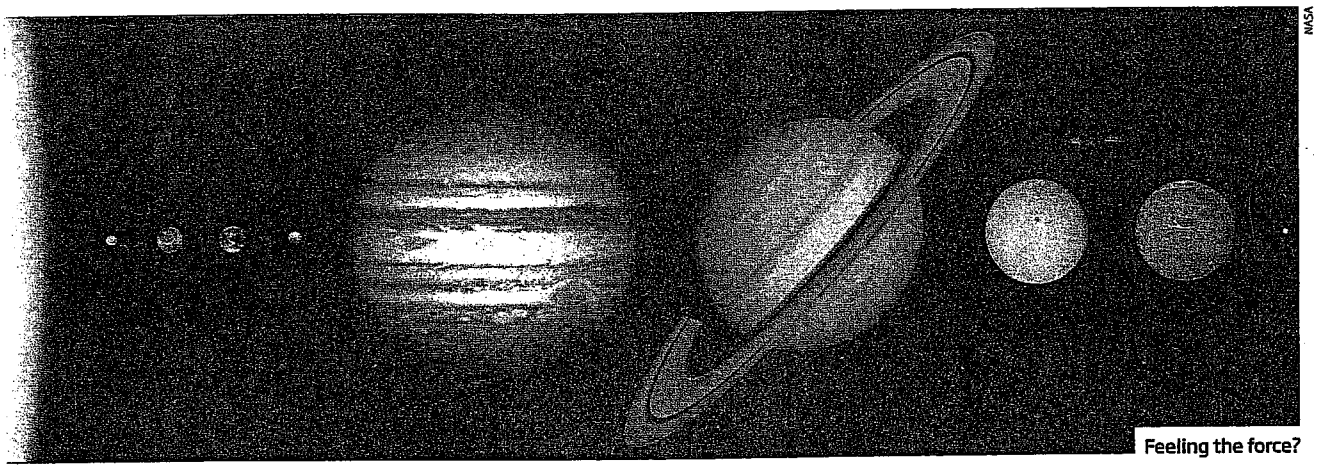
HEALING PARASITES Hookworm therapy, anybody?
THE DAY AFTER How to survive a nuclear attack
DAWN OF THE ANIMALS Solving Darwin's dilemma
NewScientist
WEEKLY 11 July 2009


NASA

Feeling the force?

Phantom menace to dark matter

Marcus Chown

A SUBTLE anomaly in the orbit of the planets in our solar system could prove a controversial idea that goes beyond Einstein.

The orbit of the innermost planet, Mercury, departs from what it should be under Newton's laws. A century ago, when Einstein explained this anomaly, it confirmed his theory of gravity – the general theory of relativity.

Now an Israeli physicist predicts that a similar but far more subtle anomaly in the orbits of the planets, if detected, might prove his own theory, known as modified Newtonian dynamics, or MOND. This provides an alternative theory to dark matter to explain why stars orbiting at the edge of spiral galaxies are not flung out into space. These stars are travelling at speeds too fast for conventional gravity from the mass at the heart of a spiral galaxy to hold them in their orbits, so something else must be keeping them on track.

One theory is that invisible dark matter provides that extra pull. But an alternative is MOND, devised in the early 1980s by Mordehai Milgrom, now at the Weizmann Institute of Science in Rehovot, Israel.

One of the suggestions behind MOND is that the gravity experienced by the galaxy's outer stars is somehow stronger than what would be expected under Newtonian physics. MOND has it that below a critical threshold acceleration, called a_0, gravity switches from the conventional Newtonian form that weakens with the inverse-square of distance to a stronger form that declines merely with the inverse of distance.

In other words, Milgrom proposed that gravity was stronger than expected at the low accelerations experienced by the outermost orbiting stars.

By quantifying a_0 at 10^{-10} metres per second per second, this single parameter makes it possible to explain stellar motion in hundreds of spiral galaxies. By contrast, the dark matter idea requires different amounts of the stuff with a different distribution in each galaxy.

But verification of MOND, like dark matter, has suffered from the fact that it manifests itself only on very large scales, comparable to the size of galaxies, and so is not amenable to local tests.

Not any more, says Milgrom. In a paper to be published in *Monthly Notices of the Royal Astronomical Society* (www.arxiv.org/abs/0906.4817), he claims there are forms of MOND that predict an effect on our cosmic doorstep: "It is the first time definite effects in the solar system are predicted by any version of MOND."

Milgrom reasons that if Newton's laws are correct, there will be a region between the sun and the centre of the galaxy

"It is the first time definite effects in the solar system are predicted by any version of MOND"

where the gravity from both cancels out. But this is also where any MOND-based departure from Newtonian gravity will most clearly show up. In other words, if there is gravity in this region, where there should be none, then MOND exists.

If MOND exists, it will appear as if there is an anomalous, "phantom" mass in that region, exerting a gravitational force on the bodies in our solar system. And because this phantom force originates from a broad zone rather than a defined single point, it would exert a pull on the planets from two directions at the same time – a so-called "quadrupole" effect.

According to Milgrom, this force should cause the orbits of the planets to precess – that is, their elliptical orbits around the sun should slowly change their orientation, over time tracing out a pattern like the petals of a flower. This is similar to the effect predicted by Einstein in 1915. "The difference is it's far smaller and it actually gets bigger the farther a planet is from the sun – the opposite of the effect predicted by Einstein," says Milgrom.

However, we are not in a position to test this as we have not observed enough full orbits of some of the outer planets, like Neptune.

A question that immediately arises is could this new force be responsible for the Pioneer anomaly? NASA's two Pioneer space probes, launched in the early 1970s, are leaving the solar system slower than they should be. Milgrom says MOND would not be to blame. "In the outer solar system, the force is about 100 times too weak and of the wrong form to explain the Pioneer anomaly."

Milgrom says that so far reaction to his paper has been positive. "It's definitely interesting," says James Binney at the University of Oxford. "It's a test of MOND on a hitherto unexplored scale." ■

8 February 2007 | www.nature.com/nature | 610 THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE
nature

Source:
Edition:
Country: UK
Date: Thursday 28, May 2009
Page: 489
Area: 64 sq. cm
Circulation: BPA 53932 Weekly
BRAD info: page rate £4,702.00, scc rate £66.00
Phone: 020 7833 4000
Keyword: Weizmann Institute of Science

DEVELOPMENTAL BIOLOGY

Use it or lose it

ELSEVIER

Dev. Cell **16**, 734–743 (2009)

Embryos need to flex their growing muscles if developing cells are to give rise to joints, says a team led by Elazar Zelzer at the Weizmann Institute of Science in Rehovot, Israel.

They found that mutant mouse embryos with defective muscles fail to form various joints, including elbows, shoulders and hips (a normal embryo is pictured above). Without muscle contraction, the cells that generate joint tissues do not activate a key regulatory pathway controlled by the protein β-catenin, and the progenitors switch fate to form cartilage instead.

One idea put forward by the authors is that the mechanical stress created by developing muscles might inform the cells of where they are and what cell type they should generate. The study could be relevant to rare human cases in which babies whose movement is restricted *in utero* develop abnormal joints.

Source: New Scientist {Main}
Edition:
Country: UK
Date: Saturday 20, June 2009
Page: 11
Area: 190 sq. cm
Circulation: ABC 166663 Weekly
BRAD info: page rate £6,000.00, scc rate £40.00
Phone: 01733 385 170
Keyword: Weizmann Institute of Science

NewScientist

Could quirky supernova be something new?

A SUPERNOVA seen in 2005 may be a new type of cosmic explosion. What's more, similar explosions may have scattered antimatter throughout our galaxy.

"SN 2005E" exploded in a galaxy 100 million light years away. A team led by Hagai Perets at the Weizmann Institute of Science in Rehovot, Israel, has concluded that it does not look like either of the well-known kinds of supernova.

The most frequently observed form is a core-collapse supernova, which happens after a massive young star has formed a large core of iron that collapses under its own gravity, releasing radiation that blows the outer layers of the star apart. They almost always occur in regions where massive new stars are forming. By contrast, SN 2005E was in the dark outskirts of its galaxy, where few new stars are forming. Core-collapse supernovae also spit out much more debris than SN 2005E did.

To date, the only other known supernova mechanism is a type 1a supernova, in which a small, dense white dwarf star steals hydrogen gas from a larger companion star. The gas builds up, gradually compressing the white dwarf until it reaches a critical point at which carbon starts to burn in an explosive thermonuclear reaction. SN 2005E doesn't look like one of these explosions either – it faded much faster than a type 1a usually does, and the spectrum of its light reveals unusually high quantities of calcium in the explosion's ashes.

So what happened? Perets says the calcium and other chemicals could have been produced by a helium-fuelled explosion. One possibility is that SN 2005E started out as a white dwarf stealing helium gas from a neighbouring helium-rich star, and that the gas accumulated into a thick layer before exploding.

"It may have started out as a white dwarf stealing helium gas from a neighbouring star"

Astronomer Craig Wheeler at the University of Texas at Austin says Perets's hypothesis is plausible, but is not convinced that it represents a completely new type of stellar explosion.

If correct, however, the discovery could explain two astronomical anomalies. In the central bulge of our galaxy, astronomers see evidence of a surprisingly large quantity of positrons – the antimatter counterparts of electrons. Helium-powered supernovae might supply most of this antimatter, as they should produce large quantities of the radioactive isotope titanium-44, which emits positrons.

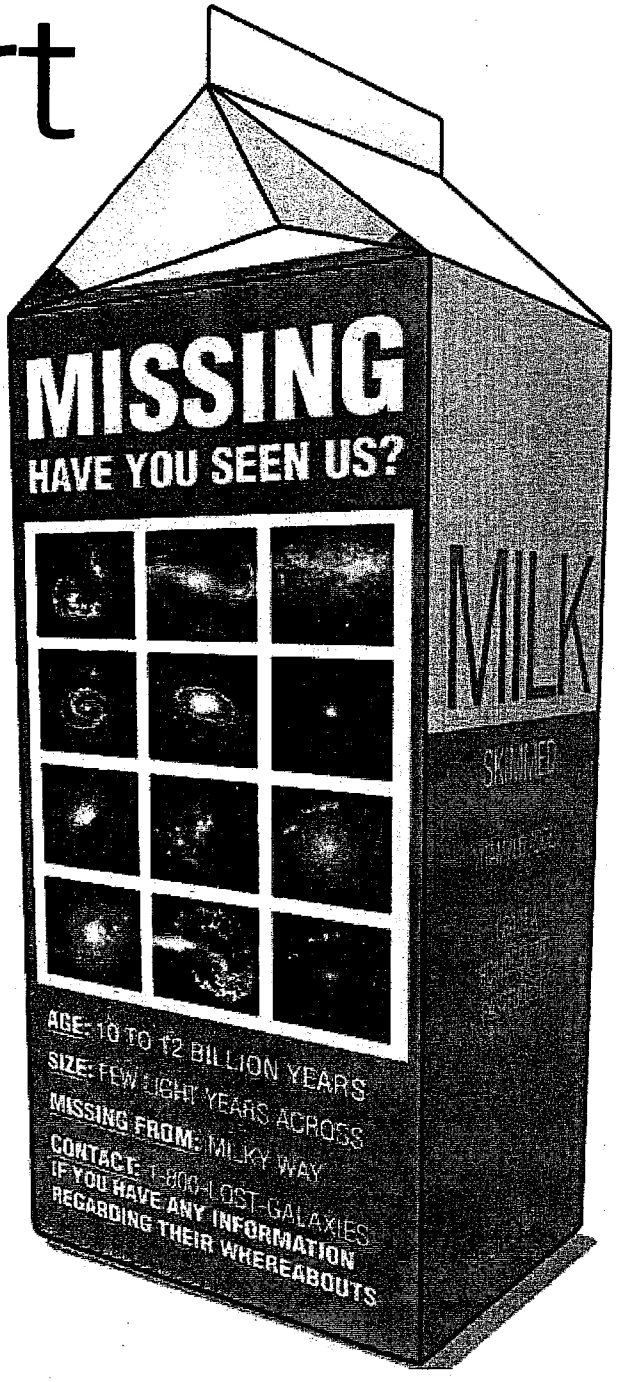
Furthermore, titanium-44 decays into calcium-44, an isotope that accounts for about 2 per cent of the calcium in our solar system – the origin of which has been hard to account for. Perhaps an explosion akin to SN 2005E supplied our solar system with its calcium-44. **Stephen Battersby** ■

NewScientist

New Scientist
Saturday 22/8/2009
Page: 37
Section: General News
Region: National
Type: Magazines Science / Technology
Size: 950.70 sq.cms.
Frequency: -----S-

O others, where art thou?

The Milky Way should be surrounded by mini galaxies. That it isn't spells trouble for gravity as we know it, says Marcus Chown



LIKE moths about a flame, thousands of tiny satellite galaxies flutter about our Milky Way. For astronomers this is a dream scenario, fitting perfectly with the established models of how our galaxy's cosmic neighbourhood should be. Unfortunately, it's a dream in more ways than one and the reality could hardly be more different.

As far as we can tell, barely 25 straggly satellites loiter forlornly around the outskirts of the Milky Way. "We see only about 1 per cent of the predicted number of satellite galaxies," says Pavel Kroupa of the University of Bonn in Germany. "It is the cleanest case in which we can see there is something badly wrong with our standard picture of the origin of galaxies."

It isn't just the apparent dearth of galaxies that is causing consternation. At a conference earlier this year in the German town of Bad Honnef, Kroupa and his colleagues presented an analysis of the location and motion of the known satellite galaxies. They reported that most of those galaxies orbit the Milky Way in an unexpected manner and that, taken together, their results are at odds with mainstream cosmology. There is "only one way" to explain the results, says Kroupa: "Gravity has to be stronger than predicted by Newton."

Challenging Newton's description of gravity is controversial. But regardless of where the truth lies, the Milky Way's satellite galaxies have become the latest battleground between the proponents of dark matter and theories of modified gravity. ›

NewScientist

New Scientist
Saturday 22/8/2009
Page: 37
Section: General News
Region: National
Type: Magazines Science / Technology
Size: 950.70 sq.cms.
Frequency: -----S-

'All the evidence screams that the Milky Way's satellite galaxies cannot possibly contain dark matter"

Our standard picture of the universe comes from many decades of observations. It asserts that visible matter – the kind of stuff that you, me, the planets and stars are made of – is outweighed by a factor of 6 or 7 by invisible, cold dark matter. No one knows what dark matter is made of, but its existence has been postulated to explain how the stars in spiral galaxies can orbit at such breakneck speeds without being flung off into the void. There isn't enough ordinary matter out there to hold on to everything, so the extra gravitational grip provided by large amounts of dark matter stops these speeding stars flying off into space.

Dark matter is also thought to have played a key role in shaping the early universe. In the aftermath of the big bang, it was the dark stuff that first began to clump together under the force of gravity because its lack of interaction with light meant it was not blasted apart by the big-bang fireball. Later on, normal gaseous matter fell into these clumps – dubbed dark matter haloes – where it congealed into stars to make visible galaxies.

A key feature of this dark matter scenario is that dark matter haloes of all sizes form. According to the standard model of cosmology, a halo as large as the one thought to have seeded the Milky Way should be surrounded by thousands of mini haloes, which themselves should have seeded small satellite galaxies.

So why don't we see them? It could simply be because most of the satellite galaxies contain only a few thousand stars and their faintness makes them extremely hard to spot (see *New Scientist*, 15 August, p 10).

Another problem is that it is not obvious to the human eye that an apparent group of stars in the sky is a bound collection rather than a chance alignment of stars at wildly different distances. Proving their connectedness requires computerised search techniques and detailed analyses of the colours of the stars to give their relative distances and types – a painstaking and expensive business.

Tidal dwarfs

Nevertheless, the rate of discovery of satellite galaxies has been boosted in the past five years by a detailed search by the Sloan Digital Sky Survey. Whereas only nine satellites were discovered in the 30 years before SDSS, another 15 have been found since. The biggest are about 1000 light years across – less than 1 per cent of the diameter of the Milky Way's disc – and the smallest about 150 light years across. Despite this progress, the total number of satellites known falls far short of that predicted by the cold dark matter paradigm.

The missing-satellites problem is not the only puzzle. Kroupa and his Bonn colleague Manuel Metz, together with Gerhard Hensler at the University of Vienna, Austria, and Helmut Jerjen of Mount Stromlo Observatory near Canberra, Australia, have studied the location and motion of the small number of known satellite galaxies. They found that a high proportion of the galaxies appear to be confined to a plane perpendicular to the disc of the Milky Way. What's more, most of the galaxies orbit the Milky Way in the same direction. "This is completely incompatible with the dark matter model of the Milky Way's formation," says Kroupa. He points out that the satellites should be more like a swarm of bees, moving on random orbits and distributed in a spherical shell around our galaxy.

If the origin of the Milky Way's satellite galaxies cannot be explained by the dark matter model, how did they originate? Kroupa says a clue can be found in a long trail of gaseous material and stars called the Magellanic Stream, which was torn free of the Large Magellanic Cloud through the effects of the Milky Way's gravity (*The Astrophysical Journal*, vol 697, p 269).

Such tidal effects were much more common 10 to 12 billion years ago when the Milky Way was born, because galaxies in the rapidly expanding universe were a lot closer together than they are today. Kroupa and his colleagues argue that the young Milky Way's gravity tore gas from a passing galaxy to form ancient "tidal dwarfs" which ended up as satellite galaxies. "Like the Magellanic Stream, such galaxies would naturally form a planar stream and share the same motion," says Kroupa.

