and get worse."

To find out why and where they occur, Talesnick, a Senior Lecturer in the Department of Structural Engineering and Construction Management, approaches the problem with the motto: "Strange situations usually require strange solutions."

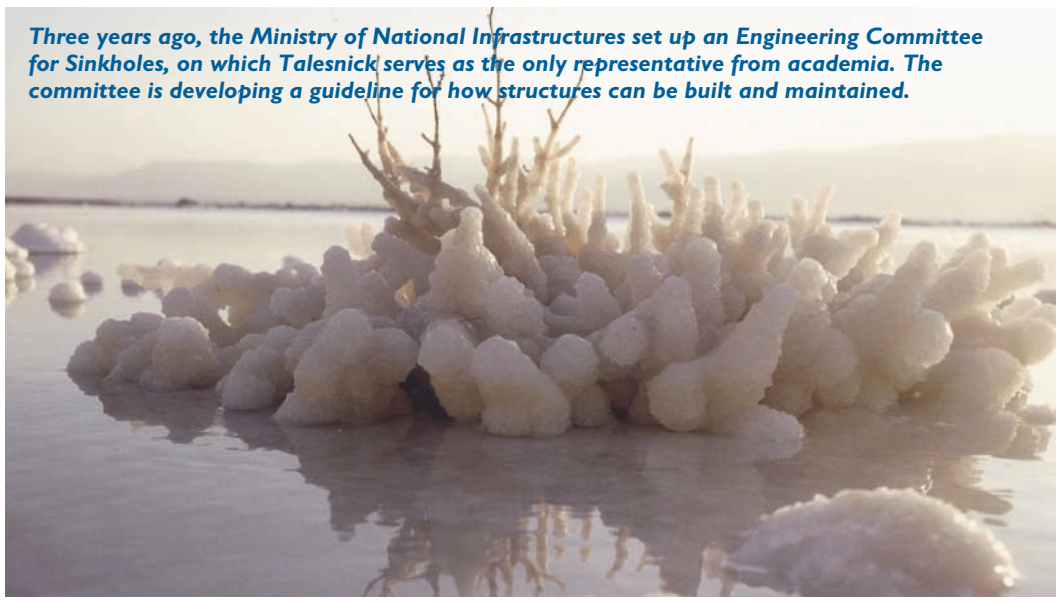
Consensus within the geological community holds that the sinkholes are forming because the water level of the Dead Sea has dropped around 25 meters over the last 30 years. "The water level has gone down so we've changed the whole water regime in the area," explains Talesnick. This allows fresh water to reach areas which it previously didn't. Furthermore, this water dissolves the salt layer, which is about 10 meters thick at a depth of between 20-60 meters. The explanation has been denied by some, partly because there's not nearly enough money from the government to test it. "There will be a tragedy," Talesnick warns, showing newspaper clippings detailing three non-fatal incidents of people falling down sinkholes.

"Say there is a cavity 10 meters below; sooner or later it will hit the surface."

"It's not my research that's groundbreaking; the thing that breaks the ground is the sinkhole itself," quips Talesnick. To understand the mechanics of what's happening, he says: "The one question I would like to ask the sinkhole is, 'Where's all that material going?'" One possible answer is that the salt dissolves and leaves a big hole, into which material falls down, staying there forever. An alternative explanation is that water is moving the material elsewhere.

"I've suggested therefore that we follow the soil; but what do you put in there – 30-40 meters under the surface – in order to follow it?" One option is to use small explosives with predetermined detonation times that can be measured with a geophone (a microphone for listening to soil). The geophones are inserted about 10 meters deep, at a minimum of three points to achieve triangulation. "Then I would use trigonometry to figure it all out," Talesnick simplifies. However, he cannot get funding for this pilot testing which requires drill holes and equipment.

A second objective is to detect where the next sinkholes will occur, before they appear. "Say there is a cavity 10 meters below; sooner or later it will hit the surface. Yet there's no reliable, simple tool to predict where these things are going to happen," Talesnick says.



Three years ago, the Ministry of National Infrastructures set up an Engineering Committee for Sinkholes, on which Talesnick serves as the only representative from academia. The committee is developing a guideline for how structures can be built and maintained.

Below the salt: natural mineral formations create the Dead Sea landscape

So far in the Dead Sea area, sinkholes have resulted in an abandoned army base; the front entrance to the Tamar Regional Council is inaccessible; roads have been closed; date trees planted 25 years ago have sunk into the ground; and "Danger of Sinkholes" signs abound. Talesnick is seeking an engineering solution to the sinkhole problem. "No one has yet tried to build a building or beachfront which can be fixed in time, when a sinkhole comes to it – which it will," he says.

One avenue is to ensure against casualties. "Don't build structures that will collapse – buildings may sustain damage, but with no concomitant loss of life. And do the same things for roadways. Then, work out how you come to rehabilitate the damaged area," Talesnick says. Another more macro approach is to say, "If the salt is going to dissolve anyway, let's help it do it." ■

That Sinking Feeling

Sinkholes are a known phenomenon in different places throughout the world, but in different terrains. In Spain, whole villages have been evacuated; in England, they feature in gypsum and in abandoned salt mines. They are well-known among Florida's carbonate rocks, where a small hole opening up in the limestone at depth – usually due to human pumping activity causing a water change – can cause a huge hole at ground surface, big enough to swallow a home or shopping center. Pumping concrete can solve the limestone problem, but at the mineral-rich Dead Sea, the salt will dissolve around the concrete.

They say you can't sink in the Dead Sea, but sinkholes along the Dead Sea coastline are a new and troubling phenomenon. The fall in the level of the sea has lowered water tables in surrounding areas leading to land subsidence. Dr. Mark Talesnick of the Faculty of Civil and Environmental Engineering, on location, Sinkhole, Dead Sea.

COUNTERTE

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Haaretz

News Features

The Technion's war on

By Amnon Barzilai

The good tidings for the war on Palestinian and international terror may emanate from the laboratories of the chemistry faculty at the Technion - Israel Institute of Technology in Haifa. If current experiments at the Technion labs are successful, Israeli security forces will soon be equipped with an efficient means of responding to explosives belts worn by Palestinian suicide bombers.

The dean of the chemistry faculty, Professor Ehud Keinan, speaks about a technological breakthrough. "There are things that are still classified, but we are examining original ways of dealing with very unconventional explosives that are manufactured in the laboratories of the Palestinian terror organizations."

Professor Keinan shared his information with the U.S. umbrella organization for security technology, the TSWG (Technical Support Working Group), which includes about 80 organizations that specialize in security (for example, the CIA, FBI, Federal Aviation Administration and Bureau of Alcohol, Tobacco and Firearms.) The umbrella organization is currently preparing a tender for American companies to create a device for identifying explosives that is based on a prototype developed by Professor Keinan.

