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Oldest known pottery found in Chinese cave

The archaeologists who discovered the vase say it is 18,000 years old.

LOS ANGELES TIMES

Chinese and Israeli archaeologists have discovered the oldest known pottery, remains of an 18,000-year-old cone-shaped vase excavated from a cave in southern China.

The shards are about 1,000 years older than the previous record-holder, found in Japan.

After flint tools, pottery is among the oldest human-made materials, and tracing its development provides insight into the evolution of culture.

The shards were discovered four years ago in Yuchanyan Cave in the Yangzi River basin by a team led by Elisabetto Boaretto of the Weizmann Institute of Science in Rehovot, Israel. The cave shows signs of human occupation from about 21,000 years to 13,800 years ago.

The problem with caves is that, over time, remains from fires and other artifacts get scrambled by the activities of humans and burrowing animals, mixing layers of artifacts and making dating difficult.

Boaretto, Xiaohong Wu of Peking University in Beijing and their colleagues circumvented this problem by focusing on excavating a small area, only a quarter of a yard square, and carefully analyzing each layer of sediment.

They reported Monday in the Proceedings of the National Academy of Sciences that radiocarbon dating of charcoal and bone fragments from the excavation produced dates that were consistently older with increasing depth.

Radiocarbon dating of charcoal and bone collagen fragments found immediately above and below the pottery shards indicate that the shards are 18,300 years to 17,500 years old, with a most likely age of about 18,000 years.

The team has been able to reassemble the shards into the partial remains of an unadorned cone-shaped pot or vase, about 11.4 inches high, that may have been used for cooking or storage.

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Chinese pottery may be earliest discovered

By RANDOLPH E. SCHMID
ASSOCIATED PRESS

WASHINGTON — Bits of pottery discovered in a cave in southern China may be evidence of the earliest development of ceramics by ancient people.

The find in Yuchanyan Cave dates to as much as 18,000 years ago, researchers report in Tuesday's edition of Proceedings of the National Academy of Sciences.

The find "supports the proposal made in the past that pottery making by foragers began in south China," according to the researchers, led by Elisabetta Boaretto of Bar Ilan University in Israel.

The pottery found at Yuchanyan "is the earliest so far," Dr. Boaretto said.

Pottery was one of the first human-made materials and tracing its origins and development opens a window on the development of culture, said Tracey Lu, an anthropologist at the Chinese University of Hong Kong, who was not part of Boaretto's team.

"Pottery initially serves as a cooking and storage facility. Later on, some pottery vessels become symbols of power and social status, as well as examples of art," Dr. Lu said. "Pottery is still an important part of human culture today."

Dr. Lu noted that the dates reported in this paper "are slightly older than the dates (of pottery found) in Japan. However, the accuracy of radiocarbon dates in the limestone area has been under debate for many years."

"I agree that pottery was made by foragers in South China, but I also think pottery was produced more or less contemporaneously in several places in East Asia ... from Russia, Japan to North and South China by foragers living in different environments," Dr. Lu added.

Dr. Boaretto, however, contends that "the importance of this study is the high precision dating, the systematic dating of the whole cave, to exclude mixing or intrusion of materials from above layers and the very detailed dating of the strata around the new pottery."

"This sets Yuchanyan as the earliest site where pottery has been made," she said.

"We do not know if the technology moved from China to the other sites, but this hypothesis is stronger now than before."

Patrick E. McGovern, an anthropologist at the University of Pennsylvania, noted that figurines have been found in what is now the Czech Republic that go back as far as 35,000 years. But those were not actual pottery vessels, he said.

"I had long thought that Japan would be the earliest," Dr. McGovern said, but in researching his forthcoming book on the history of alcoholic drinks, "Uncorking the Past," he found evidence of development of ancient drinks in China. "China has a lot of very early remains," he said, "so why not pottery."

This report "firms up that evidence for China," as the home of the earliest pottery yet found, he said, though there does seem to be a long gap between the Czech figurines and the Chinese pottery.

"It makes you wonder what was going on," Dr. McGovern said.

Dr. Boaretto's research was funded by the Peabody Museum of Harvard University, Hunan Provincial Institute of Archaeology and Cultural Relics and the Weizmann Institute of Science in Israel.

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Vase in Chinese cave is oldest pottery find

Chinese and Israeli archaeologists have discovered the oldest known pottery, remains of an 18,000-year-old cone-shaped vase excavated from a southern Chinese cave.

The shards are 1,000 years older than the previous record-holder, found in Japan.

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– *Los Angeles Times*

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Oldest known pottery found in south China

BY THOMAS H. MAUGH II
LOS ANGELES TIMES

Chinese and Israeli archaeologists have discovered the oldest known pottery remains of an 18,000-year-old cone-shaped vase excavated from a cave in southern China.

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Parasitic weeds, a scientific challenge

Stephen Duke looks at how researchers are tackling parasitic weeds as reported in a special issue of the SCI/Wiley journal *Pest Management Science*

Weeds seldom evoke the passions other crop pests do, because they are generally well controlled with available, but costly technologies. Most weeds exert adverse effects on crops through slow and continual competition, stealing resources directly from the crop plant. Their seeds germinate below the soil surface, infecting the crop, causing dramatic damage before their shoots penetrate the soil, often producing attractive flowers in the process.

Such parasitic weeds lay waste to many crops in Africa and do considerable harm in parts of Europe and Asia. Estimates of crop losses in Africa are hard to make, but $7bn/year is thought to be lost to *Striga* species, called witchweed in many places, alone.[1] *Orobanche* species, also know as broomrape, cause large economic losses too. Elimination or mitigation of this biological scourge would alleviate significant human misery.

A recent issue of the SCI journal *Pest Management Science* (May 2009) was devoted to alleviating this problem. These papers are from an OECD-sponsored conference, *Managing Parasitic Weeds*, which recently brought together the best minds in this area. Jonathan Gressel of the Weizmann Institute of Science, Israel, edited this issue containing 22 papers that distill the latest research on understanding the biology of these weeds.

This special issue is the equivalent of a very up-to-date, and readily accessible book. Authors are finding the special issue showcase for a collection of papers more attractive than books for several reasons. Journals generally go to press much more rapidly than books, but, more importantly, authors write to be read. Nearly all journals are more readily accessible to scientists than books. Therefore, a paper or review in a journal will almost certainly be read and cited more than if published in a book, potentially contributing to citation parameters of the authors, which are increasingly used as metrics for evaluation of scientists.

The seeds of these parasites are minute, and their insufficient nutritional reserves after germination makes quick contact with a compatible host plant a necessity for survival of the parasitic plant. The seeds only germinate when triggered by exotic chemicals produced by their hosts. Four of the papers[2-5] deal with this aspect of the biology of these parasites. Understanding how chemical germination stimulants work could ultimately lead to the discovery of a synthetic stimulant that could be applied in the field at a time when crops are not grown, causing the parasitic weed seeds to germinate when no host is available.

A particularly interesting paper by Palmer *et al*[5] describes how the root tips of parasitic weeds generate chemicals that the host root turns into p-hydroxyquinones. The hydroquinone and quinone compounds, produced by the roots of host plants, provides parasitic weed roots with a cue to develop organs (haustoria), which they use to attach themselves to the roots of their host.

A very effective chemical and genetic strategy to manage this problem is to use crops that are resistant to herbicides, thanks to mutation or the appropriate transgenes. This approach works quite well with a number of herbicide classes, for example, glyphosate and acetolactate synthase inhibitors, such as sulfonylurea and imidazolinone herbicides, which translocate well within the host plant. Gressel's paper[6] on this topic is an incisive review of this technology and potential problems with the parasitic weed evolving resistance to these herbicides. Strategies for mitigating evolution of resistance are provided. It is ironic that public opposition to the use of transgenic crops is so strong in Africa and Europe, where this approach is needed most.

Natural chemical products are also being evaluated for selective control of parasitic weeds. Vurro *et al* [7] describe the effects of natural amino acids and phytotoxins from fungi on the germination and growth of *Orobache ramosa* and dodder. They describe some compounds, such as the macrocyclic trichothecenes, which are quite potent against these parasitic species.

There are several excellent papers on the biology and genetics of *Orobanche* and *Striga*, as well as biological control and genetic approaches to their management. The RNA interference (RNAi) approach is particularly interesting.[8] With this method, a weed gene that is unique and critical for infection by the parasite is identified. A plasmid encoding a double stranded hairpin RNA (hpRNA), targeted against this gene, is introduced to the host. This hpRNA is then taken up from the host by the haustoria of the infecting parasitic weed, inactivating the gene necessary for infection. As the hpRNA is specific for the weed gene, it has no effect on the host. This approach has been successful in producing nematode-resistant crops.

The breadth of research and useful technologies described in this issue provide hope that parasitic weeds will exact a much smaller toll on crops in future.

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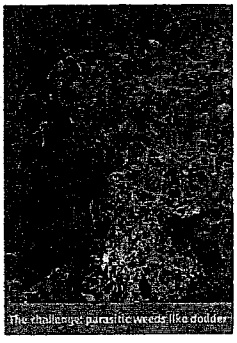
8. *Pest Manag Sci* 2009, **65**, 460



The challenge: parasitic weeds like dodder

LIVER TRANSPLANTATION

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Abstract# O-91

FETAL LIVER FRAGMENTS ARE SUPERIOR TO ISOLATED HEPATOCYTES IN CORRECTION OF WILSON DISEASE: A NEW APPROACH FOR THE TREATMENT OF CHRONIC LIVER FAILURE.

Helena Katchman[1,2], Orna Tal[1], Smadar Eventov- Friedman[1], Anna Aronovich[1], Dalit Tchorsh[1], Elias Shezen[1], Yair Reisner[1]. [1]*Immunology, Weizmann Institute of Science, Rehovot, Israel;* [2]*Gastroenterology, Tel-Aviv Sourasky Medical Center, Tel-Aviv, Israel*

Disappointing results in the treatment of acute liver failure or metabolic diseases by transplantation of isolated hepatocytes emphasize the need for alternative approaches that can enable proliferation of transplanted hepatic cells in the quiescent host liver. Our recent results reveal that transplantation of pig embryonic liver fragments harvested at optimal gestational time window, leads to marked growth and differentiation in the setting of the quiescent host liver.

In the present work we define such optimal gestational time window for harvesting and transplantation of mouse embryonic liver fragments. We further demonstrate in a mouse model of Wilson disease that this approach can be superior to isolated hepatocytes in the treatment of chronic liver disease.

At the first step syngeneic transplantation of embryonic mouse liver fragments harvested at different age of gestation (from E11 to E19) was performed. The earliest teratoma-free gestational age was defined at 15 days after conception (E15). Thereafter transgenic mice mutated in the ATP7B gene (Toxic milk) that characterized by decreased levels of serum ceruloplasmin and hepatic accumulation of copper, eventually leading to liver cirrhosis, were transplanted with syngeneic E15 fiver fragments or with E15 isolated hepatocytes. Disease alleviation was determined by histological findings. serum cerruloplasmin levels and liver copper accumulation. An increase in serum ceruloplasmin levels with gradual restoration of enzymatic activity to 30 -35% at 2 months after transplantation was found following transplantation of either fragments or hepatocytes. However, significant reduction in liver copper accumulation was noted only in animals transplanted with embryonic liver fragments. In addition, near complete replacement of cirrhotic host liver by transplanted regenerating hepatic tissue was noted in this group, further emphasizing the advantage of embryonic liver fragments over isolated hepatocytes transplantation.

