

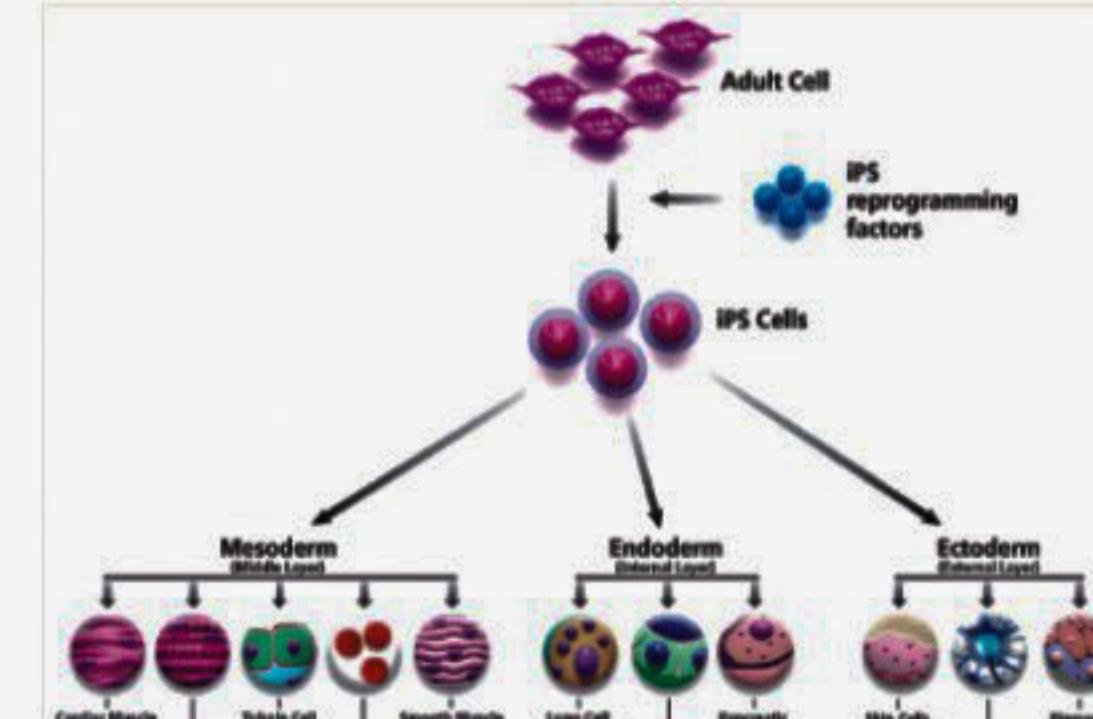


DHAKA TUESDAY MAY 31, 2011, E-MAIL: science&life@thedailystar.net

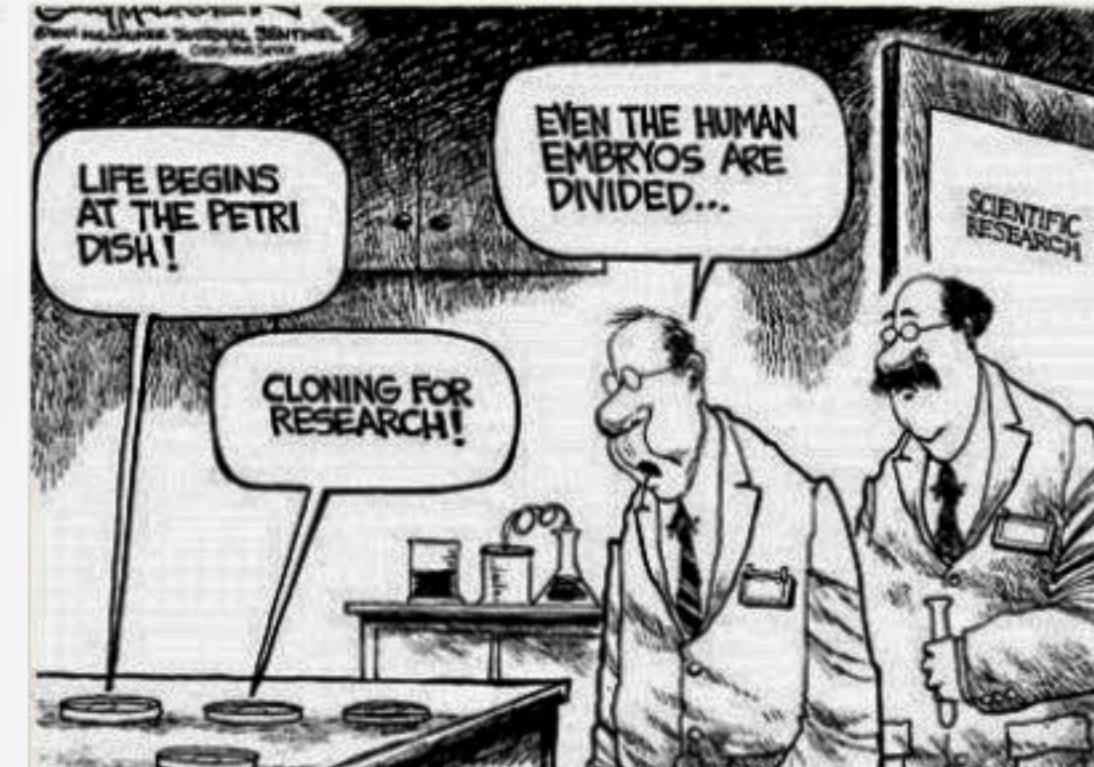
Radical shift in stem cell research

MD. RIAJUL HOSSAIN

SHIKA'S daughter has heart disease, Synthia's husband Schizophrenia. Rifat's neighbor has Parkinson's, Martin's nephew is traumatized. Proper treatment of these life-threatening diseases is subject to extensive medical research. On top of the existing medications to alleviate the conditions, permanent solutions for them are called-for. Stem cell research had long been thought as a potential tool to provide a permanent solution to these diseases. However, medical-research insiders now



iPS technique has opened up huge promise for drug discovery using adult stem cells



Embryonic stem cell research has faced ethical debate over the years

know that embryonic stem (ES) cell technology is proving to be a dead end. The alternatives could be adult stem (AS) cells which are far more controllable than the ES cells, because although ES cells have the capacity to differentiate into many types of cells, they face the pitfall of developing uncontrollable cell division phenomenon leading to cancer and also ethical debate of killing human life taking conception as the start of a new life. In contrast to ES cells, which are regarded totipotent, that is, capable of developing into any cell type found in adult organism, the types of stem cells found in adults are either unipotent, (stem cells capable of developing into a

single specialized cell type), or pluripotent, stem cells capable of developing into a few closely related cell types. So, the question arose, would it be possible to find out an alternative source of totipotent or at least totipotent-like stem cells?

The breakthrough came from a Japanese biologist named Shinya Yamanaka, who disclosed a technique that would ultimately transform both stem cell biology and ethical debate. In March 2006, at a scientific meeting at Whistler, B.C., the Kyoto University scientist described a procedure of reprogramming the ordinary mammalian cells into stem cells. It was like the adult cells were