It seems a neat solution. But the idea of the satellites being ancient tidal dwarfs raises another issue. Measurements of the velocities of the stars within the galaxies show that they are orbiting their galaxies very fast – so fast that by rights they should be flung off into intergalactic space.

This is precisely the problem that astronomers find in spiral galaxies and which they introduced dark matter to fix. "The problem is that the dark matter fix cannot be used in the case of tidal dwarf galaxies," says Kroupa. The reason is to do with the different way that ordinary matter and dark matter behave when galaxies interact or collide.

These differences are most apparent in a celestial object called the Bullet cluster, which formed when two galaxy clusters collided. Images taken in space by the Chandra X-ray

NewScientist

New Scientist
Saturday 22/8/2009
Page: 37
Section: General News
Region: National
Type: Magazines Science / Technology
Size: 950.70 sq.cms.
Frequency: -----S-

Observatory reveal that when the clusters collided, the two vast clouds of gas slammed into each other and slowed down. But maps of the mass distribution suggest that the two clusters of dark matter sailed right through each other unaffected, leaving the ordinary matter languishing behind.

Kroupa reckons the dark matter and ordinary matter would have become separated in a similar way when the tidal dwarfs formed. This presents a conundrum: evidence from the breakneck speed of the stars in the satellite galaxies "screams dark matter", says Kroupa, "but all the other evidence says these galaxies cannot possibly contain dark matter".

So how is it possible to explain the anomalously fast speeds of the stars within tidal dwarf galaxies? The only answer, says Kroupa, is to modify gravity. He favours an alternative to dark matter known as modified Newtonian dynamics, or MOND, devised in the early 1980s by Mordehai Milgrom, now at the Weizmann Institute in Rehovot, Israel. MOND has it that below a critical acceleration, gravity is stronger than Newton's law dictates. So because the stars sweeping along the outer edges of spiral galaxies experience lower acceleration than those of the inner galaxy, they are gripped a little more strongly than we would expect under Newton. With a straightforward formula, Milgrom can explain the motion of stars in every spiral galaxy for which we have velocity measurements.

"The number of ultra-faint galaxies yet to be discovered should run into thousands"

MOND is a logical alternative to dark matter. However, it is difficult to find circumstances in which the two scenarios predict different outcomes. Now all that could change. Milgrom thinks that the failure of the dark matter model to predict the numbers, location and velocities of the Milky Way's satellite galaxies is a significant observation. "It is the cleanest situation where MOND succeeds and dark matter fails," he says.

James Binney at the University of Oxford begs to differ, however. In stark contrast with Milgrom, he claims that the satellite-galaxy problem bolsters the dark matter scenario. "This is actually the cleanest situation where dark matter succeeds," he says.

Dark galaxies

How can the proponents of MOND and dark matter have such diametrically opposite interpretations of the same observations?

According to Binney, you need to look at the details of the dark matter scenario for galaxy formation. In the aftermath of the big bang, quantum fluctuations in space-time led to some regions of the universe gaining lots of matter and other, void-like regions very little. The voids expanded faster than the dense regions, whose expansion was restrained by the gravity of the matter they contained.

As the voids spread out and connected with each other, they squeezed dark matter and ordinary matter into sheets and streams. "We see this in the distribution of galaxies," says Binney. The universe looks like "Swiss cheese" with concentrations of galaxies separated by enormous voids.

He sees this process of matter squeezing into sheets and streams as acting on the scale of the Milky Way too: dark matter would have streamed into the Milky Way along certain paths (*New Scientist*, 18 July, p 34). So Binney sees it as quite natural that we see satellite galaxies largely confined to a single plane and with their velocities correlated. "Their properties are perfectly explicable within the dark matter scenario," he says.

But if the dark matter model does tally with the locations and motion of the satellite galaxies, why do we see only about 1 per cent of the number we would expect? Binney sees no problem here either. He says the missing galaxies are simply too faint for us to have detected them yet. Or "they may be exclusively composed of dark matter" with not enough gas to light up stars, he adds.

Binney points to a recent study by a team led by Sergey Koposov of the Max Planck Institute for Astronomy in Heidelberg, Germany, which concluded that the satellite galaxies we see are just the tip of the iceberg. From the properties of the observed satellite galaxies, Koposov predicts that the number of ultra-faint galaxies yet to be discovered should run into the thousands (*The Astrophysical Journal*, vol 696, p 2179).

But it is not clear how galaxies with their vast concentrations of gas and dark matter can be starless. Suppressing star formation involves complex mechanisms that are poorly understood – this much everyone agrees. "It's the Achilles' heel of the dark matter model," Binney admits. "But that just means we've still got much to do to flesh out the model."

Milgrom and Kroupa are not persuaded. They maintain that the mechanism preventing the existence of stars is the fatal flaw in the dark matter model. They face an uphill struggle convincing others, however: the majority of astronomers are wedded to dark matter and will not throw more than 30 years of work out of the window lightly. The truth is, says Binney, that both dark matter and MOND are deficient in their own ways.

So what will it take for one side to give ground? The answer may lie in mapping the gravitational landscape on the outskirts of the Milky Way. By making ever more detailed maps of the motion of all the visible satellite galaxies and globular clusters, it should be possible to deduce the presence of all the satellite galaxies that are too faint to see. If it turns out that there are indeed thousands of ultra-faint satellites, as the dark matter model predicts, then the proponents of dark matter will have backed the right horse. If not, then dark matter may yet stumble before the finish.

Without such a gravity map, both sides are slugging it out with balloons on sticks rather than boxing gloves. For now, the Milky Way's environs remain a distant battleground between two great world views. ■

Marcus Chown is the author of *Quantum Theory Cannot Hurt You* (Faber, 2008)

Technology Review
PUBLISHED BY MIT

Date: Thursday, October 01, 2009
Location: CAMBRIDGE, MA
Circulation (DMA): 188,819 (N/A)
Type (Frequency): Magazine (6Y)
Page: 65
Keyword: Weizmann Institute of Science

SOFTWARE

Anat Levin, 31

WEIZMANN INSTITUTE OF SCIENCE

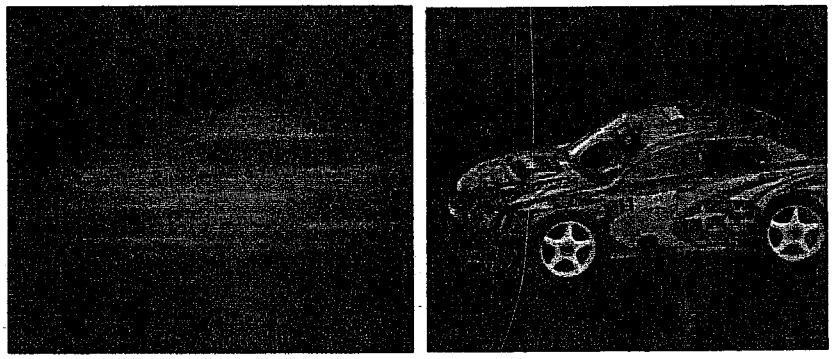
New cameras and algorithms capture the potential of digital images

ALTHOUGH a digital camera is an impressive piece of equipment, it's the same in its basic design as the old-fashioned film camera: a lens focuses an image on a plane. The digital camera simply captures that image with a light-sensing chip instead of film. Anat Levin thinks we can do more.

Levin, a senior scientist at the Weizmann Institute in Rehovot, Israel, is at the forefront of computational photography. She develops ways to manipulate digital images, both inside the camera and on computers. And increasingly, she is exploring new camera designs. "Before digital photography, we would capture images onto a film, and the film was more or less the end of the story," she says. "Now, with digital photography, what we have on the camera is not the end of the process."

Last year, Levin invented a camera and algorithm that, together, remove motion blur from an image. Paradoxically, the camera moves its sensor horizontally at a varying speed while the image is being exposed, which of course makes the whole image blurry. However, the camera's movement is specially designed to blur the moving and static parts of a scene equally, and by a known amount. Thus, she can use a relatively simple algorithm to remove the blur from all objects. A separate computer processes the image today, but a production model of the camera could eventually do the processing onboard.

Working with colleagues at MIT, Levin has also proposed a lens design that would give a camera greater depth of field, increasing the amount of a scene—near and far—that can be brought into focus at the same time. Square pieces cut from lenses with different focal lengths are superimposed over the regular lens. Each square focuses on an area a different distance from the camera. Using the information from all the lenses, Levin can recalculate the entire image to increase the depth of field, or even refocus on objects that are closer or farther away after the picture has been taken. *—Kurt Kleiner*



NO MORE BLUR The blurry image of a moving toy car was taken with a traditional camera. The clear image was taken with Levin's modified camera. The camera's sensor moves from side to side during exposure, blurring all moving and stationary objects equally, no matter how fast each object is moving. Levin developed an algorithm that can remove this uniform blur to yield a clear image.

Source: "Motion-Invariant Photography" by Levin, Sand, Cho, Durand, Freeman.

A NEW FOCUS Levin and colleagues designed a lattice of different lenses that can be placed over a camera's regular lens. Each lens focuses on an area a different distance from the camera. Using data from all the lenses, Levin can choose which part of the photo is in focus. In the image at left, the mouse is in the plane of focus and looks sharp. On the right, she has moved the plane of focus to the figurines in back.

Source: "4D Frequency Analysis of Computational Cameras for Depth of Field Extension" by Levin, Hasinoff, Green, Durand, Freeman.

Los Angeles Times

Date: Saturday, June 06, 2009
Location: LOS ANGELES, CA
Circulation (DMA): 907,997 (2)
Type (Frequency): Newspaper (SAT)
Page: A16
Keyword: Weizmann Institute of Science

Chinese vase dates back 18,000 years

Pottery remains discovered in a cave are 1,000 years older than the previous record-holder.

THOMAS H. MAUGH II

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 one of 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 to 13,800 years ago.

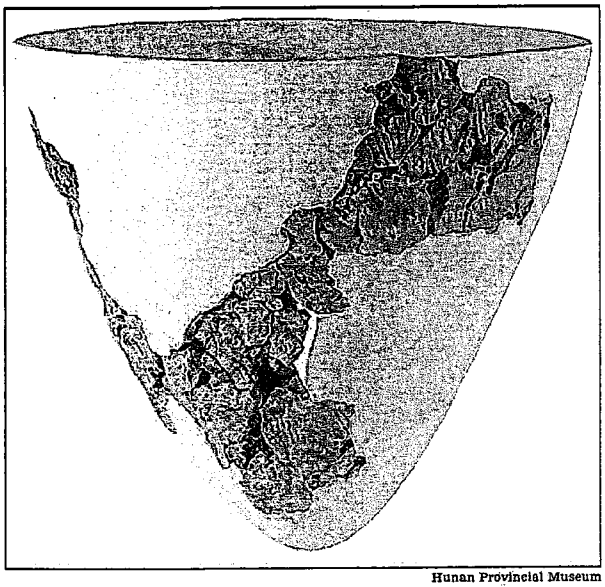
The problem with caves is that, over time, remains from fires and other artifacts get scrambled by the activities of humans and burrowing animals, mixing layers of artifacts and making dating difficult.

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 to 17,500 years old, with a most likely age of about 18,000 years old.

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 was probably used for cooking or storage.

thomas.maugh@latimes.com



Hunan Provincial Museum

CAVE FIND: Researchers pieced together an unadorned cone-shaped vase, probably used for cooking or storage.

NEW YORK POST

Date: Sunday, July 12, 2009
Location: NEW YORK, NY
Circulation (DMA): 405,486 (1)
Type (Frequency): Newspaper (S)
Page: 15
Keyword: Weizmann Institute of Science

'Trained' bacteria for better biofuels

Bacteria are not stupid. Researchers at the Weizmann Institute of Science and Tel Aviv University have proven that these pathogens can anticipate a future event and prepare for it, having discovered that their genetic networks are hard-wired to "foresee" what comes next in a sequence of events.

For example, *E. coli* bacteria encounter a number of different environments on their way down our digestive tracts. They find that one type of sugar – lactose – is invariably followed by a second – maltose. The researchers checked the bacteria's genetic response and found that, in addition to the genes enabling them to digest lactose, their gene network for using maltose was partially activated. When the researchers switched the order, there was no corresponding activation of lactose genes – implying that the bacteria had "learned" to anticipate a serving of maltose following a lactose appetizer.

To determine whether the microorganisms were truly exhibiting a conditioned response, the researchers devised an additional test for the *E. coli* based on the experiments of Ivan Pavlov (he of the salivating dogs). They stopped introducing maltose after the lactose, and several months later, the bacteria no longer anticipated maltose, turning on the relevant genes only when the substance was introduced.

The discovery – just published in the prestigious journal *Nature* – is not merely a curiosity. The researchers believe that if bacteria gain the genetic ability to prepare themselves for the next step in a process, the conditioned response could be used for fermenting plant materials and producing more efficient biofuels.

– Judy Siegel

The New York Times

Date: Thursday, June 04, 2009
Location: NEW YORK, NY
Circulation (DMA): 1,120,420 (1)
Type (Frequency): Newspaper (D)
Page: B12
Keyword: Weizmann Institute of Science

Ephraim Katzir, 93, Former Israeli President

By DENNIS HEVESI

Ephraim Katzir, Israel's fourth president and one of his nation's pre-eminent scientists, died Saturday at his home on the campus of the Weizmann Institute of Science in Rehovot, Israel. He was 93.

The death was confirmed by the Web site of the Israeli Ministry of Foreign Affairs.

Dr. Katzir was president of Israel — a largely ceremonial post — from 1973 to 1978. Symbolically, he was head of his nation during the 1973 Arab-Israeli war, from Oct. 6 to 26, which began with a surprise attack by Egypt and Syria on Yom Kippur, the Jewish day of atonement. Israel eventually repelled the Arab forces.

Four years later, on Nov. 19, 1977, it was President Katzir who officially welcomed President Anwar el-Sadat of Egypt on his historic visit to Jerusalem. A somewhat shy and modest man, Dr. Katzir came into public life through tragic circumstances. According to The Jerusalem Post, Prime Minister Golda Meir asked him to submit his name as candidate for the presidency in the spring of 1973 after her first choice for the post, Dr. Katzir's older brother, Aharon, was killed on May 30, 1972, by Japanese terrorists who machine-gunned passengers disembarking at what is now Ben-Gurion International Airport in Tel Aviv. The brothers — whose surname at birth was Katchalski — were both renowned Israeli scientists. Upon becoming president, Ephraim Katchalski Hebraicized his last name to Katzir, which means harvest.

At the time the Israeli Parliament elected him president, Dr. Katzir was chairman of the biophysics department at the Weizmann Institute. He was one of the founding scientists of the institute, and his brother had been chairman of the institute's department of polymer research.

Dr. Katzir's initial research centered on simple synthetic protein models that eventually helped to decipher the genetic code and to clarify the various steps in immune responses. He also developed a method for binding enzymes, which catalyze numerous chemical processes, to a variety of surfaces and molecules. The method helped lay the groundwork for what is now called enzyme engineering, which plays an important part in the food and pharmaceutical industries. For his work on immobilized enzymes used in oral antibiotics, he received the Japan Prize in 1985.

Ephraim Katchalski was born in Kiev, then part of Russia, on May 16, 1916. His parents, Yehuda and Tzila Katchalski, were ardent Zionists. The family emigrated to Palestine, then under British rule, in 1922.

As an undergraduate at Hebrew University of Jerusalem, Dr. Katzir studied botany, zoology and bacteriology before concentrating on biochemistry and organic chemistry. In 1941 he completed his doctoral thesis on simple synthetic polymers of amino acids, research that he continued at the Polytechnic Institute of Brooklyn, Columbia and Harvard.

While serving in the Haganah, the underground Jewish defense organization, Dr. Katzir and his brother worked together on developing new explosives for the group. He did research for the Israeli Army's science corps, Hemed, which was established at the start of the Arab-Israeli war of 1948, and later was chief scientist for the Israeli Defense Ministry.

Dr. Katzir's wife, Nina, died in 1986. He is survived by his son, Meir, and three grandchildren.

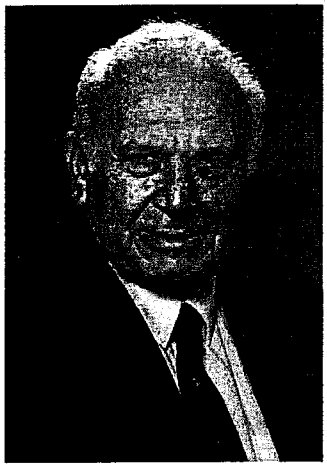
After his term as president, Dr. Katzir returned to research at the Weizmann Institute.

ONLINE: NOTABLE DEATHS

A slide show highlighting the lives of some of those who died this year.

nytimes.com/obituaries

A scientist who became a national leader after his brother was killed.



YA'AKOV SA'AR/ISRAELI GOVT., VIA GETTY

Ephraim Katzir, president from 1973 to 1978, in 1990.

The Washington Post

Date: Saturday, June 06, 2009
Location: WASHINGTON, DC
Circulation (DMA): 699,130 (8)
Type (Frequency): Newspaper (D)
Page: B6
Keyword: Weizmann Institute of Science

Israel's fourth president, Ephraim Katzir, in a 1990 photograph. Katzir served one term from 1973 to 1978.