In 1986, a pipe bomb placed by terrorists in Hebron was found near Jewish residences. The police sapper who was called to the scene discovered an unidentified white substance near the device. Suddenly, the bomb detonated and the sapper was killed. An investigation found that the white explosive was TATP (triacetone triperoxide, commonly known as acetone peroxide). This type of explosive has been around since the beginning of the 20th century, but this was the first time that terror organizations had used it. And since this incident in Hebron, Prof. Keinan has been studying the substance.

Internet sites provide detailed instructions for easily producing TATP. All that is needed to prepare this chemical compound can be found in almost any home - acetone, peroxide and lemon. The mixture forms lumps that turn to powder after drying. It is an extremely dangerous explosive because the slightest friction is liable to cause it to detonate. "The world is exposed to this material and we are helpless," says Keinan. "If someone wants to bring down a Boeing 747, no one will stop him. And security officials know this."

TATP causes 'work accidents'

The fact that TATP detonates easily is the reason for the numerous so-called "work accidents" in the clandestine labs set up by the Palestinians. In an article soon to be published in a scientific journal, Professor Keinan will describe the way this material works. When TATP is detonated, each solid molecule turns into four gas molecules. This means that within one microsecond, a huge volume of gas is created, and this is what causes the explosion. Most of the devices for detecting explosives operate on a group of specific chemical (nitro) materials present in all explosives. "We have developed a hand-held device called PET (Peroxide Explosives Tester) that detects TATP, and we are now working to develop a sensor for advance detection of explosives," Keinan says.

'Gov't leadership is lacking'

The terror attacks in the United States on September 11, 2001, led to a flurry of activity at the Technion. A group of researchers got together with the aim of developing a technological response to terror threats against the home front. This led to the establishment of the Center for Security Science and Technology. But the founder and head of the new center, Professor Abraham Marmur of the Technion's chemical engineering department, believes that this is not sufficient. According to Marmur, Israel should learn from the United States: "The Americans established the Department of Homeland Security (DHS), which brings together countless organizations and numerous authorities in order to give them a strategic view. They deal with civil defense. Only some of the measures overlap with military subjects. We, in Israel, have not organized ourselves on this matter," he says.

One of the obstacles in the way of finding technological responses to the threats posed by Palestinian terror is connected to the organizational structure of the Israeli authorities that deal with civil defense. Home front security in Israel is under military command. However, the large budgets at its disposal are used for developing military weapon systems rather than essential measures for civil defense.

Marmur: "In Israel, the national integrator on terror should be the National Security Council's Terror Combat (TC) Division. But the Terror Combat Division has no means or budgets for developing technologies for detecting and identifying terrorists or locating explosives. What is lacking is leadership on the government level. In my view, this should be headed by the prime minister."

Keinan: "The trouble in Israel is that there is very little research planned for solving long-term problems. People change positions all the time. The problem is not only the Defense Ministry. It's also the Shin Bet security service and police. Everything is done here in an atmosphere of emergency. I tried to explain the Israeli character to the Americans. We can only work under pressure. When there is no pressure, we don't work."

The Technion's Center for Security Science and Technology brings researchers from the university together with scientists working at the defense industries. Marmur, himself, was one of those who initiated a security project for Ben-Gurion International Airport, led by Elbit Systems, Nice, ICTS and businessman Aryeh Reichman, with funding from the Industry and Trade Ministry. "The vision," he says, "is to detect suspects from far off and track them unobtrusively via video cameras and sensors."

The physics department at the Technion is also involved in the special effort to develop a national response to terror and weapons of mass destruction. Physicists Uri Sivan and Erez Braun, and chemist Yoav Eichen, specialists in nano-technology, succeeded in developing a kit for detecting DNA molecules and proteins in solution. The rights to use their invention were sold to the American company, Integrated Nano-Technologies, which employs this technology in detecting anthrax bacteria.

Thanks to their work, there is no need to take cultures and wait for the organisms to grow. This saves time, an essential commodity in the event of biological attack, when the source of the outbreak must be quickly identified in order to promptly vaccinate the population. Technion researchers have registered a number of patents abroad on this invention.

Itzik Ben Malki

Prof. Daniel Weihs looks to nature for inspiration in the development of military technologies.

Protection for people and structures

In one of the wings on the ground floor of the National Building Research Institute at the Technion, there is a laboratory for studying reinforced structures. In the center of the lab, there is a simulator - a type of cannon - developed by Technion engineers. The gas gun, which fires special projectiles of large diameter, was built to test the resistance and strength of different types of concrete. The head of the institute, Professor David Yankelevsky, says that the researchers have succeeded in creating a new generation of concrete that is more likely to block missiles and shells from penetrating a structure. The institute's researchers share this information with the IDF Home Front Command, which is responsible for the construction of secure rooms in new homes, and with the IDF units charged with constructing army outposts along the border.

The institute is involved in the development of standards for planning bomb shelters and other structures designed to resist impact blast and shrapnel. In the 1990s, the institute participated in a series of experiments conducted with the Home Front Command and American security officials to test the impact of an explosion (like that of a Scud missile) near or in residential buildings. Based on information gleaned from this research, a decision was taken on the type of concrete to use in constructing the new IDF outposts along the border with Lebanon.

The institute is also involved in the operational requirements being discussed for redeployment along the separation fence. A problem is liable to arise, especially in urban areas. Prof. Yankelevsky: "We are now beginning research on thin-membrane elements that are capable of effectively blocking gunfire from light weapons directed at residential neighborhoods. It is in an initial development stage. Perhaps we'll also develop mobile elements using thin panels mounted on a concrete base."

An idea now under consideration at the institute is to develop protective vests for infantry soldiers made of concrete plates instead of ceramic elements. Yankelevsky lists the advantages: The cost of producing the concrete panels is less than the cost of making ceramic panels; from battlefield experience, the ceramic element shatters when hit and can no longer be used, while the concrete element will remain whole and not disintegrate. When the experiments are completed on the compound to be used for creating the bullet-proof concrete elements, it will represent a breakthrough in the field of personal protection.

terror

Itzik Ben Malki

Prof. Yankelevsky standing next to the simulator for testing the strength of types of concrete. "We have developed a new generation of concrete," he says.

Adopting methods from fauna and flora

A group of eight researchers make up what is called the Technion's "elite force". The Technion's directors decided that these eight professors, from various faculties, should devote their full time and efforts to proposing ideas that can serve as the basis for unique technological developments. One of the members of the group, Professor Daniel Weihs of the Faculty of Aerospace Engineering, looks to nature for inspiration on developing military technologies. "I've been studying nature for many years to learn about all kinds of phenomena of fauna and flora that can be applied to everyday human life," he explains.