Taken together, these results suggest that transplantation of fetal liver fragments could offer a novel curative approach in the treatment of chronic liver failure or metabolic diseases.

No rejection: Fluorescent red markers show that blood vessels in a transplanted pancreas are of monkey origin. Limited green coloring suggests that few pig blood vessels are present.
Credit: PNAS

Using embryonic tissue for interspecies organ transplants offers a way to evade the host's immune system, say scientists who used the method to treat type 1 diabetes in primates. By transplanting embryonic pancreatic tissue from pigs to monkeys, Israeli researchers report that they were able to reverse the primates' insulin deficiency.

The key, the researchers say, is the embryonic tissue's ability to grow into a new pancreas that uses blood vessels from the host animal. The host blood vessels are not subject to the dangerous immune reaction that has always dogged xenotransplants of mature pancreatic material.

The research team, led by Yair Reisner of the Weizmann Institute, claims that the results, published in the latest issue of the journal *PNAS*, could offer an attractive replacement therapy for type 1 diabetes, an autoimmune disease in which the destruction of the pancreas means that sufferers rely on injections of the hormone insulin to control their blood-sugar levels.

In an earlier study, the researchers found evidence that semiformed pancreatic tissue taken from pig embryos at 42 days of gestation appeared to offer the best combination of characteristics for xenotransplantation. According to Reisner, if they're harvested too early, there may not be enough partially differentiated pancreatic cells. But if taken too late, the tissues' ability to grow into a new organ is diminished, perhaps because they contain too few stem cells, while their ability to cause immune rejection increases.

In the latest study, the researchers transplanted 42-day-old pig pancreatic tissue into monkeys with induced type 1 diabetes. The first pair of animals involved in the study died soon after transplantation from an infection caused by too much immunosuppressive therapy.

The second pair of animals received milder immunotherapy and survived for a year. Furthermore, within five months of treatment, the animals had grown new pancreases and were no longer reliant on insulin injections. This indicates that the replacement organs had sufficient islets--tiny, insulin-producing structures consisting of around 1,500 beta cells, which have their own intricate vascular systems.

Radioimmunoassay tests confirmed that the insulin produced by the monkey was porcine, while the network of vessels running through the new organ was made of host cells. "This is important because it meant the monkey's immune system did not attack the vessels," says Reisner.
This type of immune reaction has been a bugbear for researchers, he says, because primates, including humans, produce a class of antibodies that attack the sugar molecules that coat pig blood-vessel tissue.

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Pig-to-Monkey Transplant Treats Diabetes

Embryonic tissue could let xenotransplants evade the host's immune system.

By Michael Day

Using embryonic tissue for interspecies organ transplants offers a way to evade the host's immune system, say scientists who used the method to treat type 1 diabetes in primates. By transplanting embryonic pancreatic tissue from pigs to monkeys, Israeli researchers report that they were able to reverse the primates' insulin deficiency.

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This type of immune reaction has been a bugbear for researchers, he says, because primates, including humans, produce a class of antibodies that attack the sugar molecules that coat pig blood-vessel tissue.

Significant immunosuppressive therapy is still needed to reduce other types of host immune reaction against the pig pancreatic cells. But Reisner claims that this is at the level typically seen in transplant medicine--even though the researchers report that both animals died from infections and drug toxicity a year after their transplants. He adds that there is scope for further reducing the amount of therapy required. "We're fine-tuning things to reduce the levels of toxicity," he says. "The important thing is that we set out to show that a pancreas could be grown this way, and that it could correct the uncontrolled glucose levels caused by diabetes, which is what we've done."

Reisner believes that the technique could eventually help humans with the same condition. Human-to-human pancreatic transplants have been shown to be effective, but a lack of donors severely limits the number of such treatments available. "The purpose of this study was to show that we could potentially have a method of providing an unlimited source of transplantation for treating diabetes."

However, Reisner, who is a scientific consultant and holds equity with Tissera, which supported the research, says that much work needs to be done before the xenotransplantation method can be used clinically.

Gordon Weir, head of the Islet Transplantation and Cell Biology Center, at Harvard Medical School's Joslin Diabetes Center, says that it is too soon to write off sources other than 42-day-old embryonic tissue for growing new islets. "I'm not necessarily convinced by the 42-day number," he says. "Some people have had good results with neonatal tissue." He adds that even mature pancreatic transplant tissue can become infiltrated to some extent by host blood vessels.

Other approaches to reversing type 1 diabetes are also emerging. Of particular interest are methods that seek to reprogram a patient's immune system to stop it from attacking the pancreas. Recently, it was reported that destroying pancreas-killing immune cells and replacing them with a patient's own stem cells can help her gain control over blood-sugar levels.

A more extreme approach is to completely wipe out a diabetic's immune system and rebuild it using his bone-marrow stem cells--a strategy that has raised some safety concerns.
"This is an interesting approach that seeks to avoid transplants," says Reisner. "It could work if used early on in the disease, while the patient still has some pancreatic tissue. But later on, when all the beta cells are destroyed, an alternative approach like ours might have to be used."

Weir adds that "terrific progress" has been made in harvesting stem cells to make new pancreatic tissue and that he is hopeful that before long this will translate into major clinical breakthroughs.

Upcoming Events

6th Annual MITX Technology Awards
Boston, MA
Tuesday, June 16, 2009
http://www.mitxawards.org/technology

Nanotech Europe 2009
Berlin, Germany
Monday, September 28, 2009 - Wednesday, September 30, 2009
http://www.nanotech.net

2009 Medical Innovation Summit
Cleveland, OH
Monday, October 05, 2009 - Wednesday, October 07, 2009
http://www.ClevelandClinic.org/innovations/summit

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Better than nature?

Improving nature's photosynthesis process could solve the world's energy problem, but it will depend on finding better catalysts, writes Jon Evans

It's become something of a cliché, but there's no denying that scientists are continually inspired by nature. Over the course of millions of years of evolution, nature has come up with some highly impressive materials and processes, which scientists are keen to understand and emulate.

Nature is not always the best role model, however, as the evolutionary process has something of a 'fit for purpose' approach to design. It tends to cobble things together from older bits of kit, in a Heath Robinson-type way, with the emphasis on functionality rather than efficiency.

Take photosynthesis, for example. The cornerstone of life on Earth, photosynthesis comprises a suite of pigments, protein structures and enzymes that use sunlight to split water into oxygen, electrons and protons. These electrons and protons are then shuttled along a complex network of pathways, ultimately providing the energy and hydrogen required to convert carbon dioxide into a wide range of carbohydrates. In this way, photosynthesis converts sunlight into chemical bonds, providing a mechanism for storing the sun's energy.

Nevertheless, despite its impressive complexity, photosynthesis is not an overly efficient process for capturing energy from the sun. Even the fastest growing plants convert less than 1% of the solar radiation falling on them into biomass.

But the sun can theoretically provide all the energy we could ever need. It's an oft repeated truism that more energy from the sun hits the earth in one hour than is currently consumed by humankind over the course of a whole year. If we could convert this sunlight into fuel more efficiently than plants (at levels of around 10%) then our energy worries would be over, without having to blanket the world in energy crops.

Achieving this will demand artificial versions of photosynthesis that are more efficient than the natural version, and the development of such artificial photosynthesis systems is becoming an increasingly active area of research.

In the US, the National Science Foundation has established a Center for Chemical Innovation to develop artificial photosynthesis systems. Entitled *Powering the Planet*, this centre comprises a network of research groups from various different institutions, including Pennsylvania State University and Massachusetts Institute of Technology. In Europe, the European Science Foundation recently called for a substantial increase in funding of solar energy technologies, particularly artificial photosynthesis.

Scientists now understand the process of photosynthesis in quite some detail. But they clearly need to go beyond this if they are to develop improved versions. So they are adding the latest findings and developments in catalysis, material science and nanotechnology. And these efforts are now starting to bear fruit.

Synthetic shortcut

One shortcut that scientists are able to take advantage of is that they don't need to replicate the full photosynthesis process. In natural photosynthesis, the protons and electrons generated by splitting water are used to produce the energy storage molecule ATP (adenosine triphosphate) and to reduce NADP (nicotinamide adenine dincleotide phosphate) to NADPH. The ATP and NADPH then provide the energy and hydrogen, respectively, needed to convert carbon dioxide into carbohydrates.

But for energy purposes, the protons and electrons could simply be combined to produce hydrogen, which can then be used to generate electricity in a fuel cell. So scientists only really need to concentrate on the water splitting part of photosynthesis, and that's where most of the action is focused.

Light-powered catalysts that can generate hydrogen from water have been around for many years. The problem is that they contain expensive metals such as platinum and often only work with high-powered ultraviolet (UV) light rather than natural sunlight.

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But scientists are now stumbling across alternatives that are both cheaper and better. In early 2009, a team led by Xinchen Wang from the Max-Planck Institute of Colloids and Interfaces in Potsdam, Germany, reported that a polymeric form of carbon nitride originally discovered in 1834 is able to generate hydrogen from water when exposed to sunlight.

'The special thing about carbon nitride is that it is stable in water, even under extremely acidic or alkali conditions,' says Wang. 'Apart from that, it is very easy and inexpensive to produce.'

Unfortunately, it's not particularly productive, generating only four micromoles of hydrogen an hour. Doping the carbon nitride with platinum increased this rate by a factor of seven, but meant it no longer had any cost advantages over existing catalysts. However, Wang and his team have since found that the rate of hydrogen production can be improved by almost a factor of 10 by creating a highly porous version of the carbon nitride polymer, greatly increasing its catalytic surface area.

Nevertheless, carbon nitride still comes up against a problem that besets every catalyst that produces hydrogen from water: what to do with the left-over oxygen atoms. If you're not careful, these lone oxygen atoms will simply recombine with the hydrogen atoms, ruining the efficiency of the whole process. Wang and his team got around this problem by employing a compound to soak up the oxygen atoms, but this is hardly ideal.

The real issue is that hydrogen production needs to be driven by the production of oxygen, specifically the production of molecular oxygen (O_2) via the oxidation of water, as is the case in natural photosynthesis.

'The water oxidation reaction is generally believed to be the "limiting" process, meaning that if it is not catalysed efficiently, it limits hydrogen production,' explains James Muckerman, a chemist at the US Department of Energy's Brookhaven National Laboratory, who studies water splitting catalysts. 'You can't sustain hydrogen production without the protons and electrons generated by water oxidation.'

Unfortunately, generating O_2 from water is a much more complex process, although catalysts based on ruthenium show some promise. Indeed, when Wang and his team doped their carbon nitride catalyst with ruthenium dioxide it could generate both hydrogen and oxygen, albeit at very low levels.

Catalysis chemistry

In natural photosynthesis, water is oxidised by a molecular structure known as the oxygen-evolving complex (OEC), which is based on a central calcium atom surrounded by four manganese atoms. In 2006, an international team of researchers used a combination of X-ray absorption spectroscopy and crystallography to determine the precise structure of the OEC. Using this blueprint, scientists are now beginning to produce the first synthetic copies.

In 2008, a team of US and Australian chemists led by Leone Spiccia from Monash University synthesised a molecular structure in which four manganese and four oxygen atoms are bound together in a cube shape (*CGI* 2009, **1**, 15). Their calculations predicted that this manganese structure should be able to oxidise water, but they were initially unable test this prediction because the structure is insoluble in water.

So Spiccia and his team incorporated the structure into the ionic polymer known as *Nafion*, which is commonly used as the proton-conducting membrane in fuel cells. 'When we bound the catalyst within the pores of the *Nafion* membrane, it was stabilised against decomposition and, importantly, water could reach the catalyst where it was oxidised on exposure to light,' says Spiccia.