Ephraim Katzir
Israeli President

Ephraim Katzir, 93, Israel's fourth president and an internationally recognized biophysicist, died May 30 in Jerusalem. The cause of death was not reported.

Dr. Katzir's tenure from 1973 to 1978 spanned two seminal events in Israeli history: the 1973 Mideast war and the visit of Egyptian President Anwar Sadat to Jerusalem in 1977. He left the presidency after one term to return to scientific research.

He was born in Kiev and moved at age 6 with his family to British-ruled Palestine. He studied biology at the Hebrew University in Jerusalem, receiving his PhD in 1941.

He served in the Haganah, the underground Jewish defense organization, where he helped to set up a military research and development unit that developed explosives, propellants and other munitions.

During the war that followed Israel's independence in 1948, he was appointed head of the military's science corps. He served as the Israeli military's chief scientist from 1966 to 1968.

Dr. Katzir was a founder of Israel's renowned Weizmann Institute of Science and headed its biophysics department, where his work on synthetic protein models deepened understanding of the genetic code and immune responses.

He was awarded the Israel Prize, the country's highest honor, in 1959 for his contribution to the natural sciences.

Los Angeles Times

Date: Wednesday, June 03, 2009
Location: LOS ANGELES, CA
Circulation (DMA): 815,723 (2)
Type (Frequency): Newspaper (D)
Page: A18
Keyword: Weizmann Institute of Science

Los Angeles Times

EPHRAIM KATZIR

Biophysicist was Israel's 4th leader

Ephraim Katzir, 93, Israel's fourth president and an internationally recognized biophysicist, died Saturday at his home in Rehovot, south of Tel Aviv, after a brief illness, according to news reports.

Katzir's 1973-78 tenure spanned two seminal events in Israeli history: the 1973 Yom Kippur War and the visit of Egyptian President Anwar Sadat to Jerusalem in 1977.

He left the presidency after one term to return to scientific research.

Born in 1916 in Kiev, Ukraine, which was then part of the Russian empire, Katzir immigrated at age 6 with his family to British-ruled Palestine and studied biology at the Hebrew University in Jerusalem, receiving his doctorate in 1941, according to his official biography on the Foreign Ministry website.

He served in the Haganah, the underground Jewish defense organization, where he helped set up a military research and development unit that developed explosives, propellants and other munitions.

During the war that followed Israel's independence in 1948, he was appointed head of the military's science corps. He served as the Israeli military's chief scientist from 1966 to 1968, the website said.

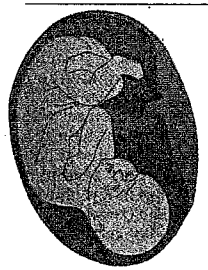
Katzir was a founder of Israel's renowned Weizmann Institute of Science and headed its biophysics department, where his work on synthetic protein models deepened understanding of the genetic code and immune responses.

WWW.JPOST.COM

THE JERUSALEM POST

Volume LXXVII, Number 23346 FOUNDED IN 1932 NIS 11.00 (EILAT NIS 9.50)

SUNDAY, MAY 31, 2009 ▪ 8 SIVAN, 5769



AFTERBIRTH

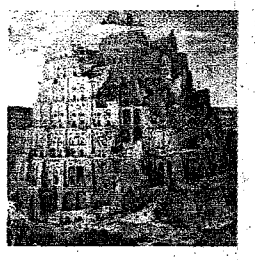
The long-ignored placenta yields secrets of mother, infant health

See Page 6

THE TOWER OF BABEL RISES?

Electronic translators try to bring down the language barrier

See Page 17



CONTROVERSIAL BODIES

Haifa's exhibit of plastinated figures has its critics, but it's drawing the crowds

See Page 24

BRILLIANT, MODEST SCIENTIST LED NATION THROUGH YOM KIPPUR WAR TRAUMA

Ephraim Katzir, Israel's 4th president, dies at 93

• By JUDY SIEGEL

THEN-PRESIDENT Ephraim Katzir with Golda Meir, whose resignation as prime minister he accepted following the Yom Kippur War. (Jerusalem Post Archives)

Prof. Ephraim Katzir, the fourth president of Israel and one of its greatest scientists, died on Saturday night after a long life full of achievement mixed with sorrow.

He was cared for until his death at his home on the Weizmann Institute of Science campus in Rehovot.

He was born in Kiev on May 16, 1916, to Yehuda, an accountant with fiercely Zionist ideals, and Tzila Katchalski. The couple lived in Lodj in Poland, where Ephraim's only sibling, Aharon, was born.

However, the family moved to Kiev because of World War I. After migrating on to Bialystock, economic problems in the country and ideology induced the Katchalskis to make aliya in 1925.

After graduating from Jerusalem's Rehavia Gymnasia high school, Ephraim enrolled at the Hebrew University of Jerusalem, where he studied botany, zoology and bacteriology before finally concentrating on biochemistry and organic chemistry.

In 1941, he completed his doctoral thesis on simple synthetic polymers of amino acids and continued his education at the Brooklyn Polytechnic Institute and Columbia University, as well as Harvard University.

While studying in Jerusalem he participated in the first non-commissioned officers' course

See KATZIR, Page 7

05/07/2009

WWW.JPOST.COM
THE JERUSALEM POST

'Trained' bacteria can lead to better biofuels

NEW WORLDS

• By JUDY SIEGEL-ITZKOVICH

Bacteria are not dumb. Israeli researchers have proven that these pathogens can anticipate a future event and prepare for it. The discovery – just published in the prestigious journal *Nature* – is not merely a curiosity. The scientists believe that if bacteria gain the genetic ability to prepare themselves for the next step in a process, the conditioned response could be used for fermenting plant materials and producing more efficient biofuels.

Prof. Yitzhak Pilpel, doctoral student Amir Mitchell and research associate Dr. Orna Dahan of the Weizmann Institute's molecular genetics department, together with Prof. Martin Kupiec and Gal Romano of Tel Aviv University, examined microorganisms living in environments that change in predictable ways. They discovered that these microorganisms' genetic networks are hard-wired to "foresee" what comes next in a sequence of events and begin responding to the new state of affairs before its onset. This evolutionary adaptation is believed to enhance survival in many organisms – and may also take place in the cells of higher organisms. For example, *E. coli* bacteria, which normally cruise harmlessly down the digestive tract, encounter a number of different environments on their way. They find that one type of sugar – lactose – is invariably followed by a second sugar – maltose. The researchers checked the bacterium's genetic response to lactose and found that, in addition to the genes that enable it to digest lactose, the gene network for using maltose was partially activated. When they switched the order of the sugars, giving the bacteria maltose first, there was no corresponding activation of lactose genes – implying that bacteria have "learned" to get ready for a serving of maltose after a lactose appetizer.

Another bacterium that experiences consistent changes is wine yeast. As fermentation progresses, sugar and acidity levels change, alcohol levels rise and the yeast's environment heats up. Although this system is somewhat more complicated that that of E. coli, the scientists found that when wine yeast feel the heat, they begin activating genes for dealing with the stresses of the next stage. Further analysis showed that this anticipation and early response is an evolutionary adaptation.

Ivan Pavlov first demonstrated this type of adaptive anticipation, which has since been known as a conditioned response, in dogs in the 1890s. He conditioned the dogs to salivate in response to a stimulus by repeatedly ringing a bell before giving them food. In the microorganisms, says Pilpel, "evolution over many generations replaces conditioned learning, but the end result is similar."

To see whether the microorganisms were truly exhibiting a conditioned response, Pilpel and Mitchell devised a further test for the *E. coli* based on another of Pavlov's experiments. When Pavlov stopped giving the dogs food after ringing the bell, the conditioned response faded until they eventually ceased salivating when it rang. The scientists did something similar, using bacteria grown by Dr. Erez Dekel, in the lab of Weizmann Prof. Uri Alon, in an environment containing lactose, but not following it up with maltose. After several months, the bacteria had evolved to stop activating their maltose genes at the taste of lactose, only turning them on when maltose was actually available.

Israel's Leading Daily Newspaper. Established 1919
HAARETZ
01/06/2009

Ephraim Katzir laid to rest in Rehovot; Peres: Unmatched devotion, kindness

Alon Ron

Prime Minister Benjamin Netanyahu and President Shimon Peres among the mourners at yesterday's funeral of Ephraim Katzir.

By Ofri Ilani

Israel's fourth president, Ephraim Katzir, who died on Saturday at the age of 93, was buried yesterday in Rehovot. Ahead of the burial, Katzir lay in state at the Weizmann Institute of Science in Rehovot, an institution on whose faculty he served from its 1949 founding up until his death.

At the ceremony, incumbent president Shimon Peres referred both to Katzir and to the late president's brother, Aharon Katzir, who was also a scientist and was killed in a terrorist attack at Lod Airport (now Ben-Gurion International Airport), which took place 37 years – to the day – prior to the late president's death. Peres spoke of how, following his brother's death, Ephraim Katzir consented to serve as president, succeeding Zalman Shazar, at the request of then-prime minister Golda Meir.

In eulogizing Katzir, Peres said: "In my heart I thought about such a small family with such great abilities that extended a ray of light beyond the family and beyond Israel." President Katzir, he added, "was unmatched in devotion and kindness, in knowledge and ability. His contention with the tragedies that struck his family inspired us and we looked on with great pain."

PM lauds modesty, simplicity

At the memorial ceremony, Prime Minister Benjamin Netanyahu said that, "Few are the people whose modesty and simplicity only strengthens as their status increases. Not many people who reach the top continue to conduct themselves with a human touch. Such was Ephraim Katzir."

Netanyahu also noted the "stoic nobility" with which Katzir conducted himself following his brother's murder.

Ephraim Katzir's granddaughter Tzila thanked her parents for the help they gave the former president as his life was drawing to an end. Addressing her grandfather directly, she said, "You only asked how to help us. Even when you were bedridden, you never thought of yourself for a moment." The late president's son Meir was choked by tears as he recited the kaddish mourners' prayer at the ceremony.

THE JERUSALEM POST - FRONT 31/05/2009

BRILLIANT, MODEST SCIENTIST LED NATION THROUGH YOM KIPPUR WAR TRAUMA

Ephraim Katzir, Israel's 4th president, dies at 93

• By JUDY SIEGEL

Prof. Ephraim Katzir, the fourth president of Israel and one of its greatest scientists, died on Saturday night after a long life full of achievement mixed with sorrow.

He was cared for until his death at his home on the Weizmann Institute of Science campus in Rehovot.

He was born in Kiev on May 16, 1916, to Yehuda, an accountant with fiercely Zionist ideals, and Tzila Katchalski. The couple lived in Lodj in Poland, where Ephraim's only sibling, Aharon, was born.

However, the family moved to Kiev because of World War I. After migrating on to Bialystock, economic problems in the country and ideology induced the Katchalskis to make aliya in 1925.

After graduating from Jerusalem's Rehavia Gymnasia high school, Ephraim enrolled at the Hebrew University of Jerusalem, where he studied botany, zoology and bacteriology before finally concentrating on biochemistry and organic chemistry.

THEN-PRESIDENT Ephraim Katzir with Golda Meir, whose resignation as prime minister he accepted following the Yom Kippur War. (Jerusalem Post Archives)

In 1941, he completed his doctoral thesis on simple synthetic polymers of amino acids and continued his education at the Brooklyn Polytechnic Institute and Columbia University, as well as Harvard University.

While studying in Jerusalem he participated in the first non-commissioned officers' course

See KATZIR, Page 7

THE JERUSALEM POST - FRONT 31/05/2009

KATZIR

Continued from Page 1

given by the underground Hagana and later became intensively involved in the IDF's Science Corps (known as Hemed), which was founded when the War of Independence broke out.

Working together, Aharon and Ephraim developed new types of explosives to supplement the Jewish paramilitary organization's precious store. But the product was so malodorous that they had to do their lab work in a cave in Jerusalem's Sanhedria quarter.

"When I entered a bus, people used to run away because of the stinky smell. Only years later did we learn how to eliminate the smell from that material," Ephraim recalled.

When the war ended, Ephraim and his brother, who was a very promising young chemist, joined the fledgling Weizmann Institute. Ephraim founded and headed the biophysics department, while Aharon was invited in 1948 by Chaim Weizmann to join the institute as head of the department of polymer research. Aharon became a professor of physical chemistry at the Hebrew University in 1952.

Their close relationship was tragically cut short when Aharon was among those murdered in the Lod Airport massacre by Japanese Red Army terrorists on May 30, 1972 – an event that broke his brother's heart.

Ephraim Katzir's initial research centered on polyamino acids, which are synthetic models that facilitate the study of proteins. His pioneering studies contributed to the cracking of the genetic code, the production of synthetic antigens and clarification of the various steps of immune responses.

The understanding of polyamino acid properties led, among other things, to a team of Weizmann scientists' development of Copaxone, a drug used worldwide to slow deterioration from multiple sclerosis.

Another major success was in immobilizing enzymes. Katzir developed a method for binding enzymes, which speed up numerous chemical processes, to a variety of surfaces and molecules. The method laid the foundations for what is now called enzyme engineering, which plays an important part in the food and pharmaceutical industries. For example, it is used to produce fructose-enriched corn syrup and semi-synthetic penicillins.

Later, he focused at Weizmann on polymers (large molecules composed of repeating structural units connected by covalent chemical bonds), specifically on immobilized enzymes and polyamino acids, which led to the development of synthetic antigens and the production of synthetic vaccines.

One practical application of his work was his development of a synthetic fiber used to sew up internal wounds that dissolves in bodily enzymes.

Katzir was always profoundly concerned with the social and educational aspects of science. He headed a government committee for the formulation of a national scientific policy, trained a generation of younger scientists, translated important material into Hebrew and helped to establish a popular, Hebrew-language science magazine.

He served as chief scientist of the Defense Ministry and chairman of the Israel Society for the Advancement of Science, the Israel Biochemical Society, the National Council for Research and Development and the Council for the Advancement of Science Education.

He also headed the National Biotechnology Council and was president of the World ORT Union.

A long-time socialist, Katzir supported the Labor Party and was urged by prime minister Golda Meir in the spring of 1973 to present his candidacy for the presidency to succeed Zalman Shazar after her favorite for the job – Prof. Aharon Katchalski-Katzir – had been murdered.

He later related that he didn't really know what a president was supposed to do, but he did recall that in 1952, when the first president Chaim Weizmann died, the post been offered to Albert Einstein (who turned it down). Powerful Labor Party finance minister Pinhas Sapir told the reluctant Katzir he would build him a lab at Beit Hanassi so he would not be separated from his beloved science during the five-year-term, but this never happened.

He formally hebraicized his surname to Katzir ("harvest") when he became president, but he remained bashful in public and reluctant to give up his scientific research and teaching. In what was perhaps his most momentous meeting as president, he welcomed Egypt's president Anwar Sadat to Israel and Jerusalem in 1977.

During his five years in office, he and his late wife, Nina, an English teacher by profession, paid special attention to the problems of society and education and were consistently eager to learn more about all sectors of the population.

About four months after moving to Beit Hanassi, Katzir symbolically led the nation through the Yom Kippur War, with its horrific death toll, anti-government demonstrations, Meir's resignation and the appointment of Yitzhak Rabin to replace her. Katzir was well received at the White House by Richard Nixon and Gerald Ford.

In 1977, the Likud defeated Labor and a new bipartisan era began. Beit Hanassi was the scene of talks with party heads and the president's symbolic request to try to establish a coalition.

Katzir never had the charisma or gift for gab that some Israelis prefer in a leader; at dull ceremonial events, he surely was dreaming of his lab, microscopes and test tubes. He always smiled shyly and looked people in the eye when he shook their hand, but a veil of sadness seemed to hang in the background.

In addition to the murder of his brother, his daughter Nurit died of carbon dioxide asphyxiation at 23 when she fell asleep at home without being aware of a burning kerosene stove and sealed windows; daughter Irit, a "sensitive poet," died at 43 in "tragic circumstances," and Katzir's wife, Nina, died of cancer 23 years ago.

'I believed with all my heart that science will bring peace to this country, renew its youthful vigor and create the sources for new life, both spiritually and materially'

Their son Meir (a mathematics professor at the Technion-Israel Institute of Technology, who has three adult children) and Aharon's son, Prof. Abraham Katzir (an expert in infrared physics at Tel Aviv University) survive him.

Upon completion of his term of office he returned to research at Weizmann and was named "institute professor," a prestigious title awarded by the Weizmann faculty and administration to outstanding scientists who made significant and meaningful contributions to science or to the State of Israel.

He also devoted himself to the promotion of biotechnological research in Israel and founded the biotechnology department at Tel Aviv University.

The creation of this department was a continuation of his efforts to establish science-based industries here. Katzir helped create several companies based on the fruits of his scientific research.

In the later years of his scientific career, Katzir turned to new areas of research. In one project, he headed a team of Weizmann scientists that won an international contest on computer modeling of proteins. In another study, he was part of an interdisciplinary institute team that revealed an important aspect of the effects of snake venom on the body.

Katzir authored hundreds of scientific papers and served on the editorial and advisory boards of numerous scientific journals. International scientific symposia were held in Rehovot and Jerusalem to celebrate his 60th, 70th and 80th birthdays.

