Mammals Might Have Soared Before Birds

Mammals might have taken to the sky before birds, scientists announced.

A new order of mammals has been named based on a recently discovered fossil of a squirrel-sized Mesozoic-era animal that lived at least 130 million years ago and was capable of gliding flight, LiveScience reported.

The ancient mammal, Volaticotherium antiquus, represents a previously unknown group that bore features adapted for arboreal life. This fossil, found in Inner Mongolia, China, puts the first record of gliding flight for mammals at least 70 million years earlier than had been known, the researchers write in the Dec. 14 issue of the journal Nature.

Previously, the earliest record of flight in mammals was found in fossils of bats dating back to 51 million years ago, said lead study author, Jin Meng from the American Museum of Natural History in New York. "Of course the bats at that time already had the ability of flapping flight not just gliding, so proto-bats could have been gliders but we don't have any fossil records of that."

Telling Teeth

The specimen was found in a book-sized slab. Bones, teeth and impressions of the soft tissue were preserved. This allowed the researchers to classify this prehistoric animal.

"If you're looking for a mammal, the first thing you will look at is the teeth," Meng told LiveScience.

Mammalian teeth have developed into four sets: incisors, canines, premolars and molars. Incisors are in the front and considered cutting teeth. Canines are the sharp stabbing teeth. Premolars and molars stand behind the canines and are used for grinding food. This specimen has all those features.

"So we can tell that this is a mammal from the dental formula," Meng said. "Also, we can tell from the teeth morphology, because it's very sharp and very hook-like, that this is an insectivore mammal."

Unlike herbivores such as the flying squirrel that eats fruits, leaves, and nuts, this ancient gliding beast fed on insects.

Extinct Lineage

The fossil also preserved a large piece of the animal's skin membrane.

"We know this [was skin] because it was covered with dense hair," Meng said. "The fur or body hair is another mammalia characteristic. So by finding that, we know that this animal has this large body skin membrane that is used for gliding. And only gliding mammals have that kind of morphology."

The V. antiquus, weighing in at less than a pound, is comparable in size and shape to flying squirrels. However, the mammal is not considered a direct ancestor of these or other flying mammals.

Instead, V. antiquus provides evidence for the independent origin of flight in this now-extinct lineage of mammals, the researchers conclude.

"It's unusual to find such a unique creature," Meng said. "Establishing a new order probably only happens once, if that, in the lifetime of a lucky paleomammalogist."

Liquid Water Theory On Saturn Moon Questioned

New research casts doubt on the existence of water near the surface of a tiny Saturn moon--a finding that, if confirmed, could set back the hunt for extraterrestrial life, CNN said.

Earlier this year, the international Cassini spacecraft orbiting Saturn caused a stir when it spied what appeared to be Yellowstone-like geysers spouting from the south pole of Enceladus.

Scientists speculated the eruptions were driven by shallow pools of water lurking just below the icy surface.

In an alternative view published in Friday's issue of the journal Science, other researchers propose that buried ice clathrates--not liquid water--are responsible for releasing the towering plumes through a sudden tectonic shift in the crust that causes cracks in the ice and gas to vent.

The study doesn't address whether liquid might be present anywhere else on the moon, said lead author Susan Kieffer, a planetary scientist at the University of Illinois at Urbana-Champaign, who has studied geysers on Earth and on the moons of Jupiter and Neptune.

"We didn't go into this trying to disprove liquid water," said Kieffer, adding that in her model, "there is no liquid water required."

The alternative theory shows scientists still don't really know what causes plumes to rise from Enceladus and until that's sorted out, it's premature to send a spacecraft to search for extraterrestrial life, said Bruce Jakosky, an astrobiologist at the University of Colorado at Boulder.

Jakosky noted that if liquid water is not easily accessible on Enceladus, it doesn't bode well for life.

"This would mean that Enceladus would not be a viable place for life. It makes a big difference!" he wrote in an e-mail.