Other researchers are taking their inspiration more from catalysis chemistry than from photosynthesis, and as such have developed water splitting structures that look very different from the OEC.

In April 2009, a team from the Weizmann Institute of Science in Rehovot, Israel, led by David Milstein reported the development of a totally novel molecular construct based on ruthenium that generates hydrogen from water via a heat-driven process and then generates O_2 via a light-driven process.

The inspiration for this construct came from the team's previous work on catalytic reactions with alcohols, in which they used a similar ruthenium construct to activate oxygen-hydrogen bonds. 'We thought that the activation of the oxygen-hydrogen bond in water should also work,' explains Milstein.

What Milstein and his team have now come up with represents a totally novel strategy for splitting water. Their construct can produce O_2 and hydrogen without requiring any electron or proton donors or any compounds to soak up oxygen atoms. During the course of the water splitting process, the construct undergoes a number of chemical changes but always reverts back to its original form, much like the OEC, but it appears to generate O_2 via hydrogen peroxide (H_2O_2), which is unprecedented in water splitting reactions.

So far, this work is very much proof-of-principle, as the construct is not actually catalytic, but Milstein intends to investigate further. 'We are planning to study the mechanisms of this reaction, modify the complex structure to make it robust towards oxidation, and combine the individual steps into a catalytic cycle,' he says.

Nanotechnology also offers novel strategies for splitting water. For instance, titanium dioxide becomes a powerful oxidising agent when irradiated with UV light. If this oxidising ability could be triggered with natural sunlight then it could also be used to split water. This is what Craig Grimes of Pennsylvania State University has now achieved.

In 2008, he developed an array containing two different types of titanium dioxide nanotubes and showed that it could split water when exposed to natural sunlight, with hydrogen produced by one of the nanotube types and oxygen generated by the other. Although the conversion efficiency of this array is fairly low, at 0.3%, Grimes believes it could be increased to 5–10%.

Then, at the beginning of 2009, he showed that titanium dioxide nanotubes could form the basis of a system that replicates almost all the features of natural photosynthesis, generating organic molecules from carbon dioxide, water vapour and sunlight.

This involved first coating titanium dioxide nanotubes with nanoparticles of copper and platinum to enhance their catalytic ability. Then Grimes placed an array of these nanotubes in a specially-made metal chamber with a central window, pumped a mixture of carbon dioxide and water vapour into the chamber and placed it outside on a sunny day for two to three hours.

The array transformed the carbon dioxide and water vapour into methane and related organic compounds such as ethane and propane at rates 20 times higher than any previous method. Nevertheless, the conversion efficiency is still quite low.

'If you tried to build a commercial system using what we have accomplished to date, you'd go broke,' admits Grimes. 'However, we believe, running the numbers, that solar-to-fuel conversion efficiencies of about 8% could be achieved in the near future.'

With this level of conversion efficiency, artificial photosynthesis systems looking very different from the natural version could start to take bloom.

Jon Evans is a freelance writer based in Chichester, UK.

GEN Genetic Engineering & Biotechnology News

Aug 3 2009, 9:00 AM EST

DNA computation gets logical at the Weizmann Institute of Science

EUREKALERT

Contact: Yivsam Azgad
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972-893-43856
Weizmann Institute of Science

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Source : Weizmann Institute of Science

Biomolecular computers are becoming user friendly and sophisticated

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PROF. EHUD SHAPIRO's advanced programs allow computers to 'think.' (Weizmann Institute)

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NEW WORLDS

• By JUDY SIEGEL-ITZKOVICH

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New World: Biomolecular computers are becoming user friendly and sophisticated

Aug. 15, 2009
Judy Siegel-Itzkovich , THE JERUSALEM POST

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Rehovot, Israel | Posted on August 3rd, 2009

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About Weizmann Institute of Science
The Weizmann Institute of Science in Rehovot, Israel, is one of the world's top-rar

DNA Computation Gets Logical at the Weizmann Institute of Science

The world's smallest computers, made of DNA and other biological molecules, just got more "user friendly" thanks to research at the Weizmann Institute of Science

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Page last updated at 21:32 GMT, Wednesday, 5 August 2009 22:32 UK

DNA computer solves logic queries

A computer with DNA as its information carrier can solve classic logic conundrums, researchers say.

The robotic "compiler" automatically sets up the computation

DNA has been used to do simple number crunching before, but a system developed by Israeli scientists can effectively answer yes or no questions.

Strands of DNA are designed to give off a green light corresponding to "yes".

In Nature Nanotechnology, the team also describes a program which bridges the gap between a computer programming language and DNA computing code.

The team, led by Ehud Shapiro of the Weizmann Institute in Israel, has been developing DNA-based computation systems for a number of years, including "computers" that can diagnose and treat cancers autonomously.

But the current approach is fundamentally different, Professor Shapiro told BBC News.

"Using more sophisticated biochemistry, we were able to implement simple logic programs, which are more akin to the way people program electronic computers," he said.

Sticky proposition

The system devised by the researchers uses molecules to represent facts and rules. In this way, the team was able to use it to answer simple molecular "questions".

First, they tried the system with simple "If... then..." propositions. One of these went as follows: "All men are mortal. Socrates is a man. Therefore, Socrates is mortal."

When fed a molecular rule (all men are mortal) and a molecular fact (Socrates is a man), the DNA computing system was able to answer the question "Is Socrates mortal?" correctly.

> **"Without computer robotic support to this process, we would not have finished this in our lifetime"**
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The team went on to set up more complicated queries involving multiple rules and facts. The DNA devices were able to deduce the correct answers every time.

The answer was encoded in a flash of green light. Some of the DNA strands were equipped with a naturally glowing fluorescent molecule bound to a second molecule which keeps the light covered.

A specialised enzyme, attracted to the part of the molecule representing the correct answer, would then remove this cover to let the light shine.

Life's work

Professor Shapiro said the fact this system was based on clever biochemistry meant it was no less a computer than the conventional kind.

"Of course when the examples are simple, as in today's logic program, one can pre-compute the answer with pencil and paper. But in principle there is no difference between simple and complex computer programs; they can compute only what they programmed to compute.

"It is important to note that, while bio-molecular computing trails behind electronic computing - in terms of actual computing power,

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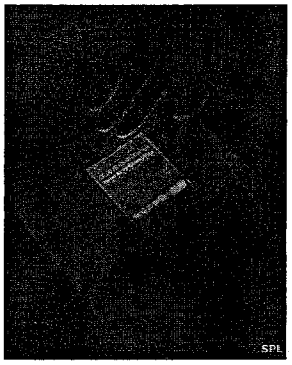
maturity of the technology, and sheer historical progression - at the conceptual level they stand side-by-side, without one being a more 'preferred' embodiment of the ideas of computation," he said.

To save time and effort, the researchers developed a robotic system to set up the DNA-based propositions and queries.

The system can take in facts and rules as a computer file of simple text. The robotic "compiler" can then turn those facts and rules into the DNA starting products of a logical query.



The results appear similar to more established DNA tests

"We had to do many, many experiments to develop, debug, and calibrate the molecular computing system, and without computer robotic support to this process, we would not have finished this in our lifetime," Professor Shapiro said.

While the current work may raise the bar for programmable, molecular computing, Professor Shapiro said: "the ultimate applications are in programmable autonomous computing devices that can operate in a biological environment."

In other words, computers that go to work inside a cell.

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August 3rd, 2009 in Nanotechnology / Bio & Medicine

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Source: Weizmann Institute of Science (**news** : **web**)

GEN Genetic Engineering & Biotechnology News

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THE JEWISH CHRONICLE
10 JULY 2009

Scientists link up for green energy talks

BY SIMON ROCKER

▶ SCIENTISTS FROM Britain and Israel met in London this week to discuss the challenges of finding alternative sources of energy amid the threat of global warming.

Professors and students from the Weizmann Institute and Imperial College, London held a two-day conference to explore the possibilities of solar energy.

The event, hosted by the charity Weizmann UK, culminated in a public session attracting several hundred, with a panel including Professor John Beddington, the government's chief scientific adviser, and Lord Hunt, the Minister of State for sustainable development and energy innovation.

Professor Gary Hodes, a member of the Weizmann team, who emigrated from Belfast in the early 1970s, said the conference "is "important for two reasons. It gives us opportunities we might not otherwise have for collaborations.

"It is also important 'politically' to show that the boycott is not universal and that there are institutions interested in positive collaboration."

Keynote speaker Professor Vernon Gibson, BP's chief chemist, highlighted rising energy demand by a world population that is expected to increase from 6.3 to 8.9 billion by 2050.

Outlining various options from wind to solar energy, and carbon capture – which means storing carbon dioxide emissions rather than allowing them to escape into the atmosphere – he said: "There are no silver bullets, no single solution to the problems we are trying to address."

While greater energy efficiency and changes in consumer lifestyle might help, there was widespread agreement that the key for the future lay in technological research into new forms of energy. "Driving smaller cars and eating fewer steaks are not going to do it," Professor Beddington remarked.

Weizmann president Professor Daniel Zajfman predicted that in future energy would belong to those with the technical know-how rather than those with natural reserves like oil.

Professor James Barber, Ernst Chain Professor of Biochemistry at Imperial, offered the striking thought: "One hour of sunlight could produce all the energy we need in one year."

❁Around 200 academics from across the world attended a major conference on Hebrew language and culture in London this week.

The three-day event, attracting participants from the US, Canada, Israel, Australia and Europe, was organised by the Wisconsin-based National Association of Professors of Hebrew, and hosted by University College London.

Tsila Ratner, of UCL's Hebrew and Jewish studies department, who chaired the conference, said: "This is the first time that NAPH has held its annual conference in Britain, actually the first time in any European university. In the current anti-Israeli climate, this is a major event."

Stanford Report, August 25, 2009

Stanford scientists team with Israeli, Jordanian researchers to study Gulf of Aqaba

BY CASSANDRA BROOKS

Scientists from Stanford University have teamed up with Israeli and Jordanian researchers to protect the Gulf of Aqaba, a strategic waterway whose fragile marine ecosystem is vital to both Israel and Jordan. Participants in the NATO-funded project say they are bridging the Arab-Israeli political divide for the sake of science, peace and environmental conservation.

"The people involved are interested in international collaboration in science and protecting the place they live," said project co-director Stephen Monismith, a professor of civil and environmental engineering at Stanford. "Nothing in the ocean understands political borders."

That's especially true in the Gulf of Aqaba (known in Israel as the Gulf of Eilat), a 99-mile-long extension of the Red Sea surrounded by four countries – Israel, Jordan, Egypt and Saudi Arabia. Lush coral reefs flourish here, offering habitat for hundreds of fish and invertebrate species. The beaches and reefs have turned the neighboring cities of Aqaba, Jordan, and Eilat, Israel, into major tourist destinations that provide much-needed income for both countries.

But the gulf is also an important transportation route for oil, and its shores are lined with industrial plants, naval bases and chemical export facilities, all of which threaten to spoil the delicate marine ecosystem.

Science for peace

To protect the gulf against oil and other toxic spills, Monismith and Stanford colleague Jeffrey Koseff, a professor of civil and environmental engineering, embarked on a unique collaboration with four marine scientists from the Middle East – Jordanians Riyad Manasrah and Tariq Al-Najjar, and Israelis Amatzia Genin and Hezi Gildor.

