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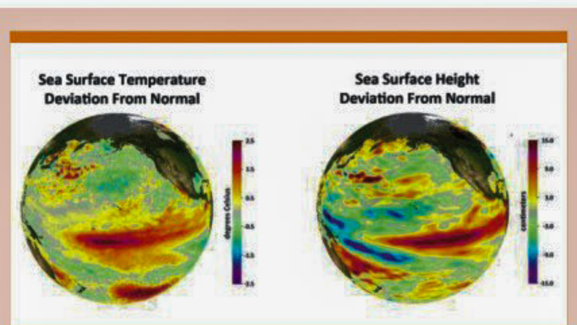
El Ninos hold clue?



El Niños grow stronger

A relatively new type of El Niño, which has its warmest waters in the central-equatorial Pacific Ocean, rather than in the eastern-equatorial Pacific, is becoming more common and progressively stronger, according to a new study by NASA and NOAA. The research may improve our understanding of the relationship between El Niños and climate change, and has potentially significant implications for long-term weather forecasting.

Lead author Tong Lee of NASA's Jet Propulsion Laboratory, Pasadena, Calif., and Michael McPhaden of NOAA's Pacific Marine Environmental Laboratory, Seattle, measured changes in El Niño intensity since 1982. They analyzed NOAA satellite observations of sea surface temperature, checked against and blended with directly-measured ocean temperature data. The strength of each El Niño was gauged by how much its sea surface temperatures deviated from the average. They found the intensity of El Niños in the central Pacific has nearly doubled, with the most intense event occurring in 2009-10.

The scientists say the stronger El Niños help explain a steady rise in central Pacific sea surface temperatures observed over the past few decades in previous studies-a trend attributed by some to the effects of global warming. While Lee and McPhaden observed a rise in sea surface temperatures during El Niño years, no significant temperature increases were seen in years when ocean conditions were neutral, or when El Niño's cool water counterpart, La Niña, was present.