Into his 90s, Katzir's former students – leading professors themselves – came to his home where he was wheelchair bound and brought their scientific articles before publication so he could comment on them.

Katzir was a member of the Israel Academy of Sciences and Humanities and of numerous other prestigious bodies in Israel and abroad, including the Royal Institution of Great Britain, the Royal Society of London, the US National Academy of Sciences, the Academie des Sciences in France, the Scientific Academy of Argentina and the World Academy of Art and Science.

He was a visiting professor at Harvard University, Rockefeller University, the University of California at Los Angeles and Battelle Seattle Research Center.

In addition, Katzir won the Rothschild and Israel prizes in natural sciences, the Weizmann Prize, the Linderstrom Land Gold Medal, the Hans Krebs Medal, the Tchernikhovski Prize for scientific translations, the Alpha Omega Achievement Medal and the Engineering Foundation's International Award in Enzyme Engineering.

He was the first recipient of the Japan Prize and was appointed to France's Order of the Legion of Honor.

The magazine *Annual Reviews* quoted Katzir as saying: "I have had the opportunity to devote much of my life to science. Yet my participation over the years in activities outside science has taught me there is life beyond the laboratory.

"I have come to understand that if we hope to build a better world, we must be guided by the universal human values that emphasize the kinship of the human race – the sanctity of human life and freedom, peace between nations, honesty and truthfulness, regard for the rights of others, and love of one's fellows."

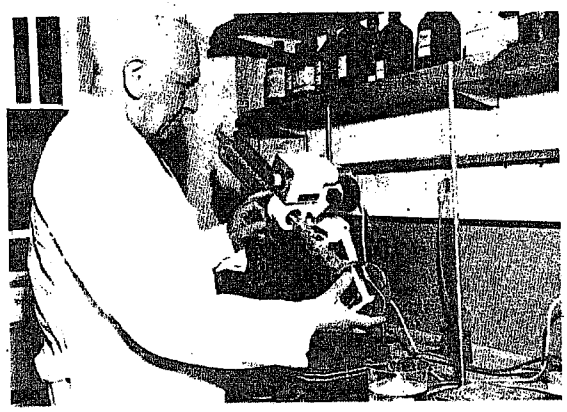
At the age of 92 last year, Katzir completed a 362-page, Hebrew-language autobiography called *Sipur Haim* (A Life's Tale) – an apt reflection of his modest manner.

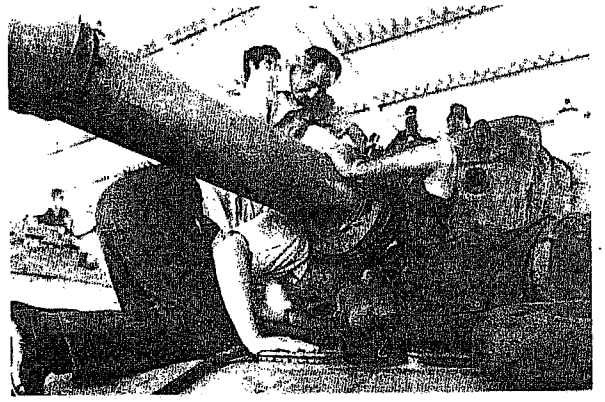
The volume is packed with a mind-boggling cornucopia of people, dates, places, events and facts from as long as eight decades ago, and reflected the fact that his life had been intertwined with some of the most memorable events of the Jewish state and the Jewish people.

"I believed with all my heart that science will bring peace to this country, renew its youthful vigor and create the sources for new life, both spiritually and materially," he wrote in a biological chemistry journal in 2005. "I have been lucky enough to spend my life in pursuit of my goals, with some success and considerable satisfaction."

After he and his former biology student Amos Carmel, a journalist at *Yediot Aharonot*, completed the writing of his autobiography, Katzir told *The Jerusalem Post*: "I didn't take notes during my long career and didn't save any documents. Everything came from memory, with Amos's help.

"I felt that before I meet the Almighty, I wanted to write a book my son and grandchildren could read and so that scientists will see that they can accomplish things outside scientific life as well."





FORMER PRESIDENT Ephraim Katzir was equally at home in the lab (left) or checking out a tank with then-defense minister Shimon Peres. (Jerusalem Post archives)

HAARETZ - FRONT 10/06/2009

A single atom opens a world of possibilities

Research conducted by a scientist at the Weizmann Institute could help make quantum computing feasible

By Shimon Adaf

A metal rod, the glow of laser beams in various colors, a field of vertical lenses. A tube, cooled to a temperature of almost absolute zero, within which an atom is imprisoned at the heart of an electric field while one of its electrons is ripped away. In my view, this is a technological miracle – the ability to convert grand theories into tangible objects, into little boxes that can change the world. Because the immobilized atom in Dr. Roee Ozeri's laboratory could, indirectly, aid in the construction of an efficient quantum computer.

The basic concepts of quantum computing were delineated in the 1980s, when particles at the quantum level were shown to simultaneously occupy several physical states at the same time. The most well-known example of this phenomenon was put forth by physicist Erwin Schrodinger, whose famous "thought experiment" placed a cat in a closed box along with a capsule of poisonous gas. Electrons are released into the box, and if a Geiger counter inside detects radiation, the capsule will shatter. Do we know whether the cat is alive or dead? As long as the box is not opened, the cat exists in two realities – in one, it is poisoned, and therefore dead; in the other, it is alive and well.

This "superposition" can also be exploited for information processing. Today's digital computers, sophisticated as they may be, are built on a binary principle, in which bits responsible for computation can exist in one of two states: one or zero.

Quantum bits, however, can represent several states at the same time, allowing – at least theoretically – vast amounts of information to be processed. While a digital computer will run through possible solutions to a problem one after the other, a quantum computer would simultaneously process them all.

The implications of technology that can harness this processing power range from the immediately useful to the unimaginable. The direct implications, unfortunately, are the source of most funding for quantum research.

But Ozeri and his staff at the Weizmann Institute of Science are not interested in immediate applications, or even the hair-raising ideas put forth by science fiction writers – say, artificial intelligence or creating alternate universes. No. They seek to discover how it is possible to preserve the information already encoded in the superposition of an atom frozen at the heart of an electric field.

This is because quantum computing has two weak points. The first is that the moment a measurement is made – i.e. that Schrodinger's box is opened to check the cat's condition – a particle's dual reality disappears, and we are left with only one. The second is that if you enlarge the number of quantum states, "noise" is generated, and information begins to leak out and gradually disappear, until the number of states is also reduced.

But as Ozeri says, "given the correct conditions, there is no reason why our world should not behave in a quantum manner." Methods for preventing the loss or corruption of information are employed in virtually every encoding system, from tape recorders to hard disks, and Ozeri intends to put his statement to the test by extending these methods of preventing information loss to complex quantum systems.

To this end, the physicist and his team intentionally engineer irregular information leaks to watch how they develop, with the goal finding ways to prevent such leaks and ensure that quantum systems preserve the relevant information even if measurements are made.

Should their efforts succeed, the future of the information age will soon be here, and we will, as Ozeri hopes, be able to see Schrodinger's cat occupying both states – dead and alive – at the same time.

Poet, songwriter and novelist Shimon Adaf was born in Sderot in 1972 and published his first collection of poetry, "Icarus' Monologue," in 1997. Adaf is a founding member of the literary group "Ev," whose aim was to achieve a poetic integration of classical and modern Hebrew. His most recent novel, "Panim Tzruvei Hama" ("Sunburned Faces"), was published in 2008. A selection of Adaf's poems appears in translation in the online journal of the international writers and human rights organization PEN.

Alon Ron

Writer Shimon Adaf, right, with Dr. Roee Ozeri.

WWW.JPOST.COM
THE JERUSALEM POST
11/06/2009

nificance of the dating of this 18,000-year-old bowl lay in the question of when pottery started. It is generally accepted that Israeli pottery is 8,000 years old, Syrian pottery is 9,000 years old and Japanese pottery – which used to be considered the oldest – is 12,000 years old. But now, it appears that Chinese pottery is even older.

Logically, said Garfinkel, this makes sense. China had a more developed civilization, and pottery-making could very well have spread from China to Korea to Japan.

And although Weiner stressed that nothing was certain, he said the dating of the bowl represented a different lifestyle for hunter-gatherers than archeologists have always attributed to them, and that was a pleasant surprise.

"Discovering it was so old was unexpected," said Weiner. "That wasn't what we had in mind."

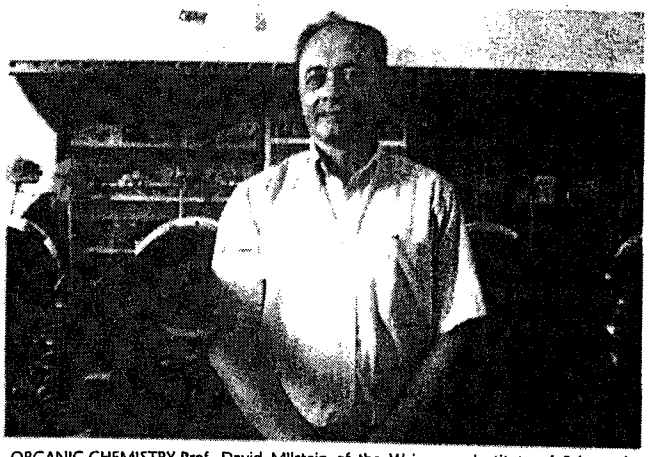
HAARETZ - FRONT
17/06/2009

Iranian daily details Israeli scientist's research project

The Iranian daily Tehran Times carried a story last week about a research project led by the Israeli scientist Yossi Yovel of the Weizmann Institute. The paper reported on a study testing how bats recognize others in flight, based on sounds. The paper quoted Yovel, who described how a computer model helped analyze bats' sonar communication to determine how they identify one voice among hundreds. The Iranian paper, basing its story on a BBC report, also noted that the project was a collaborative effort with German scientists. *(Zafrir Rinat)*

WWW.JPOST.COM
THE JERUSALEM POST
26/04/2009

Weizmann pursues sun-powered separation of H_2O into H and O



ORGANIC CHEMISTRY Prof. David Milstein of the Weizmann Institute of Science in Rehovot has found an artificial way to separate water molecules as an energy source more efficiently than the natural process of photosynthesis. (Weizmann Institute)

NEW WORLDS

• By JUDY SIEGEL-ITZKOVICH

The perfect replacement for petroleum and other polluting fuels would be using sunlight to split water into hydrogen and oxygen. Hydrogen clearly has a long-term potential as a clean, sustainable fuel. But so far, man-made systems require additional chemical agents. Now, a unique approach developed by Prof. David Milstein and colleagues at the Weizmann Institute of Science organic chemistry department takes 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 were recently published in *Science*.

Nature has evolved a very efficient process – photosynthesis, which is the source of all oxygen on Earth. Although there has been significant progress in understanding photosynthesis, just how this system functions remains unclear; worldwide efforts have been devoted to the development of artificial photosynthetic systems based on metal complexes that serve as catalysts, but with little success.

The Rehovot institute's approach is divided into a sequence of reactions, which leads to the release of hydrogen and oxygen in consecutive thermal- and light-driven steps, mediated by a special metal complex that Milstein's team designed in previous studies. Moreover, the one they designed from the element ruthenium is a "smart" complex in which the metal center and the organic part attached to it cooperate in cleaving 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 binding to its organic part, while the remaining hydrogen and oxygen atoms (OH group) bind to its metal center. 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 is released from the complex and another OH group is added to the metal center.

"But the most interesting part is the third light stage," says Milstein. "When we exposed this third complex to light at room temperature, not only was oxygen produced, but the metal complex reverted to its original state, which could be recycled."

Milstein and his team have also succeeded in identifying an unprecedented 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 join and form hydrogen peroxide (H_2O_2), which quickly breaks 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," says 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 comes from a single metal center.

Discovery of an efficient artificial catalyst for the sunlight-driven splitting of water 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.

WWW.JPOST.COM
THE JERUSALEM POST
METRO-מטרו
22/05/2009

Octo-robot in the works

Israeli scientists are part of an international team working to build the world's first soft-bodied robot, an octopus that will revolutionize oceanic exploration

• By Karin Kloosterman/Israel21c

Now building the world's first robotic octopus, and the world's first soft-bodied robot, Israeli scientists have joined a seven-group international team to help marine scientists explore nooks and crannies on the ocean floor, like an octopus would.

Instead of dropping down clunky metallic submarines to the seafloor, which offer little in the way of precision, scientists are working on a soft-bodied robotic device that can gingerly walk over delicate objects, making sure not to damage coral reefs and pristine marine environments.

The initial goal of the octopus robot is to monitor the effects of global warming on the sea. But Prof. Binyamin Hochner, from the Octopus Group of the Life Sciences Institute at Hebrew University of Jerusalem, imagines that when complete, the robot will also have applications in medicine – inside the body – and in search and rescue missions after devastating natural disasters, such as the recent earthquake in Italy.

Funded by the European Agency's Framework 7, the international team – which includes scientists from the UK, Italy, Switzerland, Turkey and Greece – has been challenged to create the world's first soft-bodied robot sometime within the next four years.

A robot of this type isn't as easy to build as some might think, but it offers many advantages over the stiff robotic arms now being used, says Hochner.

"We just started on the new project with the European team, but now the idea is to build a robot, which is an entire octopus, for underwater exploring," says Hochner, who is working with Prof. Tamar Flash from the Weizmann Institute in Israel.

The Israeli role in the project is in developing the mechanics of octopus locomotion. "We are collaborating with groups who are supposed to build the material, and from our side we are analyzing octopus behavior and motor control strategies for the arm, which have multiple degrees of freedom," explains Hochner.

"The other groups are developing special materials to imitate the [octopus] muscle, and in my opinion this is the most difficult part of the project," he says.

When complete, the scientists are expected to have built a life-like octopus robot, with a head, body and eight tentacles, each with a range of motion of 360 degrees. Elongating and stretching like the real ones do, the robotic tentacles will be able to stretch out and become thin in order to reach tiny objects in small spaces.

Furthermore, the researchers intend to mimic the exact same structure and properties of a real octopus. There is something called intelligent design, where nature knows what's best, explains Hochner. "You shouldn't [build] only the arm, but [also] other parts of the biological system [of the octopus], which in nature also adapt to certain goals."

Sucker systems, a nervous system, the sensory system and even the structure of the skin will be copied, he says.

"We are replicating the muscular structure of an octopus by making a robot with no rigid structure – and that is completely new to robotics," said one of Hochner's partners from Italy.

Octopus tentacles are made up of four longitudinal muscles, and the scientists plan on replicating them with a soft silicone rubber fitted with an electroactive polymer called a dielectric elastomer.

When they apply an electric field to this polymer, it will squeeze the silicon making it shorter, and thereby mimic the contraction process in octopus and other soft-bodied marine animals.

The Israeli group has been working on research and feasibility studies toward a robotic octopus for over 15 years. In the past, both the US Navy and the US Defense Advanced Research Agency (DARPA), funded Hochner to investigate the range, possibilities and limitations on flexible octopus arms.

A study on how the international team plan to carry out the work has been published in the journal *Bioinspiration & Biomimetics*.

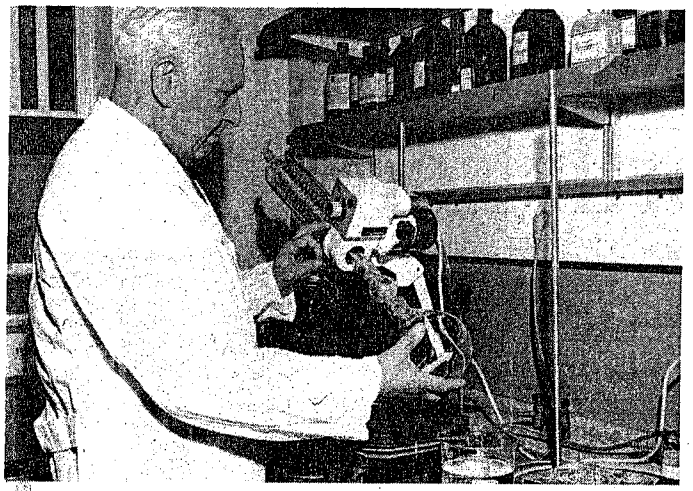
So far, scientists have only been able to develop a snake-like tentacle that inflates with compressed air. Due to buoyancy issues, such a device would never work underwater.

Hochner, who loves octopuses, is guardedly optimistic that the new team will be able to reach its goal. "It's a very fascinating animal," he says. "When we started to work on its motor control, we got very interested in its intelligence. It's considered to be the most intelligent invertebrate, and can learn and do things higher vertebrates can do," says Hochner, who compares the intelligence level to that of a rat or mouse.

The original version of this article first appeared in Israel21c.

WHEN COMPLETE, the scientists are expected to have built a life-like octopus robot, with a head, body and eight tentacles, each with a range of motion of 360 degrees. (Illustrative photo)

WWW.JPOST.COM
THE JERUSALEM POST
FOUNDED IN 1932



FORMER PRESIDENT Ephraim Katzir was equally at home in the lab (left) or checking out a tank with then-defense minister Shimon Peres. (Jerusalem Post archives)

KATZIR

Continued from Page 1

given by the underground Hagana and later became intensively involved in the IDF's Science Corps (known as Hemed), which was founded when the War of Independence broke out.