In November 2006, the researchers were awarded a three-year grant from the NATO Science for Peace and Security Program to study the physical processes that drive water circulation on the surface of the gulf. The goal of the project is to provide detailed oceanographic data that will help environmental agencies in Israel and Jordan respond to spills and minimize pollution.

"The movement of surface currents is a big part of how an oil spill spreads," said Monismith, a senior fellow at Stanford's Woods Institute for the Environment. "Our idea was to create a real-time map with the surface currents, and then theoretically we could see where the spill is going and clean it up."

Since 2007, the scientific team has installed three high-frequency radar systems – two in Israel and one in Jordan – that measure surface currents on both sides of the gulf, along with Acoustic Doppler Current Profilers, which use sonar to measure current velocities at various depths, and other instruments.

So far, the researchers have discerned gyres, internal waves and a large-scale convection in the surface waters. These findings have greatly increased the understanding of how currents behave inside the gulf, and how water is exchanged between the gulf and the larger Red Sea, Monismith said.

Beyond borders

In spring 2008, as part of the data-gathering process, Monismith traveled to Jordan to join his Middle East colleagues on the first cross-gulf scientific expedition.

"We boarded a boat in Aqaba with a Jordanian crew, and we did transects from coast to coast," recalled project co-director Amatzia Genin, a professor of ecology at the Hebrew University of Jerusalem. "We had oceanographic equipment, and we did transects back and forth between Jordan and Israel. There was no customs, no passports, no police. That

was the first time ever, and that was so nice."

The cruise was "an exciting accomplishment for both Jordan and Israel," added Koseff, co-director of Stanford's Woods Institute. "It's also been a very positive program for Stanford and gives students amazing opportunities to work internationally." To date, three Stanford graduate students have completed core elements of their doctoral dissertation work in the gulf.

In addition to mitigating environmental disasters, an understanding of how the gulf circulates and mixes could help officials plan large-scale water projects, such as the proposed Red Sea-Dead Sea Canal. That project aims to provide power and fresh water to Jordan, one of the most water-starved countries in the world, but its environmental consequences remain a source of controversy.

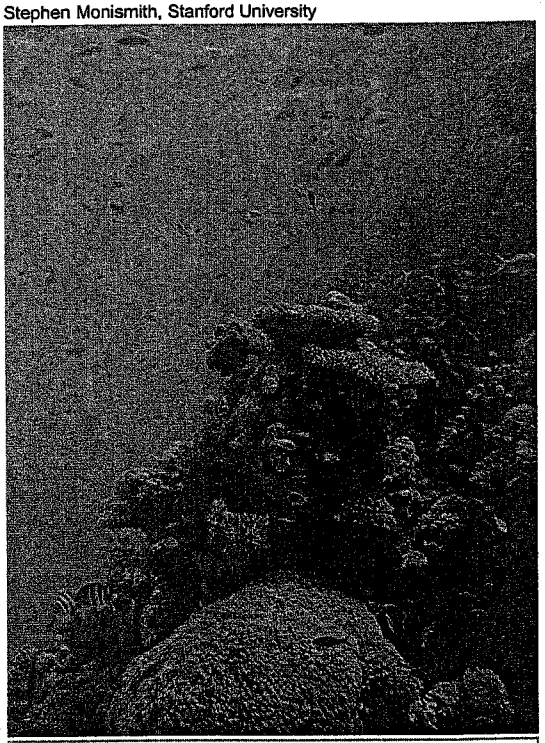
"This is really just the start for understanding the dynamics of water circulation in the gulf," said NATO project co-director Riyad Manasrah, a physical oceanographer at the Marine Science Station in Aqaba, Jordan. "We still need more work to fully understand how the gulf water mixes with the Red Sea."

Eventually, the scientists hope to work jointly with researchers in Egypt and Saudi Arabia, two other countries that border the gulf. Meanwhile, the research team has asked NATO to extend the Stanford-Jordanian-Israeli project through 2010.

"For me, this is the first joint project with colleagues from an Arab country," said project co-director Hezi Gildor, a physical oceanographer from the Weizmann Institute of Science in Rehovot, Israel. "From my point of view, it has worked very well. We shared the data, we shared the instruments, we did a joint cruise. It was a nice and unique experience to deal with this type of collaboration, and I'm looking forward to continuing it."

Cassandra Brooks is a writer intern at the Woods Institute for the Environment at Stanford.

Stephen Monismith, Stanford University



Moses Rock, a popular coral reef diving site in the Gulf of Aqaba, is home to a wide variety of fish and invertebrates.

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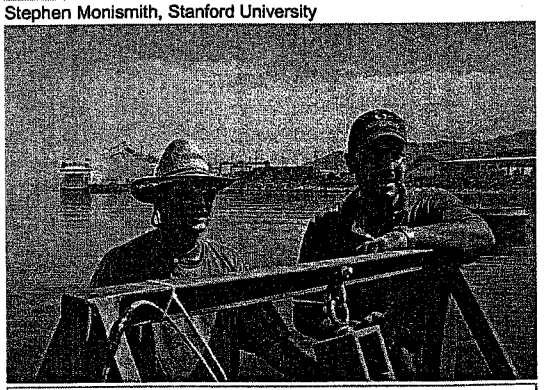
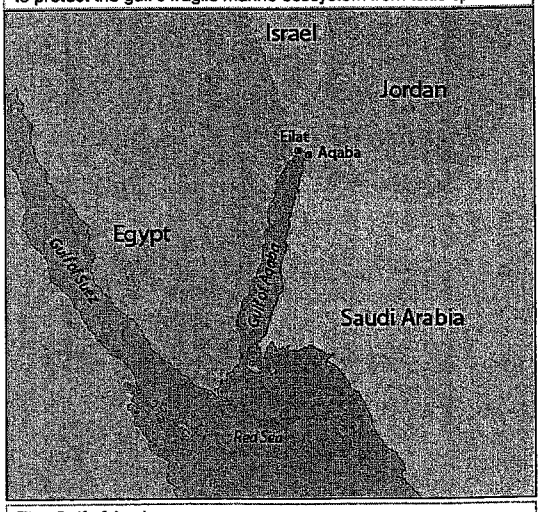


Oceanographers Hezi Gildor of Israel and Riyad Manasrah of Jordan aboard a research vessel in the Gulf of Aqaba. The scientists are collaborating with Stanford University researchers to protect the gulf's fragile marine ecosystem from toxic spills.



The Gulf of Aqaba

Jewish Independent (Vancouver, BC)

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Splitting water into H and O

Canadian centre supports Weizmann Institute's scientific work.

The design of efficient systems for splitting water into hydrogen and oxygen, driven by sunlight, is among the most important challenges facing science today, underpinning the long-term potential of hydrogen as a clean, sustainable fuel. But current man-made systems are very inefficient and often require additional use of sacrificial chemical agents. In this context, it is important to establish new mechanisms by which water splitting can take place.

A unique approach developed by Prof. David Milstein and colleagues of the Weizmann Institute's organic chemistry department provides important steps in overcoming this challenge. During this work, the team demonstrated a new mode of bond generation between oxygen atoms and even defined the mechanism by which it takes place. In fact, it is the generation of oxygen gas by the formation of a bond between two oxygen atoms originating from water molecules that proves to be the bottleneck in the water splitting process. Their results have recently been published in *Science*.

Nature, by taking a different path, has evolved a very efficient process: photosynthesis – carried out by plants – the source of all oxygen on earth. Although there has been significant progress towards the understanding of photosynthesis, just how this system functions remains unclear; vast worldwide efforts have been devoted to the development of artificial photosynthetic systems based on metal complexes that serve as catalysts, with little success. (A catalyst is a substance that is able to increase the rate of a chemical reaction without getting used up.)

The new approach that the Weizmann team has recently devised is divided into a sequence of reactions, which leads to the liberation of hydrogen and oxygen in consecutive thermal- and light-driven steps, mediated by a unique ingredient – a special metal complex that Milstein's team designed in previous studies. Moreover, the one that they designed – a metal complex of the element ruthenium – is a "smart" complex in which the metal centre and the organic part attached to it co-operate in the cleavage of the water molecule.

The team found that, upon mixing this complex with water, the bonds between the hydrogen and oxygen atoms break, with one hydrogen atom ending up binding to its organic part, while the remaining hydrogen and oxygen atoms (OH group) bind to its metal centre. This modified version of the complex provides the basis for the next stage of the process: the "heat stage." When the water solution is heated to 100°C, hydrogen gas is released from the complex – a potential source of clean fuel – and another OH group is added to the metal centre.

"But the most interesting part is the third 'light stage,'" said Milstein. "When we exposed this third complex to light at room temperature, not only was oxygen gas produced, but the metal complex also reverted back to its original state, which could be recycled for use in further reactions."

These results are even more remarkable considering that the generation of a bond between two oxygen atoms promoted by a man-made metal complex is a very rare event, and it has been unclear how it can take place. Milstein and his team have also succeeded in identifying a mechanism for such a process. Additional experiments have indicated that, during the third stage, light provides the energy required to cause the two OH groups to get together to form hydrogen peroxide (H_2O_2), which quickly breaks up into oxygen and water.

"Because hydrogen peroxide is considered a relatively unstable molecule, scientists have always disregarded this step, deeming it implausible, but we have shown otherwise," said Milstein. Moreover, the team has provided evidence showing that the bond between the two oxygen atoms is generated within a single molecule – not between oxygen atoms residing on separate molecules, as commonly believed – and it comes from a single metal centre.

Discovery of an efficient artificial catalyst for the sunlight-driven splitting of water into oxygen and hydrogen is a major goal of renewable clean energy research. So far, Milstein's team has demonstrated a mechanism for the formation of hydrogen and oxygen from water, without the need for sacrificial chemical agents, through individual steps, using light. For their next study, they plan to combine these stages to create an efficient catalytic system, bringing those in the field of alternative energy an important step closer to realizing this goal.

Participating in the research were former postdoctoral student Stephan Kohl, PhD student Leonid Schwartsburd and technician Yehoshoa Ben-David, all of the organic chemistry department, together with staff scientists Lev Weiner, Leonid Konstantinovski, Linda Shimon and Mark Iron of the chemical research

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support department.

Milstein's research is supported by the Mary and Tom Beck Canadian Centre for Alternative Energy Research and the Helen and Martin Kimmel Centre for Molecular Design. The Weizmann Institute of Science in Rehovot, Israel, is one of the world's top-ranking multidisciplinary research institutions. Noted for its wide-ranging exploration of the natural and exact sciences, the institute is home to 2,600 scientists, students, technicians and supporting staff. Institute research efforts include the search for new ways of fighting disease and hunger, examining leading questions in mathematics and computer science, probing the physics of matter and the universe, creating novel materials and developing new strategies for protecting the environment.

Weizmann Institute news releases can be found at the websites wis-wander.weizmann.ac.il and www.eurekalert.org.

– Courtesy of Weizmann Institute

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DNA repair system may hold cancer key

Scientists are eager to understand how DNA corrects damage in hopes of improving their ability to diagnose and treat the disease.

BY ROBERT S. BOYD
MCCLATCHY NEWSPAPERS

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Fortunately, our bodies have developed an elaborate biochemical system that detects and repairs damaged DNA. If the repair system can't fix the mistake, it signals the cell to commit suicide.

"Without effective DNA repair, life as we know it could not exist," Zvi Livneh, a biochemist at Israel's Weizmann Institute of Science, wrote in the Feb. 18 issue of EMBO Journal, a publication of the European Molecular Biology Organization.