Sources: Science Daily

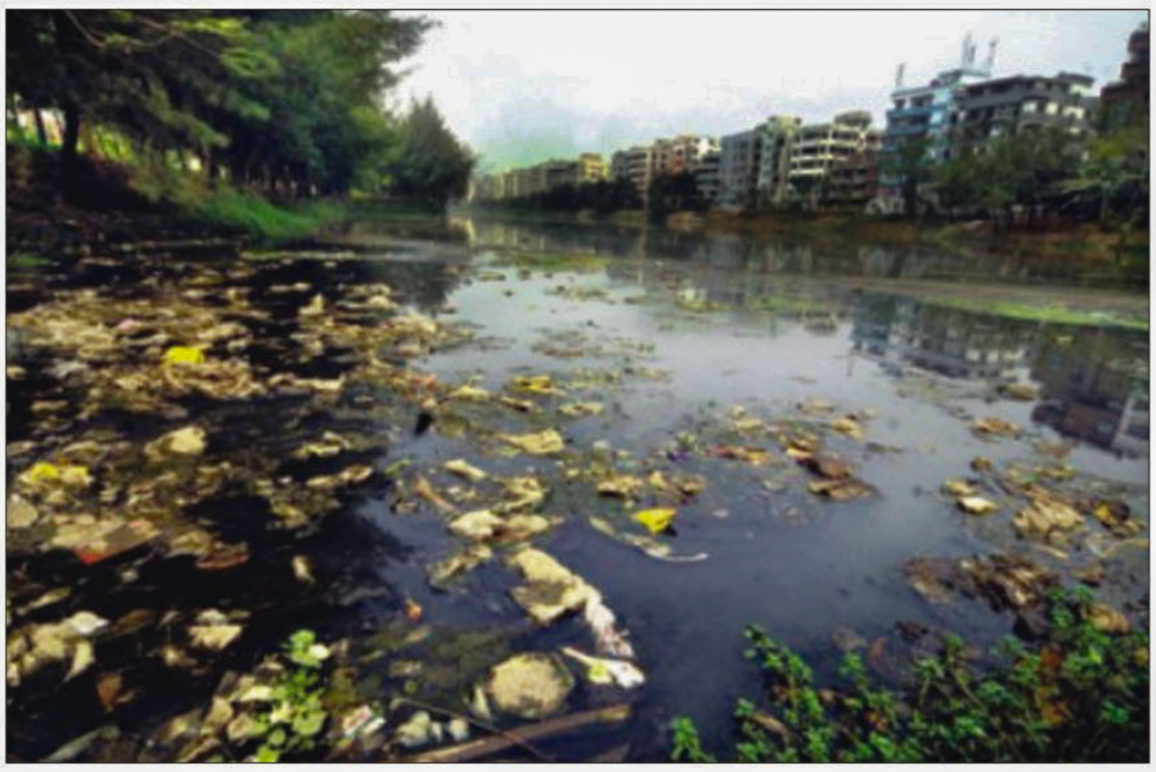
Superbugs that clean up environment

MD. RIAJUL HOSSAIN

A contaminated site, of either terrestrial or aquatic ecosystems, that is polluted with toxic chemicals is deadly for the environment. The textile, leather, fertilizer and other industries are continuously releasing toxic pollut into our land and rivers, disturbing the normal balance of both the ecosystems which is alarming for a clean and healthy environment. Although there are various ways to clean up the environment such as recycling the wastes, incineration or disposing the wastes and pollutants into landfill sites, the best and most eco-friendly way to clean up the pollutants is using the microorganisms, the process known as bioremediation. Genetically engineered microbes (GEMs) or the so called superbugs could be a very promising option to perform this job. Don't confuse this superbug with those resistant bacteria which are also called superbugs and are capable of resisting almost any antibiotics present to date and thus a major concern now in health sector. I will limit today's discussion to the genetically engineered microbes with their promise for a better, cleaner and a greener environment.

Nature performs its own way of cleaning the environment by biodegradation of the toxic chemicals by its inhabitant microorganisms to maintain a perfect balance. This process is known as intrinsic bioremediation or biorestoration. But in this modern and industrialized society, the rate of pollution, probably, has gone far beyond what the natural biodegradation can deal with. Moreover, the generation of recalcitrant molecules, chemicals which are hard to degrade, and xenobiotics, unnatural chemical substances in the environment, has made it quite difficult for the natural microorganisms to cope with those pollutants. However, microorganisms also evolve to gain the capability of degrading certain chemicals. Here comes the opportunity for the biotechnologists to apply a simple trick and what they do is combine several characteristics, capable of degrading different chemicals, from different bacteria into a single one simply by transferring the plasmids responsible for those different characteristics making the new bacterium a superbug. Plasmids are extra chromosomal genetic elements of bacteria containing certain genetic traits that can hop to other bacteria and gain the capability of reproducing independently into the new ones and share the traits with them.

The very first superbug was created to degrade oil in 1970s when Chakrabarty and co-workers reported the development of a new strain of bacterium by transfer of plasmids and named it superbug which could utilize a number of toxic organic chemicals like octane, hexane, xylene, toluene, camphor and naphthalene. In 1980, United States granted the patent to this superbug making it the first genetically engineered microorganism to be patented. This superbug was then used for cleaning an oil spill in Texas in 1990. Recent research shows that deep sea microbes are evolving in response to the deepwater horizon disaster helping to clean up the contaminated water in the Gulf of Mexico, according to a study published in August 2010 in Science Express. Terry Hazen of Lawrence Berkeley National Laboratory in California and his colleagues in the study found increases in several bacteria varieties within the oil's reach. The 1989 Exxon Valdez spill provided similar clues. The task for genetic engineers, therefore, is to take the unique characteristics from the evolving microbes and construct strains of so called superbugs, with broad spectrum of catabolic potential ideal for bioremediation of polluted environment in both aquatic and terrestrial ecosystems.



Polluted water bodies like lakes and rivers can be treated with genetically engineered microorganisms (GEMs)

In a country like Bangladesh, superbugs, if proved safe for the environment, could be an excellent option to deal with the severely polluted environmental sites. Therefore, bioremediation protocols can be generated for treatment of industrial effluents from various industries like textile, leather, fertilizer and pharmaceuticals and many more. Our rivers and the largest sea beach, the proud of our country, could be saved in this way and we can get a cleaner and safer environment for fresh breathing and a happy life.

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It's no freak!

Gay birds!

In greylag geese, nearly a fifth of all long-term couples are composed of two males. They're not alone: More than 130 bird species are known to engage in homosexual behavior at least occasionally, a fact that has puzzled scientists.

After all, in evolutionary terms same-sex mating seems to reduce the birds' chances of reproductive success. But that's not necessarily so, according to a new study. In a given species, the sex with lighter parental duties tends to mate more, period whether with the same or the opposite sex.