One question that was examined together with Israel Military Industries was whether missile warheads should be built in a non-circular shape for certain types of attack missions. Professor Weihs: "We found that there is fish that because of the configuration of its fins, attacks at a slight angle to the direction in which its prey is heading. We discovered that the due to configuration of its fins, the fish creates a whirlpool in the water that gives it additional power, enabling it to boost its buoyancy and hunt its prey. A circular body does not create power."

Based on the study of this fish by Professor Weihs and his team, IMI developed a new generation of winged missiles capable of drawing attacking missiles off target.

Last year, Prime Minister Ariel Sharon was shown a model of an engineless, nano-RPV (remote piloted vehicle) developed by Professor Weihs and his colleagues. The RPV was modeled after the way in which dandelion seeds fly in the wind. This flower produces thousands of seeds about 5-6mm long. The seeds are shaped like an umbrella blown inside out by the wind. The wings of the seeds are made of very thin capillaries, with spaces between them that create air movement to help their flight. The width of each fiber is a third of a micron, thinner than a human hair. The nano-RPV was based on this idea. To test this idea, a model was built at 50 times the scale. Polymer fibers were used instead of the seed fibers of the dandelion. During the next stage, stronger fibers were developed, made of titanium and weighing a tenth of a milligram. The results surprised everyone, with tests showing that a nano-RPV capable of climbing to an altitude of 100 meters could be built without an engine.

Professor Weihs believes that the nano-RPV can be used for several purposes. One potential application would be to fire a swarm of nano-RPVs from the rifle magazine of a grenade launcher into an area contaminated by gases and use the nano-RPVs to identify the type of gas. When the RPV comes into contact with the gas, it will change in color, thus providing a visual demarcation of the area contaminated by the gas. Thanks to their light weight, the RPVs would be carried with the wind, together with the cloud of gas, and would continue to indicate the radius of danger. This solution could also be used in the event of a highway mishap involving a gas tanker.

Tracking Terror *...continued from Page 1*

Expert in motion-based recognition Dr. Roman Goldenberg is on the case to help us get crucial information about moving objects, whether inside the human body or in the local bank. In the course of his Ph.D. studies at the Faculty of Computer Science under the supervision of Prof. Ehud Rivlin and Prof. Ron Kimmel, he developed a system in which computers can first identify a real-time filmed object in motion, and separate it from the static background. The object can be tracked using a novel geometric-variational algorithm developed by the group. Then the system identifies what the object actually is and what it is doing based on its motion. The identification demands a more detailed segmentation than the one usually used by the military for automatic target recognition.

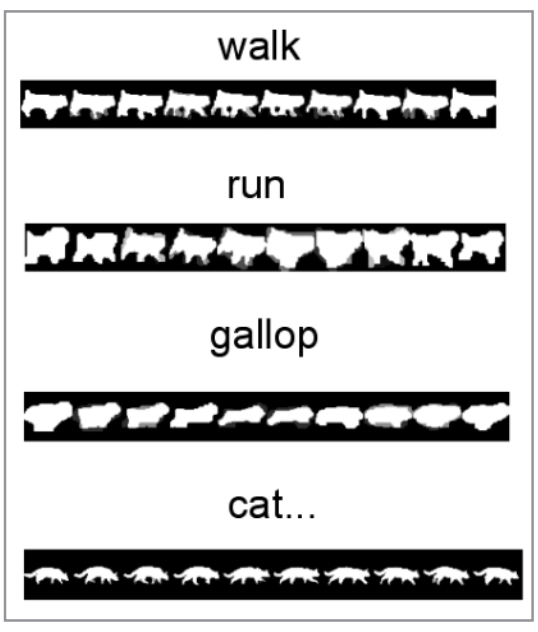
The system identifies any number of moving objects, assigns a number to each, detects their type, and reports their activities. Goldenberg's program classifies the object as human or animal and then recognizes the activity that is taking place. An example of the classification power of the approach is the system's ability to distinguish between a dog and a cat by analyzing gait alone. The different activities the system is trained to recognize for a human are walking, running or moving in an oblique angle towards the camera, but it is possible to customize the system to individual needs.

The next stage of the research was to develop applications. Two Technion students – Uri Bogomolov and Stas Lapchev, led by Dr. Michael Rudzsky – developed both indoor and outdoor surveillance systems.

The indoor system could be installed in a laboratory, office or any high security location. The camera films the scene and the computer reports on the activity of a person entering the room, or if they come into contact with anything in the room. It tracks all motion events that occur and can sound an alert.

Work on the outdoor surveillance system was done for the El-Op company, which is interested in developing an outdoor surveillance system to use with a panning camera to identify moving objects in a wide area. The system has to be able to alert users to a particular kind of unusual motion.

Technion scientists have also collaborated with RAFAEL Israel Armament Development Authority and the Ministry of Defense in motion-based recognition research. ■



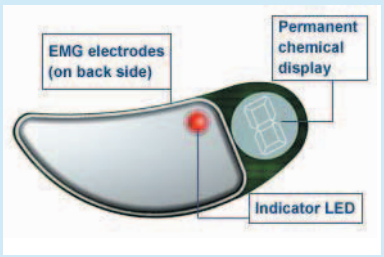
Medicine in Motion

Dr. Roman Goldenberg is now doing postdoctoral research with motion-based recognition in the field of medical image processing. He is specializing in applications for radiology and pathology. By applying the same geometric-variational techniques used for moving object tracking, to a CT (computer tomography) or MRI scan of the head, it is possible to obtain an accurate model of a human cortex, which is required in physiological and functional brain analysis. The active contour technique produces 3D surfaces that capture the outer and inner boundary of the brain's gray matter layer. This technique was also successfully applied for brain tumor segmentation to determine the dimensions of a tumor.

MEDICAL BRIEFS

SENSING GNASHING

Teeth gnashing during sleep, called bruxism, can cause serious dental problems and damage to the joints of the jaw. The Technion subsidiary SLP has received first prize in an international medical design competition for its electronic sensor that detects bruxism in people who are asleep. Organized by Canon Communications, the annual Medical Design Excellence Award competition is open to international manufacturers of medical equipment. SLP's innovation, BiteStrip, is a one-time device that monitors and analyzes the electric activity of the jaw muscles. It is the first medically proven device to diagnose bruxism.



CAN ANTIOXIDANTS HARM YOU?

New research by Technion scientists, published in *Diabetes Care*, April 2004, reveals taking antioxidant vitamins can benefit some women, while harming others. Dr. Andrew Levy of the Rappaport Faculty of Medicine reports that a simple blood test can determine whether post-menopausal women with diabetes will be helped or hurt by taking vitamins C and E meant to protect their hearts. The test screens for genetic variations in the blood protein haptoglobin. "This study says that you can find subgroups of people who actually might benefit and subgroups which will actually be harmed by antioxidant vitamins, so it is important to know which haptoglobin type you are," Levy says.

