



BREEZE OF PERFECTION

EPIGENETICS

Changing gene's expression

MD. RIAJUL HOSSAIN

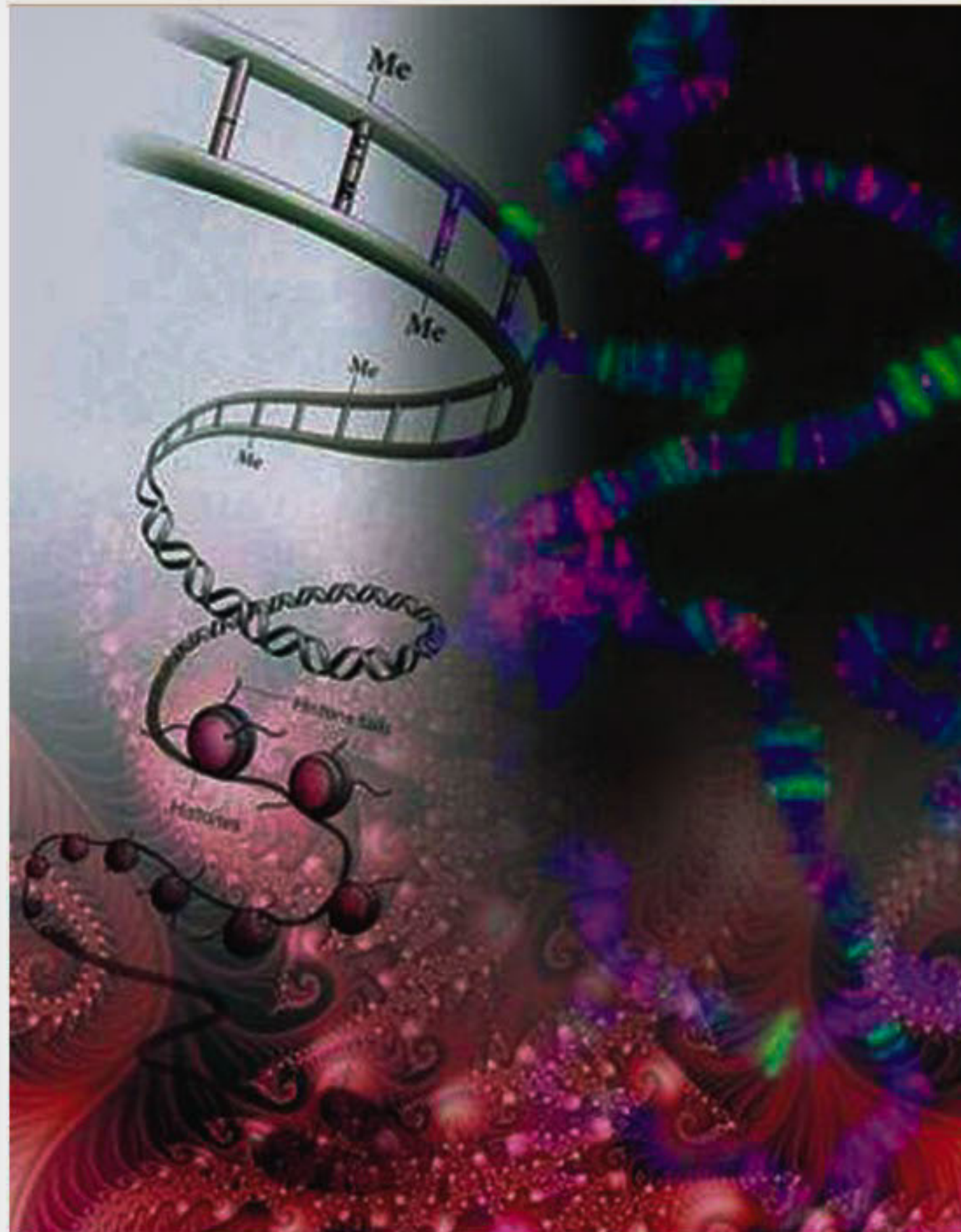
SUPPOSE, you are a poet writing or thinking of a poem sitting on a boat in a river and your genes are helping you to do so. But is this everything? The answer is no. Some experience may have been imprinted into some of your genes helping to boost your imagination, creating a simulation of an experience that might have been experienced by your great grandfather. Your great grandfather might have had an experience of similar type, in a similar river, on a similar boat, and had probably created similar imagination. This is nothing but epigenetics. Epigenetics is the study of the interaction of genes, experience, and environment in the expression of a trait.