taken back to an embryo-like or stem-like state without the requirement of developing and destroying an embryo. He named the cells "induced pluripotent stem cells" or iPS cells. Just four years before this exciting discovery, a group of scientists led by Thomas M. Jessel and Hynek Wichterle published a landmark paper in the Cell Journal, explaining the ingredients and procedure for creating motor neurons from ES cells. One researcher, Lee L. Rubin, who was the head of translational medicine at the Harvard Stem Cell Institute found something of great promise in this work. Rubin got the idea to use stem cells to discover drugs rather

than using for mere cell therapy which had already reached a dead end resulting in failures in these sorts of experiments over the years. Several projects were launched to take an adult cell, coax it back biochemically into an embryo-like state, allow it to replicate, and harvest stem cells from the colonies produced. The amazing outcome of using this iPS technique was that the cells in the diseased conditions including unique genetic mutations could be replicated in the cell culture. So, it can serve as the model diseased cells to search or discover potential therapeutic compounds that can either cure or alleviate the condition or enhance survival

of the particular cell types. Experimenting with the technique on motor neuron disease, Rubin has identified almost two dozen small molecules that interact with one of the newly identified pathways in those cells and enhance the survival of motor neurons. This paradigm shift in stem cell research has created much excitement in the scientific community which spilled over into biotech: Many of the researchers of this story have become involved in a California-based biotechnology company iPierian, which is one of several start-ups, including Cellular Dynamics International and Fate Therapeutics, that are adapting iPS technology for drug discovery.