STEM CELL LINE-UP

The Wisconsin Alumni Research Foundation of the University of Wisconsin and the Technion Research and Development Foundation (TRDF) have signed an agreement arranging Technion distribution of human embryonic cell lines. Promising to stimulate stem cell activity worldwide, the agreement may well serve as the basis for renewed collaboration between the two institutes. In 1998, collaboration between research groups of both universities led to the first derivation of human stem cell lines. "Embryonic stem cell research has many applications and shows significant promise in the world of medicine," says Prof. Zvi Kohavi, Managing Director of TRDF. "We are confident that this agreement will enable us to make a valuable contribution to the new and fast-growing field and to support the scientific community in a vital global mission."

GUMS AND OVULATION

As reported in the *Journal of Periodontology*, Technion investigators have found that women tend to have higher levels of gum inflammation while ovulating and just prior to menstruation; the inflammation tends to decrease and then fall even further after menstruation. Rappaport Faculty of Medicine Prof. Eli Machtei, and associates at Rambam Medical Center's Department of Maxillofacial Surgery followed 15 women between the ages of 20 and 50 who scheduled teeth-cleaning visits several times per year. Each visit coincided with a different point in their menstrual cycles. The researchers found that gum inflammation fluctuated with the menstrual cycle, but the amount of plaque and other indicators of gum health did not. They noted that women tended to report more oral discomfort during the days before or during menstruation – right around the time that their gum inflammation was decreasing. Machtei is continuing to investigate the association between hormonal changes in women and periodontal problems in a research project concerning the effect of gingival inflammation on the prevalence of pre-eclampsia, during pregnancy. This study represents collaboration between researchers from Rambam, Bnai-Zion and Western Galilee Medical Centers.

MY BRAIN IS RUSTY

Research into the vital role iron plays in brain metabolism and the prevention of neurodegenerative diseases has won the Technion's pharmaceutical brainstormers a research grant from the Michael J. Fox Foundation.

BY BARBARA FRANK

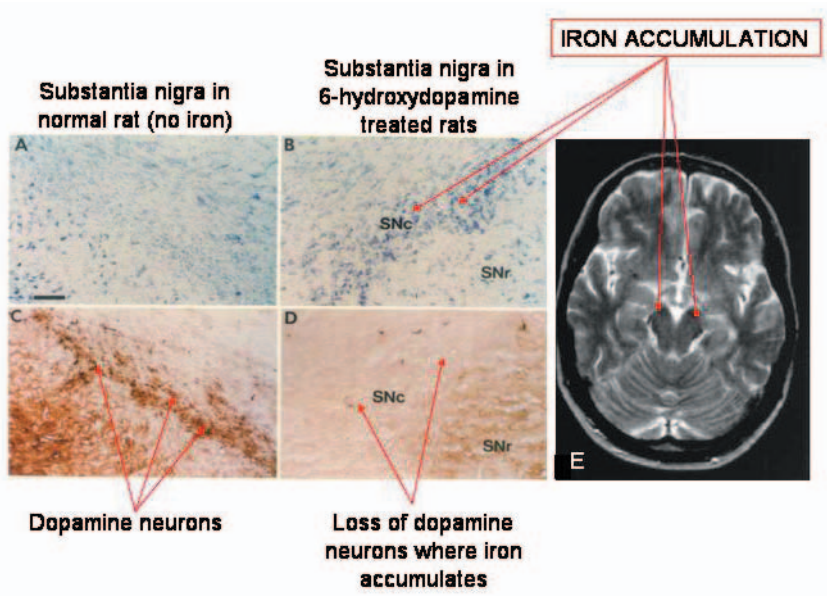
"When your grandmother used to say, 'Your brain must be rusty,' she may have known what she was talking about," says Prof. Moussa Youdim, head of Technion's Eve Topf and US National Parkinson's Foundation Centers of Excellence for Neurodegenerative Diseases Research and Teaching.

Thirty years of research into brain iron metabolism has made Youdim the first to determine the vital role of iron in brain function.

"Youdim's group is the first to advocate the use of iron chelators for Parkinson's and Alzheimer's ."

The World Health Organization (WHO) estimated that between 400 and 600 million people are iron deficient, which Youdim has shown can reduce cognitive ability, especially in infants and children.

In addition, Youdim has shown that too much iron in the brain may play a role in neurodegeneration and can affect responses in brain functioning when brain metabolism is altered. "The function of iron is a two-edged sword," explains Youdim. "Too little as well as too much can damage neuronal function. Therefore the cell has developed a unique system to take in the right amount of iron and release it when it is needed. Any deviation will result in pathological changes."



The right-hand figure shows accumulation of iron as demonstrated by MRI (Magnetic Resonance Imaging) in substantia nigra of Parkinsonian brain where the dopamine neurons die and give rise to Parkinson's disease. Fig. A and Fig. C show the same brain region in a normal rat with dopamine neurons stained. In 6-hydroxydopamine models of Parkinson's disease in rats iron accumulates in the similar region of substantia nigra as in Parkinsonian brain and dopamine neurons die (Fig. B and D). The iron chelator desferal and the newly developed brain permeable iron chelator, VK-28 and green tea extract protect against this neurotoxin and the neurotoxic action of iron.

In Parkinson's disease, Alzheimer's disease, Huntington's disease and Amyotrophic Lateral Sclerosis (ALS) an accumulation of iron occurs at the point where neurons die in the brain. Since iron plays a critical role in brain functioning, it is important that the level of iron in the brain is maintained at a constant. "To understand why the accumulation of iron is important in the pathology of these neurodegenerative diseases, we have to understand what free iron does chemically," says Youdim. "Iron exists in two forms and it can fluctuate between the two, causing oxidative reductive reaction. It is this reaction that actually causes rusting of cars. This results from the generation of reactive oxygen or oxygen free radicals. Such radicals are continuously produced in our body and are useful in combating disease and processes that may damage the cell. They are constantly removed from the neurons by the very active processes, which neutralize them.

Miki Koren

Prof. Moussa Youdim

"If too many oxygen free radicals are produced in the neurons and cannot be removed, the radicals act like bullets and bombard the membrane of the neurons inducing oxidative stress and thus causing the collapse and death of the neurons." He adds, "This is one reason why so many people are obsessed with using antioxidants such as vitamin E and similar substances."

Given that the abnormal iron pathology that is found in Parkinson's or Alzheimer's may have a primary and pivotal role in the process of neurodegeneration – what can be done?

"Drugs can be developed that prevent iron induced oxygen free radical generation, such as antioxidants, or better yet we can iron out iron from the brain with drugs that capture iron and prevent it from acting," says Youdim.