It is the change in the expression of a gene without changing its base sequence. Methylation, which is the addition of methyl group in the regulatory regions of a gene, does the trick, alters the gene expression, gives an experience that has never been experienced by someone and this can be transmitted to the next generation to give that experience. "Nutrition isn't a fleeting affair," said Jirtle, a life scientist. "We are, quite literally, what we eat as well as what our parents and even grandparents ate." Duke scientists

explain methylation as putting gum on a light switch. The switch is okay, but the gum has blocked its function.

The environment we grow up in is as important as our DNA in determining the person we ultimately become. Diet, life style and environment may act as the player in this variable expression of the genes. A team of scientists in Switzerland by experimenting on mice found the involvement of a family of genes in the brain to be helpful to cope with stress conditions. Depending on the level of expression, some people are more susceptible to stress conditions, such as anxiety and depression, than others. One of the scientists in this research group states "It's a way for a cell to have a sort of memory", while describing what epigenetic alterations are. So, by altering epigenetic marker later in life, maternal programming can be changed or reversed by methyl supplementation. A study in 2005 revealed this phenomenon in the journal of neuroscience. Altered methylation patterns are observed changing human cognition and behavior.

Indeed, epigenetic research can offer a lot for us. DNA methylation, the process of epigenesis, can permanently turn genes of an organism on or off for an entire lifetime. The University of Utah Genetic Science Learning Center highlighted some



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study results of how changes in epigenetic tags affect behavior, and how behavior can change epigenetic tags. People who commit suicide have less-active ribosomal RNA genes than people who die of other causes. Child abuse is an environmental factor that leaves an epigenetic mark on the brain. CBP is a protein that is important for activating genes involved in learning and with memory.

The gene for REELIN protein has less methyl, and hence is more active than normal one in schizophrenic brains. Flowering of plants and cancer progression can be controlled by epigenetic mechanisms. Methyl groups can be obtained through diet incorporated into folate and methionine pathways and eventually the low dietary levels of folate and methionine can have serious consequences such as neural deformities, cancer progression and heart diseases.

So, a combination of nature and nurture seems to be effective in maintaining appropriate and beneficial epigenetic regulation. In Duke University health news they state, "Epigenetics means what we eat, how we live and love, alters how our genes behave". Epigenetics is and will be a fascinating research area in biological science in the days to come.

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Growing perfect icicle



Growing a smooth cone of ice requires pure water and a breeze, while other conditions create bent or lumpy pieces of ice like these

A team of Canadian iciclogists has put to rest the notion that one frozen cone of drips is exactly the same as the next. By growing lots of icicles in controlled laboratory conditions, the scientists have uncovered evidence that runs counter to an earlier theory saying that all icicles should, by and large, assume the same uniform, platonic icicle shape. They posted their observations online August 11 at arXiv.org, with a supplementary series of videos on YouTube.

Physicists Stephen Morris and Antony Szu-Han Chen of the University of Toronto set out to test the existing theory's prediction that most icicles should assume a conical shape. Break off one of these perfect icicles anywhere along its length, and the fragment will be the exact same shape as the whole thing.

"As far as we know, no one has really systematically studied the shape of drips and how they grow," Morris says. "Nobody has really tried to fill in the physics of how the shape emerges."

Source: Science News



FREEZING AGE



MAMMALIAN CROC



CLIMATE FOSSIL?

Perpetuating your beauty

MALIHA AFRIN

HUMAN body is used to grow and change since the time of its birth. In adolescence, the body starts to grow fast but after twenty the rate of growth falls. But the process continues even after the body becomes fully grown up. Human body is composed of different kinds of cells. Some of these cells are always being replaced by newer cells. New cells slowly take the place of the older cells in the body. Through aging, the body loses its capability to produce newer cells. So after a certain age people get old.