Working together, Aharon and Ephraim developed new types of explosives to supplement the Jewish paramilitary organization's precious store. But the product was so malodorous that they had to do their lab work in a cave in Jerusalem's Sanhedria quarter.

"When I entered a bus, people used to run away because of the stinky smell. Only years later did we learn how to eliminate the smell from that material," Ephraim recalled.

When the war ended, Ephraim and his brother, who was a very promising young chemist, joined the fledgling Weizmann Institute. Ephraim founded and headed

Katzir was always profoundly concerned with the social and educational aspects of science. He headed a government committee for the formulation of a national scientific policy, trained a generation of younger scientists, translated important material into Hebrew and helped to establish a popular, Hebrew-language science magazine.

He served as chief scientist of the Defense Ministry and chairman of the Israel Society for the Advancement of Science, the Israel Biochemical Society, the National Council for Research and Development and the Council for the Advancement of Science Education.

He also headed the National Biotechnology Council and was president of the World ORT Union.

A long-time socialist, Katzir supported the Labor Party and was urged by prime minister Golda Meir in the spring of 1973 to present his candidacy for the

eye when he shook their hand, but a veil of sadness seemed to hang in the background.

In addition to the murder of his brother, his daughter Nurit died of carbon dioxide asphyxiation at 23 when she fell asleep at home without being aware of a burning kerosene stove and sealed windows; daughter Irit, a "sensitive poet," died at 43 in "tragic circumstances," and Katzir's wife, Nina, died of cancer 23 years ago.

'I believed with all my heart that science will bring peace to this country, renew its youthful vigor and create the sources for new life, both spiritually and materially'

Royal Society of London, the US National Academy of Sciences, the Academie des Sciences in France, the Scientific Academy of Argentina and the World Academy of Art and Science.

He was a visiting professor at Harvard University, Rockefeller University, the University of California at Los Angeles and Battelle Seattle Research Center.

In addition, Katzir won the Rothschild and Israel prizes in natural sciences, the Weizmann Prize, the Linderstrom Land Gold Medal, the Hans Krebs Medal, the Tchernikhovski Prize for scientific translations, the Alpha Omega Achievement Medal and the Engineering Foundation's International Award in Enzyme Engineering.

He was the first recipient of the Japan Prize and was appointed to France's Order of the Legion of Honor.

The magazine *Annual Reviews* quoted Katzir as saying: "I have had the opportunity to devote

love of one's fellows."

At the age of 92 last year, Katzir completed a 362-page, Hebrew-language autobiography called *Sipur Haim* (A Life's Tale) – an apt reflection of his modest manner.

The volume is packed with a mind-boggling cornucopia of people, dates, places, events and facts from as long as eight decades ago, and reflected the fact that his life had been intertwined with some of the most memorable events of the Jewish state and the Jewish people.

"I believed with all my heart that science will bring peace to this country, renew its youthful vigor and create the sources for new life, both spiritually and materially," he wrote in a biological chemistry journal in 2005. "I have been lucky enough to spend my life in pursuit of my goals, with some success and considerable satisfaction."

After he and his former biology student Amos Carmel, a

the biophysics department, while Aharon was invited in 1948 by Chaim Weizmann to join the institute as head of the department of polymer research. Aharon became a professor of physical chemistry at the Hebrew University in 1952.

Their close relationship was tragically cut short when Aharon was among those murdered in the Lod Airport massacre by Japanese Red Army terrorists on May 30, 1972 – an event that broke his brother's heart.

Ephraim Katzir's initial research centered on polyamino acids, which are synthetic models that facilitate the study of proteins. His pioneering studies contributed to the cracking of the genetic code, the production of synthetic antigens and clarification of the various steps of immune responses.

The understanding of polyamino acid properties led, among other things, to a team of Weizmann scientists' development of Copaxone, a drug used worldwide to slow deterioration from multiple sclerosis.

Another major success was in immobilizing enzymes. Katzir developed a method for binding enzymes, which speed up numerous chemical processes, to a variety of surfaces and molecules. The method laid the foundations for what is now called enzyme engineering, which plays an important part in the food and pharmaceutical industries. For example, it is used to produce fructose-enriched corn syrup and semi-synthetic penicillins.

Later, he focused at Weizmann on polymers (large molecules composed of repeating structural units connected by covalent chemical bonds), specifically on immobilized enzymes and polyamino acids, which led to the development of synthetic antigens and the production of synthetic vaccines.

One practical application of his work was his development of a synthetic fiber used to sew up internal wounds that dissolves in bodily enzymes.

presidency to succeed Zalman Shazar after her favorite for the job – Prof. Aharon Katchalski-Katzir – had been murdered.

He later related that he didn't really know what a president was supposed to do, but he did recall that in 1952, when the first president Chaim Weizmann died, the post been offered to Albert Einstein (who turned it down). Powerful Labor Party finance minister Pinhas Sapir told the reluctant Katzir he would build him a lab at Beit Hanassi so he would not be separated from his beloved science during the five-year-term, but this never happened.

He formally hebraicized his surname to Katzir ("harvest") when he became president, but he remained bashful in public and reluctant to give up his scientific research and teaching. In what was perhaps his most momentous meeting as president, he welcomed Egypt's president Anwar Sadat to Israel and Jerusalem in 1977.

During his five years in office, he and his late wife, Nina, an English teacher by profession, paid special attention to the problems of society and education and were consistently eager to learn more about all sectors of the population.

About four months after moving to Beit Hanassi, Katzir symbolically led the nation through the Yom Kippur War, with its horrific death toll, anti-government demonstrations, Meir's resignation and the appointment of Yitzhak Rabin to replace her. Katzir was well received at the White House by Richard Nixon and Gerald Ford.

In 1977, the Likud defeated Labor and a new bipartisan era began. Beit Hanassi was the scene of talks with party heads and the president's symbolic request to try to establish a coalition.

Katzir never had the charisma or gift for gab that some Israelis prefer in a leader; at dull ceremonial events, he surely was dreaming of his lab, microscopes and test tubes. He always smiled shyly and looked people in the

Their son Meir (a mathematics professor at the Technion-Israel Institute of Technology, who has three adult children) and Aharon's son, Prof. Abraham Katzir (an expert in infrared physics at Tel Aviv University) survive him.

Upon completion of his term of office he returned to research at Weizmann and was named "institute professor," a prestigious title awarded by the Weizmann faculty and administration to outstanding scientists who made significant and meaningful contributions to science or to the State of Israel.

He also devoted himself to the promotion of biotechnological research in Israel and founded the biotechnology department at Tel Aviv University.

The creation of this department was a continuation of his efforts to establish science-based industries here. Katzir helped create several companies based on the fruits of his scientific research.

In the later years of his scientific career, Katzir turned to new areas of research. In one project, he headed a team of Weizmann scientists that won an international contest on computer modeling of proteins. In another study, he was part of an interdisciplinary institute team that revealed an important aspect of the effects of snake venom on the body.

Katzir authored hundreds of scientific papers and served on the editorial and advisory boards of numerous scientific journals. International scientific symposia were held in Rehovot and Jerusalem to celebrate his 60th, 70th and 80th birthdays.

Into his 90s, Katzir's former students – leading professors themselves – came to his home where he was wheelchair bound and brought their scientific articles before publication so he could comment on them.

Katzir was a member of the Israel Academy of Sciences and Humanities and of numerous other prestigious bodies in Israel and abroad, including the Royal Institution of Great Britain, the

much of my life to science. Yet my participation over the years in activities outside science has taught me there is life beyond the laboratory.

"I have come to understand that if we hope to build a better world, we must be guided by the universal human values that emphasize the kinship of the human race – the sanctity of human life and freedom, peace between nations, honesty and truthfulness, regard for the rights of others, and

journalist at *Yediot Aharonot*, completed the writing of his autobiography, Katzir told *The Jerusalem Post*: "I didn't take notes during my long career and didn't save any documents. Everything came from memory, with Amos's help.

"I felt that before I meet the Almighty, I wanted to write a book my son and grandchildren could read and so that scientists will see that they can accomplish things outside scientific life as well."

WWW.JPOST.COM
THE JERUSALEM POST
22/05/2009

LETTERS

Science research

Sir, – Re "Failure to invest in basic science 'threat to Israel's existence'" (May 15): With the financial crisis reverberating worldwide, there is no better time to reassess international funding priorities.

Scientific research is key to stimulating economic growth through the introduction of innovative new technologies and medical treatments. Moreover, collaborations between scientists in Israel and abroad can strengthen diplomatic ties while advancing research of mutual interest.

After listening to the president of the Weizmann Institute speak at a recent life sciences forum in France, I am encouraged that a strong framework is in place to bring together scientists across disciplines to tackle emerging challenges.

It is vital that the far-reaching benefits of research in the basic sciences be recognized so that Israel continues to be a world leader in the global scientific community.

LINDSAY CHURA
Cambridge, UK

Israel's Leading Daily Newspaper. Established 1919

HAARETZ

English Edition

Sunday, May 31, 2009 | Sivan 8, 5769. Vol 90, No 27366

Largest civil-defense drill starts today

Anshel Pfeffer
Page 3

Ephraim Katzir, Israel's fourth president, dies at 93

Haaretz Staff

The fourth president of Israel, Ephraim Katzir, died yesterday at the age of 93, at his home on Rehovot's Weizmann Street. Katzir was a world-renowned biochemist and physicist who served as Israel's president from 1973 to 1978.

Katzir (Ephraim Katchalski) was born in Kiev in May 1916. He immigrated to Palestine with his family at the age of 6.

He studied biochemistry at the Hebrew University in Jerusalem, eventually receiving a Ph.D. and also teaching there. As a student Katzir was also a counselor in the Noar Haoved youth group and a member of the Haganah, the pre-state underground Jewish militia.

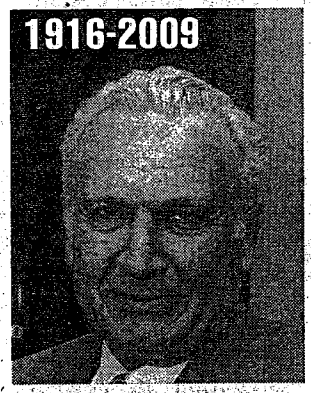
In 1939 Katzir completed the Haganah's first officers' course and became commander of the students' infantry brigade. He played an active role in the Haganah, helping to develop explosives and other weapons. In 1948, during Israel's War of Independence, Katzir was appointed commander of the Israel Defense Forces science corps.

In 1949 Katzir was hired as the founding head of the biophysics department of the Weizmann Institute of Science in Rehovot. Ten years later he was awarded the Israel Prize for natural sciences.

In 1966 he was the first Israeli elected to the U.S. National Academy of Sciences. The same year he was appointed chief scientist of the IDF, a post he remained in until 1969.

Katzir began serving as president of Israel in May 1973. In November 1977 Katzir had the honor of welcoming his Egyptian counterpart, Anwar Sadat, in his historic visit to Jerusalem.

Katzir declined to serve a second term due to the illness of his wife. After the end of his term, in May 1978, he resumed his scientific career.



Ephraim Katzir

JERUSALEM REPORT

Date: Monday, August 03, 2009
Location: NEW YORK, NY
Circulation (DMA): 69,000 (N/A)
Type (Frequency): Magazine (26Y)
Page: 36,37
Keyword: Weizmann Institute of Science

MARKETPLACE: Shlomo Maital

Putting Life into Life Sciences

ACCORDING TO OFFICIAL data, Israel is a huge success in the life science industry. Life sciences exports totaled $6.5 billion in 2008, comprising 13 percent of total goods exports, and 38 percent of all high-tech exports. There are some 1,250 life science start-ups, with 50-60 new ones formed annually. A third of them already generate revenue. Moreover, according to the Swiss business school IMD, Israel is first in the world in per capita medical-device patents, fourth in biopharma patents, and is a pioneer in stem cell research.

I believe these data are highly misleading. Some 59 percent of life sciences exports comprise medical devices or medical information technology, built not on biology but on computer technology. Only 21 percent is biotechnology itself, defined as any technological application that uses biological systems or organisms to make or modify products or processes for specific use.

Biotech itself is thinly spread over a huge range of technologies (diagnostics, drugs, tissue engineering, immunotherapy) with no focus. Biotech start-ups are largely weak and poorly funded. Biotech could be a cash cow. Instead it is a perpetual newborn calf. Why? Why is Israel among the world leaders in life science research, with two Nobel laureates, yet cannot seem to make a buck from biotech?

I sought answers in history and in the views of experts. I found that had we followed the trail blazed by Israel's first president, Chaim Weizmann, a biotech pioneer, we could today be a biotech superpower.

Israel is arguably the only existing sovereign nation, of some 203 countries, that partially owes its existence to a bacterium – a single-celled organism. That amazing bacterium holds the key to solving the biotech riddle.

JERUSALEM POST ARCHIVES

TRAILBLAZER: Chaim Weizmann in his laboratory

The little bacterium that helped create Israel dates back to Weizmann's chemistry lab at the University of Manchester in 1906. Weizmann, who emigrated to Britain in 1904 from Russia, joined the staff of the University of Manchester. In 1910, the home secretary, named Winston Churchill, signed Weizmann's citizenship papers.

Not long after arriving in Manchester, Weizmann met a dynamic politician named Arthur Balfour, while Balfour was politicking in Manchester for his Unionist Party. It was shortly after Uganda had been mooted as a possible homeland for the displaced Jews. In his recent book: "The Zionist, the Zealot and the Declaration Which Changed the World," author Geoffrey Lewis recounts that Balfour asked Weizmann why Palestine – and Palestine alone – could be the basis for Zionism.

"Anything else would be idolatry," Weizmann protested, adding: "Mr. Balfour, supposing I were to offer you Paris instead of London, would you take it?"

"But Dr. Weizmann," Balfour retorted, "we have London." Weizmann rejoined, "That is true, but we had Jerusalem when London was a marsh."

Balfour was visibly surprised.

"Are there many Jews who think like you?" he asked.

"I believe I speak for millions of Jews," replied Weizmann.

"It is curious," Balfour remarked, "the Jews I meet are quite different."

"Mr Balfour,"said Weizmann. "you meet the wrong kind of Jews."

Weizmann and Balfour were later to meet again, with fateful results.

In World War I, Britain fought Germany. The British needed an explosive known as cordite to propel shells for the 12-inch guns of its fearsome Dreadnought battleships. Cordite was made of nitroglycerine mixed with acetone. When the acetone dried, it formed explosive "cords," hence the name "cordite."

Acetone was very scarce. It was feared that the lack of acetone would force the British to modify the Dreadnought's guns, taking them out of action.

In August 1914, Weizmann writes, he found a circular on his desk from the War Office, inviting scientists to report any discovery of military value. Perhaps, Weizmann thought, I can "ferment" acetone. Weizmann was a big fan of Louis Pasteur's work on fermentation.

Weizmann offered the War Office his fermentation idea. There was no response. But later, the editor of the Manchester Guardian, C.P. Scott, who had heard of Weizmann's scientific prowess, contacted a rising Welsh politician named David Lloyd George, then minister of munitions. Scott arranged for Weizmann and Lloyd George to meet.

JERUSALEM REPORT

Date: Monday, August 03, 2009
Location: NEW YORK, NY
Circulation (DMA): 69,000 (N/A)
Type (Frequency): Magazine (26Y)
Page: 36,37
Keyword: Weizmann Institute of Science

Perhaps I can find a microbe in nature, able to synthesize acetone, Weizmann theorized. In a few weeks, he found it, after studying bacteria occurring in soils and able to turn cereal starch into acetone and butyl alcohol. It was Clostridium acetobutylicum, an amazing bacterium able to produce both acetone and butyl alcohol from starch.

Churchill, by then first lord of the Admiralty, summoned Weizmann and spoke with Churchillian bluntness.

As Weizmann relates in his autobiography, "Trial and Error," "[Churchill's first words were] "Well, Dr. Weizmann! We need 30,000 tons of acetone. Can you make it?"

"I was so terrified by this lordly request that I almost turned tail," Weizmann wrote later. But fortunately, he did not.

"Once the bacteriology of the process is established," he said calmly to the gruff Churchill, "it is only a question of brewing."

A huge acetone plant was soon set up, using Weizmann's bacterial fermentation process. There was a wartime shortage of grain. So Weizmann and the Ministry of Munitions had schoolchildren collect horse chestnuts instead, fermented in six huge silos.

The United States Patent Office lists patent number 1315585, filed December 26, 1916, issued to "Charles Weizmann" on September 1919, for the acetone process.

Weizmann's process was replicated in huge plants in Canada and the U.S. New versions of Weizmann's original process are used to this day to produce biofuels, making Weizmann one of the founding fathers of biotechnology.

HAD ISRAEL PURSUED THIS remarkable technology, perhaps fossil fuels might today be as obsolete as dinosaurs, petroleum might be worthless sticky goo and the geopolitical power of Arab oil-producing states might be zero.

Lloyd George became prime minister late in 1916. When he asked Weizmann what payment he chose for his crucial wartime synthesis of acetone, Weizmann declined money, asking for (according to Lloyd George) "the rights to Palestine." As a result, Balfour (who was then foreign minister) issued his declaration on November 2, 1917, stating that "His Majesty's government views with favour the establishment in Palestine of a national home for the Jewish people," in a letter to Baron Rothschild.

It can therefore be argued that the birth of Israel had its origins in Balfour's declaration, for which the little bacterium Clostridium acetobutylicum is directly responsible.