Drugs called "iron chelators" are able to capture iron and make it inert. These have been used to remove excess iron from cells. It is a process that has also been effective in removing iron from patients with the genetic disease Thalassemia, where iron accumulates in the liver and other organs.

Youdim's group is the first to advocate the use of iron chelators for Parkinson's and Alzheimer's and the first to demonstrate that the prototype iron chelator, desferal, can prevent degeneration of neurons in the animal model of Parkinson's.

In 1989 Youdim teamed up with the late Prof. Avraham Warshawsky to develop a novel iron chelator that unlike desferal can penetrate the brain. Desferal cannot be absorbed into the brain and needs to be directly injected.

Youdim continues this work with Prof. Mati Fridkin of the Weizmann Institute and their Ph.D student, Hailin Zheng, of China. They have developed a series of novel iron chelator drugs from VK28 – a prototype introduced with Warshawsky. They have now synthesized bifunctional drugs that work as iron chelators as well as having the anti-Parkinson's action of rasagiline (the acclaimed drug Youdim developed with Technion colleague Prof. John Finberg).

According to Youdim, "In both academia and in pharmaceutical companies there is a strong belief that drugs with multiple actions may be more effective for the treatment of neurodegenerative diseases."

In collaboration with Technion Research and Development Foundation and Weizmann Institute, Youdim and Fridkin have set up the company Varenil Inc. to develop these drugs. They have received several patents and are in negotiation with pharmaceutical companies for further development.

Youdim's work was recently awarded one of five major grants by the Michael J. Fox Foundation. Fox is a well-known Hollywood actor who suffers from Parkinson's disease. ■

Prof. Moussa Youdim holds the Minnie and Ruben Finkelstein Chair in Life Sciences.

Futuristic Tumor Removal

Not the sharpness of the surgeon's knife, but the precise power of sound will provide the means to remove tumors in tomorrow's operating rooms. A device combining ultrasound with MRI will make physically cutting out tumors seem archaic.

By Roberta Neiger

Combining ultrasound with the latest technology in Magnetic Resonance Imaging (MRI), Technion graduate start-up company InSightec, promises to redefine surgery. "If we look at surgery performed by the ancient peoples, the tools they used, like knives and tweezers, were similar to those used today. The scalpel may have replaced the flint knife, but basically, surgical tools are unchanged," says President, CEO and founder of InSightec, Dr. Jacob Vortman. "This company was created to replace surgery with a non-invasive, real-time monitored procedure." Vortman, who holds a Technion doctorate in electrical engineering, explains that "MR guided Focused Ultrasound (MRgFUS) gives surgeons immediate feedback and enables them to change parameters *during the procedure* – and meet the needs of specific patients."

"What we are showing here is a virtual surgical scalpel. It represents the alternative operating theater of the 21st century."

Surgical procedures are still mainly a matter of knife cutting flesh. While the use of lasers has removed some of the invasive work, InSightec's innovative MRgFUS – called ExAblate 2000 – is entirely hands-off. Providing quick, nearly painless, and effective treatments, this technology will make tumor removal a much more humane experience.

MRgFUS is based on the union of ultrasound and MRI. Ultrasound, long a diagnostic tool, is used here therapeutically. Delivered to a precise point in the body, focused ultrasound waves generate heat, burning off unwanted tissue, without harming surrounding areas. MR allows the surgeon to closely guide, monitor and control the procedure. It provides 3-D anatomic information on the targeted tumor, and on the energy's beam path and temperature. The procedure is performed in an outpatient setting, eliminating hospitalization and lengthy recovery times.

MRgFUS is already commercially available to treat uterine fibroids in Europe, Japan and Israel. InSightec has filed an application with the U.S. Food and Drug Administration (FDA) for marketing approval of ExAblate 2000. Affecting one in every four women, uterine fibroids can cause pain, discomfort and heavy bleeding. Hysterectomy, today's most common treatment, involves long hospitalization and recovery periods, frequent complications and psychological issues.

A woman undergoing MRgFUS treatment for uterine fibroids lies prone inside the MR scanner. She is given gentle sedation to prevent movement during the roughly three-hour procedure. No general anesthetic is administered and no incisions are made. Conscious throughout, the woman can provide feedback regarding discomfort to medical personnel, who conduct and monitor treatment from a nearby control station. When the sedation wears off, the woman goes home. By the next day, she typically returns to normal activities.

"The basis for an endeavor like this comes from the Technion."

InSightec is also conducting clinical trials for treating breast fibroadenomas, breast cancer and brain tumors. Trials are taking place in 10 sites around the world, including the Mayo Clinic, Brigham and Women's Hospital, and Johns Hopkins Hospital in the USA; and hospitals throughout Europe, Japan and Israel. In the future the company plans to work on bone, liver and prostate tumors. Dr. Shuki Vitek, InSightec's VP of R&D, points to an almost unlimited range of potential applications including treatments for tumors in the pancreas and bladder; and targeted drug delivery.

According to Vitek, who holds a joint Ph.D. in Mathematics and Electrical Engineering from the Technion, "MRgFUS can be performed repeatedly, with no harmful side effects. The procedure is so precise that surgeons will no longer need to leave a wide safety margin around targeted areas."

InSightec maintains close connections with the Technion. "In our Haifa office, more than 90 percent of R&D employees are Technion graduates," says Dr. Jacob Vortman. "From my experience, the Technion prepares engineers with the tools that enable them to contribute immediately to the company," he says. "Many of our best people prove to be from the Technion."

"Our research requires a multidisciplinary approach combining materials, electronics, mechanics, computer science and physics," adds Vitek. "The basis for an endeavor like this comes from the Technion." ■

InSightec was founded as a joint venture between Elbit Medical Imaging (EMI) and General Electric Medical Systems (GEMS) in 1999. The company has some 80 employees, and maintains headquarters near Haifa, a ten-minute drive from the Technion campus, and an office in Dallas, Texas. More than $50 million have been invested in InSightec's R&D and clinical research, and the company has been granted more than 30 patents. In 2003, InSightec was awarded the European Information Society Technologies (IST) Grand Prize for Innovation.

Travel Immunity

By Roberta Neiger

It may be a reaction to living within claustrophobic borders, or to an abundance of hostile neighbors. Perhaps it's just wanderlust. Whatever the reasons, a good many of Israel's 6.8 million citizens love to travel abroad. For travelers heading to developing countries, or places with infectious diseases that are rare at home, travel clinics are crucial.

Offering practical advice and immunizations prior to traveling, these clinics help establish whether travelers need to take medicines, and which drugs are best suited for their destination. Travel health specialists also enable off-the-beaten-path voyagers to prepare for visits to areas where emergency medical assistance may not be available.