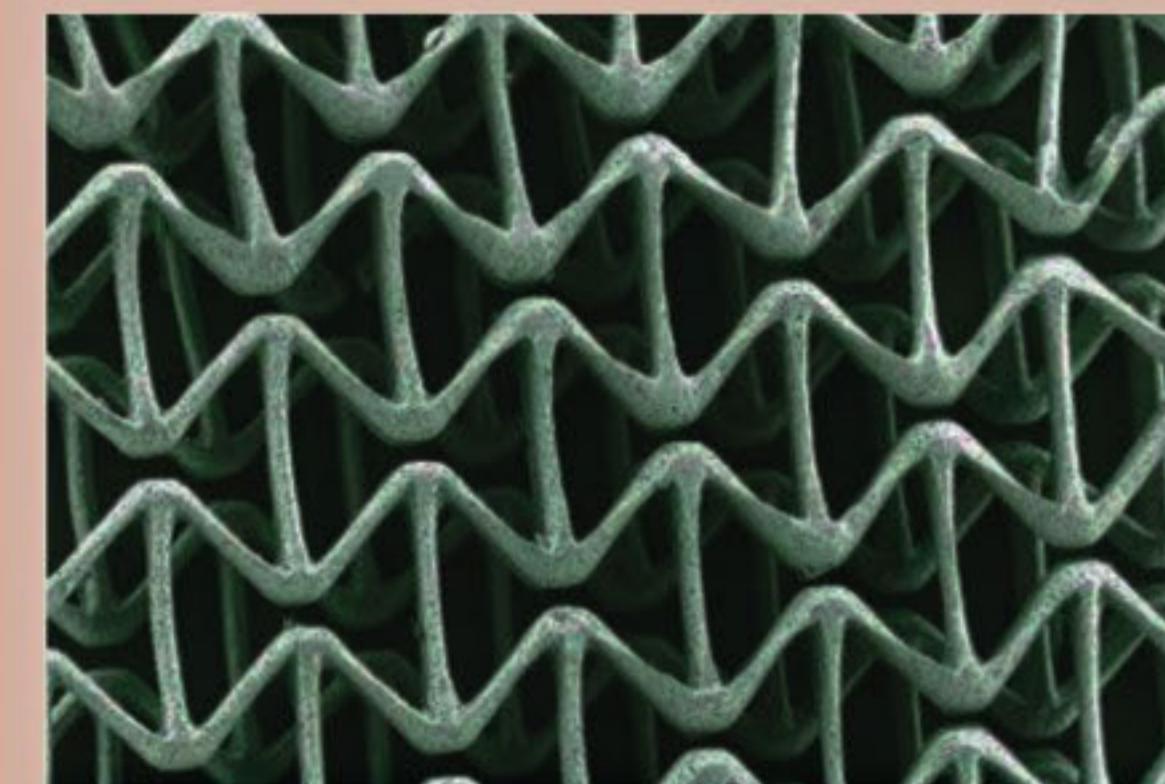
With all these thrilling advances in stem cell research, the scope for extensive stem cell research should be created removing the restriction on this. As President Obama of US said, it would hasten "a day when words like 'terminal' and 'incurable' are finally retired from our vocabulary." Indeed, daughters, husbands, neighbors, and nephews—all loved individuals deserve compassion and the best of advanced medical research.

The writer is a Lecturer in Biotechnology at BRAC University



MIMICKING LIFE

Nanoengineers' feat



A new biomaterial designed for repairing damaged human tissue doesn't wrinkle up when it is stretched

A new biomaterial designed for repairing damaged human tissue doesn't wrinkle up when it is stretched. The invention from nanoengineers at the University of California, San Diego marks a significant breakthrough in tissue engineering because it more closely mimics the properties of native human tissue.

Shaochen Chen, professor in the Department of NanoEngineering at the UC San Diego Jacobs School of Engineering, hopes future tissue patches, which are used to repair damaged heart walls, blood vessels and skin, for example, will be more compatible with native human tissue than the patches available today. His findings were published in a recent issue of the journal Advanced Functional Materials.

