The Daily Star

SCIENCE & LIFE

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COSMIC NEIGHBOURHOOD

Milky Way fell together!

A preliminary analysis of elderly stars in the Milky Way appears to strike a blow against the prevailing theory of galaxy formation. The study suggests that several large and seemingly disparate chunks of the Milky Way galaxy formed at the same time from the collapse of a single blob of gas and dust.

That's in direct contrast to the leading galaxy-formation scenario, which holds that the Milky Way and other galaxies began small and grew bit by bit for the most part, gravitationally acquiring intergalactic gas and dust and merging with galaxies in their immediate neighborhood.

The new evidence, which astronomers emphasize is only tentative, comes from a new, ongoing study of a familiar globular cluster a dense, elderly grouping of more than a million Milky Way stars collectively known as 47 Tucanae. Earlier this year, Harvey Richer of the University of British Columbia in Canada and his colleagues began examining 47 Tucanae with two Hubble Space Telescope cameras the newly installed Wide Field Camera 3 and the Advanced Camera for Surveys, which stopped working early in 2007 but was revived by astronauts during the servicing mission last year.

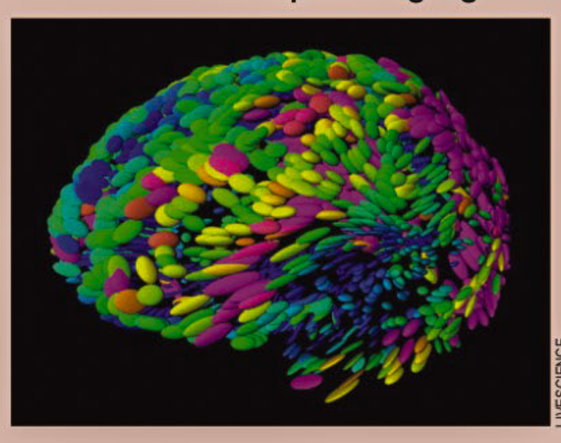
The cluster lies near but not inside the Milky Way's bulge, a massive concentration of stars that surrounds the galaxy's core. But because the cluster shares several properties with the bulge, such as chemical composition and orbital motion, astronomers consider the age of 47 Tucanae a good proxy for that of the bulge.

An analysis of the Hubble portrait, which includes one of the deepest infrared views ever recorded, reveals that 47 Tucanae, and therefore the Milky Way's bulge, formed between 11 billion and 12 billion years ago, Richer reported May 4 at a symposium on stellar evolution at the Space Telescope Science Institute in Baltimore. He said previous age estimates that did not use the new Hubble camera and put the cluster at a more youthful 9 billion years old are simply not correct.

Source: Science News

New infrared images of the Milky Way globular cluster 47 Tucanae (this one recorded at a wavelength of 1.6 micrometers), reveal that both the cluster and the Milky Way's central bulge are 11 billion to 12 billion years old and may have formed simultaneously with the Milky Way's halo.

Brains never stop changing



LIVESCIENCE

UCLA scientists created these template brain images that can be compared with brains of test subjects to show differences related to aging and disease, for instance. The variation in color and shape of the spheres that make up the brain show the magnitude and direction of these differences. Credit: Paul Thompson and Arthur Toga, UCLA

Source: LiveScience

Hawking's time machine

Stephen Hawking

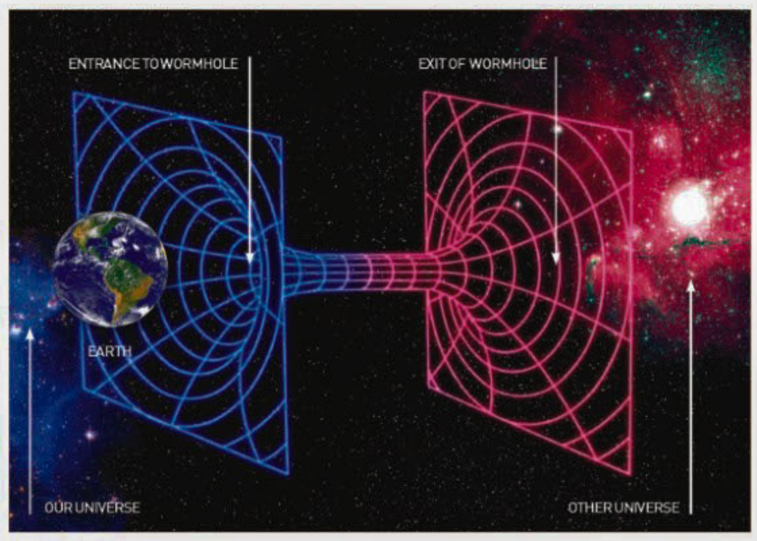
OBAIDUR RAHMAN

There has always been a great deal of interest about time-travel. It has been the centre of many science fictions. Frankly, who wouldn't want to travel through time and aspire to a part of this surreal experience? But as of now, it seems the idea of time machine is still a dream. But according to eminent astrophysicist Stephen Hawking, the notion of time-travel is in fact, quite realistic and he strongly believes that humans would be able to travel millions of years into the future and repopulate their devastated planet. In an article earlier this month, published in the British tabloid, Daily Mail, the noted cosmologist outlined theoretically his ideas on time travel. It may be mentioned here that, this is his second surprise, after expressing his belief in the existence of extraterrestrials.