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DNA research could lead to suicide for cancer cells

DOCTORS TRYING TO KEEP THEM OUT OF BODY'S REPAIR SHOP

By Robert S. Boyd
McClatchy Newspapers

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The DNA repair kit contains a rich variety of tools. Their use depends on the type of damage. If only a single DNA unit, called a "base," has mutated, special enzymes — proteins that facilitate biochemical reactions — can restore the correct base.

If a longer stretch of DNA is corrupted, different enzymes loosen the tightly wound strings of DNA — the famous double helix — to let the repair crew gain access to the spoiled part. The enzymes then clip out a patch around the trouble spot and synthesize a fresh batch of DNA to replace it.

If an entire strand of DNA is broken, certain genes encode proteins that can stitch the broken ends back together.

That's the case with genes known as BRCA-1 and BRCA-2; if those genes are damaged, for instance, a woman is more likely to get breast cancer.

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DNA repair system studied for better cancer treatment

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McClatchy Newspapers

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DNA errors are a factor in aging as well as in cancer, which primarily affects the elderly.

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On the Net:
An animated view of the DNA cell cycle, http://tinyurl.com/ym8alq.

'Without effective DNA repair, life as we know it could not exist'

— Biochemist Zvi Livneh, writing in the Feb. 18 issue of EMBO Journal

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DNA repair, cancer treatment linked

By ROBERT S. BOYD
MCCLATCHY NEWSPAPERS

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Scientists study DNA repair system

Better treatment for cancer sought

By Robert S. Boyd
Washington Bureau

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The DNA repair kit contains a rich variety of tools. Their use depends on the type of damage. If only a single DNA unit, called a "base," has mutated, special enzymes — proteins that facilitate biochemical reactions — can restore the correct base.

If a longer stretch of DNA is corrupted, different enzymes loosen the tightly wound strings of DNA — the famous double helix — to let the repair crew gain access to the spoiled part. The enzymes then clip out a patch around the trouble spot and synthesize a fresh batch of DNA to replace it.

If an entire strand of DNA is broken, certain genes encode proteins that can stitch the broken ends back together.

That's the case with genes known as BRCA-1 and BRCA-2; if those genes are damaged, for instance, a woman is more likely to get breast cancer.

The Wichita Eagle

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DNA repair may help treat cancer

BY ROBERT S. BOYD
McClatchy Newspapers

WASHINGTON — For a human cell, this is a scary world. Each of the 60 trillion or so cells in the average person's body is damaged tens of thousands, perhaps a million, times a day, scientists say.

The results can be deadly.

Ultraviolet rays from the sun, smoking, harmful chemicals, moldy peanuts, certain diseases, genetic accidents and simply growing old can cause mutations, additions, subtractions, swaps and reversals that jumble the long strings of DNA that control a cell.

Even breathing can create mischief. As cells take in oxygen to make energy from food, hazardous byproducts are created that can corrupt DNA.

An injured cell can run amok, reproducing wildly and spreading through the body, causing cancer, blindness, anemia, premature aging or other misfortunes.

Fortunately, evolution has developed an elaborate biochemical system that detects and repairs damaged DNA. If the repair system can't fix the mistake, it signals the cell to commit suicide.

"Without effective DNA repair, life as we know it could not exist," Zvi Livneh, a biochemist at Israel's Weizmann Institute of Science, wrote in the Feb. 18 issue of EMBO Journal, a publication of the European Molecular Biology Organization.

With DNA damage playing such an important role in cancer, scientists are eager to understand how DNA corrects such damage in hopes of improving their ability to diagnose and treat the dread disease.

Alan D'Andrea, a radiology professor at Harvard Medical School, founded a firm called the DNA Repair Co. in Cambridge, Mass., which is developing personalized cancer therapies.

At a weeklong DNA repair conference last winter in Ventura, Calif., scientists discussed what conference leaders called "major advances (in a) rapidly expanding field."

Be sensitive to infertile couples' feelings, panel told

By SHERI SHEFA
Staff Reporter

Rabbi Baruch Frydman-Kohl, spiritual leader of Beth Tzedec congregation, knows that many couples who suffer from infertility often feel deprived, inadequate and shamed.

The rabbi, First Steps Fertility (FSF) clinic founder Dr. Fay Weisberg, FSF clinic manager Shira Benson, and former FSF patient Roslyn Angel Kaman were part of a May 26 discussion panel at Beth Tikvah Synagogue that addressed the emotional, physical and spiritual challenges associated with infertility and its treatments.

Rabbi Baruch Frydman-Kohl

Angel Kaman shared her experience of having spent nine years trying to conceive. When she and her husband, Howard, decided to have a child when she was 32, they spent two years trying the "old-fashioned way" before seeking help.

"We felt like we were the only people who couldn't have a baby," Angel Kaman said.

After experimenting with fertility drugs, they moved on to insemination, when sperm is injected directly into the uterus.

Angel Kaman was overcome by tears when she recalled finally becoming pregnant by insemination after five years of trying, only to suffer a miscarriage shortly thereafter. She conceived twice more, but both pregnancies were ectopic, when an embryo implants outside the uterus and eventually miscarries.

They decided to move on to in vitro fertilization (IVF), and within three cycles, they succeeded only in producing a blighted ovum, or an empty sac with no embryo.

"I was almost 40 years old, the age I told myself I would stop trying to have a baby... I did a lot of soul-searching and came to the realization that what I really wanted was to be a parent."

It was then she and her husband began to pursue adoption.

But when she read an article in The CJN about a fertility discovery at Weizmann Institute of Science in Rehovot, Israel, she and her husband had new hope.

"While my mind was saying that I was done with fertility treatments, and that I wouldn't go through it again, my heart was saying, 'One more time, just one more time.'"

The article explained that an accidental discovery was made by Weizmann professor Nava Dekel.

Usually, only 20 to 50 per cent of fertilized embryos result in a successful pregnancy after they are transferred to the uterus. But after Dekel and her team gave women a uterine biopsy – scraping a small amount of tissue from the uterus – the success rate increased by 50 per cent.

Dekel explained that the local injury of the uterus doubled the chance of having a viable pregnancy.

Angel Kaman contacted the Israeli doctors, who sent a detailed description of the procedure to her fertility doctor in Toronto, Dr. Fay Weisberg.

Finally, after nine years, the Kamans were expecting a baby.

"For the next nine months, I became cautiously optimistic. This was my fifth pregnancy, and I had a hard time letting myself get excited," Angel Kaman said.

"It wasn't until Oct. 23 [2008], when I held Hannah in my arms for the first time that I really believed that it was true."

The story ends with a beautiful, healthy baby girl, but the Kamans are all too familiar with the pain and helplessness couples feel when they're unable to conceive.

Rabbi Frydman-Kohl, who offered a spiritual approach to dealing with the issue, said that Jewish tradition regards a good marriage as one that includes loving companionship and children.

"We recognize that procreation, having children, is a mitzvah. But what happens when you're not able to have children? My experience is that couples often feel deprived, inadequate, unlucky, shamed, as if one has let down the other, as if one is letting down one's family," he said.

"Some people feel that since the Jewish community puts such an emphasis on having children that they may be letting down God, may be letting down the Jewish people."

Rabbi Frydman-Kohl said that the Jewish community must be sensitive to the struggle some people have with fertility and help them feel valued as human beings and Jews.

He added that it's important to understand that if a couple can't have children, "the mitzvah of having children is no longer operative."

That is, if a couple is unable to naturally conceive, they aren't obligated to seek alternative, often costly, methods.

Weisberg, who offered a more clinical approach to infertility, gave a presentation dispelling myths and misconceptions about infertility and offered advice about how couples can give themselves the best chance to conceive.

The main message was that women have a biological clock that's ticking, and after 35, it ticks quickly.

A woman's eggs age with her, and the number of quality eggs a woman produces decreases with age, she added.

"The older you get, the less eggs you have. Our ovaries have an expiration date."

Tone Magazine (Ottawa, ON)

Date 30.06.2009

Food Trends and Nutrition...

Monday June 8, 5:30 p.m. – 7:30 p.m.

from Plant Science to Palate Pleasers! A Weizmann Science Canada cocktail event featuring guest speakers who will take us on a journey from the science of plants and their nutritional value to food trends and the pleasure of dining. Proceeds will fund a special Women in Science Award. Guest Speakers are Professor Gad Galili, of the Weizmann Institute of Science and Stephen Beckta, award winning sommelier and owner of the very popular Beckta dining & wine and Play food & wine. Agudath Israel Synagogue, Couvert $50. For more information and/or sponsorship opportunities please call Lorie Blumer TODAY at 613-236-3391 or email lorie@weizmann.ca

Tone Magazine (Ottawa, ON)

Date 30.06.2009

An Event Not To Be Missed!

Food Trends and Nutrition

Weizmann Science Canada, is hosting an exciting Luncheon event on June 8th, 2009 entitled Food Trends and Nutrition at the Agudath Israel Synagogue from 11:45 a.m. to 2:00 p.m. Featured guest speakers will take us through food trends from the science of plants and their nutritional values to the pleasure of restaurant dinning.

The Weizmann Institute of Science is world renowned as a multidisciplinary center of excellence for cutting-edge research and innovation in the natural and life sciences located in Rehovot, Israel. Professor Gad Galili of the Institute will be one of the featured guest speakers. Prof Galili is the Head of the Department of Plant Sciences and will be demystifying current topics such as organic foods, genetically modified foods and the general science of food.

Stephen Beckta, local Restauranter and famed sommelier, with two highly successful restaurants in the Ottawa area: Beckta Dining and Wining and Play Food Wine will be a guest speaker as well. Beckta dining & wine appeared in April in the New York Times in The Frommer's review, featured in the Travel section highlighting Ottawa restaurants and "Where to Eat." Stephen will be discussing food trends and the pleasures of restaurant dinning.

The event will be a journey from understanding food and nutrition to enjoying the experience of them. A special Women in Science Awards Program was launched recently, aimed at assisting highly talented young women pursing a career in science. The special award provides the PhD student with $20,000 per year for two years to help with additional costs. Proceeds raised at this event will contribute towards this special award. For more information on attending or the many sponsorship opportunities available please call Lorie Blumer at 613-236-3391, seats are limited. Couvert 50$.

The Ottawa Chapter of Weizmann Science Canada has proudly announced their new president Dr. Graham Sher, Chief Executive Officer of Canadian Blood Services. The Ottawa chapter of Weizmann Science Canada is growing and exciting educational programs and events are being planned. To learn more about Weizmann Science Canada please contact executive director of the Eastern Region, Susan Stern at 514-342-0777.

SCIENCE NEWS

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Team spots odd stellar explosion

Supernova 2005E doesn't match any known classes

By Ron Cowen

Astronomers found a new type of stellar firecracker just in time for July 4.

Stars that die an explosive death generally fall into two categories: young, massive stars that collapse under their own weight and hurl their outer layers into space, and older, sunlike stars that undergo a thermonuclear explosion. But the stellar explosion recorded in January 2005 and known as SN 2005E doesn't fit either class, according to a new analysis reported online June 11 at arXiv.org.

The explosion ejected only a small amount of material—the equivalent of 0.3 solar masses—and erupted in the halo of an isolated galaxy, a region devoid of any star formation. These findings suggest that the explosion, or supernova, did not arise from the collapse of a massive star, report Hagai-Binyamin Perets and Avishay Gal-Yam of the Weizmann Institute of Science in Rehovot, Israel, and their colleagues. A massive star would have cast off much more material and would have erupted in a star-forming region. Since stellar heavyweights are so short-lived, they can't move far from their birth sites.