Weizmann believed creativity and Zionism were inextricably linked. "From the beginning," he writes in "Trial and Error," "I looked upon Zionism as a force for life and creativeness residing in the Jewish masses, [not solely] the blind need of an exiled people for a home of its own."

Weizmann would have been pleased to see how, in the 21st century, the creativity of its scientists and engineers have made Israel a world high-tech power. But Weizmann would not have been pleased to see how Israel has dropped the ball in its biotechnology efforts, despite the renowned Weizmann Institute he founded.

I asked biotech expert Dr. Shai Yarkoni what policy changes would most help advance Israel's biotech companies. He made several suggestions: "Investing in physical and human infrastructure; creating facilities that will allow start-ups to get to the value-creating steps; creating a backbone of management/leadership personnel that can 'steer the boats'; focusing on key areas and substantially increasing the amount per grant while reducing the number of grants; and changing the regulatory climate to allow for higher exposure to the global players and faster adaptation to clinical development regulations." Yarkoni, founder of a biotech forum that regularly brings CEOs together, is a veteran of several biotech start-ups, inventor of innovative proteins, including one useful for treating allergies and currently CEO of Raanana-based G.A.S.R. Biotechnology.

M.I.T. Professor Lester Thurow, an expert on globalization, has claimed for years that biotechnology is the growth industry of the future. IMD, the Swiss business school, confirms this view, noting in its World Competitiveness Roadmap for 2009-2050 that "life sciences... will attract massive investments, as the population becomes older (40,000 centenarians in Britain alone in 2030), innovation proliferates [and] wellness (in addition to curing existing diseases) becomes a priority for ageing populations."

Israel can still become a world biotechnology leader with $20 billion in true annual biotech exports. We can put new life back into genuine life sciences. How? Back to basics, back to creativity, back to Weizmann, back to the focused pragmatic can-do genius that used a little single-cell organism to help save one nation and help create another. ●

The writer is Academic Director, TIM-Tel Aviv.

COMMUNICATIONS OF THE ACM

Date: Saturday, August 01, 2009
Location: NEW YORK, NY
Circulation (DMA): 82,423 (N/A)
Type (Frequency): Magazine (M)
Page: 104
Keyword: Weizmann Institute of Science

Puzzled
Probability and Intuition

Welcome to three new puzzles. Solutions to the first two will be published next month; the third is (as yet) unsolved. In each puzzle, the issue is how your intuition matches up with the mathematics.

1. It is your last night in Las Vegas as you celebrate your 29th birthday. Standing at the roulette table with $105 in your pocket, you resolve to make 105 successive $1 bets on the number 29. You will win $36 (minus your $1 bet) each time the ball lands on "29," but, unfortunately, this happens with probability only 1/38; the rest of the time you simply lose your dollar. Use your intuition. What is the probability that, after the 105 bets, you come out ahead?

2. A hundred people board a fully booked aircraft. Unfortunately, the first person in line somehow loses his/her boarding pass while entering and takes a random seat. Each successive passenger then sits in his/her proper seat, if available; otherwise, each one rather wimpily takes a random vacant seat. Again, use your intuition. What is the probability that the last passenger finds the properly assigned seat unoccupied?

3. The Random Arcade, a favorite hangout of local video gamers, boasts a line of n gumball machines. Each machine is unpredictable but produces an average of one gumball each time it is operated; for example, it may be that Machine no. 1 produces two balls half the time and the rest of the time none at all.

What is the maximum possible probability that if you put a coin in each machine, you will be rewarded with a total of more than n gumballs?

This puzzle (stated in terms of sequences of independent random variables) is due to Uriel Feige of the Weizmann Institute of Science, Rehovot, Israel. My intuition, and perhaps yours, too, suggests that the best possible situation is if each gumball machine disgorges $n+1$ gumballs with probability $1/(n+1)$, otherwise it gives nothing. That way, you succeed as long as at least one of the n machines pays off. What is your success probability?

Failure requires that every machine refuses to cooperate, happening with probability $(1 - 1/(n+1))^n$. So you succeed with probability one minus that expression. For $n = 1$ through 6, this gives success probabilities of 1/2, 5/9, 37/64, 369/625, 4,651/7,776, and 70,993/117,649; to the nearest thousandth, these numbers are .500, .556, .578, .590, .598, and .603. The numbers approach $1 - 1/e \sim .632$ from below as n increases. Thus, the answer appears to be $1 - 1/e$.

However, despite some serious effort, no one has managed to prove that you can't do better than $1 - 1/e$. Feige himself showed that the success probability can never exceed $12/13 \sim .923$. Can you improve on his bound?

WWW.JPOST.COM
THE JERUSALEM POST
19/08/2009

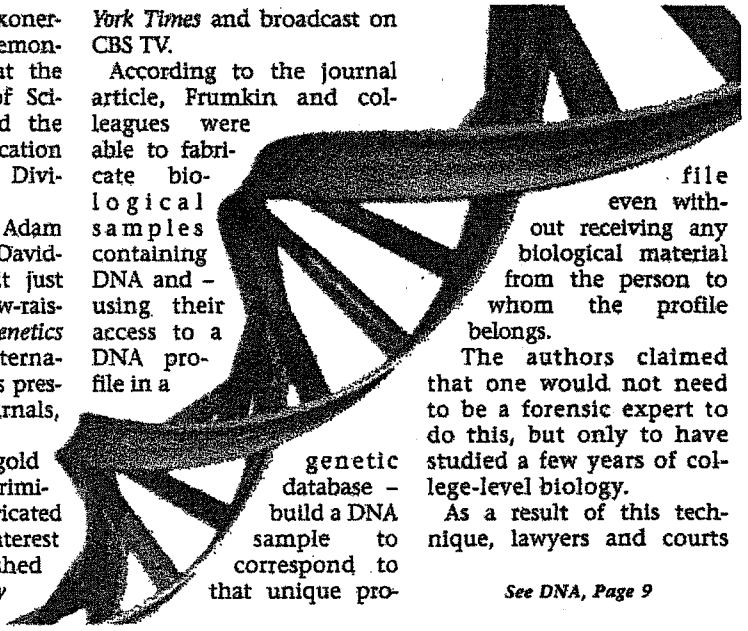
Criminals can fake DNA, Israeli researchers show

• By JUDY SIEGEL

The possibility that clever criminals could fake DNA from blood and saliva samples to incriminate or exonerate suspects has been demonstrated by scientists at the Weizmann Institute of Science in Rehovot and the Israel Police's Identification and Forensic Science Division.

Dr. Dan Frumkin, Dr. Adam Wasserstrom, Ariane Davidson and Arnon Grafit just published their eyebrow-raising article in *FSI Genetics* (Forensic Science International, part of Elsevier's prestigious family of journals, Genetics).

The news that the "gold standard" of proof in criminal cases could be fabricated has aroused much interest after being published worldwide in *The New York Times* and broadcast on CBS TV.



According to the journal article, Frumkin and colleagues were able to fabricate biological samples containing DNA and – using their access to a DNA profile in a genetic database – build a DNA sample to correspond to that unique profile even without receiving any biological material from the person to whom the profile belongs.

The authors claimed that one would not need to be a forensic expert to do this, but only to have studied a few years of college-level biology.

As a result of this technique, lawyers and courts

See DNA, Page 9

NEW JERSEY JEWISH NEWS

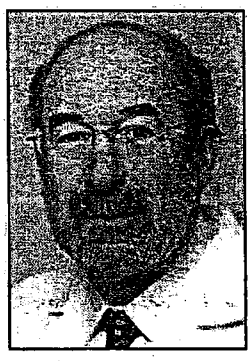
Date: Tuesday, April 28, 2009
Location: DEAL, NJ
Circulation (DMA): 51,968 (1)
Type (Frequency): Newspaper (BW)
Page: 3
Keyword: Weizmann Institute of Science

The doctor is in

A California oncologist has become the first Jew to win Saudi Arabia's top medical research prize.

Ronald Levy, who heads Stanford University's oncology department, accepted the King Faisal International Prize in medicine for his research into cancer-fighting antibodies.

Levy's honor led to speculation that the Saudis were sending a message of political tolerance — although some noted that Levy's postdoctoral fellowship at Israel's Weizmann Institute was the only item omitted from a curriculum vitae Levy had submitted to the prize's website.



Yet Levy was accompanied to the prize ceremony in Riyadh by his Israeli wife and three daughters.

"There was no formal acknowledgement that I was different from the other winners," Levy told *The Jerusalem Post*. "We were always wondering whether it was an issue, and even now we wonder whether it was an issue, but we never brought it up, and it never came up."

The Chronicle Herald (Halifax, NS)

Date 31.05.2009 Circ. 108076 Page

Ephraim Katzir, 93, Israel's 4th president

By The Associated Press

JERUSALEM — Ephraim Katzir, Israel's fourth president and an internationally recognized biophysicist, died Saturday, several weeks after his 93rd birthday.

Katzir's 1973-1978 tenure spanned two seminal events in Israeli history: The 1973 Middle East War and the visit of Egyptian president Anwar Sadat to Jerusalem in 1977. He left the presidency after one term to return to scientific research.

"Ephraim Katzir was devoted to the state of Israel in all that he did and was a scientific pioneer," Prime Minister Benjamin Netanyahu said in a statement. "He also contributed to Israel's security, and his integrity and modesty set an example."

Born in Kyiv in 1916, Katzir immigrated at age six with his family to British-ruled Palestine and studied biology at the Hebrew University in Jerusalem, receiving his PhD in 1941, according to his official biography on the Foreign Ministry website.

He served in the Haganah, the underground Jewish defence organization, where he helped to set up a military research and development unit that developed explosives, propellants and other munitions.

During the war that followed Israel's independence in 1948, he was appointed head of the military's science corps. He served as the Israeli military's chief scientist from 1966 to 1968, the Web site said.

Katzir was a founder of Israel's renowned Weizmann Institute of Science and headed its biophysics department, where his work on synthetic protein models deepened understanding of the genetic code and immune responses.

Katzir was awarded the Israel Prize, the country's highest honour, in 1959 for his contribution to the natural sciences. He received the Japan Prize in 1985 for his work on immobilized enzymes used in oral antibiotics.

Sunday Sun-Times

Date: Sunday, May 31, 2009
Location: CHICAGO, IL
Circulation (DMA): 281,129 (3)
Type (Frequency): Newspaper (S)
Page: 32A
Keyword: Weizmann Institute of Science

EPHRAIM KATZIR | 1916-2009

Israel's 4th president

JERUSALEM — Ephraim Katzir, Israel's fourth president and an internationally recognized biophysicist, died Saturday, several weeks after his 93rd birthday.

Mr. Katzir's 1973-1978 tenure spanned two seminal events in Israeli history: The 1973 Mideast war and the visit of Egyptian President Anwar Sadat to Jerusalem in 1977. He left the presidency after one term to return to scientific research.

Born in Kiev in 1916, Mr. Katzir immigrated at age 6 with his family to British-ruled Palestine and studied biology at the Hebrew University in Jerusalem, receiving his Ph.D. in 1941, according to his official biography on the Foreign Ministry Web site.

Mr. Katzir was a founder of Israel's renowned Weizmann Institute of Science and headed its biophysics department, where his work on synthetic protein models deepened understanding of the genetic code and immune responses.

Mr. Katzir was awarded the Israel Prize, the country's highest honor, in 1959 for his contribution to the natural sciences. *AP*

THE SUN

Date: Sunday, May 31, 2009
Location: BALTIMORE, MD
Circulation (DMA): 377,561 (24)
Type (Frequency): Newspaper (S)
Page: 22A
Keyword: Weizmann Institute of Science

NOTABLE DEATHS

EPHRAIM KATZIR, 93
Israel's fourth president

Ephraim Katzir, Israel's fourth president and an internationally recognized biophysicist, died Saturday, several weeks after his 93rd birthday.

Dr. Katzir's 1973-1978 tenure spanned two seminal events in Israeli history: the 1973 Mideast war and the visit of Egyptian President Anwar Sadat to Jerusalem in 1977. He left the presidency after one term to return to scientific research.

Born in Kiev in 1916, Dr. Katzir immigrated at age 6 with his family to British-ruled Palestine and studied biology at the Hebrew University in Jerusalem, receiving his Ph.D. in 1941, according to his official biography on the Foreign Ministry Web site.

He served in the Haganah, the underground Jewish defense organization, where he helped to set up a military research unit that developed explosives, propellants and other munitions.

During the war that followed Israel's independence in 1948, he was appointed head of the military's science corps. He served as the Israeli military's chief scientist from 1966 to 1968, the Web site said.

Dr. Katzir was a founder of Israel's renowned Weizmann Institute of Science and headed its biophysics department.

International

Israel & the Jewish World

Ephraim Katzir dies at 93

JERUSALEM — Ephraim Katzir, Israel's fourth president and an internationally recognized biophysicist died Saturday at his home in Rehovot, several weeks after his 93rd birthday.

Katzir's tenure, 1973 to 1978, spanned two seminal events in Israeli history: the 1973 Yom Kippur War and the historic visit of Egyptian president Anwar Sadat to Jerusalem in 1977.

He left the presidency after one term to return to scientific research, declining a second term due to his wife's illness.

"Ephraim Katzir was devoted to the State of Israel in all that he did and was a scientific pioneer," Prime Minister Benjamin Netanyahu said in a statement. "He also contributed to Israel's security, and his integrity and modesty set an example."

Born in Kiev in 1916, Katzir immigrated at age six with his family to British-ruled Palestine and studied biology at the Hebrew University in Jerusalem, receiving his PhD in 1941, according to his official biography on the Foreign Ministry website.

Ephraim Katzir, Israel's fourth president

He served in the Haganah, the underground Jewish defence organization, for which he helped to set up a military research and development unit that developed explosives, propellants and other munitions.

During the war that followed Israel's independence in 1948, he was appointed head of the military's science corps. He served as the Israeli military's chief scientist from 1966 to 1968, the website said.

Katzir was among the founders of Israel's renowned Weizmann Institute of Science and headed its biophysics department, where his work on synthetic protein models deepened understanding of the genetic code and immune responses.

Katzir was awarded the Israel Prize, the country's highest honour, in 1959 for his contribution to the natural sciences. He received the Japan Prize in 1985 for his work on immobilized enzymes used in oral antibiotics. In 1996, the former president was selected as the first Israeli to be invited to join the American Academy of Sciences.

TALLAHASSEE DEMOCRAT

Date: Sunday, May 31, 2009
Location: TALLAHASSEE, FL
Circulation (DMA): 60,580 (108)
Type (Frequency): Newspaper (S)
Page: 5B
Keyword: Weizmann Institute of Science

Israel's fourth president dies

THE ASSOCIATED PRESS

JERUSALEM

Ephraim Katzir, Israel's fourth president and an internationally recognized biophysicist, died Saturday, several weeks after his 93rd birthday.

Katzir's 1973-1978 tenure spanned two seminal events in Israeli history: The 1973 Mideast war and the visit of Egyptian President Anwar Sadat to Jerusalem in 1977. He left the presidency after one term to return to scientific research.

"Ephraim Katzir was devoted to the state of Israel in all that he did and was a scientific pioneer," Prime Minister Benjamin Netanyahu said in a statement. "He also contributed to Israel's security, and his integrity and modesty set an example."

Born in Kiev in 1916, Katzir immigrated at age 6 with his family to British-ruled Palestine and studied biology at the Hebrew University in Jerusalem, receiving his Ph.D. in 1941, according to his official biography on the Foreign Ministry Web site.

He served in the Haganah, the underground Jewish defense organization, where he helped to set up a military research and development unit that developed explosives, propellants and other munitions.

During the war that followed Israel's independence in 1948, he was appointed head of the military's science corps. He served as the Israeli military's chief scientist from 1966 to 1968, the Web site said.

Katzir was a founder of Israel's renowned Weizmann Institute of Science and headed its biophysics department, where his work on synthetic protein models deepened understanding of the genetic code and immune responses.

Katzir was awarded the Israel Prize, the country's highest honor, in 1959 for his contribution to the natural sciences. He received the Japan Prize in 1985 for his work on immobilized enzymes used in oral antibiotics.

Source: Jewish Telegraph (Leeds & Yorks Edition) (Main)
Edition:
Country: UK
Date: Friday 5, June 2009
Page: 14
Area: 415 sq. cm
Circulation: Pub Stmt 3000 Weekly
BRAD info: page rate £1,260.00, scc rate £5.00
Phone: 0113 295 6000
Keyword: Weizmann Institute of Science

Farewell, Mr President

ISRAEL'S fourth president, Ephraim Katzir, who accepted Golda Meir's resignation after the Yom Kippur War, has died, aged 93.

Katzir's 1973-1978 tenure spanned two seminal events in Israeli history: The 1973 Yom Kippur War war and the visit of Egyptian president Anwar Sadat to Jerusalem in 1977.

He left the presidency after one term to return to scientific research.

"Ephraim Katzir was devoted to the State of Israel in all that he did and was a scientific pioneer," said Benjamin Netanyahu.

The prime minister told the Cabinet: "He divided his life between science and security. He was a very, very modest man.

"His life was one of struggles, challenges, successes and accomplishments, all of which were for the good of the State of Israel.

"The State of Israel and its citizens have lost one of their dearest sons."

Born in Kiev in 1916, Katzir emigrated as a six-year-old with his family to British-ruled Palestine and studied biology at the Hebrew University in Jerusalem.