Birds engage in all kinds of same-sex hanky panky, from elaborate courtship displays to mounting and genital contact to setting up house together. In some species the same-sex pairs even raise young (conceived with outside partners, obviously) and stay together for several years.

In 2007, a team led by Geoff MacFarlane, a biologist at the University of Newcastle in Australia, reported that male homosexual behavior was more common in polygynous bird species, where males mate with numerous females, and that female homosexual behavior was more common in monogamous species.

Intrigued, MacFarlane looked for help explaining the pattern in a theory predicting that whichever gender spends less time caring for young tends to have sex with more partners.

Sources: Live Scienc

Nearly one-fifth of all long-term greylag geese couples are gay, composed of two males.

Ant gives in to science

Ant genomes unravelled

REPORTING on the sequencing of the first two ant genomes, scientists say their work can help them understand variations in appearance, biology and social roles within colonies as well as differences between ant species. The research, they say, could also clear a path to better understanding genes' effects on social behavior, neurobiology and life-span in other animals.

"This study opens doors for a completely new system where now we can study behavior among ants and social insects," says study coauthor Danny Reinberg, a biochemist at the New York University School of Medicine. The research appears in the Aug. 27 Science.

Ants live in colonies with queens and specialized workers of various types, each of which has a different set of biological and behavioral traits. Queens are larger than worker ants, can live 10 years or more and lay eggs all their lives. Shorter-lived workers have more complex behaviors and use more brainpower to forage and maintain the colony.

But all the individuals in a colony have the same genetic blueprints. That means differences among individuals depend on how genes are turned on and off, or cranked up or down, rather than the actual DNA. So scientists want to use ants to study how differences in genes and gene activity bring about changes in aging, behavior and brain activity.

The researchers, from institutions in the United States, China and Denmark, chose two socially different ant species to sequence so that they could study a variety of ant lifestyles and behaviors. The Florida carpenter ant, Camponotus floridanus, lives in large colonies with one egg-laying queen that is crucial to the colony's survival. Workers come in two sizes, have specialized tasks, and use smell to recognize each other and tell their peers where to find food.

In contrast, the jumping ant Harpegnathos saltator, from India, lives in smaller colonies that can replace a queen if she dies. Workers aren't as highly specialized as carpenter ant workers and don't recognize each other as easily.

The newly sequenced genome of the Florida carpenter ant finds differences in gene activity between major workers (shown), which defend the nest, and minor workers, which search for food.

Now that both genomes are sequenced, the scientists will start studying the differences among individuals and between species to find out whether ants' actions, brain activity and life-span can be linked to gene activity. The researchers have already found some tantalizing tidbits that they'll study further.

Within jumping ants, the team found major gene-expression differences among colony members. For instance, worker ants that stepped up to replace a dead queen showed boosted levels of two antiaging enzymes, which may relate to queens' longer lifespans. The researchers will study how the activity of these genes gets cranked up and how the genes affect aging.

Among the carpenter ants, the two types of workers had different gene-expression levels affecting brain function. Minor workers go out and find food, while major workers stay behind to defend the nest. Minor workers showed higher gene expression for some brain signaling molecules, possibly because these workers need more brainpower to find food, lay chemical trails to lead others, and find the nest again, says geneticist Roberto Bonasio of NYU School of Medicine, a coauthor of the study. The finding suggests workers' different behaviors arise from differences in genes controlling brain signaling.

The researchers are just beginning to learn how gene activity modifies neurobiology in social insects.

"These kinds of things give clues to what kind of inputs are important for these species ...to see how they control developmental strategies, social behavior, social responses," says developmental biologist Vincenzo Pirrotta of Rutgers University in Piscataway, N.J., who was not involved in the research. "Particularly interesting is the pattern of development that can lead to such different body size and shapes as the body of a queen, for example." While significant findings will come down the road, he sees this project as a great beginning.

Sources: Science News

Solar clock set back

Solar system older than thought

The solar system may be almost 2 million years older than previously thought, a new study shows.

Data from a newly studied meteorite recovered from the Saharan Desert show that the solar system formed 4,568.2 million years ago, 0.3 million to 1.9 million years earlier than other estimates. The results were published online August 22 in Nature Geoscience.

"All the interesting things we want to understand about the chemistry of our solar system happened within the first five to 10 million years," says study coauthor Meenakshi Wadhwa, a cosmochemist from Arizona State University in Tempe. "When you push it back by 2 million years, that's a substantial proportion of that 5 to 10 million years."