The new biomaterial was created using a new biofabrication platform that Chen is developing under a four-year, \$1.5 million grant from the National Institutes of Health. This biofabrication technique uses light, precisely controlled mirrors and a computer projection system -- shined on a solution of new cells and polymers -- to build three-dimensional scaffolds with well-defined patterns of any shape for tissue engineering.

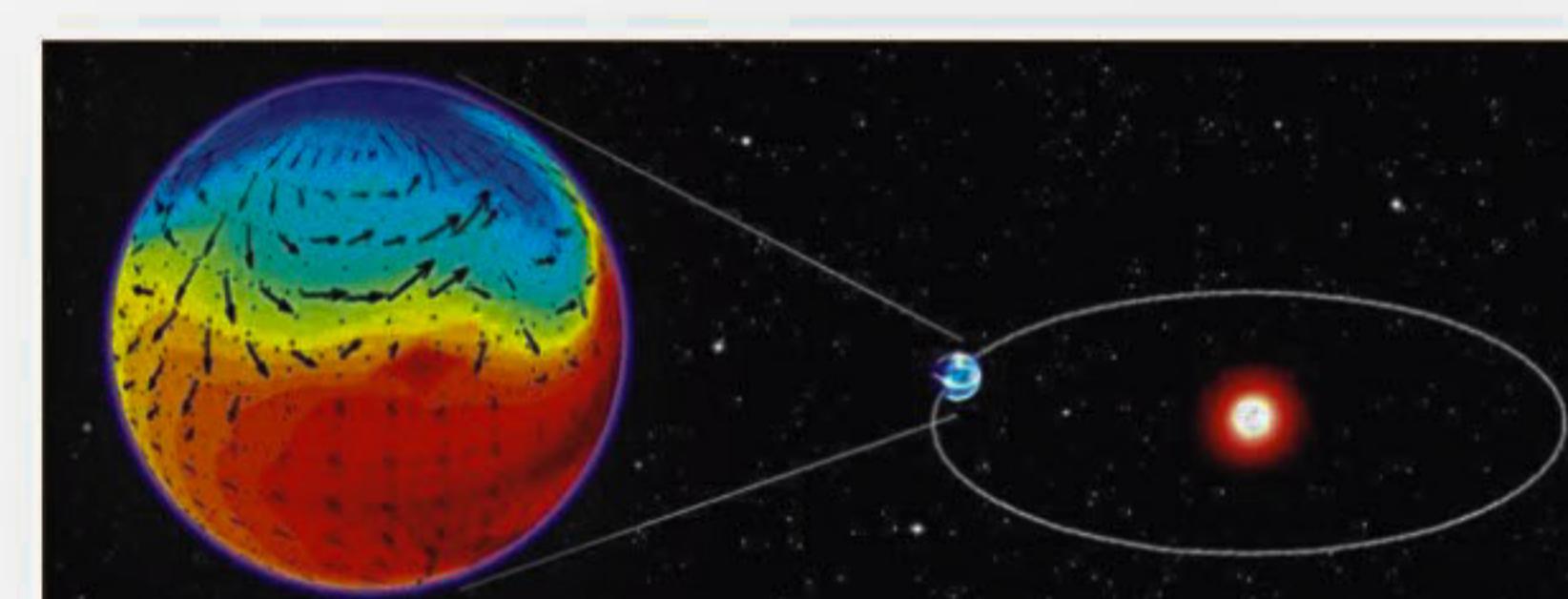
"We are also exploring other opportunities," said Chen. "It's a new material. I think it's just a matter of time before more people will pick up and find applications for it in defense, energy and communications, for instance."

Source: Science Daily

HOPE OR MIRAGE?

First habitable Exoplanet?

OBайдур РАХМАН



argue that Gliese 581d might just be the Earth-like planet with extra-terrestrial life forms.

It is understood that Gliese 581d is a rocky planet with a mass at least seven (7) times that of Earth and about twice its size and receives less than a third of the solar energy than that of our blue planet. And also believed to be tidally locked with a permanent day and night side. Initially, because of this, it was thought the planet was, both, too cold and too hot to sustain life. But to test this idea in more in depth, a team of European scientists developed a computer model, which is capable of more accurately determining the climate of a exoplanet by stimulating the planet's atmosphere and surface in three dimensions, very much like those that are used to study the climate change here on Earth.

