

Fresh Amazon wonders



Ranitomeya amazonica, a newly discovered poison dart frog

OBAIDUR RAHMAN

DESPITE rapid deterioration of the rainforests across the globe, it is a relief to learn that the Amazon Rainforest, defying all the odds, is still thriving. According to a recent study finding by the global conservation organization World Wildlife Fund (WWF), at least 1,200 new species have been discovered in the Amazon ecosystem at an average rate of 1 in every 3 days during a decade-long study between the year 1999 and 2009. This is in fact a greater number of species than the combined total of new species found over a decade in other biologically diverse areas such as the Congo Basin, Borneo and the Eastern Himalayas.

Presented to the delegates from 193 countries in the last month's UN Convention on Biodiversity in Nagoya, Japan, the WWF's 58-page

report titled "Amazon Alive: A decade of Discoveries 1999-2009 illustrated the details of the 1,200 species that were discovered within the study's time-frame. Experts believe that the number could have been higher had insects been included in the research. This significant study catalogued the discoveries of entirely new species of 39 mammals, 55 reptiles (28 snakes and 27 lizards), 500 spiders, 216 amphibians, 16 birds, 257 fishes and 637 plants. And amongst the new mammals, the finding includes that of 7 monkeys, a pink river dolphin, 2 porcupines, 8 mice, 9 bats, 6 opossums, 5 rats, a guinea pig, 13-foot-long anaconda, a bald-headed, rainbow-hued parrot and a tiny, blind, crimson catfish.

Conservationists are hoping that the number will grow in the years to come. It must be mentioned here that the Amazon forest, lovingly called the Amazonia is a vast region



Mico acariensi, the Rio Acari marmoset

measuring more than 2.5 million square miles (6.7 million sq km) of 600 different types of land and freshwater habitats extending into Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname and French Guiana.

Amongst all the new species that have been discovered in this study by the WWF, quite a few of them stands out. And among those stellar cast includes, the Amazon River dolphin (Inia geoffrensis) or pink river dol-

phin, the Rio Acari marmoset or Mico acariensi (one of the seven new monkeys that was discovered in 2000), the Ranitomeya amazonia or the poison dart frog of Alpuhayo Mishana National Reserve, Peru, with a red and yellow pattern that looks like flames on its head, and legs patterned like water drops, the 13-foot long Eunectes beniensis was snake or the first new species of anaconda identified in more than 70 years. Others include, a member of

the true parrot family, the Pytilia aurantiocephala, found only in the Lower Madeira and Upper Tapajos rivers in Brazil, the "goliath" catfish, measuring nearly 1.5 meters long and weighing 32 kg which normally exist on a diet of other fishes even though some of them have been caught with parts of monkeys in their stomachs! Amongst the 55 reptile species discovered, there includes 2 members of Elapidae, the most venomous snake family of the world. Amazon is also home to at least 40,000 plant species and this recent WWF study have discovered 637 new plant species which includes sunflowers, ivy, lilies, variety of pineapples and a custard apple.

Even though Amazon mothers countless species of wildlife however it's very existence is also under great threat as well. During the last 50 years, 17% of Amazonia, which is the world's largest rainforest, has been destroyed due to intense logging and clearing of forest for agricultural purposes. An area twice the size of Spain! Aside from sheltering outstanding varieties of life on Earth, the great Amazonia also absorbs 90-140 billion tons of carbon. WWF explains that even if a portion of this carbon is released into the atmosphere through further forest loss and land use changes, then it would accelerate global warming and end up devastating consequences on life on Earth. According to Francisco Ruiz, the leader of WWF's Living Amazon Initiative, "Urgent and immediate action is needed if we are to avoid this frightening scenario. The fate of the Amazon - and of its species whether known or yet to be discovered - depends on a significant shift in the current way development is embraced by all Amazon countries."

The contributor is a freelance science writer.

SEEING DARKNESS

Dark side of Milky Way



Fermi Gamma-ray Space Telescope may have spotted signs of the annihilation of dark matter particles at the core of the Milky Way, as shown here in an artist's illustration

FOR years, most claims that scientists had found evidence of dark matter, the ghostly material believed to account for more than 80 percent of the universe's mass, have seemed to dissolve into thin air. But a new claim of dark matter detection may have more than a dollop of cosmic credibility, scientists say.

Physicists Dan Hooper of the Fermi National Accelerator Laboratory in Batavia, Ill., and the University of Chicago and Lisa Goodenough of New York University base their findings, posted October 15 at arXiv.org, on an unexplained excess of energetic gamma rays emitted from the core of the galaxy. The gamma rays were recorded over the past two years with an instrument aboard NASA's Fermi Gamma-ray Space Telescope, launched in 2008.

Dark matter, like ordinary atomic matter, is expected to concentrate at the galaxy's center. That makes the Milky Way's crowded core one of the most promising places to look for signs of the dark stuff, theorists agree. It's also one of the most complex places to search, because the core is riddled with a variety of ordinary but poorly understood sources of gamma ray emission, notes Fermi scientist Steve Ritz of the University of California, Santa Cruz.