To put it simply, time travel means, moving between different points in time. The laws of physics accommodate the idea of time travel through what is known as 'wormhole'. According to Dr. Hawking, a wormhole is a "Tiny tunnels or shortcut through space and time that constantly form, disappear and reform within the quantum world. And it actually links two separate places and points of time". A wormhole, which is also permitted by the Einstein's field equations of general relativity, is unfortunately too small (just a billion-trillion-trillionth of a centimetre) for people to pass through. However, scientists believe that it may be possible to catch one such wormhole and make it big enough for people or spaceships to enter and travel through time! But Prof. Hawking also believes that this applies only to forward movement in time. On the impossibility of backward time travel, the Professor explained that it would violate the law of causality, which says that effect must follow cause. But in the case of travel backwards in time, cause will have to follow the effect! He explains, if you go back in time and destroy the time machine, then how is it that you travelled to the past in the first place? The author of the best seller, "A brief History of Time", also believes that radiation feedback might collapse any wormhole even if scientists manage to expand it to a usable size, making them useless for actual travel. But in that case, what is the other option? In his own words, "Time flows like a river and it seems as if each of us is carried relentlessly along by time's current. But time is like a river in another way. It flows at different speeds in different places and that is the key to travelling into the future". It was Einstein who first proposed the idea that there are places where time slows down and there are others where time speeds up. And it is the black hole, the region of space-time from which nothing, not even light can escape due to its intensely strong gravity, which has a dramatic effect on time, slowing it down. And Dr. Hawking strongly believes that this particular nature of a black hole makes it a natural time machine!

Another key aspect of time-travel is travelling at the speed of light. Hawking explains, "believe it or not, travelling close to the speed of light transports you to the future". Being a firm believer of time-travel, Dr. Hawking maintains that if such a mechanism were invented, a trip to the edge of the galaxy would take just 80 years! Would humans ever be able to travel through time in the future? Only time will tell.

The contributor is a freelance science writer.



A wormhole is a theoretical 'tunnel' or shortcut, predicted by Einstein's theory of relativity, that links two places in space-time - visualised above as the contours of a 3-D map, where negative energy pulls space and time into the mouth of a tunnel, emerging in another universe.

FLIGHTLESS WING

Earliest birds didn't make a flap

The wings were willing, but the feathers were weak. Delicate, thin-shafted plumage would have made flapping difficult if not impossible for two prehistoric birds, a new analysis of fossil feathers suggests.

Their feathers probably would have buckled or snapped during strong flapping or sharp maneuvers, so the primitive birds may have been limited to gliding, says Robert Nudds, an evolutionary biologist at the University of Manchester in England. He and paleontologist Gareth Dyke of University College Dublin report an engineering analysis of feathers from the ancient birds Archaeopteryx and Confuciusornis in the May 14 Science.

Nudds and Dyke used a simple formula often applied to bridges and beams to estimate the load-carrying capacities of the birds' feathers, based on fossil remains. The team also looked at the feathers of four modern birds with a variety of feather and flight types a pigeon, a gull, an albatross and a vulture.

Even though the feathers of Archaeopteryx and Confuciusornis were about the same size as those of a modern-day pigeon, they had smaller diameter shafts that rendered them much weaker.

"Even if these feathers had solid shafts, they're not very impressive," says Lawrence Witmer, a paleontologist at Ohio University in Athens who was not part of the new study. "They're so flimsy that they couldn't have supported much weight."

In straight and level flight, the lift generated by a bird's wings, tail and other flight surfaces must support the bird's weight. But during extreme maneuvers such as high-speed turns analogous to a fighter pilot "pulling g's" the forces on a bird's feathers are much higher, Nudds says. In those cases, birds rely on their bones and feathers having a "margin of safety" that makes them several times stronger than needed for straight and level flight.

In modern birds, feathers typically fail when forces acting perpendicular to the central shaft cause that load-bearing structure to buckle, Nudds says. To prevent this, lift-generating feathers in present-day birds are many times stronger than necessary for level flight, from a factor of around six in vultures to a factor of more than 13 in gulls. But in the ancient birds, margins were much smaller: 2.9 for Confuciusornis and four for Archaeopteryx. If these birds had feathers with partially hollow shafts similar to those of modern feathers, these margins could have been even lower, the team argues.

The ancient birds may have simply glided from one branch to another, the researchers say, or "parachuted" from high spots to low by splaying their wings and slowing their descent.

Other recent studies of Archaeopteryx a fossil iconic of the transition from dinosaurs to birds have also cast doubt on the creature's flying ability.

