

Berries fight cancer?

GARDEN-VARIETY berries provide about the same cancer-fighting punch as more exotic ones, a study of rats with esophageal cancer shows. A separate study finds a potentially protective effect against breast cancer as well.

Cancer biologist Gary Stoner of Ohio State University in Columbus and his colleagues tested seven berry types against cancer of the esophagus in rats: black raspberries, red raspberries, blueberries, strawberries, moni berries, açai berries and wolfberries (also called goji berries).

The scientists injected the animals with a carcinogenic chemical and gave some of the rats normal food, while others got similar chow containing 5 percent of one of the berries in dehydrated form.

While nearly all of the rats fed normal chow developed tumors rapidly, only about two-thirds of the berry-supplemented rats did. Overall, these rats had about half as many tumors as the others, the researchers report in the June *Pharmaceutical Research*. The berry-fed rats also had lower concentrations of interleukin-5 and a rat version of interleukin-8, inflammatory proteins implicated in esophageal cancer.

Earlier work by Stoner's group found that black raspberries



Familiar berries pack the same punch against cancer as more exotic varieties, new studies show.

contain ample amounts of the two cancer-fighting compounds ellagitannin and anthocyanin. Ellagitannins also show up in nuts, pomegranates and other berries, while anthocyanins give many berries a red, purple or blue color.

But the new work shows that a berry need not have large concentrations of either compound to be a cancer fighter. For example, blueberries and açai berries

are high in anthocyanins but low in ellagitannins. And wolfberries are low in both, Stoner says.

"There may be different things in different berries that are providing these [anticancer] effects," says Ramesh C. Gupta, a cancer biologist at the University of Louisville School of Medicine in Kentucky. "It's a good thing," he says, since availability varies by region.

In the other study, Gupta and

his colleagues induced breast cancer in female rats by implanting estrogen in the animals. Some animals received a diet comprising 2.5 percent dehydrated blueberries or black raspberries and others got food without berries. Those getting berries showed less tumor growth, the researchers report in the June *Cancer Prevention Research*. The berries also decreased activation of two

genes implicated in breast cancer, CYP1A1 and CYP1B1.

Although the various berries tested in these studies differ from one another in chemical composition, they have things in common, such as an anti-inflammatory effect, Stoner says. They also contain cellulose, lignin and pectin. These fibrous compounds "may be the common denominator," he says, because in digesting these fibers, the body makes butyrate, which previous research has shown may have anticancer properties.

"It could be the presence of more conventional antioxidants such as the carotenoids, or more likely vitamin C, which was not measured in this study," says Susan Duthie, a nutritional biochemist at the University of Aberdeen in Scotland.

In any case, the potent anticancer effect of berries shown in lab-dish and animal studies has yet to be replicated in people, she cautions. A huge European study reported earlier this year found only very modest protection against cancer from a diet high in fruits and vegetables. "There is stronger protective evidence for berries and the compounds in them against heart disease and cognitive decline in humans," Duthie says.

Source: ScienceNews



ACT OF DISCOVERY

Hidden harmony

The following makes the fourth instalment of Dr. M Ali Asgar's original article titled "Establishment of an Interactive science discovery centre in Asia-Pacific region."

SCIENTIFIC discovery comes about in many different forms which often depends on the particular domain to which they belong. Thus for mathematical discovery logical deductions, interpretation and synthesis and an intuition of a mathematical order to guess the hidden harmonies and relations are needed. According to Henri Poincare mathematical discovery consists in making new useful combinations with mathematical entities already known. These are an infinitely small minority compared to an infinite number of combinations that are devoid of interest. Mathematical discovery is thus discernment selection by mathematical intuition. Again, there are two main categories of mathematicians, intuitionists and logicians. The first kind, often called geometrician, advances from the first rather precariously like a dashing vanguard, while the second kind advances step by step leaving almost nothing to chance, and are called analysts. For example mathematician Charles Hermite was a tabulated analyst and Riemann an intuitionist. It is the very nature of their minds that make them either logicians or intuitionists, independent of the subject they tackle.