But using the gift of science, now people can freeze their age for a while. The obsession for beauty is a common among all. Perpetuating youthful skin condition is the way of achieving it. When body ages, the connective tissues of skin become weaker and wrinkles appear. In show-business, people always have to keep their face tender and fresh. For glamour and fame generally the show-business people are the main user of cosmetic treatments. Some new cosmetic treatments are available now which are very simple for its less painful non-surgical process. For cosmetic treatments now Botulinum toxin injection is effective to get rid of wrinkles. Botulinum toxin is a neurotoxic protein produced by the bacteria Clostridium botulinum. Botulinum toxin is being used commercially under the brand names Botox, BTXA, Myoblock, Neuroblock and Xeomin. Botulinum toxin injections can be used in the affected part of the face muscle, where wrinkles are prominent. In cosmetic treatment 'Botox' injection contains a small dose of Botulinum toxin which is used to prevent formation of wrinkles in the facial muscles. After the 'Botox' treatment, the wrinkle disappears giving the user younger and tender look. Tenderness of the facial skin lasts for about 6 months after which it needs to be treated with 'Botox' again. However, excess doses are harmful for human body.

The writer is a student of Home Economics College Dhaka



Jurassic crocodile

OBAIDUR RAHMAN

IN an interesting turn of event in the field of paleontology, scientists very recently discovered the fossils of, what they are referring to as, an ancient crocodile with mammal-like teeth! Discovered in the Rukwa Rift Basin, South-Western Tanzania, which's details have been published in the August 5 issue of the journal Nature, paleontologists believe that this newly discovered species, named Pakasuchus Kapilimai, lived between 65 and 144 millions years ago during the Cretaceous period and in the region what is now known as Sub-Saharan Africa. Traditionally what is understood about crocodiles is that, all species of such kind surviving today look, as well as behave in similar fashion. That is, they live mostly in water, ambush their preys of various kinds and eventually swallow it either whole or in sizable chunks. But the discovery of the fossil of this relatively lanky, cat-sized animal with skinny legs, dog-like nose along and mammal-like teeth features only supports a growing consent that crocodiles, as species, were once far more diverse than they are today. It must be mentioned here that the fossilized remains clearly indicate that Pakasuchus (even though at only 50 centimeters or 20 inches in length) has many trademark features that clearly categorizes it as a crocodylian. But its land-based lifestyle on the African floodplains far removed from its aquatic descendants and preying on dragon flies, lizards as well as other animals only point out its distinct mammal-like characteristics which make it stand-out one in the history of crocodile community. According to Patrick O' Connor, lead author and associate professor of anatomy, Ohio College of Osteopathic Medicine, "If you only looked at the teeth, you wouldn't think this was a crocodile. You would wonder what kind of strange mammal or mammal-like reptile it is". It is him who named the species after Kiswahili word for "cat", the Greek word for "crocodile" and in honor of the late Prof. Saidi Kapilima, who was an important member of the expedition which was funded by the U.S. National Science



When crocodiles tried to be mammals: the Cretaceous crocodylian Pakasuchus kapilimai, complete with complex, mammal-like dentition and an unusually flexible spine, hunts dragonflies on an ancient Tanzanian floodplain

Foundation and the National Geographic Society.

Back in 2008, a complete skeleton of Pakasuchus was first found and the most complete specimen included a nearly complete skull. This fossil skull, which is very small as Dr. O'Connor neatly puts it, "its head would fit in the palm of your hand", was originally encased in hard, red sandstone, and the jaws were happen to be very tightly closed. This prompted the researchers to take the aid of a scanning technology called X-ray computed tomography which created detailed digital images of the Pakasuchus teeth, skull and the entire skeleton to an accurate of 45 micrometers (millionths of a meter). This revealed to the scientists, first and foremost, that Pakasuchus belonged to an extinct crocodile group called notosuchian crocodyliform. The study also discovered several other somewhat uncanny features of that species as well, most notably its teeth. It is known that all modern crocs have a snout full of consistently conical teeth which allow them

snap at their prey with powerful bite before eventually swallowing them whole. But it was found that Pakasuchus had a diverse set of "chompers" including piercing canines and grinding molars along with shearing teeth like those of cats and other meat-eating mammals. The scans also revealed that this ancient creature had only 13 teeth, far fewer than its modern descendants, which were very diverse and its molars fit together extremely well enough to grind and shear food with the aid of a mobile jaw. And these traits are standard features of mammal physiology and very contradictory to the traditional crocodile structure.