Cassini found the geysers were a mix of water vapor and ice particles containing significant amounts of carbon dioxide and trace amounts of methane. Kieffer said methane cannot completely dissolve in liquid water, but can exist in ice clathrates, lattice-like structures that trap water ice and organic particles.

Carolyn Porco, a Cassini scientist who first raised the idea of an underground water reservoir on Enceladus, said that while the new model sounds plausible, it doesn't rule out her own model or the possibility of water flowing further down. She also said the new study shouldn't deter any future missions from probing whether microbial life can exist in such an environment.

Buried ice clathrates--not liquid water--are responsible for releasing the towering plumes through a sudden tectonic shift in the crust that causes cracks in the ice and gas to vent. (NASA Photo)

"There's reason to believe that there's enough warmth on Enceladus to support liquid water," Porco said.

Enceladus, at only 300 miles wide, was a virtual unknown until Cassini imaged the jets bubbling from a warm zone in its southern polar region.

The discovery vaulted the tiny moon into an exclusive club of celestial bodies that might favor life. Scientists generally agree that Mars and Jupiter's icy moons might have--or once had--conditions conducive to life.

New Semiconductor Technology Created

American scientists report developing technology that allows the integration of dissimilar classes of semiconductor devices on a single substrate, UPI wrote.

Frederick Seitz Materials Research Laboratory scientists at the University of Illinois-Champaign say the new technology permits either a one- or three-dimensional layout.

The approach uses specialized rubber 'stamps' with functional 'inks' consisting of high performance semiconductor materials in the form of micro and nanoscale ribbons, wires, tubes and bars.

A printing operation delivers the materials to virtually any type of substrate, including lightweight, flexible plastic sheets. The researchers say circuits built in such a manner offer electrical and mechanical attributes that would be impossible to achieve using conventional, wafer-based approaches to electronics.

'Important new types of electronic systems will rely on the ability to mix and match wide ranging classes of devices in three dimensional configurations on unusual substrates,' said Professor John Rogers. 'The circuits enabled by such approaches will open up interesting application possibilities that lie beyond the scope of existing single-material, wafer-scale electronics.'

Dieting Without Exercise Harms Bones

Overweight dieters who cut calories are likely to lose more bone mass than weight if they don't exercise, says a study that highlights the importance of both diet and exercise, NewKerala reported.

If you just cut calories--and don't exercise--you harm your bones two ways: you may cut nutrients needed to maintain strong bones, and you don't stimulate bone growth, indicated the study that looked 46 men and women with an average age of 57.

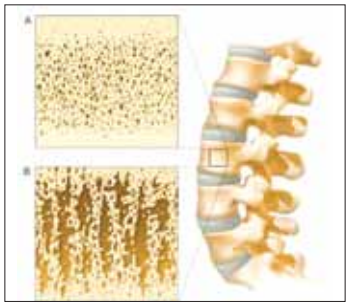
Dennis T. Villareal and colleagues at Washington University in St. Louis studied all these typical Americans who were overweight; none got regular exercise, reported the online edition of health Magazine WebMD.

Of the 46 participants, 36 agreed to lose weight. Half of them ate less--about 20 percent fewer calories. The other half worked out more--burning off about 20 percent more calories.

For comparison, 10 more participants got advice on healthy lifestyles but didn't diet or exercise. Compared with the 10 who only got advice, the dieters and the exercisers both lost weight.

But, unlike the exercisers, the dieters lost more than weight. They lost bone, too.

And they lost it in the areas where elderly people are most likely to suffer fractures: spine, hips, and upper legs.



Calorie restriction is beneficial, but if you don't combine it with exercise you lose bone mass. (Google Photo)

"Calorie restriction is beneficial, but if you don't combine it with exercise you lose bone," Villareal was quoted as saying.

"You might get lighter without exercise--but that's because you have less skeleton than you did before. That is a really big concern for people as they age," the researcher said.

Scientists Push for Manned Trip to Mars

The chief scientist behind the twin Mars rovers said he supports a human presence on the moon, but hopes the journey will not dead-end there.