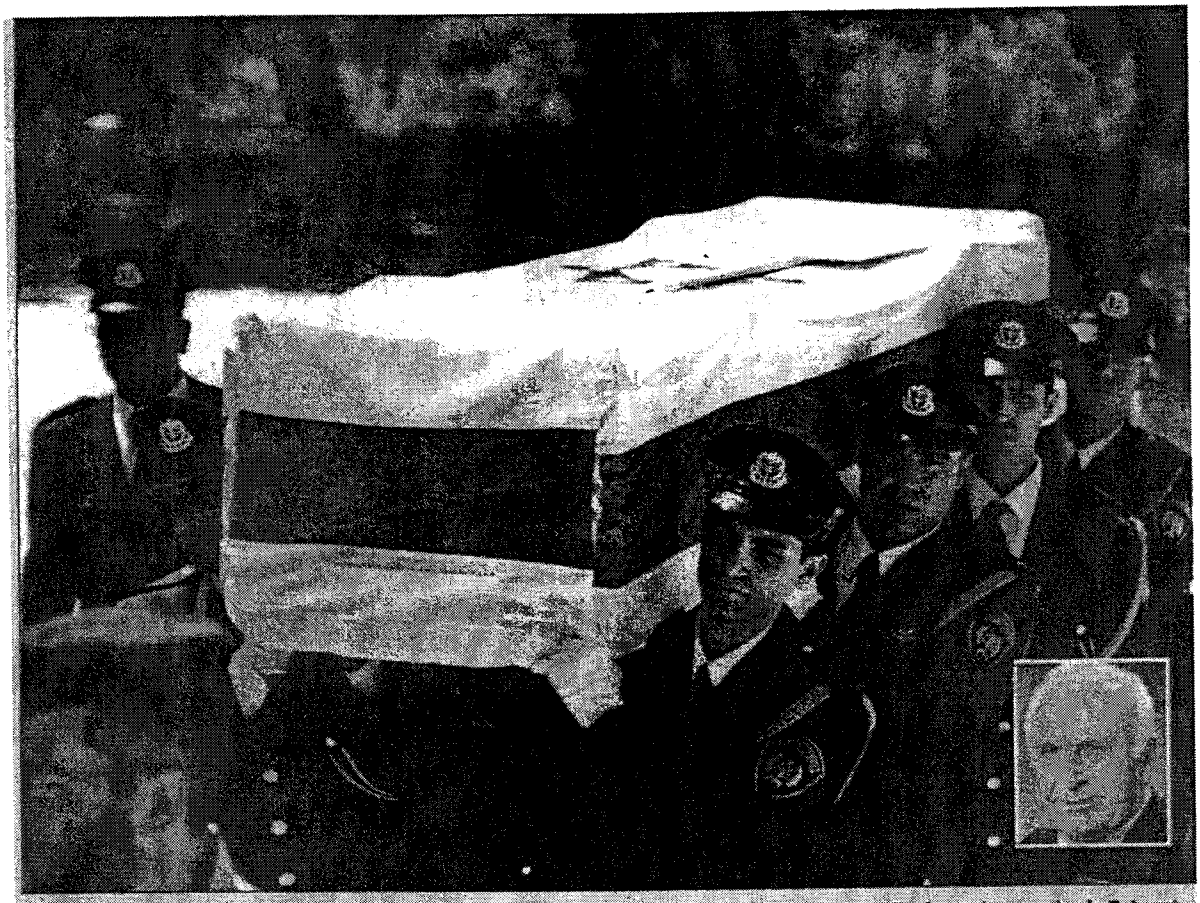
He served in the Haganah – the underground Jewish defence organisation – where he helped to set up a military research and development unit that developed explosives, propellants and other munitions.

TRIBUTE: Netanyahu at funeral

During the war that followed Israel's independence in 1948, he was appointed head of the military's science corps. He served as the Israeli military's chief scientist from 1966 to 1968.

Katzir was a founder of Israel's renowned Weizmann Institute of Science and headed its biophysics department, where his work on synthetic protein models deepened understanding of the genetic code and immune responses.

Source: Jewish Telegraph (Leeds & Yorks Edition) (Main)
Edition:
Country: UK
Date: Friday 5, June 2009
Page: 14
Area: 415 sq. cm
Circulation: Pub Stmt 3000 Weekly
BRAD info: page rate £1,260.00, scc rate £5.00
Phone: 0113 295 6000
Keyword: Weizmann Institute of Science



SO LONG: Knesset guards carry the coffin of Ephraim Katzir (inset), Israel's fourth president, at the funeral procession in Rehovot

The Miami Herald

Date: Saturday, June 06, 2009
Location: MIAMI, FL
Circulation (DMA): 272,291 (16)
Type (Frequency): Newspaper (D)
Page: 4B
Keyword: Weizmann Institute of Science

EPHRAIM KATZIR, 93

Co-founded science center, was Israeli president

Ephraim Katzir was president during the 1973 Arab-Israeli war, then welcomed Egypt's Anwar Sadat to Jerusalem in 1977.

New York Times Service

Dr. Ephraim Katzir, Israel's fourth president and one of his nation's pre-eminent scientists, died Saturday at his home on the campus of the Weizmann Institute of Science in Rehovot, Israel. He was 93.

The death was confirmed by the website of the Israeli Ministry of Foreign Affairs.

Katzir was president of Israel — a largely ceremonial post — from 1973 to 1978. Symbolically, he was head of his nation during the 1973 Arab-Israeli war, from Oct. 6 to 26, which began with a surprise attack by Egypt and Syria on Yom Kippur, the Jewish day of atonement. Israel eventually repelled the Arab forces.

Four years later, on Nov. 19, 1977, it was Katzir who officially welcomed President Anwar Sadat of Egypt on his historic visit to Jerusalem.

BROTHER SLAIN

A somewhat shy and modest man, Katzir came into public life through tragic circumstances. According to The Jerusalem Post, Prime Minister Golda Meir asked him to submit his name as candidate for the presidency in the spring of 1973 after her first choice for the post, Katzir's older brother, Aharon, was killed on May 30, 1972, by Japanese terrorists who machine-gunned passengers disembarking at what is now Ben-Gurion International Airport in Tel Aviv. The brothers — whose surname at birth was Katchalski — were both renowned Israeli scientists. Upon becoming president, Ephraim Katchalski then Hebraicized his last name to Katzir, which means "harvest."

At the time the Israeli Parliament elected him president, Katzir was chairman of the biophysics department at the Weizmann Institute. He was one of the founding scientists of the institute, and his brother had been chairman of the institute's department of polymer research.

Katzir's initial research centered on simple synthetic protein models that eventually helped to decipher the genetic code and to clarify the various steps in immune responses.

ENZYME RESEARCH

He also developed a method for binding enzymes, which catalyze numerous chemical processes, to a variety of surfaces and molecules. The method helped lay the groundwork for what is now called enzyme engineering, which plays an important part in the food and pharmaceutical industries. For his work on immobilized enzymes used in oral antibiotics, he received the Japan Prize in 1985.

Ephraim Katchalski was born in Kiev, then part of Russia, on May 16, 1916. His parents, Yehuda and Tzila Katchalski, were ardent Zionists. The family emigrated to Palestine, then under British rule, in 1922.

As an undergraduate at Hebrew University of Jerusalem, Katzir studied botany, zoology and bacteriology before concentrating on biochemistry and organic chemistry. In 1941 he completed his doctoral thesis on simple synthetic polymers of amino acids, research that he continued at the Polytechnic Institute of Brooklyn, Columbia and Harvard.

DEVELOPED EXPLOSIVES

While serving in the Haganah, the underground Jewish defense organization, Katzir and his brother worked together on developing new explosives for the group. He did research for the Israeli army's science corps, Hemed, which was established at the start of the Arab-Israeli war of 1948, and later was chief scientist for the Israeli Defense Ministry.

Katzir's wife, Nina, died in 1986. He is survived by his son, Meir, and three grandchildren.

After his term as president, Katzir returned to research at the Weizmann Institute.

The Blowing Rocket

Date: Thursday, June 18, 2009
Location: BLOWING ROCK, NC
Circulation (DMA): 3,200 (26)
Type (Frequency): Newspaper (W)
Page: 7
Keyword: Weizmann Institute of Science

Westglow owners to underwrite AWF's Women of Vision Award

"Charity begins at home" is more than just a phrase to Bonnie and Jamie Schaefer. They are words to live by and a philosophy of philanthropy for which the Schaefer's are well-known. Bonnie and Jamie Schaefer, owners of Westglow Resort & Spa, have partnered with the Appalachian Women's Fund as the premiere sponsor and underwriters of the AWF Woman of Vision Award Luncheon to be held on June 25th at the Blowing Rock Country Club.

Though Bonnie and Jamie split their time between Blowing Rock and Boca Raton, they financially support many non-profits in this area. As founding members of the Appalachian Women's Fund, the Schaefers have seen firsthand the amount of support needed to help many women and young girls in the mountain counties beat the odds.

"How can we not help women in our community?" replied Jamie when asked about their support of the AWF and the work they do.

"Our goals are the same," said AWF President, Patti Turner, "to break the cycles of poverty, violence, and abuse that trap women and erode their potential for a better life."

With the Schaefers underwriting much of the event's cost, more money raised from ticket sales and the silent auction will go directly back into the fund for the 2010 cycle of grants.

With no paid staff and a working board of volunteers, AWF Treasurer, Debbie Stevens said "The mounting cost of an event like this can be staggering. Keeping overhead low is a key component of being able to put more money back into the community where it belongs. The Schaefers are big picture visionaries and we are lucky to have them on our team of generous sponsors."

Empowering women and girls is a common theme among the charitable organizations supported by the Schaefers. On a national level, the Schaefers work with the Women's Media Center in New York, Equality Now, Women Moving Millions, the Women's Funding Network, the Women's Division of the Weizmann Institute of Science and co-created the National Ovarian Cancer Coalition's Run/Walk. Locally, their philanthropic influences are seen everywhere in Watauga County, from the Hayes Center to the Humane Society and many points in-between.

The first and only synagogue in this area will be built from the seed money donated by the Schaefer's.

Members of the Appalachian Women's Fund say they feel honored to be among the many philanthropic endeavors near and dear to the hearts of the Schaefer's.

"They are making a huge impact on the lives of women and girls right here, right now" said one member.

To purchase tickets to the Woman of Vision Award Luncheon and Silent Auction call 828-264-4006 or go on-line to www.appalachianwomensfund.org. Tickets are $50 per person and seating is limited.

'Trained' bacteria can lead to better biofuels

NEW WORLDS

• By JUDY SIEGEL-ITZKOVICH

Bacteria are not dumb. Israeli researchers have proven that these pathogens can anticipate a future event and prepare for it. The discovery – just published in the prestigious journal *Nature* – is not merely a curiosity. The scientists believe that if bacteria gain the genetic ability to prepare themselves for the next step in a process, the conditioned response could be used for fermenting plant materials and producing more efficient biofuels.

Prof. Yitzhak Pilpel, doctoral student Amir Mitchell and research associate Dr. Orna Dahan of the Weizmann Institute's molecular genetics department, together with Prof. Martin Kupiec and Gal Romano of Tel Aviv University, examined microorganisms living in environments that change in predictable ways. They discovered that these microorganisms' genetic networks are 'hard-wired' to "foresee" what comes next in a sequence of events and begin responding to the new state of affairs before its onset. This evolutionary adaptation is believed to enhance survival in many organisms – and may also take place in the cells of higher organisms. For example, *E. coli* bacteria, which normally cruise harmlessly down the digestive tract, encounter a number of different environments on their way. They find that one type of sugar – lactose – is invariably followed by a second sugar – maltose. The researchers checked the bacterium's genetic response to lactose and found that, in addition to the genes that enable it to digest lactose, the gene network for using maltose was partially activated. When they switched the order of the sugars, giving the bacteria maltose first, there was no corresponding activation of lactose genes – implying that bacteria have "learned" to get ready for a serving of maltose after a lactose appetizer.

Another bacterium that experiences consistent changes is wine yeast. As fermentation progresses, sugar and acidity levels change, alcohol levels rise and the yeast's environment heats up. Although this system is somewhat more complicated that that of E. coli, the scientists found that when wine yeast feel the heat, they begin activating genes for dealing with the stresses of the next stage. Further analysis showed that this anticipation and early response is an evolutionary adaptation.

Ivan Pavlov first demonstrated this type of adaptive anticipation, which has since been known as a conditioned response, in dogs in the 1890s. He conditioned the dogs to salivate in response to a stimulus by repeatedly ringing a bell before giving them food. In the microorganisms, says Pilpel, "evolution over many generations replaces conditioned learning, but the end result is similar."

To see whether the microorganisms were truly exhibiting a conditioned response, Pilpel and Mitchell devised a further test for the *E. coli* based on another of Pavlov's experiments. When Pavlov stopped giving the dogs food after ringing the bell, the conditioned response faded until they eventually ceased salivating when it rang. The scientists did something similar, using bacteria grown by Dr. Erez Dekel, in the lab of Weizmann Prof. Uri Alon, in an environment containing lactose, but not following it up with maltose. After several months, the bacteria had evolved to stop activating their maltose genes at the taste of lactose, only turning them on when maltose was actually available.

Jewish Independent (Vancouver, BC)

Date 17.07.2009 Circ. 2350 Page

Survival of the fittest

Bacteria can plan ahead: Weizmann Institute.

Bacteria can anticipate a future event and prepare for it, according to new research at the Weizmann Institute of Science. In a paper that appeared recently in *Nature*, Prof. Yitzhak Pilpel, doctoral student Amir Mitchell and research associate Orna Dahan of the institute's molecular genetics department, together with Prof. Martin Kupiec and Gal Romano of Tel Aviv University, examined microorganisms living in environments that change in predictable ways.

Their findings show that these microorganisms' genetic networks are hard-wired to "foresee" what comes next in the sequence of events and begin responding to the new state of affairs before its onset, a discovery which could have significance for human cell survival and genetically modified food.

E. coli bacteria, for instance, which normally cruise harmlessly down the digestive tract, encounter a number of different environments on their path. In particular, they find that one type of sugar – lactose – is invariably followed by a second sugar – maltose – soon afterward. Pilpel and his team checked the bacterium's genetic response to lactose and found that, in addition to the genes that enable it to digest lactose, the gene network for using maltose was partially activated. When they switched the order of the sugars, giving the bacteria maltose first, there was no corresponding activation of lactose genes, implying that bacteria have naturally "learned" to get ready for a serving of maltose after a lactose appetizer.

Another microorganism that experiences consistent changes is wine yeast. As fermentation progresses, sugar and acidity levels change, alcohol levels rise and the yeast's environment heats up. The scientists found that when the wine yeast feel the heat, they begin activating genes for dealing with the stresses of the next stage. Further analysis showed that this anticipation and early response is an evolutionary adaptation that increases the organism's chances of survival.

Ivan Pavlov first demonstrated this type of adaptive anticipation, known as a conditioned response, in dogs in the 1890s. He trained the dogs to salivate in response to a stimulus by repeatedly ringing a bell before giving them food. In the microorganisms, said Pilpel, "evolution over many generations replaces conditioned learning, but the end result is similar."

"In both evolution and learning," said Mitchell, "the organism adapts its responses to environmental cues, improving its ability to survive." Romano indicated that "this is not a generalized stress response, but one that is precisely geared to an anticipated event."

To see whether the microorganisms were truly exhibiting a conditioned response, Pilpel and Mitchell devised a further test for the E. coli based on another of Pavlov's experiments. When Pavlov stopped giving the dogs food after ringing the bell, the conditioned response faded until they eventually ceased salivating at its sound.

The Weizmann Institute scientists did something similar, using bacteria grown by Dr. Erez Dekel, in the lab of Prof. Uri Alon of the molecular cell biology department, in an environment containing the first sugar, lactose, but not following it up with maltose. After several months, the bacteria had evolved to stop activating their maltose genes at the taste of lactose, only turning them on when maltose was actually available.

"This showed us that there is a cost to advanced preparation, but that the benefits to the organism outweigh the costs in the right circumstances," said Pilpel. What are those circumstances? Based on the experimental evidence, the research team created a cost/benefit model to predict the types of situations in which an organism could increase its chances of survival by evolving to anticipate future events.

Pilpel and his team believe that genetic conditioned responses may be a widespread means of evolutionary adaptation that enhances survival in many organisms – one that may also take place in the cells of higher organisms, including humans.

These findings could have practical implications, as well. Genetically engineered microorganisms for fermenting plant materials to produce biofuels, for example, might work more efficiently if they gained the genetic ability to prepare themselves for the next step in the process.

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.

– Courtesy of the Weizmann Institute

Genetic conditioned responses may be a widespread means of evolutionary adaptation that enhances survival in many organisms.

JEWISH NEWS

Date: Wednesday, July 01, 2009
Location: SHERMAN OAKS, CA
Circulation (DMA): 0 (N/A)
Type (Frequency): Magazine (M)
Page: 12
Keyword: Weizmann Institute of Science

Weizmann Institute: Israeli Scientists Show that Bacteria Can Plan Ahead

By Yael Marwah

REHOVOT, ISRAEL — Bacteria can anticipate a future event and prepare for it, according to new research at the Weizmann Institute of Science. In a paper that appeared in the June 17, 2009 issue of Nature, Prof. Yitzhak Pilpel, doctoral student Amir Mitchell, and research associate Dr. Orna Dahan of the Institute's Molecular Genetics Department, together with Prof. Martin Kupiec and Gal Romano of Tel Aviv University, examined microorganisms living in environments that change in predictable ways.