The conditions of discovery in theoretical science ranging from the frontiers of mathematics to those of experimental and observational science differ considerably in some essential points. For example, the hypotheses or theories of the theoretician must be supported by observation or experiment. Thus theoretical creations appear to be intermediary between invention and discovery. When a theoretical scientist is confronted with observed facts that can not be explained by the existing theories and feels that an essential element is missing in the interpretation, making a true understanding of the facts impossible, he looks for a new theory. He begins to suspect hidden relationships that can only be explained by a new theory based on entirely new ideas. It takes a long period of preparation for the discovery to appreciate the difficulties in his path, to elucidate the connections between the observed facts from the directive ideas that are slowly organized almost subconsciously in his mind. Then quite suddenly there occurs some kind of crystallization of new concepts. When he finds a new path with a flash of thought, he has to deduce all the implications of the new theory and make predictions based on the theory to be checked by experimentalists. As often happen there are rival theories and objections put forward by other scientists. All theories are in fact tentative. In order that a theory makes an assertion about the empirical world must in principle be refutable. According to Karl Popper no theory can in fact be proved or even verified, it can only be falsified. A theory which is testable can claim to be tentatively right so long as it is not falsified.

To be continued



DREAM DASHED

Theory of Everything shelved

SCIENTISTS dropped an experiment nearly five stories down an elevator shaft of sorts to test a possible way to meld the physical theory of the very small - quantum mechanics - with the very large - general relativity, to create a theory of everything.

General relativity, on the other hand, governs the realm of the very large, describing how gravity acts on some of the largest, densest, heaviest things in the universe like stars and black holes.

Yet to the enduring frustration of physicists, these two grand theories seem incompatible with each other. So far, the laws of the very small and the very large are impossible to reconcile.

A new experiment offers hope by probing the very boundary between these two realms, the researchers said. They experimented with a special type of super-cold matter called a Bose-Einstein condensate.

The Bose-Einstein condensate in the experiment was composed of a cloud of millions of rubidium atoms that were cooled to temperatures nearing absolute zero. At this point, they basically lose their individual identities and can be described by a single macroscopic wave function essentially an equation from quantum mechanics, but on a large scale.

The researchers then dropped a capsule containing the Bose-Einstein condensate down a very tall tower built especially for scientific experiments. The drop allowed the material to experience weightlessness during its brief freefall.

The lack of gravity caused the gas to expand, and allowed the scientists to study the gravitational effects on the quantum gas.

The experiment showed that such projects could offer a fertile ground for testing the murky boundary between quantum mechanics and general relativity, the researchers said. They hope to one day send such an experiment to space, perhaps on the International Space Station.

Source: LiveScience



View from below, inside the 479-foot (146-meter) tall drop tower with typical experimental capsule.



THE PESTS!

Invasive species in Antarctica

Scientists with the British Antarctic Survey (BAS) have discovered that a species of fly originally from South Georgia, the chironomid midge, has flourished since its accidental introduction to Signy Island in the Antarctic in the 1960s. It has expanded to more than 650 feet (200 meters) away from its original site, and in some areas is more numerous than any of the native insects.

"There's a risk of the flies becoming persistent and then turning into something invasive and damaging," said Peter Convey, a terrestrial ecologist with the BAS, who, along with study author Kevin Hughes, environmental research and monitoring manager at the BAS, presented research on invasive species in Antarctica at the International Polar Year science conference in Oslo last week.

The fly likely traveled unnoticed on the backs of plants that were brought to Antarctica for research purposes, Convey said. It was discovered in the 1980s, but didn't seem to be causing any harm. Then in the 1990s and early 2000s, its populations exploded, Convey said.

Source: Our Amazing Planet



An adult midge found on Signy Island off Antarctica



SCIENCE QUIZ

Quiz

If you could travel in a space-ship at the speed of light away from the solar system, how long could you see the sun?

ANS

The exact answer depends on your eyesight and observing conditions but most people could see the sun for about 30 years in reasonably good observing conditions. The sun is considered an average star. There are stars as much as 400,000 times brighter than the sun and others as much as 400,000 times fainter if they could all be seen at the same distance.

Martian ocean that was

OBAIDUR RAHMAN

NAMED after the Roman God of war, Mars is still a mystery in the human quest of the Heavens. Even though lately the talk of water on moon has resurfaced, it has always been Mars, which captivated people's imagination as far as extra-terrestrial liquid and life-forms are concerned. Before getting into details it is sensible to point out that the current atmospheric condition of Mars is not hospitable enough to sustain liquid water on its surface. But numerous researches suggest that Mars was once a wet planet with plenty of liquid water flowing down the surface, much like Earth's oceans. And according to a recent study conducted by the University of Colorado (CU) at Boulder, it is likely that a vast ocean covered one-third of the surface of Mars some 3.5 billion years ago. Published in the latest edition of the journal *Nature Geoscience*, planetary geologists from the United States, after studying a ring of ancient Martian delta deposits and valley networks from the databases of NASA and European Space Agency, strongly imply that up to a third of Mars was under about 30 million cubic miles of liquid water. The study further maintains that the ancient red planet probably had an Earth-like global hydrological cycle, including precipitation, runoff, cloud formation, ice and groundwater accumulation which strongly supports the commonly held idea that the planet may have once harboured a rich array of extra-terrestrial life forms. The river deltas on Mars are of high interest to planetary scientists, mostly because deltas on Earth rapidly bury organic carbon and other biomarkers of life and scientists believe same is the situation in the Martian deltas. According to CU-Boulder researcher and lead author of the study, Gaetano Di Achille, "On Earth, deltas and lakes are excellent collectors and preservers of sign of past life. If life ever arose on Mars, deltas may be the key to unlocking Mars". It is important to mention