Hooper and Goodenough analyzed gamma rays recorded by Fermi from the innermost 175 light-years of the galaxy and found a sharply rising gamma-ray signal that peaked at energies between 2 billion and 4 billion electron volts, about a billion times the energy of visible light. Hooper asserts that the location and energy of the gamma rays can't easily be explained by run-of-the-mill sources, such as ultradense, rapidly spinning stars called pulsars.

"In our paper, we discussed a number of astrophysical possibilities for the origin of the signal, including a population of pulsars, cosmic ray interactions and emission from our galaxy's supermassive black hole," notes Hooper. "And in the end, no combination of any astrophysical sources could give us the signal we're seeing," he adds. "Eventually we just got fed up and concluded there doesn't seem to be a way to explain the signal except for one thing we tried dark matter and it fit beautifully without any special bells or whistles."

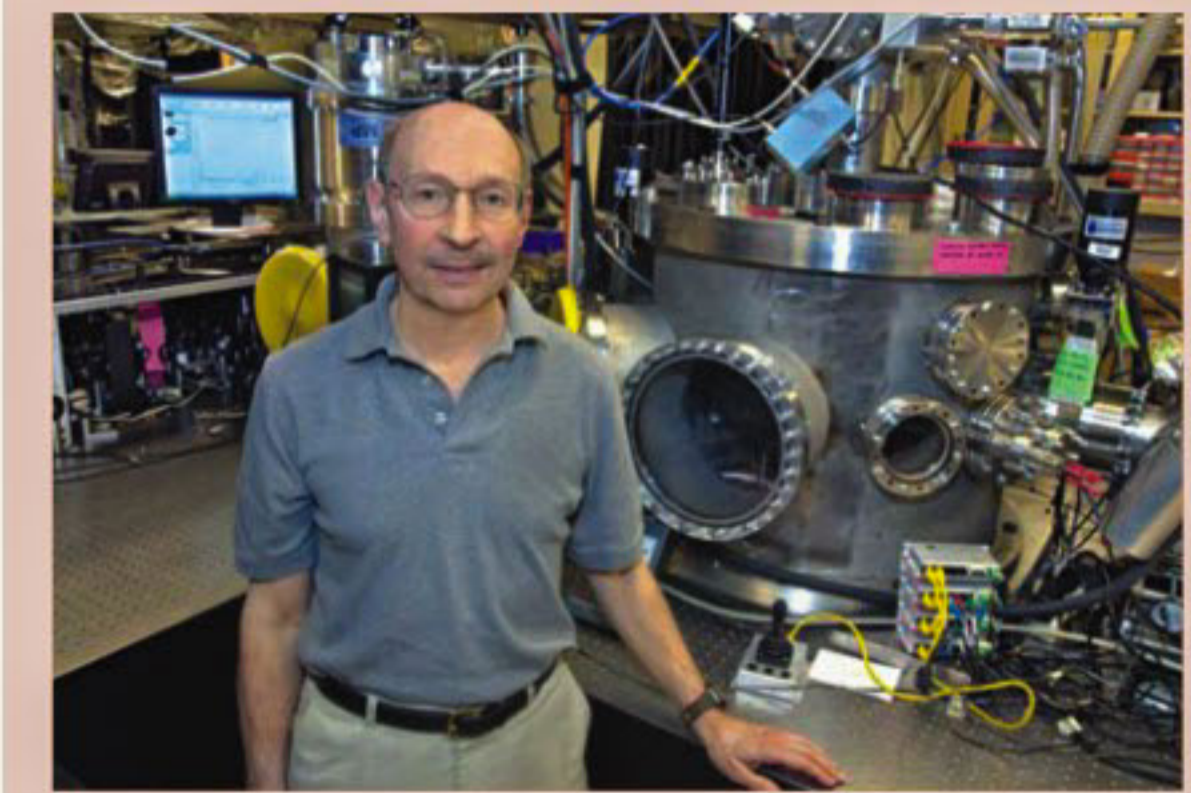
Source: Science News

TIME SHREDDING

Tracking smallest particles

SMALL, smaller, smallest. Fast, faster, fastest. These appear to be the watchwords for today's technology. Moreover, they guide research for tomorrow's technology and University of California, Berkeley, chemist and physicist Stephen Leone helps lead the way. He works with the smallest and fastest particles ever observed. For the first time, he and an international team of scientists used ultrashort flashes of laser light to directly observe an atom's outer electrons. Through a process called attosecond absorption spectroscopy, his team was able to time, with great precision, the repetitive variations between electrons that simultaneously produce quantum states. The outermost electrons of an atom are crucial for deciding how an atom will react chemically with other atoms. Attosecond transient absorption will, in Leone's words, "allow us to unravel processes within and among atoms, molecules and crystals on the electronic timescale" processes that previously could only be hinted at with studies.

Source: Live Science



Stephen Leone, the chemist of the microworld, in his laser laboratory at Lawrence Berkeley National Laboratory

The camouflage gene

RESearchers led by Vanderbilt's Roger Cone, Ph.D., have discovered a new member of a gene family that has powerful influences on pigmentation and the regulation of body weight.

The gene is the third member of the agouti family. Two agouti genes have been identified previously in humans. One helps determine skin and hair color, and the other may play an important role in obesity and diabetes.