Earlier this month, NASA announced its plan to return to the moon will include establishing a lunar outpost for a permanent human presence by 2024. Eventually, the space agency said, it wants to land humans on Mars, AP reported.

Steve Squyres of Cornell University said that while it makes sense to start with the moon he fears that budget overruns will ground humans there and foil a manned mission to Mars.

"The best way to explore Mars is with humans," Squyres said during an American Geophysical Union meeting.

Scientists have long been intrigued with the red planet and the question of whether it can support microbial life. The fascination went into overdrive last week when researchers reported finding evidence that liquid water may still gush up to the frigid surface as occasional spurts.

NASA's decision to focus on lunar exploration is "ill-timed" given that the Mars missions have revealed a great deal about the planet's ancient history, said Kenneth Herkenhoff, a US Geological Survey scientist who is on the team managing the new Mars Reconnaissance Orbiter.

The Reconnaissance Orbiter, which slipped into orbit earlier this year, has beamed back detailed images of the ice-rich deposits on Mars' north pole that show the region underwent recent climate change, Herkenhoff told the AGU meeting.

Meanwhile, the durable rovers, which have been exploring opposite ends of the planet since 2004, continue to amaze scientists with geologic discoveries. Most recently, Opportunity examined cliff faces resembling those found at Zion National Park in Utah while Spirit saw for the first time a water ice cloud floating through the winter sky.

"The recent cuts in the sciences from NASA is not good," Herkenhoff said. "We're currently drowning in data and more is expected. We need more graduate students involved, not fewer."

Ray Arvidson, deputy principal investigator for the rovers, said the emphasis on the moon could prevent future missions to collect a sample from Mars or land a super rover on the Martian surface to probe for further evidence of water.

"It would just be unfortunate to lose momentum with all these very exciting Mars discoveries," he said.

Advanced System to Track Quakes

US scientists unveiled a new system they hope will improve the accuracy in forecasting the likelihood of earthquakes in the long-term.

In a presentation at the annual meeting of the American Geophysical Union, researchers revealed a method which combines geological records with GPS tracking to help assess earthquake risk, AFP said.

"This is the most realistic model to date," said Kaj Johnson, a geophysicist from the University of Indiana. "This is something that people have been asking for years now - it's the next step."

Earthquake probability assessment requires accurate determination of how fast a fault moves. Prior to the advent of GPS technology, scientists relied solely on paleoseimology, a complex method of digging trenches along fault lines and mapping the signatures of past earthquakes over thousands of years.

Now, the earth's movements are measured down to the millimeter with GPS antennae secured into bedrock.

"People say 'let's compare the rates of fault movement from GPS to rates of fault movement from geological studies," said Paul Segall, Geophysicist from Stanford University and co-author of the study.

"But it's as if you're measuring different parts of the same thing with different tools. The discrepancy can be quite big."

Segall and Johnson's model weds all available data about the way any given fault moves, and takes into account that fault-slippage rates vary over time. Time dependence is important because GPS doesn't measure fault slippage directly but how quickly points on the earth's surface are moving.

Scientists then fit this GPS data into mathematical models to estimate the rate of fault slip.

"Because of the time dependant rate, your estimate depends on where you are in the earthquake cycle," said Segall. "If the model doesn't take that into account, you will get a different slip rate."

Using their new system, the researchers found the slip rates from GPS tracking and the geological record to be relatively consistent for the San Francisco bay area, which was reduced to rubble by a quake in 1906.

But in other tectonically active regions of China and Taiwan, there are large discrepancies between the data. The researchers want to use their time-dependent model to scrutinize these faults to reconcile the data.

"There is debate within the scientific community about how fast the faults are slipping in Tibet and China," said Johnson.

"This model can better resolve those discrepancies between the data on modern surface velocities and what the geologists say has happened over time."

But Johnson stressed that this new methodology is by no means a crystal ball. "We are not talking about short-term forecasting at all," he said. "But this type of approach is very helpful for long-term probability forecasting."