Other unconventional features of Pakasuchus include its long slender legs and nostrils on the front end of its snout (indicating it primarily lived on land) whereas modern crocodiles which hunt in water have short legs and nostrils are on the top of their snout.

The contributor is a freelance science writer.

Ancient climate rebuilt

An international team of scientists including Mark Williams and Jan Zalasiewicz of the Geology Department of the University of Leicester, and led by Dr. Thijs Vandenbroucke, formerly of Leicester and now at the University of Lille 1 (France), has reconstructed the Earth's climate belts of the late Ordovician Period, between 460 and 445 million years ago.

The findings have been published online in the Proceedings of the National Academy of Sciences -- and show that these ancient climate belts were surprisingly like those of the present.

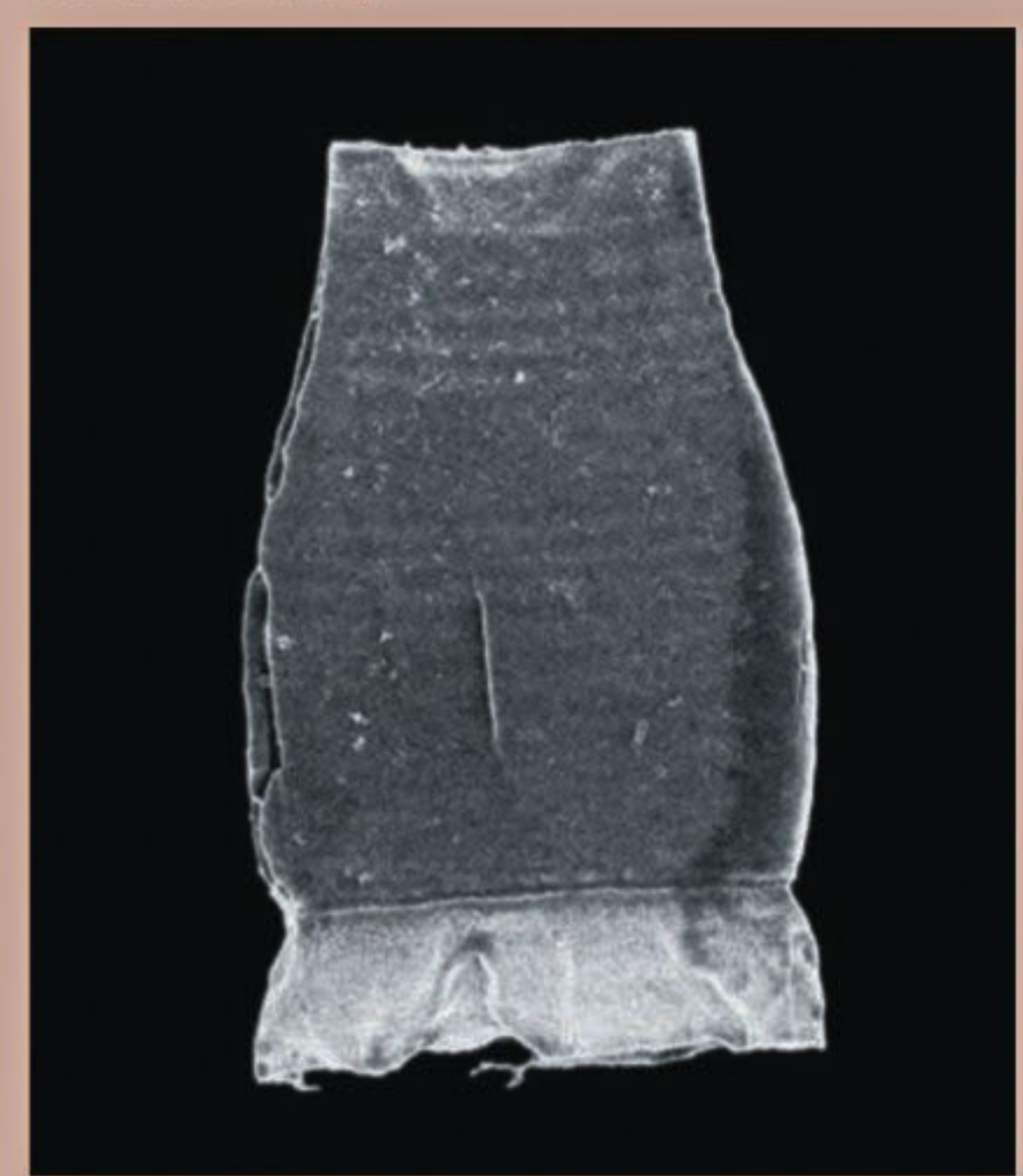
The researchers state: "The world of the ancient past had been thought by scientists to differ from ours in many respects, including having carbon dioxide levels much higher -- over twenty times as high -- than those of the present. However, it is very hard to deduce carbon dioxide levels with any accuracy from such ancient rocks, and it was known that there was a paradox, for the late Ordovician was known to include a brief, intense glaciation -- something difficult to envisage in a world with high levels of greenhouse gases."