On the other hand, the researchers note, the explosion's dimness and the abundance of elements forged in the eruption indicate it was not a typical thermonuclear explosion. Spectra show that debris from the outburst contains five to 10 times more calcium than observed in any other known stellar explosion and probably contains an abundance of radioactive titanium-44.

"In my experience, there are lots of strange supernovas out there ... but it really does look like this one might be something different," says theorist Andrew MacFadyen of New York University.

The authors of the paper declined to be interviewed because they had submitted the report to *Nature*. In their article, they report that the erupting oddball matches a model in which a compact star called a white dwarf nabs a thick layer of helium from a companion star. The star would then undergo a thermonuclear explosion that would destroy the helium but leave the rest of the white dwarf intact. By contrast, in a common type of supernova known as a type Ia supernova, a white dwarf made up mostly of carbon and oxygen blows itself to smithereens after stealing matter from a companion.

Perets, Gal-Yam and their collaborators report that SN 2005E resembles a few other peculiar supernova, notably an explosion found last year and known as SN 2008ha.

"Both of these objects have very low luminosity, low velocity [of debris] and strong calcium lines," says Robert Kirshner of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. Kirshner, along with some of the collaborators on the SN 2005E study, is a coauthor of a study on SN 2008ha published online June 17 in *The Astronomical Journal*.

The conclusions of both papers suggest a weak thermonuclear explosion, Kirshner says.

34 Number of supernovas detected in 1988

260 Number of supernovas detected in 2008

Team spots odd stellar explosion

Supernova 2005E doesn't match any known classes

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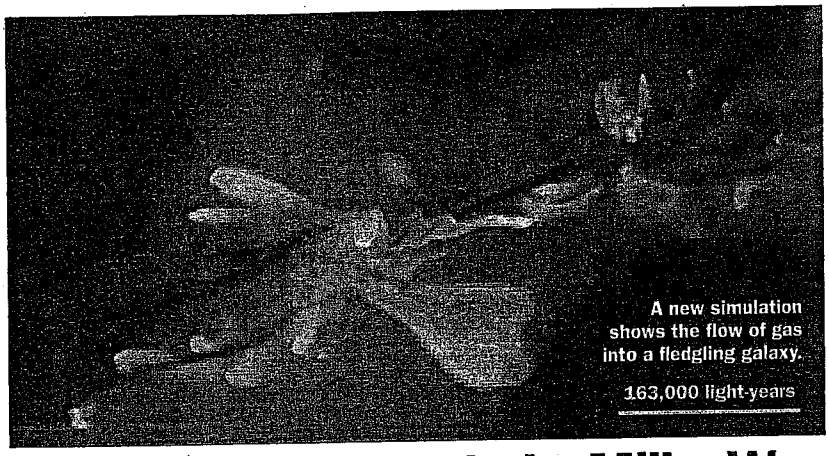

A new simulation shows the flow of gas into a fledgling galaxy.

163,000 light-years

B. MOORE, OSCAR AGERTZ, ROMAIN TEYSSIER/UNIV. OF ZURICH

New model bears a baby Milky Way

State-of-the-art simulation shows galaxy formation in high-res

By Ron Cowen

BLOIS, France — Like a proud papa showing off a picture of his newborn, cosmologist Ben Moore of the University of Zurich displayed an image of a galaxy that he says looks just like an infant Milky Way.

These days, with the sharp eye of Hubble and other telescopes, that may not sound like much of a feat. But the image Moore unveiled June 23 at the Windows on the Universe meeting was produced by a supercomputer and is the highest-resolution simulation ever attempted of a galaxy's assembly.

Moore and his colleagues put in all the raw ingredients and detailed interactions that are generally agreed to be essential for galaxy formation. "The complexity we find is very beautiful," Moore says. As time unfolded, the simulation, which begins shortly after the Big Bang and ends when the universe is about 2 billion years old, produced a spiral galaxy akin in mass and shape to a young Milky Way.

JOURNAL OF
COLLEGE
SCIENCE
TEACHING

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Immune system has legs

How do white blood cells get to the site of infection or injury? They must crawl swiftly along the lining of the blood vessel—gripping it tightly to avoid being swept away in the blood flow—all the while searching for temporary "road signs" made of special adhesion molecules that let them know where to cross the blood vessel barrier so they can get to the damaged tissue.

Current opinion maintains that immune cells advance like inchworms, but new findings show that the rapid movement of the white blood cells is more like that of millipedes. Rather than sticking front and back, folding and extending to push itself forward, the cell creates numerous tiny "legs" no more than a micron in length—adhesion points, rich in adhesion molecules (named LFA-1) that bind to partner adhesion molecules present on the surface of the blood vessels. Tens of these legs attach and detach in sequence within seconds—allowing them to move rapidly while keeping a good grip on the vessels' sides.

Images produced by transmission and scanning electron microscopes showed that, upon attaching to the blood vessel wall, the white blood cell legs "dig" themselves into the endothelium, pressing down on its surface. The fact that these legs, which had been thought to appear only when the cells leave the blood vessels, are used in crawling the vessel lining suggests that they may serve as probes to sense exit signals. The researchers found that the shear force created by the blood flow was necessary for the legs to embed themselves. Without the thrust of the rushing blood, the white blood cells couldn't sense the exit signals or get to the site of the injury. These results explain researchers' previous findings that the blood's shear force is essential for the white blood cells to exit the blood vessel wall. The present study suggests that shear forces cause their adhesion molecules to enter highly active states. The scientists believe that the tiny legs are trifunctional: used for gripping, moving, and sensing distress signals from the damaged tissue. *(Weizmann Institute of Science)*

Lifestyles Magazine (Richmond Hill, ON)

Date 30.09.2009 Circ. 106227 Page 122

PROFILE *Brian Berkowitz*

Free flowing

*Researcher **Brian Berkowitz** is working to extract oil from the Alberta oil sands—and honor his father in the process.*

By Sheila Dropkin

Photo courtesy of Brian Berkowitz

When Professor Brian Berkowitz of the Weizmann Institute of Science was still in university, he had to decide whether his professional life would be devoted to music or science. Science won, but music, which he calls "wonderful therapy," has remained a constant in his life. He is now recognized as a world leader in the study of the properties, distribution, and effects of water in the Earth's subsurface, in the soil and underlying rocks, with the goal of remediating water polluted by toxic contaminants of all kinds. Since the lack of potable water has reached critical levels in much of the Third World and is of looming concern in developed countries, including North America, he obviously made the most propitious decision for himself and for humankind.

Meeting Berkowitz in the coffee shop of a downtown Toronto hotel during a series of talks to Weizmann Institute supporters in several Canadian cities, he is slender, with a trim beard and high forehead. He speaks quickly, rarely stopping for a breath, as though he wants to make sure he gets to say everything he can before he has to leave. He does, however, laugh easily, and periodically stops to tell a joke.

Much of his current research is focused on the analysis of water pollution caused by organic contaminants and heavy metals, with particular emphasis on groundwater systems and pollutant migration patterns. At the same time, Berkowitz and his team are working toward developing new methods and materials with which to remediate water, leading to fresh, clean water, safe waste disposal, and sustainable development with a cleaner environment. His website, in which he describes his work in great scientific detail, is used by researchers around the world.

From his earliest days as a researcher, he did his own experiments and "went more and more into the labs," he says. "It's basic science—trying to understand the world

Lifestyles Magazine (Richmond Hill, ON)

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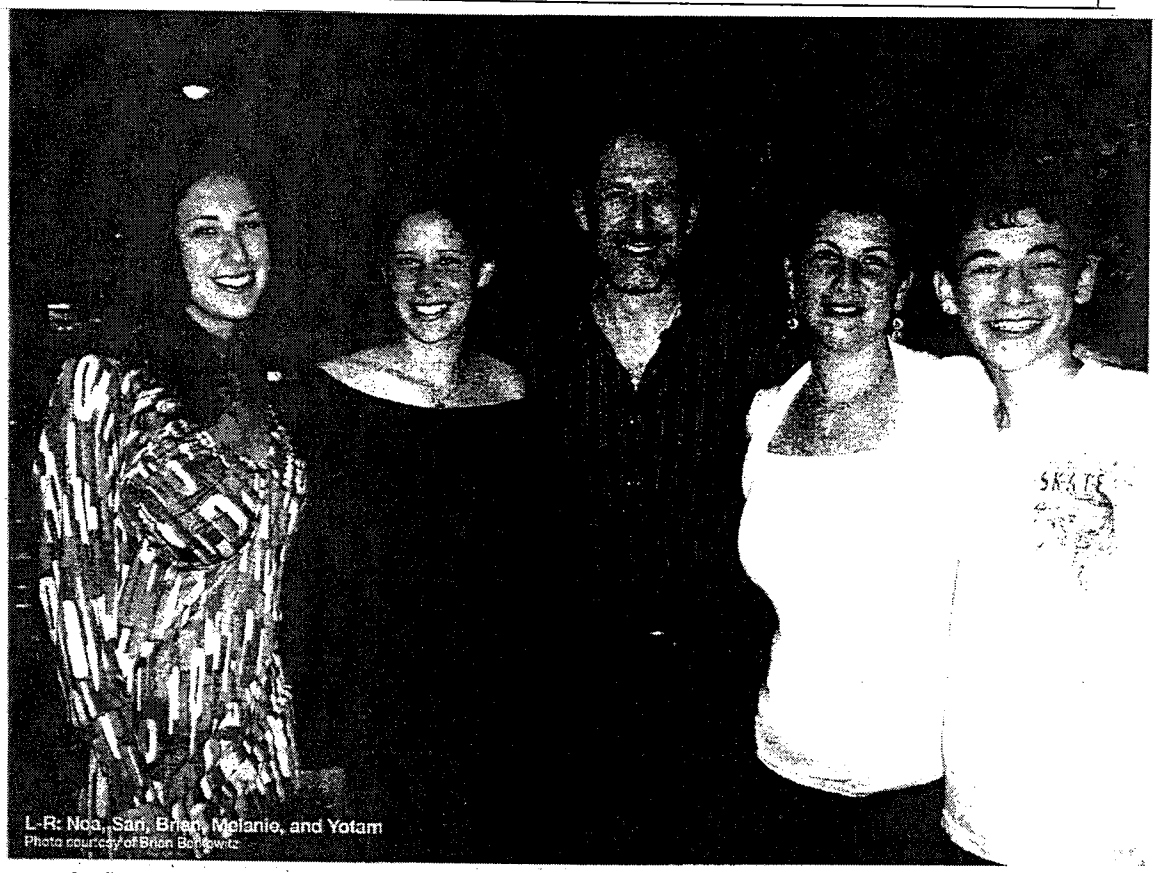

L-R: Noa, Sari, Brian, Melanie, and Yotam
Photo courtesy of Brian Berkowitz

around us." Providing an example of his use of Israeli ingenuity, he explains that early in his career, when he needed equipment to model the flow of water through rock formations, rather than spend thousands of dollars for a sophisticated design built in Germany, he bought a $20 fish tank, which worked just as well.

Among his many concerns is the high level of pharmaceuticals in water supplies, which emanates largely from the urine of people and animals. (For the most part, the properties of these medications don't change when ingested.) Another concern is the high rate of industrial effluent polluting water supplies. He is now testing a well site that he developed using natural chemicals, which is proving able to degrade over 90 percent of the contamination. "We were just mixing things up," he says, "and it's working very well."