The study found out that, having dense carbon dioxide, which is a likely scenario in a large planet, the climate of Gliese 581d is both stable and warm enough to have oceans on its surface as well as clouds and rainfall! One key factor in the research is the consideration of Raleigh scattering, which gives its bluish appearance in our sky. It was found that as the starlight (solar rays)

from Gliese 581 is red and unaffected, it can penetrate much deeper into the atmosphere of Gliese 581d, where it heats the planet (for good) effectively due to the greenhouse effect of the carbon dioxide-rich atmosphere. Besides, the 3D circulation simulations also showed that the daylight heating was efficiently redistributed across the planet by the atmosphere, preventing atmospheric collapse on the night side or at the poles.

Although it seems that Gliese 581d is habitable but experts believe that it could have kept some atmospheric hydrogen, like in Uranus and Neptune, or the possibility of the fierce solar-wind from its star during its infancy which could even have torn its atmosphere away entirely. Nonetheless, it is believed to be a crucial discovery because for the first time climate models have been applied to prove that the planet is habitable. It is now believed that the diversity of planetary climates is far wider and complex than it is understood to be. Many ponder over the fact that such findings will usher in the idea that life-supporting planets not necessarily need to be like what we have here on Earth.

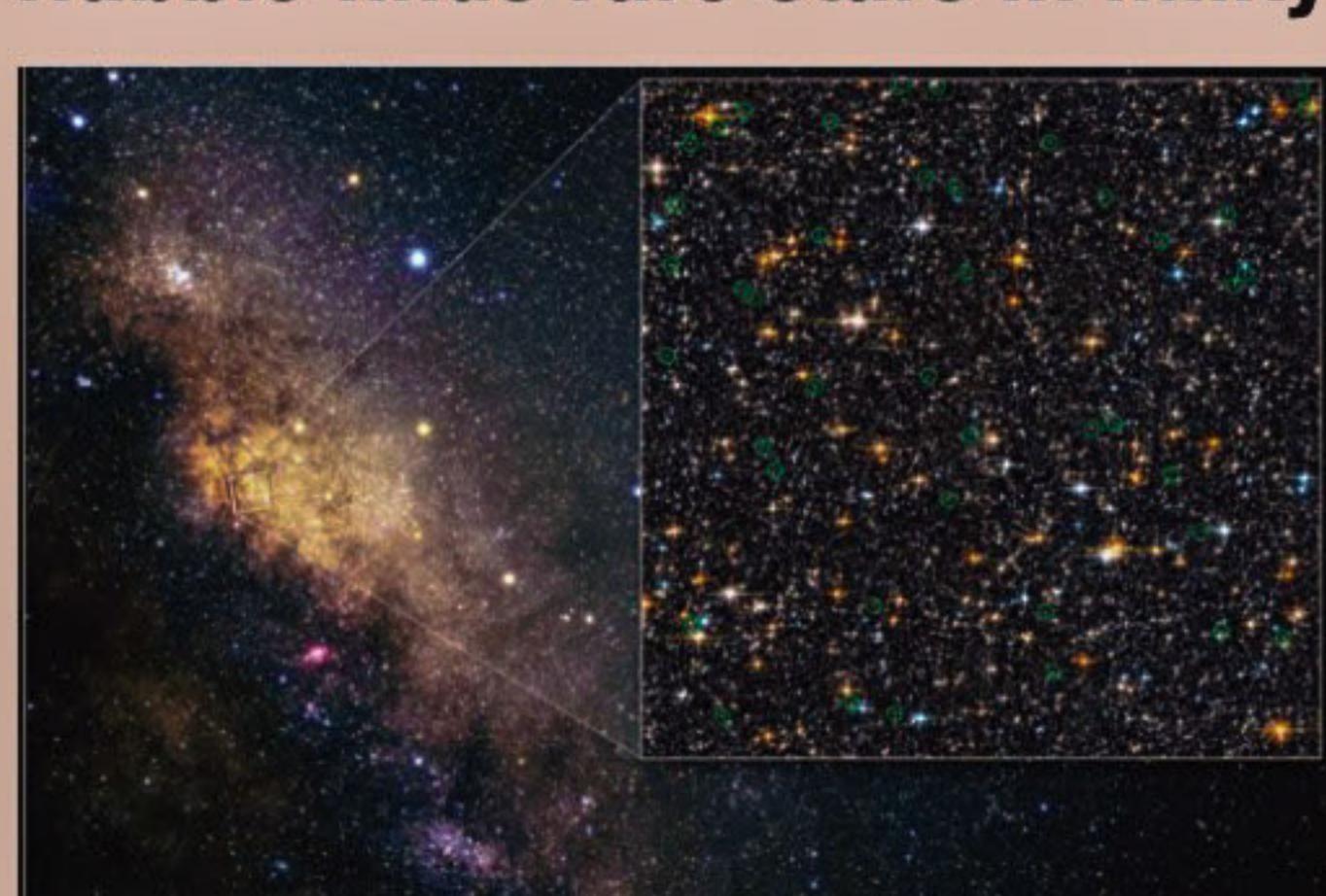
The contributor is a freelance Science writer.