The new gene, called agrp2, has been found exclusively in bony fish, including zebrafish, trout and salmon. The protein it encodes enables fish to change color dramatically to match their surroundings, the researchers report this week in the early edition of the Proceedings of the National Academy of Sciences (PNAS).

"When my graduate student, Youngsup Song, discovered a third agouti protein in the fish pineal gland, an organ that regulates daily rhythms in response to light, we initially thought we had found the pathway that regulates hunger diurnally," said Cone, chair of the Department of Molecular Physiology & Biophysics and director of the Vanderbilt Institute for Obesity and Metabolism.

"That is the mechanism that makes you hungry during the day, but not at night," he continued. "However, Chao Zhang, a graduate student who followed up the study, ultimately discovered that this agouti protein ... is involved in the rapid pigment changes that allow fish to adapt to their environment."

This phenomenon, called background adaptation, also has been observed in mammals. The coat of the arctic hare, for example, turns from brown in summer to white camouflage against the winter snow.



Like other bony fish, the peacock flounder can change the color and pattern of its skin to blend into the sea floor

In contrast to mammals that have to grow a new coat to adapt to a changing environment, fish, amphibians and reptiles can change their skin color in a matter of minutes.

The first agouti gene, which produces the striped "agouti" pattern in many mammals, was discovered in 1993. The same year, Cone and his colleagues at Oregon Health Sciences University in Portland reported the discovery of the gene that encoded the melanocortin-1 receptor, a key player in the pigmentation story.

They demonstrated that the agouti protein prevented the melanocortin-1 receptor in melanocytes (pigment cells) in the skin from switching on production of black-brown pigment, and instead shifted the pigment to yellow-red hues.

The second agouti gene encodes agouti-related protein (AgRP), which

blocks a melanocortin receptor in the brain. It prevents the melanocortin-4 receptor from inhibiting food intake, and thus stimulates eating.

In the current paper, Cone's group reports that the newly discovered protein, AgRP2, regulates expression of the prohormone genes pmch and pmchl, precursors to melanin-concentrating hormone, which has a pigment-lightening effect.

"Together, the versatile agouti proteins and melanocortin receptors are responsible for regulation of body weight, the banded patterns of mammalian coats, and even red hair in most people," Cone said. The current work shows that agouti proteins are also involved in the camouflage mechanisms used in thousands of fish species.

Source: Science Daily.



SPOOKY!

Ghosts of White House

The Washington, D.C., home of America's presidents has surely seen untold tragedy through the centuries, from being burned down in 1814 by British troops to several attempted (and accomplished) assassinations. Among the White House's spooky stories include the appearance of Abraham Lincoln's ghost. Lincoln's widow, Mary Todd, dabbled in the occult and held séances in the White House. Other reputed ghosts include Andrew Jackson, Dolley Madison, and Abigail Adams, though they are rarely seen today.

Source: Live Science



DID YOU KNOW?

What was Sphinx's riddle that Oedipus solved?



Egyptian Sphinx, Louvre

fours; at noon, in his prime, he walks on two feet; and, when the darkness of old age comes over him, he uses a stick for better support as a third foot.

What animal walks on four legs in the morning, on two at noon, and on three at night?

Oedipus's answer:

Man, for in the morning, the infancy of his life, he creeps on all fours; at noon, in his prime, he walks on two feet; and, when the darkness of old age comes over him, he uses a stick for better support as a third foot.



LAB LEVIATHAM

Giant pumpkin

LINUS was right after all. Not only does the Great Pumpkin exist, but scientists have figured out how he manages to get so big.

In a sort of self-perpetuating cycle, the bigger a gourd gets the more physical stress it experiences thus triggering giant pumpkins to grow even more.

"Their weight generates tension, which pulls cells apart and accelerates growth," says David Hu, a mechanical engineer at the Georgia Institute of Technology in Atlanta whose team has submitted a paper to a peer-reviewed journal.

Such research doesn't just illuminate the story behind record-setting pumpkins, like the nearly 1,811-pound behemoth recognized this month by Guinness World Records. The work also addresses larger questions of plant development, such as how tissues cope under stress, Hu says. All giant pumpkins are grown from a single strain, the Atlantic Giant seed, which has a longer growing season than normal pumpkins. The fruits start out round, but once they get to about 220 pounds they begin to flatten under their own weight, eventually resembling a giant deflated sack.

Wondering how the monsters got so large without splitting, Hu's group squashed regular-sized gourds in the lab see how much stress they could take before rupturing. The researchers then created a mathematical model of how the fruits could accommodate the stress.

The model predictions matched observations of giant pumpkin dimensions sent in by 50 farmers from around the country. Hu says that plastic, or irreversible, deformation allows the fruit to distribute stresses so it can grow sometimes adding 50 pounds a day without breaking.

The New York Botanical Garden, where the world's biggest pumpkin will be carved this weekend, says that a 2,000-pound pumpkin could be grown within the next few years.

Source: Science News



Chris Stevens' record-breaking pumpkin weighs 1,810.5 pounds, shown here with New York Botanical Garden staff