The model he developed on how contaminants are disbursed is now used all over the world, Berkowitz says. "Our research is completely generic," he explains of the studies being done by his group. "It's not anything specifically Israeli, and it's good for Israel and good for the world. Israel is a microcosm of the world. It's at the cusp of Europe, Asia, and Africa and, with the Galilee, the Negev Desert, and the Dead Sea, it's a geologist's dream."

Although he's not involved in the development of Israeli desalinization techniques, he adds with pride that these are now also used worldwide. Ironically, Israel exported the details of these technologies to turn salt water into fresh water internationally years before using it itself (except in Eilat). There are now several desalinization centers across the country.

Berkowitz grew up surrounded by both music and science—his mother, a bacteriologist from Prince Albert, Saskatchewan, played the piano; his father "played the audience," Berkowitz jokes, but he was also a renowned scientist who was born in Berlin and was saved from the Holocaust by the Kindertransport, which took 10,000 Jewish children from Germany to England in the earliest days of World War II. Having earned a Ph.D. in chemistry and petroleum engineering at the University of London, he moved in 1952 to Edmonton, where he worked with the Alberta Research Council for 27 years. Over many years, he

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served in parallel as a member and then as vice chairman of the Energy Resources Conservation Board in Calgary. He was honored with an Order of Canada in 1984 in recognition of the new methods of extracting and refining coal that he discovered and developed, along with multiple other patented inventions associated with coal technology. He subsequently left the ARC and assumed a professorship at the University of Alberta. He and his wife, Sheila, were tragically killed in a car accident in 2001.

Berkowitz's wife, Melanie, also an Edmonton native, is a nurse by training and manages a family health clinic in Gedera, near Mazkeret Batya, the city in which they live. About 15 years ago, she embarked on an additional career as a sushi chef, for which she gives workshops and has appeared on television and the Internet. The couple has three children, 22-year-old Noa, who recently completed her army service and is now studying occupational therapy at Hebrew University; 20-year-old Sari, an officer in the Israel Defense Forces; and 16-year-old Yotam, a gifted mathematician, who is doing a double program in high school and Bar-Ilan University. He "loves numbers," his father says, and he is also a musician.

It's basic science— trying to understand the world around us.

Despite his already heavy workload, Berkowitz is working through the grief of his parents' death by following up on his father's work in developing a process for extracting oil from the Alberta oil sands. He has developed a system to turn viscous gunk in the oil sands into free-flowing oil, using near-supercritical water (water that has been heated under pressure and is neither a liquid nor a gas). With the support of Stephen Dunn, his father's Canadian business partner, and using the data in the three books and dozens of scientific papers written by his father as a "wonderful resource," he has built a prototype to prove the effectiveness of the process created and initiated in the lab by the elder Berkowitz. The Yeda Research and Development Company, the business arm of the Weizmann Institute, is now handling the original patent for the system, as well as additional patents for improvements, and is in the midst of negotiations to commercialize the technology. Designed to eliminate the need for chemical diluents (thinners) and for large upgrades, the technique is expected to expedite delivery of oil from such repositories as the Alberta oil sands to refineries through pipelines.

Yeda, which means "knowledge" in Hebrew, was founded in 1959. It initiates and promotes the transfer of innovations stemming from the research at the Weizmann Institute to the global marketplace. The Institute and researchers share in a portion of the proceeds from the commercialization of these products and processes.

Berkowitz has developed innovative new theories, on water flow and the movement of chemicals in rock formations, which he has taken from the lab into the field, where he has successfully tested their accuracy. He's received international recognition for his developments and the integration of hydrology, geology, statistical physics, and computer simulation into his technologies. As if he isn't sufficiently busy, until recently he was editor of *Water Resources Research*, the flagship hydrology journal published by the American Geophysical Union. During his tenure, he handled approximately 250 papers a year and he still tackles 30 to 40 e-mails a day that he tries to answer immediately. He was elected a fellow of the American Geophysical Union in 2005 and a fellow of the Geological Society of America in 2007. The following year, he was named Inventor of the Year by Yeda. He has also earned the Goldschmidt Award of the Israel Association for Hydrology; the Faculty of Science Teaching Excellence Award from the Science Undergraduate Society, University of British Columbia; and the Michael Landau Achievement Prize in Israel. In an effort to get some "cathartic" downtime, he has started setting aside a few hours a week when he doesn't answer his phone and stays away from the computer. But judging by his intensity, it would not be incorrect to assume that his mind remains active (possibly discerning scientific formulas or musical scores or both) even when he's presumably resting.

And does the thought of moving on ever occur to Berkowitz?

"Weizmann is very unique and the level of excitement and intensity of life in Israel is incredible," he says. "It's become a powerhouse in scientific export: water technology, hi-tech, and military industries. There's nowhere else I'd rather be." LM

The Canadian Jewish news (Toronto, ON)

Date 11.06.2009 Circ. 43000 Page 14

Water can be found in unexpected places, prof says

By SHAUN SHLOMO FELDMAN
CJN Intern

Hydrology is an area that has the scientific community's attention, specifically regarding methods of water treatment, Brian Berkowitz says.

Even with the $400 billion that have been invested in water treatments, there are two questions we still need to ask ourselves, he said: first, do we know how to protect ourselves, and second, do we know what to look for?

A professor at the Weizmann Institute of Science in Israel, Berkowitz said that since the hydrological cycle is a closed system – meaning there is no beginning or end to it – we are never in danger of completely running out of water, as there are always places where it can be accessed, besides obvious ones like lakes and rivers.

"The vast majority of the world's water is underground, stored in the pores and cracks of rocks," he said.

The key problem is water quality, he said. There are thousands of potentially hazardous contaminants that end up in our water supply as waste by-products, including industrial substances, agrochemicals, domestic products, heavy metals and biological elements. These products often don't get broken down, making them difficult to manage, he said at a lecture on "Water, Energy and the Environment: Science and Sustainability," sponsored by Weizmann Science Canada and the Israel Chamber of Commerce.

In the presentation at the Park Hyatt Hotel last month, Berkowitz referred to the give and take nature of the various water treatment methods used as a "zero-sum game... [that is] sometimes you win, and sometimes you lose," he said.

In speaking of water and the environment with respect to water flow and precipitation, he illustrated in his presentation that Israel tries to incorporate a prevention and mediation technique that involves predicting contaminant transport patterns through lab analysis of water movement.

Several desalination methods have been tried with varying degrees of success. Hadera, a city in southern Israel, is home to the world's largest desalination plant, built in 2005. Berkowitz said desalination, which involves the removal of salt and harmful minerals from water, is the best method of water treatment available today.

One desalination technique used is in-situ/ex-situ pump treatment, involving the excavation of water from wells for purification. This gets rid of chlorine molecules in the water so that the contaminants can degrade at a faster rate.

Other methods include the oxidation of industrial effluents, which "is considered extremely cost efficient... and yields excellent results"; air injection, which "causes significant reduction of hydraulic conductivity and volumetric fluid flow"; and Poleris carbon sequestration, which "turns carbon dioxide into rock."

In a news report illustrating Israel's leadership in this area, shown prior to Berkowitz's presentation, American news broadcaster Dan Rather spoke of the booming Israeli scientific community. Israel has more scientists and researchers per capita than any other country in the world, Rather said, and since its inception in 1934, the Weizmann Institute of Science has earned over 200 patents and $100 million for discoveries involving high-tech security and medicine.

Despite the progress that has been made, Berkowitz said that Israel "has no choice but to build more desalination plants."

The Jewish Tribune (Downsview, ON)

Date 04.06.2009 Circ. 100750 Page 5

From the left: Dr. Jay Alan Smith, chairman of the board/president of Weizmann Science Canada with Prof. Brian Berkowitz, department of environmental sciences and energy research, Weizmann Institute of Science; Jonathan Levy, Israel consul for economic affairs and Israel's trade commissioner to Canada; David Rubin, president, Canada Israel Chamber of Commerce, and Michael E. Meyer, national executive vice-president, Weizmann Science Canada.

The Jewish Tribune (Downsview, ON)

Date 04.06.2009 Circ. 100750 Page 5

It's all interconnected, Weizmann scientist says

Shlomo Kapustin
Correspondent

TORONTO – As any observer of Middle Eastern realpolitik knows, all is interconnected; a push here, a pull there, can lead to a shove or tug miles away. Apparently, the same is true in the natural world.

Professor Brian Berkowitz of Israel's renowned Weizmann Institute, department of environmental sciences and energy research, pointed this out to an audience of about 100 recently at the Park Hyatt Hotel in downtown Toronto. The event was co-sponsored by the Canada-Israel Chamber of Commerce.

Berkowitz, who hails from Edmonton, talked about *Water, Energy, and the Environment: Science and Sustainability*, making it clear that no single solution will materialize to solve what many consider to be the two most serious environmental challenges facing the world today.

"It is a zero-sum game," he said. "If you win somewhere, you lose somewhere else.... There ain't no such thing as a magic bullet."

Take ethanol, for example. The latest cure-all for the much-predicted global energy shortage is produced from corn, but – even aside from the use of food to produce energy – Berkowitz bemoaned the water being converted into fuel, with water being used at a 4:1 ratio.

Similarly, desalination – a reality of Israel's water situation – sacrifices energy to produce water.

Berkowitz's work focusses on the analysis and modelling of fluid and chemical transport in geological formations, especially relating to groundwater systems. Groundwater represents 95 per cent of the earth's accessible fresh water, he said.

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His laboratory is developing new methods to both prevent pollution and to clean water that is polluted by contaminants and heavy metals. While industrial substances and agrochemicals (such as pesticides) receive their fair share of media attention, domestic products are also a concern, said Berkowitz, with 90 per cent of drugs exiting from the body unchanged.

But the water system is a closed one, so these toxins don't leave, they just hide. It's no surprise that traces of the anti-depressant Prozac were found in London's drinking water supply in 2004, he said.

Weizmann trumpets its pursuit of basic science, while still stressing its success in finding real-world solutions – from pharmaceuticals to the work of Berkowitz and his colleagues with environmental contaminants. To this end, *Yeda* (Hebrew for "knowledge") works to bring Weizmann's discoveries and technologies to the global marketplace.

"Sometimes doing basic research leads to the really neat breakthroughs," Berkowitz said.

NEWS > SCIENCE > DONATION > ISRAEL

It's all interconnected, Weizmann scientist says

Shlomo Kapustin
Correspondent

TORONTO – As any observer of Middle Eastern realpolitik knows, all is interconnected; a push here, a pull there, can lead to a shove or tug miles away. Apparently, the same is true in the natural world.

Professor Brian Berkowitz of Israel's renowned Weizmann Institute, department of environmental sciences and energy research, pointed this out to an audience of about 100 recently at the Park Hyatt Hotel in downtown Toronto. The event was co-sponsored by the Canada-Israel Chamber of Commerce.

Berkowitz, who hails from Edmonton, talked about *Water, Energy, and the Environment: Science and Sustainability*, making it clear that no single solution will materialize to solve what many consider to be the two most serious environmental challenges facing the world today.

"It is a zero-sum game," he said. "If you win somewhere, you lose somewhere else.... There ain't no such thing as a magic bullet."

Take ethanol, for example. The latest cure-all for the much-predicted global energy shortage is produced from corn, but – even aside from the use of food to produce energy – Berkowitz bemoaned the water being converted into fuel, with water being used at a 4:1 ratio.

From the left: Dr. Jay Alan Smith, chairman of the board/president of Weizmann Science Canada with Prof. Brian Berkowitz, department of environmental sciences and energy research, Weizmann Institute of Science; Jonathan Levy, Israel consul for economic affairs and Israel's trade commissioner to Canada; David Rubin, president, Canada Israel Chamber of Commerce, and Michael E. Meyer, national executive vice-president, Weizmann Science Canada.