'BLUE STRAGGLERS'



DID YOU KNOW?

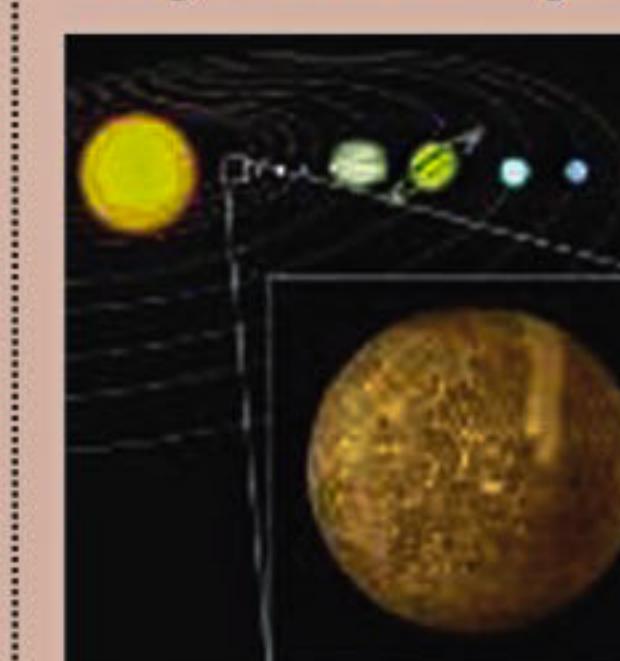
Hubble finds rare stars in Milky Way



Peering deep into the star-filled, ancient hub of our Milky Way (left), the Hubble Space Telescope has found a rare class of oddball stars called blue stragglers, the first time such objects have been detected within our galaxy's bulge. Blue stragglers -- so named because they seem to be lagging behind in their rate of aging compared with the population from which they formed -- were first found inside ancient globular star clusters half a century ago. The picture at right shows the 42 blue straggler candidates circled in green.

Source: Science Daily

Why is Mercury forgotten planet?



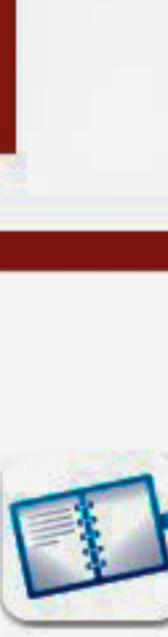
poses significant challenges as the planet orbits close to the sun. Hence, it is regarded as the forgotten planet in the solar system.

Mercury can claim the title for the "weirdest" planet in the solar system, apart from being the smallest and the innermost. It has the wildest temperature extremes - from 800°C to -300°C and drifts from being the nearest to being the farthest from the sun. Reaching mercury