Research suggests, for example, that although Archaeopteryx had large enough feathers for flight, it didn't have the right bone structure to take the large upstroke required for efficiently powered flight, says Richard Prum, an ornithologist at Yale University.

"Not only is the shoulder joint oriented wrong for powered flight in Archaeopteryx and Confuciusornis, but the new study shows that even the feathers aren't built right for it," says Phil Senter, a paleontologist at Fayetteville State University in North Carolina. "I've thought for some time that the feathers of nonavian dinosaurs and [primitive] birds were primarily display structures, and the lack of powered flying ability is consistent with that idea," he notes.

Science News

The feathers of Archaeopteryx (shown in an artist's reconstruction) and Confuciusornis probably weren't strong enough to withstand the stresses of flapping.

LAST JOURNEY

Shuttle Atlantis arrives at space station

Atlantis arrived at the International Space Station on Sunday for what could be its last visit, delivering fresh batteries and other equipment to help keep the outpost running long after the shuttle program ends.

For now, Atlantis' dance card is empty after this flight, and NASA has just two missions remaining. But there's a push to keep the space shuttles flying until next June and to give Atlantis one last hurrah.

Shuttle commander Kenneth Ham was visibly moved as he floated into the space station. He grabbed two of the station astronauts in a tight embrace.

"It's bigger than we remember and, speaking for myself, better than I remember," Ham said. "I love this place."

The rendezvous by Atlantis was accompanied by considerably more picture-taking than usual, to make up for a curtailed safety survey the day before.

Source: AP

PERENNIAL WAR

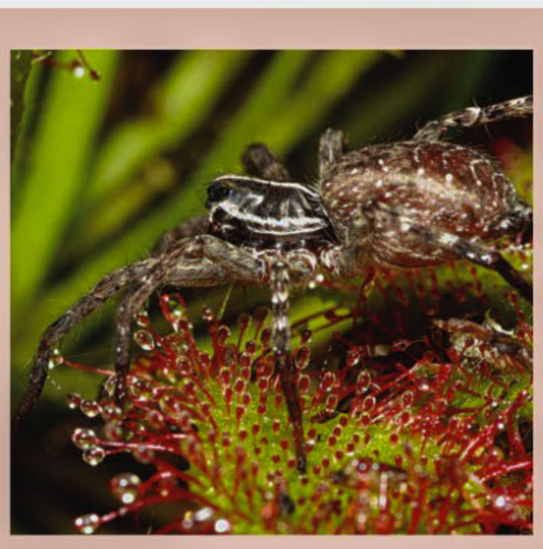
Clash of the Kingdoms

Closely related species often compete aggressively for resources. But researchers have now found a remarkable exception: a plant competing for food with an animal.

The species in question are sundews and insect-eating wolf spiders. Sundews (Drosera capillaris) cover their leaves in a sticky mucous to trap insects and consume them with digestive enzymes, whereas the spiders (Sosippus floridanus) weave dense webs. Both species live close to the ground in the damp bogs of southern Florida, and both prey on a variety of bugs, including flies, ants, crickets, and springtails. This overlap led ecologist Jason Rohr of the University of South Florida in Tampa to wonder if the two species competed for resources.

Rohr and his colleagues surveyed field sites in Florida, counting the placement and number of sundews and spiders. They also trapped insects in the area in order to estimate the resources available to both. The team observed that the spiders built larger webs when sundews were around than when they were absent, ostensibly to catch more insects.

Source: Science Now



SCIENCE QUIZ

QUIZ 1:
To whom was the first patent for a technical invention awarded?

a. Christiaan Huygens, mathematician and engineer
b. Filippo Brunelleschi, architect and engineer
c. Leonardo da Vinci, artist and inventor
d. Sir Christopher Wren, architect and scientis

QUIZ 2:
When was plywood invented?

a. 3500 BC
b. 200 AD
c. 675 AD
d. 1835 AD

Answers to last week's Quiz
Quiz 1: C
Quiz 2: C

DO YOU KNOW?

What is a Jovian planet?

Jovian planets, also known as gas giants, is a collective term for Jupiter, Saturn, Uranus and Neptune...

Jovian planets, also known as gas giants, is a collective term for Jupiter, Saturn, Uranus and Neptune. The term Jovian came from planet Jupiter, which describes the other gas giants in our solar system which are like Jupiter. These planets are surrounded by a number of moons and rings and their rotation is faster than terrestrial planets. Jovian planets have a dense core surrounded by a huge layer of gas which is made up of hydrogen and helium.

What is a super galaxy?

Clusters of galaxies are known as a super galaxy, or a super cluster...

A galaxy is a group of large number of stars in the sky which have generally the same origin of evolution, such as our Milky Way. A galaxy may contain billions of stars. A cluster of galaxies, which may have up to 10 or even more galaxies is called a local group. Clusters of galaxies are known as a super galaxy, or a super cluster. This may have up to 50 or even 1,000 galaxies. The Milky Way is a member of the Virgo super cluster.