The team of scientists looked at the global distribution of common, but mysterious fossils called chitinozoans -- probably the egg-cases of extinct planktonic animals -- before and during this Ordovician glaciation. They found a pattern that revealed the position of ancient climate belts, including such features as the polar front, which separates cold polar waters from more temperate ones at lower latitudes. The position of these climate belts changed as the Earth entered the Ordovician glaciation -- but in a pattern very similar to that which happened in oceans much more recently, as they adjusted to the glacial and interglacial phases of our current (and ongoing) Ice Age.

This 'modern-looking' pattern suggests that those ancient carbon dioxide levels could not have been as high as previously thought, but were more modest, at about five times current levels (they would have had to be somewhat higher than today's, because the sun in those far-off times shone less brightly).

"These ancient, but modern-looking oceans emphasise the stability of Earth's atmosphere and climate through deep time -- and show the current man-made rise in greenhouse gas levels to be an even more striking phenomenon than was thought," the researchers conclude.

Source: Science Daily



Microfossils of marine zooplankton



CORAL SHEDS LIGHT



DO YOU KNOW?

Corals in cancer cure

The vividly fluorescent cluster was found in waters off Lord Howe Island, 600 kilometres (400 miles) east of the Australian mainland, with some displaying rich reds that were difficult to find and in high demand for studies of cancer cells, researcher Anya Salih said.

"The underwater buttresses and caverns are densely inhabited by hundreds of corals, all deeply pigmented by the most intense green, blue and many with red fluorescence," she said.

Salih said she had never seen such an abundance of highly red fluorescent corals, nor such an extraordinarily vibrant site.

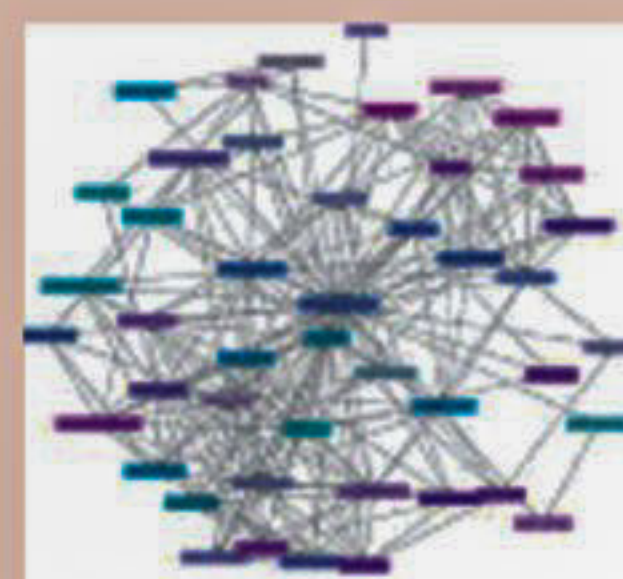
"We are using these pigments to light up the workings of living cells and to study what goes wrong in cancer cells," said Salih, from the University of Western Sydney.

The gene producing the particular pigment -- red, green, blue or yellow -- would be attached to a molecule in both healthy and cancerous cells, and would enable scientists to track cell growth and change using a special fluorescent-sensitive laser microscope.

Source: AFP



What is a banana problem?



The term comes from the story of the little girl who said, "I know how to spell 'banana', I just don't know when to stop". The banana problem basically means not knowing where or when to stop. It is usually used in computer programming when an algorithm with improper termination commands leads to repetition. It also applies to a web design, which is subjected to feature creep or the rapid expansion of features which complicate the simple design.

Source: AFP