Source: Live Science

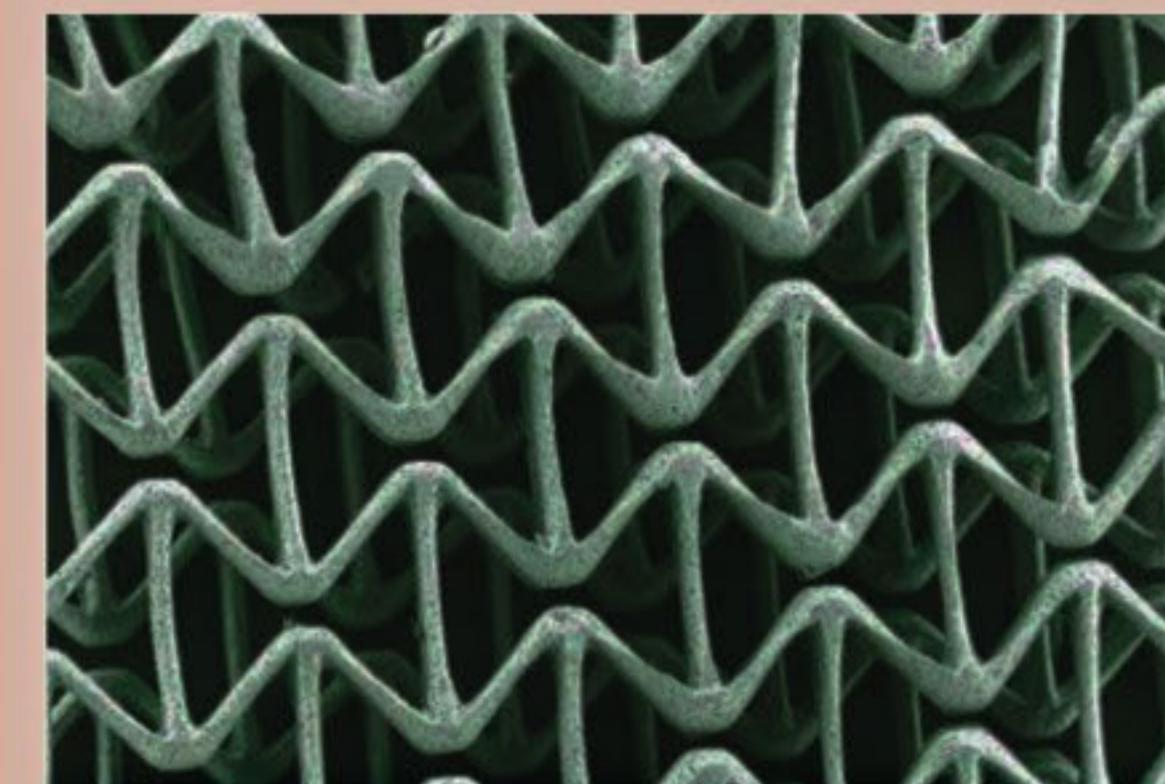


Ancient shrimp-like creatures called anomalocaridids had long, spiny head limbs presumably used to snag prey



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Source: Science Daily



CAMBRIAN BEAST

Ancient sea monsters

BIZARRE shrimp-like monsters that were the world's largest predators for millions of years grew even larger and survived much longer than thought, scientists find.

The creatures, known as anomalocaridids, were giant predators (ranging from 2 to possibly 6 feet in length) with soft-jointed bodies and toothy maws with spiny limbs in front to snag worms and other prey.

"They were really at the top of the food chain," said researcher Peter Van Roy, a paleobiologist at Ghent University in Belgium, and formerly at Yale. "The uncontested top predators of their time."

Past research showed they dominated the seas during the early and middle Cambrian period 542 million to 501 million years ago, a span of time known for the "Cambrian Explosion" that saw the appearance of all the major animal groups and the establishment of complex ecosystems.

"The anomalocaridids are one of the most iconic groups of Cambrian animals," said researcher Derek Briggs, director of the Yale Peabody Museum of Natural History. "These giant invertebrate predators and scavengers have come to symbolize the unfamiliar morphologies displayed by organisms that branched off early from lineages leading to modern marine animals and then went extinct."

Bigger and better

Fossils suggested these ancient marine predators grew to about 2 feet (0.6 meters) long. Prior studies also suggested they died out at the end of the Cambrian.

Now, extraordinarily well-preserved fossils unearthed in the rocky desert in southeastern Morocco by local collector Mohammed Ben Moula reveal giant anomalocaridids that measured more than 3 feet (1 m) in length.

"The Moroccan specimens are the largest anomalocaridids known to date; they are about double the size of their Cambrian counterparts," Van Roy told LiveScience. "There have been suggestions of Cambrian anomalocaridids of over 6 feet (2 meters) in length, but these estimates are extrapolations from very fragmentary material, and hence not too reliable."

Source: Live Science