The meteorite contains millimeter- and centimeter-sized bits of calcium- and aluminum-rich substances, some of the oldest material ever found in primordial rocks. These pockets in the rock, called inclusions, are believed to be among the first solids that condensed from gas at the beginning of the solar system's formation. Along with other materials in the presolar cloud, the inclusions snowballed into larger objects, eventually forming asteroids and planets.

Study coauthor Audrey Bouvier of Arizona State measured the ratios of variants of lead atoms produced by the radioactive decay of uranium present when the inclusions formed. Since uranium decays at a known rate, current amounts of lead forms, or isotopes, allow scientists to calculate how long ago the space dust formed.

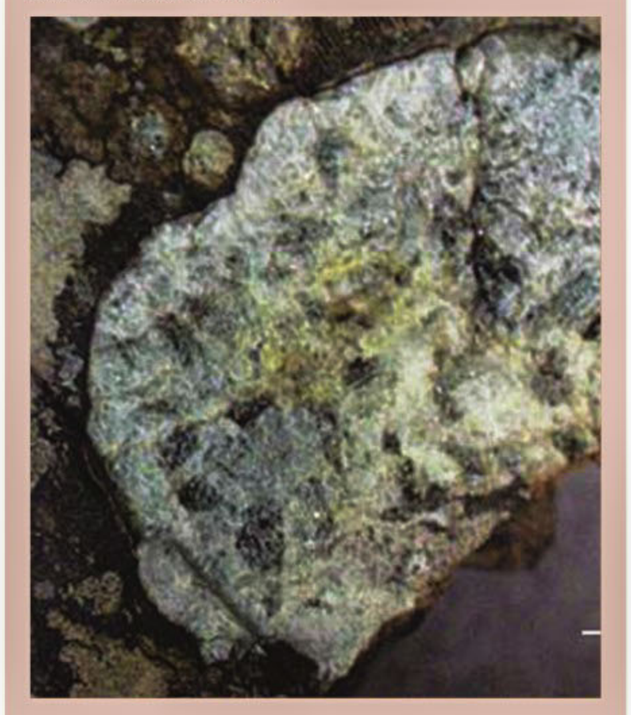
Two meteorites previously analyzed for their lead-isotope ratio suggested the first solar system solids formed 4,567.1 million to 4,567.6 million years ago. But these ages were inconsistent with other radioactive "clocks" in the same rocks, such as one based on the decay of an aluminum isotope to magnesium.

The uranium-lead decay age is consistent with other clocks in the new meteorite. The rock probably went through less heating and bombardment when it was part of an asteroid than the previously studied meteorites did, the authors say, so it experienced less chemical change.

The softball-sized meteorite was found in Morocco in 2004 and weighs a little over three pounds.

"It's like crime-scene investigation four and a half billion years after the scene is vacated," says astrophysicist Alan Boss of the Carnegie Institution for Science in Washington, D.C. "We're coming toward more of a cohesive picture of how things happened."

Sources: Science News



A pocket of calcium- and aluminum-rich material (light area) in a meteorite may be the remains of some of the first solids that formed in the solar system.

Lakes of Uxul

Mayan reservoirs discovered

Two artificial lakes, each capable of holding the water of 10 Olympic-size pools, were discovered in ancient Mayan ruins, archaeologists announced.

An analysis of the so-called "aguadas" revealed the ancient Mayans lined these huge reservoirs of drinking water with ceramic shards, similar to outdoor pools today.

The lakes would have held enough water to support a population of 2,000 living in the Mayan city of Uxul during the three-month dry season, the researchers say.

"We found that the bottom, which is at a depth of 2 meters [6.6 feet], was covered with ceramic shards probably from plates practically without any gaps," said Nicolaus Seefeld, a member of the German-Mexican archaeological team that made the discovery.

Source: Live Science

Archaeologists uncover the reservoir's floor B in the ruins of the ancient Mayan city Uxul.

DO YOU KNOW?

What is a seed crystal?

Seed crystals are tiny single crystals made to dissolve in a solution (or melt) from which larger crystals are drawn either by precipitation, centrifuging or drawing up from a melt. Seeds have the same chemical composition and crystalline structure as that of the larger crystal. Large crystals are grown on a preferred geometer (normally the most densely packed) plane of the seed. Such seeding is a common practice in semi-conductor industries and making artificial single crystal gemstones like silicon, germanium, sapphire, diamond, zirconia, etc.