Their findings show that these microorganisms' genetic networks are hard-wired to "foresee" what comes next in the sequence of events and begin responding to the new state of affairs before its onset.

E. coli bacteria, for instance, which normally cruise harmlessly down the digestive tract, encounter a number of different environments on their way. In particular, they find that one type of sugar—lactose— is invariably followed by a second sugar—maltose—soon afterward. Pilpel and his team in the Molecular Genetics Department checked the bacteria's genetic response to lactose and found that, in addition to the genes that enable it to digest lactose, the gene network for utilizing maltose was partially activated. When they switched the order of the sugars, giving the bacteria maltose first, there was no corresponding activation of lactose genes, implying that bacteria have naturally "learned" to get ready for a serving of maltose after a lactose appetizer.

Another microorganism that experiences consistent changes is wine yeast. As fermentation progresses, sugar and acidity levels change, alcohol levels rise, and the yeast's environment heats up. Although the system was somewhat more complicated than that of E. coli, the scientists found that when the wine yeast feel the heat, they begin activating genes for dealing with the stresses of the next stage. Further analysis showed that this anticipation and early response is an evolutionary adaptation that increases the organism's chances of survival.

Ivan Pavlov first demonstrated this type of adaptive anticipation, known as a conditioned response, in dogs in the 1890s. He trained the dogs to salivate in response to a stimulus by repeatedly ringing a bell before giving them food. In the microorganisms, says Pilpel, "evolution over many generations replaces conditioned learning, but the end result is similar." "In both evolution and learning," says Mitchell, "the organism adapts its responses to environmental cues, improving its ability to survive." Romano: "This is not a generalized stress response, but one that is precisely geared to an anticipated event."

To see whether the microorganisms were truly exhibiting a conditioned response, Pilpel and Mitchell devised a further test for the E. coli based on another of Pavlov's experiments. When Pavlov stopped giving the dogs food after ringing the bell, the conditioned response faded until they eventually ceased salivating at its sound. The scientists did something similar, using bacteria grown by Dr. Erez Dekel, in the lab of Prof. Uri Alon of the Weizmann Institute's Molecular Cell Biology Department, in an environment containing the first sugar, lactose, but not following it up with maltose. After several months, the bacteria had evolved to stop activating their maltose genes at the taste of lactose, only turning them on when maltose was actually available.

"This showed us that there is a cost to advanced preparation, but that the benefits to the organism outweigh the costs in the right circumstances," says Pilpel. What are those circumstances? Based on the experimental evidence, the research team created a sort of cost/benefit model to predict the types of situations in which an organism could increase its chances of survival by evolving to anticipate future events. The researchers are already planning a number of new tests for their model, as well as different avenues of experimentation based on the insights they have gained.

Pilpel and his team believe that genetic conditioned response may be a widespread means of evolutionary adaptation that enhances survival in many organisms – one that may also take place in the cells of higher organisms, including humans. These findings could have practical implications, as well. Genetically engineered microorganisms for fermenting plant materials to produce biofuels, for example, might work more efficiently if they gained the genetic ability to prepare themselves for the next step in the process.

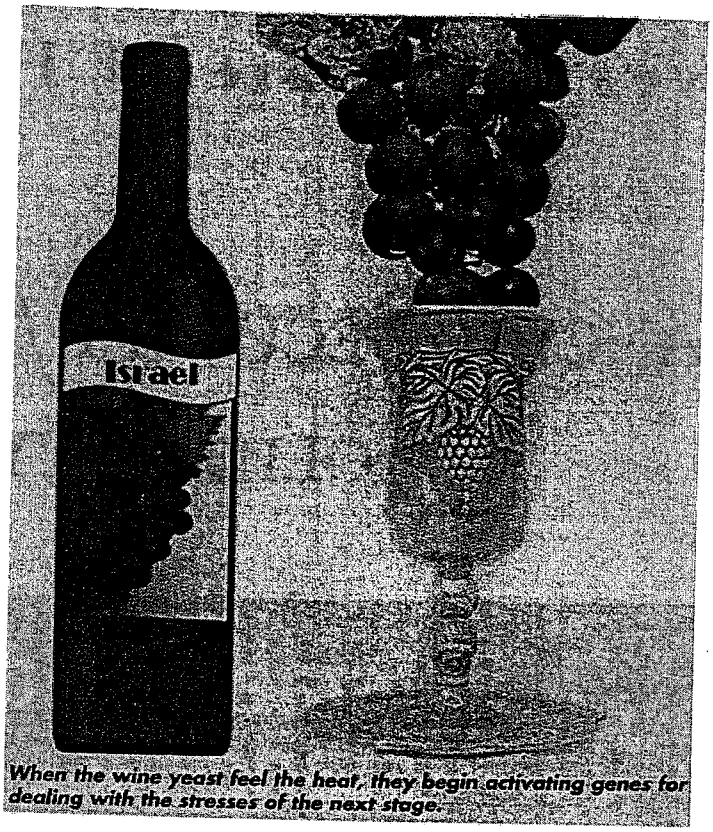
The Weizmann Institute of Science in Rehovot, Israel, is one of the world's top-ranking multidisciplinary research institutions. Noted for its wide-ranging exploration of the natural and exact sciences, the Institute is home to 2,600 scientists, students, technicians, and supporting staff. Institute research efforts include the search for new ways of fighting

JEWISH NEWS

Date: Wednesday, July 01, 2009
Location: SHERMAN OAKS, CA
Circulation (DMA): 0 (N/A)
Type (Frequency): Magazine (M)
Page: 12
Keyword: Weizmann Institute of Science

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.

Prof. Yitzhak Pilpel's research is supported by the Ben May Charitable Trust and Madame Huguette Nazez, Paris, France.



When the wine yeast feel the heat, they begin activating genes for dealing with the stresses of the next stage.

THE JEWISH ADVOCATE

Date: Friday, June 26, 2009
Location: BOSTON, MA
Circulation (DMA): 1,400 (7)
Type (Frequency): Newspaper (W)
Page: 1,4
Keyword: Weizmann Institute of Science

Israeli scientists: Bacteria plan ahead

REHOVOT, Israel — Bacteria can anticipate a future event and prepare for it, according to new research at the Weizmann Institute of Science.

In the June 17, 2009 issue of Nature, Professor Yitzhak Pilpel, doctoral student Amir Mitchell and research associate Dr. Orna Dahan of the Institute's Molecular Genetics Department, together with Professor Martin Kupiec and Gal Romano of Tel Aviv University, showed that these microorganisms' genetic networks are hardwired to "foresee" what comes next in the sequence of events and begin responding to the new state of affairs before its onset.

E. coli bacteria, for instance, which normally cruise harmlessly down the digestive tract, encounter a number of different environments on their way. In particular, they find that one type of sugar – lactose – is invariably followed by a second sugar – maltose – soon afterward.

Pilpel and his team checked the bacteria's genetic response to lactose and found that, in addition to the genes that enable it to digest lactose, the gene network for utilizing maltose was partially activated. When they switched the order of the sugars, giving the bacteria maltose first, there was no corresponding activation of lactose genes, implying that bacteria have naturally "learned" to get ready for a serving of maltose after a lactose appetizer.

Another microorganism that experiences consistent changes is wine yeast. As fermentation progresses, sugar and acidity levels change, alcohol levels rise and the yeast's environment heats up. The scientists found that when the wine yeast feel the heat, they begin activating genes for dealing with the stresses of the next stage. Further analysis showed that this anticipation and early response is an evolutionary adaptation that increases the organism's chances of survival.

Ivan Pavlov first demonstrated this type of adaptive anticipation, known as a conditioned response, in dogs in the 1890s. He trained dogs to salivate in response to a stimulus by repeatedly ringing a

Continued on Page 4

bell before giving them food.

In the microorganisms, said Pilpel, "evolution over many generations replaces conditioned learning, but the end result is similar."

To see whether the microorganisms were truly exhibiting a conditioned response, Pilpel and Mitchell devised a further test for the E. coli based on another of Pavlov's experiments. When Pavlov stopped giving the dogs food after ringing the bell, the conditioned response faded until they eventually ceased salivating at its sound.

The scientists did something similar, using bacteria in an environment containing the first sugar, lactose, but not following it up with maltose. After several months, the bacteria had evolved to stop activating their maltose genes at the taste of lactose, only turning them on when maltose was actually available.

"This showed us that there is a cost to advanced preparation, but that the benefits to the organism outweigh the costs in the right circumstances," said Pilpel.

Pilpel and his team believe that genetic conditioned response may be a widespread means of evolutionary adaptation that enhances survival in many organisms – one that may also take place in the cells of higher organisms, including humans.

These findings could have practical implications, as well. Genetically engineered microorganisms for fermenting plant materials to produce biofuels, for example, might work more efficiently if they gained the genetic ability to prepare themselves for the next step in the process.

THE JEWISH ADVOCATE

Date: Friday, June 26, 2009
Location: BOSTON, MA
Circulation (DMA): 1,400 (7)
Type (Frequency): Newspaper (W)
Page: 1,4
Keyword: Weizmann Institute of Science

Israeli scientists: Bacteria plan ahead

REHOVOT, Israel — Bacteria can anticipate a future event and prepare for it, according to new research at the Weizmann Institute of Science.

In the June 17, 2009 issue of Nature, Professor Yitzhak Pilpel, doctoral student Amir Mitchell and research associate Dr. Orna Dahan of the Institute's Molecular Genetics Department, together with Professor Martin Kupiec and Gal Romano of Tel Aviv University, showed that these microorganisms' genetic networks are hardwired to "foresee" what comes next in the sequence of events and begin responding to the new state of affairs before its onset.

E. coli bacteria, for instance, which normally cruise harmlessly down the digestive tract, encounter a number of different environments on their way. In particular, they find that one type of sugar – lactose – is invariably followed by a second sugar – maltose – soon afterward.

Pilpel and his team checked the bacteria's genetic response to lactose and found that, in addition to the genes that enable it to digest lactose, the gene network for utilizing maltose was partially activated. When they switched the order of the sugars, giving the bacteria maltose first, there was no corresponding activation of lactose genes, implying that bacteria have naturally "learned" to get ready for a serving of maltose after a lactose appetizer.

Another microorganism that experiences consistent changes is wine yeast. As fermentation progresses, sugar and acidity levels change, alcohol levels rise and the yeast's environment heats up. The scientists found that when the wine yeast feel the heat, they begin activating genes for dealing with the stresses of the next stage. Further analysis showed that this anticipation and early response is an evolutionary adaptation that increases the organism's chances of survival.

Ivan Pavlov first demonstrated this type of adaptive anticipation, known as a conditioned response, in dogs in the 1890s. He trained dogs to salivate in response to a stimulus by repeatedly ringing a

Continued on Page 4

bell before giving them food.

In the microorganisms, said Pilpel, "evolution over many generations replaces conditioned learning, but the end result is similar."

To see whether the microorganisms were truly exhibiting a conditioned response, Pilpel and Mitchell devised a further test for the E. coli based on another of Pavlov's experiments. When Pavlov stopped giving the dogs food after ringing the bell, the conditioned response faded until they eventually ceased salivating at its sound.

The scientists did something similar, using bacteria in an environment containing the first sugar, lactose, but not following it up with maltose. After several months, the bacteria had evolved to stop activating their maltose genes at the taste of lactose, only turning them on when maltose was actually available.

"This showed us that there is a cost to advanced preparation, but that the benefits to the organism outweigh the costs in the right circumstances," said Pilpel.

Pilpel and his team believe that genetic conditioned response may be a widespread means of evolutionary adaptation that enhances survival in many organisms – one that may also take place in the cells of higher organisms, including humans.

These findings could have practical implications, as well. Genetically engineered microorganisms for fermenting plant materials to produce biofuels, for example, might work more efficiently if they gained the genetic ability to prepare themselves for the next step in the process.

THE BUFFALO NEWS

Date: Sunday, June 28, 2009
Location: BUFFALO, NY
Circulation (DMA): 262,507 (49)
Type (Frequency): Newspaper (S)
Page: G6
Keyword: Weizmann Institute of Science

Broken vase sets an antiquity record

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.

After flint tools, pottery is one of 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 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 skirted this problem by excavating an area only a quarter of a yard square and analyzing each layer of sediment.

They reported 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. Fragments found immediately above and below the pottery shards indicate they are between 18,300 and 17,500 years old.

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.

— Los Angeles Times

WWW.JPOST.COM THE JERUSALEM POST FOUNDED IN 1932

Israeli team dates 18,000-year-old pottery in China

Find of world's oldest know ceramic work shows hunter-gatherers may have also been pottery-makers

• By RACHEL GEIZHALS

They went to understand the origins of rice in China and to date a specific cave site. What the archeologists discovered was that ancient hunter-gatherers may have been pottery-makers as well, indicating that they were more advanced than previously thought and that pottery originated in China.

Israeli, Chinese and American teams, led by Bar-Ilan University's Elisabetta Boaretto, say they have succeeded in dating the fragments of a cone-shaped bowl excavated in the 1990s in a small cave in China's Hunan province.

Early last week, the team reported that they had reexcavated the site and, using the most well-preserved ceramic fragments, been able to date the bowl to about 18,000 years ago.

The bowl, which is about 25 cm. in diameter at its widest point, is the oldest known ceramic work.

Because pottery-making is not usually associated with hunter-gatherers, who foraged to eat and did not domesticate wild animals or plant food, the archeologists were surprised by their findings.

"This is a change of a paradigm using a very early primitive ceramic," Steve Weiner, director of the Kimmel Center for Archeological Science at the Rehovot-based Weizmann Institute of Science, told *The Jerusalem Post* on Wednesday.

Boaretto and Weiner – the Israeli segment of the group – contributed the technical know-how to the process. Weiner's expertise is in mineralogy and site layering, Boaretto's in radiocarbon dating and fieldwork.

ISRAELI, CHINESE and American archeologists have dated this ceramic bowl, excavated in China in the 1990s, as the oldest known work of pottery. (Hunan Provincial Museum)

Boaretto, who is currently under contract with the Kimmel Center, was on a flight from Hawaii and was not available for comment.

Radiocarbon dating is difficult because it may not be entirely accurate. Critics say excavated fragments also contain minerals that skew the results. However, Weiner said that by screening out the best samples, the team had succeeded in cleaning and dating the fragments properly.

According to an article by Andrew Lawler in *ScienceNOW*, some scholars are confused about the dating. Because other civilized technologies surfaced in different parts of Asia long before pottery-making did, he says, the question is why pottery-making developed in China first.

Other experts, such as Yosef Garfinkel, a professor of archeology at the Hebrew University of Jerusalem, are optimistic about the team's findings.

Garfinkel said Wednesday that the significance of the dating of this 18,000-year-old bowl lay in the question of when pottery started. It is generally accepted that Israeli pottery is 8,000 years old, Syrian pottery is 9,000 years old and Japanese pottery – which used to be considered the oldest – is 12,000 years old. But now, it appears that Chinese pottery is even older.

Logically, said Garfinkel, this makes sense. China had a more developed civilization, and pottery-making could very well have spread from China to Korea to Japan.

And although Weiner stressed that nothing was certain, he said the dating of the bowl represented a different lifestyle for hunter-gatherers than archeologists have always attributed to them, and that was a pleasant surprise.

"Discovering it was so old was unexpected," said Weiner. "That wasn't what we had in mind."

THE SUNDAY CONSTITUTION

Date: Sunday, June 07, 2009
Location: LAWTON, OK
Circulation (DMA): 24,313 (148)
Type (Frequency): Newspaper (S)
Page: 8A
Keyword: Weizmann Institute of Science

Archaeologists discover oldest known pottery in China

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 one of 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.

THE BUFFALO NEWS

Date: Sunday, June 28, 2009
Location: BUFFALO, NY
Circulation (DMA): 282,507 (49)
Type (Frequency): Newspaper (S)
Page: G6
Keyword: Weizmann Institute of Science

Broken vase sets an antiquity record

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.

After flint tools, pottery is one of 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 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 skirted this problem by excavating an area only a quarter of a yard square and analyzing each layer of sediment.

They reported 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. Fragments found immediately above and below the pottery shards indicate they are between 18,300 and 17,500 years old.

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.

— *Los Angeles Times*

The Oneida Daily Dispatch

Date: Tuesday, June 02, 2009
Location: ONEIDA, NY
Circulation (DMA): 6,519 (79)
Type (Frequency): Newspaper (D)
Page: A13
Keyword: Weizmann Institute of Science

Ancient pottery found in China

WASHINGTON (AP) – 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," 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," Lu said. "Pottery is still an important part of human culture today."

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," Lu added.

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," 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," McGovern said.

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.

On the Net:

PNAS: www.pnas.org

THE STATE Journal Register

Date: Tuesday, June 02, 2009
Location: SPRINGFIELD, IL
Circulation (DMA): 57,659 (82)
Type (Frequency): Newspaper (D)
Page: 32
Keyword: Weizmann Institute of Science

Chinese pottery is earliest evidence of ceramics

By RANDOLPH E. SCHMID
THE 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," 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," Lu said. "Pottery is still an important part of human culture today."

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," Lu added.

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," 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," McGovern said.

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.