Similarly, desalination – a reality of Israel's water situation – sacrifices energy to produce water.

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'Electronic sniffer' that can also identify kidney disease

by Judy Siegel-Itzkovich
The Jerusalem Post

A chemical engineer at the Technion, who had been named one of the world's 35 top young scientists after developing a device that can detect cancers by "sniffing out" biomarkers, has now discovered that it can also be used to discover the presence of kidney disease.

It will "require a long and tiring path" to reach the target of diagnosis of kidney disease early enough to delay kidney failure and dialysis, says Dr. Hossam Haick, since 2006 a senior lecturer in chemical engineering, whose electronic "nose" can diagnose cancer in just two or three minutes by analyzing a patient's breath.

Raised in Nazareth, Haick, 34, received his bachelor of science degree from Ben-Gurion University and doctorate from the Technion; he spent two years at the Weizmann Institute of Science and later pursued postdoctoral research at the equally prestigious California Institute of Technology (Caltech), where he did much of the work leading to the device.

Last year, Haick, a Technion senior lecturer, was chosen for inclusion in a list known as the "TR35" from more than 300 nominees by a panel of expert judges and editorial staff at Technology Review, the magazine of innovation of the Massachusetts Institute of Technology.

Haick is the first Israeli scientist to win the European Union's Marie Curie Excellence Grant; he was also honored by the president of France with the France-Israel Foundation Prize for Excellence in Science and received a Fulbright fellowship.

When a malignant tumor develops in the body, its cells produce chemicals, called biomarkers, that circulate in the blood or urine. They cross from the blood into the lungs, where they are exhaled in minute amounts.

Haick's artificial olfactory device detects cancer by "sniffing out" these molecules. The device is comprised of nano-sized chemical sensors that can detect cancer in a person's breath, which could greatly improve survival rates via critical early diagnoses.

So far, Haick can identify lung, breast and colon cancer and started testing the electronic nose at the oncology division of Haifa's Rambam Medical Center.

The person to be screened exhales into the electronic nose comprised of nanometric sensors, and the device can detect if there is a malignancy and, sometimes, what type.

The developer hopes that the finished device will be the size of a cellular phone and cheap. It would not only allow doctors to detect tumors early, but may even be able to pinpoint the location of the cancer in the body, just as a pointer dog identifies animals that hunters are seeking.

The electronic nose's use in detecting kidney disease was reported in the latest issue of the journal *ACS Nano*. Identifying patients, including Type II diabetics with kidney disease when it has just begun, is important, because by the time symptoms occur, it may be too late to save them, and dialysis to clean the blood can cost NIS 300,000 per year per patient.

Once the first signs of kidney disease are detected, the patient will be able to get medications and change his diet to slow its development to kidney failure, Haick said.

The idea to try the electronic nose on kidney disease was raised in a conversation between Haick and professor Zaid Abassi, along with professor Farid Nahoul of the Technion's Rappaport

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Medical Faculty and Rambam. They said that malodorous urea is released in the breath of patients with advanced kidney disease.

The team created kidney disease in rats and used Haick's electronic nose. They found that the device detected all cases that were confirmed by blood and urine tests.

It also detected 27 other substances in the breath of the sick rats, but not in healthy rats — that could make the detection even more exact. Among these, they identified only five that are the best indicators that kidney disease has begun.

The team has registered a patent for the discovery and the changes in the electronic nose that were needed for their kidney research.

APPLAUSE · SUSAN SCHWARTZ

Participants come from all walks of life

Fundraiser supports diabetes research

About 2,500 participants joined the local 2009 Telus Walk to Cure Diabetes on June 14 at Laval's Centre de la nature. The event, the Juvenile Diabetes Research Foundation's single largest annual fundraiser, raised $280,000 of its $410,000 goal.

More than 45,000 Canadians take part in the walk, which last year raised more than $8 million. The foundation is the leading charitable advocate and funder of research into Type 1 diabetes. Type 1 diabetes is a non-preventable autoimmune disease most commonly diagnosed between infancy and one's late 30s. It is the most severe form of diabetes. For more information, visit www.jdrf.ca.

■ Laura Horowitz and Ali Antolin, who were among the participants in the June 14 walk, have been best friends since Grade 1. In Grade 6, Antolin learned she had Type 1 diabetes.

When they were younger, the two would go door to door collecting money for diabetes research, writes Horowitz, a 20-year-old McGill student. They graduated to barbecues: a fundraising backyard barbecue organized last year for their friends met its goal of $500.

This year, Horowitz and Antolin, together with Jessica Walters and Ellis Timerman, organized a larger fundraiser – a coffee-wine-dessert event for 150 held at the Dollard des Ormeaux Civic Centre on May 23.

They found sponsors, got the refreshments and party supplies donated, organized entertainment and a raffle featuring prizes donated by Montreal-area businesses.

The event raised $3,700 for the Juvenile Diabetes Research Foundation.

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Two hundred Montreal women – and a few men – who attended a nutrition and wellness program organized by Weizmann Science Canada heard from a panel of experts about the health benefits of eating fruits and vegetables – and enjoyed a healthful lunch featuring some of those foods, including carrots, sweet peppers, cabbage, edamame beans and pomegranate juice.

The June 9 event raised $20,000 for Weizmann's Women in Science award, an award designed to encourage women to pursue academic careers in science.

Gad Galili, chairman of the department of plant science at the Weizmann Institute of Science in Rehovot, Israel, and head of its Mel Dobrin Centre for Nutrition, spoke about research under way at the Israeli facility to make fruits and vegetables even more nutritious. Richard Béliveau, who holds the chair in cancer prevention and treatment at the Université du Québec à Montréal and has written three books about diet and cancer prevention, encouraged guests to eat five servings a day of fruits and vegetables – seven if they're over 50. Shawna Goodman-Sone, a Montreal chef and cooking instructor and editor of Panache: Montreal's Flair for Kosher Cooking, spoke about including these healthful foods in our diets.

Program moderator was Joe Schwarcz, director of McGill University's Office for Science and Society. Debra Mayers and Carole Zuckerman co-chaired the event, held at the Mount Stephen Club.

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PIERRE OBENDRAUF CANWEST NEWS SERVICES

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How to block the next real estate bubble

Sami Peretz

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Ehud Gazit

A vision of a scientific superpower

It is still hard to write about Prof. Ephraim Katzir in the past tense. Very few people kept their wits and deep desire for science at such an advanced age and in such a difficult physical condition. I vividly recall our talks in his last few months, in which he evinced amazing expertise in cutting-edge scientific developments in nanotechnology and brain science, and astounded me with his clear and precise insights.

It is said of the sages that "as they age, their wisdom grows," and Katzir was truly a scholar who grew in wisdom.

But that is just one aspect of his complex personality: A scientific genius who labored for the defense of the State of Israel far from the ivory tower; a man who lost his beloved brother Aharon in a terror attack, yet remained committed to peace; a man who outgrew his socialist adolescence and founded Israel's defense and biotechnology industries; an outstanding researcher who was at home in the world's most prestigious scientific institutions, as well as in the ORT Braude Academic College of Engineering in Carmiel; and finally, a true academic who answered the prime minster's call and became a president and statesman.

One of Katzir's most special and impressive traits was his ability to blend vision and action. He viewed the Zionist enterprise and the establishment of the State of Israel as the central mission of scientists and researchers. Even though scientific research was his main pursuit and a cornerstone of his identity, he understood the importance of integrating science into the country's institutions and government. As a military man he served as commander of the scientific corps. He invented the post of chief scientist in government ministries, served as the Defense Ministry's chief scientist and was involved in establishing the National Council for Research and Development.

Ephraim and Aharon Katzir also understood the importance of maintaining an intimate and ongoing relationship not only with the state's institutions and government ministries, but also with the political echelon. They were in direct and close contact with politicians, and did not hesitate to engage in party activism. Aharon Katzir was instrumental in drawing up the platform for Rafi during the 1965 Knesset elections, in which the party called for the "scientification" of the State of Israel, due to its lack of natural resources but wealth of human capital.

IPPA

Ephraim Katzir with Golda Meir in 1973. What parts of Katzir's legacy can we implement today? The scientist's role is to serve the public.

Despite the contributions of such great minds, Rafi won only 10 Knesset seats and found itself in the opposition – and well before its time scientification was reduced to a pragmatic ideology best known in history books.

What aspects of Katzir's legacy can we implement today? The most important thing is to understand that the scientist's role is serving the public. As important and fascinating as it may be, science is only part of an academic's job. Our role as scientists is to be at the forefront of Israeli achievement in every realm: education, research, industry, policy and security.

We must pass the scientific knowledge we are developing on to society and industry. A society where academics are active partners in running the country is a better society, and can bring prosperity for the State of Israel.

Prof. Ehud Gazit is the vice president of research and development at Tel Aviv University and chairman of its Nano-Biology department.

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New Year foods PAGE 30

Golden achievers

TWO Jewish youngsters – Terryn Sesel and Dylan Weisz (pictured) – were presented with The Duke of Edinburgh's Gold Award by Governor of NSW Professor Marie Bashir at Government House recently. The students took part in the award program last year.

Participants are able to take part in the Duke of Edinburgh's Award in three levels: bronze, silver and gold. Each of the levels has four sections – skills, service, physical recreation and adventurous journey.

The Duke of Edinburgh's Award is a youth empowerment program, which equips, engages and rewards young Australians striving toward personal excellence. In 2008, the award was undertaken by some 33,000 young Australians aged between 14 and 25.

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30,000-year-old fibers unearthed

Georgia dig produces bits of string humans made from flax

RANDOLPH E. SCHMID
THE ASSOCIATED PRESS

WASHINGTON — More than 30,000 years ago, someone living in a cave in the Caucasus Mountains twisted wild flax together and dyed it, producing the earliest known fibers made by humans, scientists report.

"Making strings and ropes is a sophisticated invention," said Ofer Bar-Yosef, a professor of prehistoric archaeology at Harvard University. "They might have used this fiber to create parts of clothing, ropes or baskets — for items that were mainly used for domestic activities."

The fibers were discovered in an analysis of clay deposits in Dzudzuana Cave in what is now the country of Georgia, Bar-Yosef and co-authors report in today's edition of the journal *Science*.

The earliest previous evidence of fibers worked by humans was from Dolni Vestonice, a site in the Czech Republic dated to 28,000 years ago.

The newly discovered fibers were made from the wild form of flax, not a plant that had been domesticated for farming.

These ancestors really had a clear idea and method of dealing with a useful plant in its wild form to provide good quality fibers for different uses, Bar-Yosef said via e-mail.

"Innovation was a trait of modern humans when compared to earlier populations," he added. "The invention of strings and ropes is an old one and probably helped to change the organization of transport from earlier times."

Some of the fibers appear to have been dyed using plant materials common in the area, the researchers said. The color range included yellow, red, blue, violet, black and green.

"The colored fibers may indicate that the inhabitants of the cave were engaged in producing colorful textiles," they reported. There was also evidence of processing fur and skin at the site.

Overall, the team, which had been studying pollen remains, collected 787 fragments of fibers.

In addition to Bar-Yosef, the team included researchers from Hebrew University in Jerusalem; Weizmann Institute of Science in Rehovot, Israel; Bar-Ilan University in Ramat Gan, Israel; and the Georgian State Museum in Tbilisi.

The research was funded by the American School of Prehistoric Research at Harvard's Peabody Museum.