To offer these services to the population of northern Israel, Technion Prof. Israel Potasman founded the Travel Clinic in 1992. Potasman heads the Infectious Diseases Department of the Bnai Zion Medical Center, which is affiliated with the Rappaport Faculty of Medicine.

Potasman's first step was to introduce computer software, updated weekly, that allows users to see which vaccinations are needed in specific locations by clicking on a country.

Under Potasman's direction, two physicians and a nurse treat some 2500 travelers yearly. In addition to vaccines, the clinic provides videotaped lectures on travel medicine, and personal consultations. Specific problems include vaccinations for the immunocompromised, pregnant women, small children, and those with allergies.

First port of call for the cautious traveler: the Travel Clinic staffed by (l-r), Dr. Alona Paz, Prof. Israel Potasman, and Dr. Neora Pik.

Travelers are referred to the clinic through travel agents or by word of mouth. Not only serving departing travelers, the clinic treats, on an outpatient basis, hundreds of patients who return from their trips with tropical diseases. Those with illnesses like dengue fever, malaria, dysentery or typhoid are generally hospitalized. Dengue – a virus transmitted by the Aedes mosquito in tropical areas – occurs in more than 100 countries, and is now considered a global pandemic. "In Israel, after malaria, dengue is the second most frequent cause of hospitalization among returning travelers," says Potasman.

As no cure or specific treatment exists for any of the four forms of dengue fever – just 'supportive treatment' in the form of pain relievers, rest, and intravenous fluids – Potasman is a vocal advocate for the development of a vaccine.

Meanwhile, he recommends the generous use of today's only preventive measure: insect repellent. ■

Needle Nerves

Over the years, Prof. Israel Potasman has noted that many patients avoid vaccinations, posing a major hurdle to the provision of important health care measures. His research published in *American Journal of Tropical Medicine and Hygiene* indicated that 20 percent of the population has some degree of fear of needles; about three of every thousand travelers faint, even sustaining serious injuries. Potasman recalls a surgeon colleague whose fainting spells made him steer clear of injections for years.

With questionnaires, Potasman examined the roots of this fear. Sensory input like hospital smells, the sight of needles and preparation of injections all played major roles. "Our observations suggested that certain architectural and behavioral variables within travel clinics can help reduce the fear of injection," says Potasman, whose clinic has been accordingly altered. The vaccination corner is separated from the waiting area and nurses conceal their preparation of injections. "Since making these changes, no-one has fainted, and patients have been more relaxed," he says.

Q&A: Ben Sosewitz

Yoav Bachar

Ben Sosewitz, Chair of the International Board of Governors

Ben Sosewitz assumed the role of Chair of Technion's International Board of Governors on October 1, 2003. A Technion Guardian, Sosewitz's involvement with the Institute spans over 40 years, together with his late wife Shelley. Sosewitz is the recipient of a Technion Honorary Fellowship and Doctorate, and the Albert Einstein Award from the American Technion Society (ATS). At the recent Chairman's Leadership Meeting, Sosewitz outlined his priorities as new chair.

How did your involvement with Technion begin?

My own professional background led me to Technion. I graduated in Civil and Environmental Engineering, and my career began in government – in water and waste. Around 1960, I started to attend ATS events in Chicago, and to meet leading people, including Leonard Sherman, and Samuel Bernstein, whose son-in-law, Alberto Wax, then Dean of Civil Engineering, invited me to give lectures at Technion. I went through the ranks of the ATS, in Chicago and at the National level, from the time we adopted major fundraising programs (1978-9). My election to the Board of Governors followed, and I met Henry Taub, who asked me to take a committee chair.

I felt a sense of responsibility associated with all my involvement. Anyone involved philanthropically better serves the place if they have a sense of "ownership." After spending many years in Zionist and synagogue activities I concluded that the road to Israel's economic growth and security were with technology and it was then that I became an advocate for Technion.

"The key is excellence in teaching."

What are your top priorities for your term of office?

The job has more to do with improving the caliber of the Board, and not changing the university. I plan to support the administration, in which I have confidence. I want to energize the BOG, by bringing in younger members, and, drawing on my experience as co-chair of the PARD (Public Affairs and Resource Development) committee, to encourage the societies to increase their membership.

What is your vision for Technion, and Technion's role in Israel?

Firstly, I'm guided by my predecessor Henry Taub's 13 years in office. A current notion holds that because there is competition, from colleges and so forth, there is no longer a need for Technion to produce 75 percent of the country's engineers. This provides Technion with the opportunity to produce an elite, raising standards even higher. This also requires hiring the best faculty, and listening to industry representatives who need engineers. The more talented engineers there are, the more Israel can produce innovations and create jobs. The key is excellence in teaching.

We need to change the undergraduate to graduate ratio, and maybe ultimately to think in terms of a 1:1 ratio.

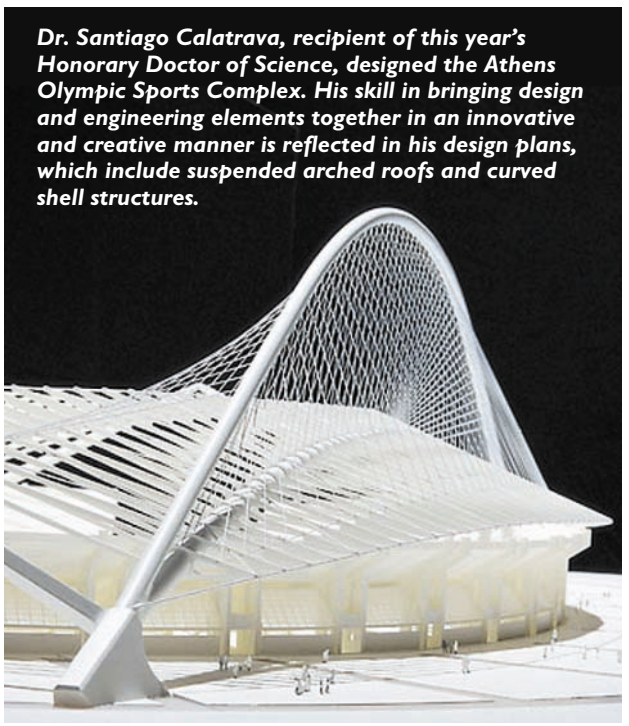
The economy of this country is dependent on human resources. The ramifications of a sound economy include the social fabric of the country, and the respect of the world around you. Technion is one of the most important elements for establishing the character of the country, and Israel's special niche in the world economic picture. Technion affects the quality of life in Israel – it's as simple as that.

"Technion affects the quality of life in Israel – it's as simple as that."

You came at a time of budgetary crisis. Does this affect your agenda?