Artist's impression of a Martian ocean shoreline seen from the air based on satellite images.

here that the CU-Boulder study is the first to combine the analysis of water-related features including scores of delta deposits and thousands of river valleys to test the existence of an ocean sustained by a global hydrosphere on early Mars.

Using images taken by different satellites, the researchers looked at the remains of 52 Martian river deltas, each fed by numerous river valleys. And it was found that 29 out of these 52 deltas were connected either to the ancient Mars Ocean or to the groundwater table of the ocean and to several large adjacent lakes. Di Achille and his teammate, Dr. Brian Hynek, used a geographic information system (GIS) to map the Martian terrain and concluded that the ocean might have covered about 36% of the planet and contained about 30 million cubic miles or 124 million cubic kilometers of water. The amount of water in the ancient ocean would have formed an equivalent of 1800 foot or 550 meter deep layer of water spread over the one third of the 4.6 billion year old planet. According to Dr. Hynek, the volume of the ancient Martian ocean would have been about 10 times less than the current volume of Earth's oceans, since Mars is slightly more than half the size of Earth. The

researchers also found that the large, ancient lakes upslope from the ancient ocean probably formed inside impact craters and would have been filled by the transport of groundwater between the lakes and the ancient sea. Another separate study headed by Dr. Hynek, detected roughly 40,000 river valleys on Mars, which is about 4 times the number of river valleys that were previously been identified by scientists.

All in all, both scientists agreed that, these collective findings only strengthen the existing theories on the extent and formation time of an ancient ocean on Mars and imply that the surface conditions during the time probably allowed the presence of a global and active hydrosphere integrating valley networks. With eyes on the future, Di Achille stated, "One of the main questions we would like to answer is where all of the water on Mars went". Scientists are hoping that future Mars missions like NASA's \$485 million Mars Atmosphere and Volatile Evolution mission or MAVEN which is scheduled for launch in 2013, will finally provide some insights into this mysterious 4th planet from the Sun.

The contributor is a freelance science writer



MANMADE HELL

Sea creatures flee oil spill

DOLPHINS and sharks are showing up in surprisingly shallow water off Florida beaches, like forest animals fleeing a fire. Mulletts, crabs, rays and small fish congregate by the thousands off an Alabama pier. Birds covered in oil are crawling deep into marshes, never to be seen again.

Marine scientists studying the effects of the BP disaster are seeing some strange phenomena.

Fish and other wildlife seem to be fleeing the oil out in the Gulf and clustering in cleaner waters along the coast in a trend that some researchers see as a potentially troubling sign.

The animals' presence close to shore means their usual habitat is badly polluted, and the crowding could result in mass die-offs as fish run out of oxygen. Also, the animals could easily be devoured by predators.

"A parallel would be: Why are the wildlife running to the edge of a forest on fire? There will be a lot of fish, sharks, turtles trying to get out of this water they detect is not suitable," said Larry Crowder, a Duke University marine biologist.

The nearly two-month-old spill has created an environmental catastrophe unparalleled in U.S. history as tens of millions of gallons of oil have spewed into the Gulf of Mexico ecosystem. Scientists are seeing some unusual things as they try to understand the effects on thousands of species of marine life.

Day by day, scientists in boats tally up dead birds, sea turtles and other animals, but the toll is surprisingly small given the size of the disaster. The latest figures show that 783 birds, 353 turtles and 41 mammals have died numbers that pale in comparison to what happened after the Exxon Valdez disaster in Alaska in 1989, when 250,000 birds and 2,800 otters are believed to have died.

Researchers say there are several reasons for the relatively small death toll: The vast nature of the spill means scientists are able to locate only a small fraction of the dead animals. Many will never be found after sinking to the bottom of the sea or being scavenged by other marine life. And large numbers of birds are meeting their deaths deep in the Louisiana marshes where they seek refuge from the onslaught of oil.

"That is their understanding of how to protect themselves," said Doug Zimmer, spokesman for the U.S. Fish and Wildlife Service.

Source: AP



A dolphin swims in the Barataria Bay near oil from the Deepwater Horizon spill Wednesday, June 16, 2010