Clearly we must find additional and alternative sources of funding to the current government's level of support which is approximately 65 percent of the budget. Technion's management has called upon its societies around the world to accelerate support for graduate fellowships and scholarships. Ultimately we may need to petition the government to raise tuition and also convince Israeli industry and commerce that it must support more aggressively Technion's research and technological needs. Until there is a change in the current government's policy for funding higher education, few options for meeting our budgetary needs exist independent of the government. It is therefore incumbent upon us to continue to call for the appropriate levels of government support to maintain the levels of excellence in both teaching and research which are the cornerstone of a world-class university. ■

Board Highlights



Dr. Santiago Calatrava, recipient of this year's Honorary Doctor of Science, designed the Athens Olympic Sports Complex. His skill in bringing design and engineering elements together in an innovative and creative manner is reflected in his design plans, which include suspended arched roofs and curved shell structures.

A **Festive Reception** hosted by President Prof. Yitzhak and Mrs. Zipora Apeloig honoring **Henry and Marilyn Taub** will mark the beginning of this year's session on June 12, 2004. The **Festive Opening of the Board of Governors and the presentation of Honorary Fellowships** to eight devoted Technion friends will take place on June 13. The event, held in the Kellner Amphitheater, will celebrate **80 years of Technion.** The following evening, in the Churchill Auditorium, **Honorary Doctorates** will be conferred on 10 eminent public servants and distinguished scientists. The **Student Salute** to the Board of Governors takes place on June 15.

Following the opening plenary session, ceremonies will celebrate the **Irving A. Shepard Chair** and the **ATS/Women's Division Career Development Chair**. At the final plenary session, the **Shavit Scholarship Fund** made possible by **Isaac (Eddie) and Cipora Streifler-Shavit** will be established.

Outstanding faculty will be recognized at the annual ceremony with the **Muriel and David Jacknow Awards** for Excellence in Teaching, the **Salomon Simon Mani** Awards for Excellence in Teaching, the **Hershel Rich Technion Innovation** Awards and the **Henry Taub** Prizes for Excellence in Research.

New facilities to be dedicated include the British Technion Society's **Nassau Dormitory** in memory of Hubert and Lisette Nassau and the **Alexandre Mallat** Wings and the **Hellenic Technion Society** Wing in the **Bellock Family Dormitory**. There will be dedication ceremonies for the **Lidow Physics Complex** and for the **Edna and Jonathan Sohnis Family Research Laboratory for the Regeneration of Functional Myocardium**. A ceremony will mark the newly renovated **Senate Building,** made possible through the generosity of the **Louis Edelstein Family**. The **Samuel and Cecilia Neaman Program** will establish a new fund for doctoral students and postdoctoral fellows.

The **Faculty of Aerospace Engineering** is hosting the Board members this year (see below, Arrow). ■

2004 Honorees

Honorary Doctors:
Dr. Zeev Bonen, Israel
Dr. Santiago Calatrava, Switzerland
Joseph Gurwin, USA
Lawrence S. Jackier, USA
Philip E. Klein, USA
Benny Landa, Israel
Prof. Azriel Rosenfeld, USA (awarded posthumously)
Dr. Bernard Sherman, Canada
Gil Shwed, Israel
Prof. Richard E. Smalley, USA

Honorary Fellows:
Zahava Bar-Nir, USA
Dahlia Blech, USA
David Brecher, UK
Benjamin Carasso, Israel
Aaron Etra, USA
Reinhard Frank, USA
Herbert Pollack, USA
Nina Sabban, USA

The Technion Arrow

Gustavo Hochman

Board participants are invited to have their photo taken with the Arrow II.

"Technion's Faculty of Aerospace Engineering is the cornerstone of the aerospace industry in Israel," announced Israel's former Minister of Defense, Prof. Moshe Arens, speaking at the arrival of the Arrow II antiballistic missile on campus in February. Donated to the Technion by Israel Aircraft Industries Ltd. (IAI) the stunning life-sized replica marks the 50th anniversaries of the Aerospace Engineering Faculty and IAI, and commemorates 100 years of aviation.

"IAI has made unprecedented achievements in industry. The building block of this prolific activity is the Faculty of Aeronautical Engineering, whose graduates are the force behind the aviation industry of the country," Arens continued.

"I'm proud to be here today as a Technion graduate and CEO of Israel's largest company. The Arrow is an exceptionally important system," said Moshe Keret, CEO of IAI. "The uniqueness of the Arrow lies in the cutting-edge technology thanks largely to Technion grads. It is symbolic that this model of the Arrow is here." ■

Pictured with the Arrow II antiballistic missile (r-l): Prof. Moshe Arens, Israel's former Minister of Defense, Moshe Keret, CEO of Israel Aircraft Industries Ltd., and President of Technion, Prof. Yitzhak Apeloig.

CHENNOTI TALES

The third extract of Georgina Johnson's historical novella celebrating 80 years of Technion
For previous extract see www.focus.technion.ac.il/Cchennoti.html

IN THE PREVIOUS EXTRACT PUBLISHED IN FOCUS, JANUARY 2004, ISAAC CHENNOTI WAS DISTRACTED FROM PURE ENGINEERING BY THE NEEDS OF THE JEWISH RESISTANCE. AFTER FIGHTING FOR THE BRITISH IN WWII, AND DEVELOPING A SERIES OF SECURITY GADGETS TO KEEP THE COMMUNITY SAFE, HE WOULD BE KILLED IN THE 1948 WAR OF INDEPENDENCE. HERE THE CHENNOTIS FIND THAT GRIEF, WHEN HONORED, IS DEEPLY EMPOWERING.

Technion students and graduates in the British Army, 1942. A total of 1000 Technion-educated technicians and engineers join the war effort, making Palestine one of the allies' most dependable supply sources.

"Thank God we have the Technion family to support us," said Gittel quietly. She said it because she needed to fill the silence, and because the Technion people have really been there for them, beyond duty.

It was a year since Isaac was killed in action and the Chennotis were gathered around his grave. Benyamin put a protective arm around his mother's shoulder. "We have a nation, but I have lost my father," he told himself, catching a tear which snuck out from behind his round spectacles. "Abba is dead..." He still didn't believe it, and didn't want to accept it. He would have fought in his father's place if they had let him, but he had been too young. Instead, he would now do science in his place, at the Technion. Science that would astound the world. He would make his father's death meaningful.

Gittel glanced over at Hannah who was looking wistfully at the sky. She had her suitor with her, David. It must be getting serious. They all loved David. He had also fought in the War of Independence, in a different unit, driving a truck to get supplies through to Jerusalem. He had been hit too, but had survived with lacerations to his left ankle. It made him limp a little.

"Abba won us the war..." Hannah was telling David, "You know he would work all night at the Technion in the Metallography Laboratory – showing them how to make cartridges faster. All the early warning systems we have are thanks to the devices he dreamed up. He helped the British beat Hitler and he helped Israel exist..."

David put his arm around his cherished Hannah and lowered his eyes to the grave that had been carefully tended by Gittel with small lavender plants since that terrible day when Isaac had fallen. Isaac had been like a father to David, who had lost his parents to Hitler's death camps.

"The depth of his pain had given him the power to experience and communicate the greatest joy."

When WWII broke out, David had been a Polish boy of ten years old. Wiser than her years about the immensity of the Nazi threat, his mother had hidden him in a Catholic orphanage. He had never seen either of his parents since that rainy morning when they had sent him off with a hooded sister, clutching his small satchel with a bagel inside and believing it was just for a month or so. He had been passed from place to place, like one whose very existence could kill those who cared for him.

He had ended up in England, where in 1945, Friends of the Technion contacted Isaac Chennoti who was active in Technion outreach programs to see if a family would adopt him. Isaac arranged the lot; a school, a home with Gittel's friend Raya, and he met him at the port, making sure he was really welcomed.

David was now an associate professor at the Faculty of Civil Engineering and Architecture at the Technion. "We will build our future from the foundations up!" he had announced to Hannah, one evening beneath the jasmine, that same evening he had noticed how very beautiful she had become...

"Oh, time waits for noone," said Gittel. "We have to keep moving forward. If we look back we'll be pillars of salt! Let's remember our blessings... Let's go home."

"Oh, Ima! David and I have to go to the Technion," said Hannah. "I have to work on my thesis to show to Prof. Goldstein!"

Students of Aeronautical Engineering await the completion of the first building on the new campus, 1953. This year, the Faculty of Aerospace Engineering is celebrating its jubilee.

She kissed her mother and trotted off hand-in-hand with David. At 23 years old, Hannah was enrolled as a student in the Technion's Nautical School. She still wanted to build airplanes, but learning about the dynamics of motion through water had been the best the Technion could offer. There had been wonderful news: the British Prof. Sydney Goldstein, chairman of Britain's Aeronautical Research Council was joining Technion faculty! It now looked like a real possibility that Hannah would realize her aeronautical dreams. The only problem was lack of space.

"They are talking about building a whole new campus uphill!" David had told her one evening. "The Technion will take over half the Carmel! They will call it Technion City! There will be space there to build your planes, and even launch rockets into space! You know, sweetie," he had assured her as she looked doubtful. "I'll take the ground, and build houses for the immigrants, bridges and commercial centers. I'll build a country like America that we won't even recognize! And you will take the skies and keep them safe. If you believe in your talents, Hannah, the sky's the limit!"

Prof. Sydney Goldstein, mathematician and chairman of the Aeronautical Research Council of Great Britain, accepts Technion's invitation to found the Aeronautical Engineering Department, 1949.

David was like that. His open heart and the depth of grief of his earlier life had made him a free spirit capable of realizing the priceless value of every moment, and the beauty of each person he met. The depth of his pain had given him the power to experience and communicate the greatest joy and compassion. He had been the emotional sanctuary and a towering pillar of support for the Chennotis when Isaac had been killed. He was one of Haifa's most active campaigners for the absorption and integration of the waves of refugees and new immigrants arriving to Israel from the four corners of the globe. Gittel would love to have him as a son-in-law.. ■

TO BE CONTINUED...

VETERAN GRAD COMES HOME

Gustavo Hochman

Pictured in the Historic Classroom of the original Technion Building, where he studied for a degree in Civil and Structural Engineering, Joseph Osher, a graduate of the class of 1941, took a trip down memory lane this year. The 84-year-old Osher, visibly moved by the visit, exclaimed, "So many memories are flooding back to me. Now that I am back here I am remembering so many of my professors."
The impressive building now houses the Israel National Museum of Science, Technology and Space.

Same place, another time: Joseph Osher and fellow students in chemistry class, 1937.

Technion Playhouse

The Night of the Twentieth *by Joshua Sobol, performed by Technion students, tells the story of young, idealistic Zionist pioneers in the Galilee who have to contend with fear and ideological confusion.*

Yosi Shrem

Areej meets Arik

Minister of Science and Technology Eliezer (Modi) Sandberg was so impressed by Areej Kbaishi that he introduced her to Prime Minister Ariel Sharon during a recent visit to Technion.

Twenty-year-old Biotechnology and Food Engineering student Kbaishi has all the ingenuity it takes to step out of the frame and realize her dreams. As a young woman from Julis, a small Druze village in northern Israel, her plans to study at the Technion and to take a leading position in the food industry could have seemed like girlish whims; living in a dormitory on campus, as an act of insurgence.

With determination, patience and success she is now one of a handful of women from Julis studying engineering. Her goal is to become a quality control manager.

"Israel is not a racist state"—Areej Kbaishi

After an Israel TV interview, Kbaishi was inundated with phone calls from Druze girls. She is pleased to be instrumental in setting an example, and gives 100 hours of voluntary service encouraging other Druze women to study. Kbaishi has met with the Organization of Zionist Druze in Israel, a group formed after the infamous UN decision linking Zionism to racism. "Druze people stood up and declared that they too are proud Israeli citizens and Israel is not a racist state," she explains. ■

(l-r) Minister of Science and Technology Eliezer (Modi) Sandberg, Prime Minister Ariel Sharon, Technion President Prof. Yitzhak Apeloig and student Areej Kbaishi at the Coler-California Visitors Center.

It's Debatable

The eight-person Technion delegation to the European Universities Debating Championships (EUDC) held in Durham, UK in April came up trumps. Over 70 university teams participated this year, including 53 English as Second Language (ESL) teams. One of the three Technion teams – Victor Chernov, a Master's student in Aerospace Engineering and Electrical Engineering senior Gilad Barzilay – reached the semifinals, where they debated the motion, "This house would not allow fast food companies to sponsor sporting events." In addition, out of 106 ESL speakers, Barzilay came fifth. ■

Semifinalists Victor Chernov (l) and Gilad Barzilay pictured at the Senate Chambers, University of Durham, UK.

Sweet Treatment

The best of the candy and chocolate industry in Israel, including top brands Elite and Vered HaGalil, took part in a further education course organized by Technion's Faculty of Biotechnology and Food Engineering. The short course covered novel processing technologies, as well as various health, chemical and microbiological aspects. Pictured at the hands-on workshop: (r-l) Technion graduate and course lecturer Dr. Eyal Ben-Yosef, Prof. Uri Cogan, incumbent of the Bernice and Joseph Tanenbaum Chair in Preventive Medicine, and course participants. Drs. Sima Yaron and Yechezkel Kashi also contributed to the intensive course which touched upon "sticky" issues, including hard and soft panning, recrystallization and polishing. ■

Paul Urlieb

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