

N0.573

CHINA SCIENCE AND TECHNOLOGY

NEWSLETTER

The Ministry of Science and Technology
People's Republic of China

N0.573

February 10, 2010

IN THIS ISSUE

- * Colored Ancient Birds and Feather Dinosaurs
 - * Finest Carbon Nanotube Synthesized
 - * Diseases Tracing Signal Molecules
 - * New Approach Betrays Cancer Metastasis
 - * Tea Tree Genome Sequenced
 - * China Fifth in PCT Applications
 - * Water Cooling Unit Approved
-

INTERNATIONAL COOPERATION

Colored Ancient Birds and Feather Dinosaurs

A team of Chinese scientists, including ZHANG Fucheng, ZHOU Zhonghe, XU Xing, and WANG Xiaolin from the Institute of Vertebrate Paleontology and Paleoanthropology, part of the Chinese Academy of Sciences, in collaboration with the scientists from the UK and Ireland, have recently discovered fossilized melanosomes and colors in Cretaceous dinosaurs and birds, proved for the first time that Cretaceous dinosaurs and birds are colored species. The finding was published in the recent issue of journal *Nature*.

The study has for the first time gathered the evidences showing that some dinosaur species, including *Sinosauropteryx* and *Sinornithosaurus*, have a fiber like 'feather' structure identical to the pennaceous feathers of early birds, based on the melanosomes found in the pennaceous feathers of the early birds. The finding supports the scenario that birds are originated from dinosaurs.

The study provides empirical evidences for reconstructing the colors and color patterning of ancient creatures, and for understanding the systematic relationship between the origins of feathers, birds, and dinosaurs, created a new approach for studying the origins and evolution of feathers in a more detailed manner.

Earlier Dinosaurs Found

According to a finding published in January 29, 2010 issue of journal *Nature*, Chinese and American scientists have found the earliest dinosaurs so far unearthed in the world, or *Alvarezsauridae*. The development has greatly advanced the time where birds first appeared.

Scientists from the Institute of Vertebrate Paleontology and Paleoanthropology, part of the Chinese Academy of Sciences and George Washington University unearthed in 2004 an ancient fossilized dinosaur. The analysis of the dinosaurs confirmed that it was lived during the Late Jurassic, approximately 160 million years ago. The discovery has advanced the period where *Alvarezsauridae* lived by some 63 million years. The newly found fossilized dinosaur, with a body length between 1.9m and 2.3m, was named *Haplocheirus.sollers* (meaning simple, skillful hand). It has a narrow and long head and neck, small teeth, but strong front limbs. It is supposed to mainly eat small mammals and reptiles, including lizards.

Haplocheirus.sollers shared many features of a modern bird. For example, it has four toes on two feet respectively. What makes it different from modern birds is it has one lateral toe, and three front toes. A modern bird usually has one rear toe and three front toes.

Haplocheirus.sollers' upper body moves sideways, like a stretched out bird. It has special "hands", with three "fingers" on each hand. The middle 'finger' is longer than the other two.

Anchiornis Huxleyi Reconstructed



Simulated bird dinosaur.

Not long ago, scientists from Peking University, the University of Yale, and the University of Texas, reconstructed *Anchiornis huxleyi*, a small ancient four-wing dinosaur. The simulated bird dinosaur, appeared in the February 4, 2010 online issue of journal *Science*, has feathered wings with mixed black and white colors, donning a reddish brown crown. Researchers rolled out 29 images of reconstructed *Anchiornis huxleyi*, based on the fossilized *Anchiornis huxleyi* unearthed in China. They picked out the shape and density of the colors hidden in the fossils using scanning electron microscope, and reconstructed the bird dinosaurs accordingly. The reconstructed dinosaur that lived some 155 million years ago has a beak quite like a woodpecker. It has a reddish brown crown with a spotted face. Its four wings are mixed with black and white colors, with the tip of the wings being black. Researchers believe that *Anchiornis huxleyi*'s feathers are more symbolic than flying, mainly for attracting the opposite gender or scarring away the enemy. The feathered wings may help the dinosaur to slide between tree branches, though a springboard for building up the flying capability in the future.

Finest Carbon Nanotube Synthesized

Not long ago, scientists from Zhejiang University and University of California have successfully synthesized the smallest carbon nanotubes, or C90, in the world. The finding was published in the first issue of German *Applied Chemistry* in the year. Chinese and American scientists have long worked together to synthesize novel and metal Fullerene. In recent years, they have achieved a range of findings on large carbon and metal Fullerene, and synthesized three large metal Fullerene: $Gd_2C_2@C_{92}$, $Ca@C_{94}$, and $Sm_2@C_{104}$, which eventually allowed them to work out a C90 with a unique nanotube structure. The synthesized C90 is 0.7 nanometer across, with a length at 1.1 nanometers, the world's finest and shortest closed carbon nanotube that can stay stable in the air, enjoying a high D5h symmetry. Researchers are currently working on the physical and chemical properties of C90, exploring its possible applications in the area of organic solar energy and nanoelectronic components.

Skin Texture Survey Completed



China established a skin texture research team in 1979. In the past 30 years, ZHANG Haiguo, a skin texture expert at Shanghai Jiaotong University, and coworkers have established more than 150 skin texture modules made up of some 68,000 skin texture samples collected from Chinese individuals in 56 ethnic groups. Statistical analysis show that the 56 ethnic groups can split into the northern cluster and southern cluster. Researchers have sorted out the common skin textures shared by Chinese population, and lined out the basic distribution pattern across the entire nation.

Researchers found that Han population can be grouped into the southern cluster and the northern cluster with 33 degree north latitude as the demarcation line. The southern cluster is made up of the individuals mainly from the Yangtze River Valley or the south of the Yangtze River, with little differences seen between them. However, the northern cluster saw a larger difference between individual groups, enjoying relative independence. Analysis indicates that the genetic coding of ancient Chinese population has left a clear mark on the modern Chinese population. Comparative study has concluded that Han population is strongly mixed in terms of skin textures, implying that they are the mixed descendents of the ethnic groups across China. In other words, Han population has been growing through melting with other ethnic groups in the past several thousand years, while other ethnic groups have become increasingly mixed with Han population, which confirms the fact that the Chinese nation is an integration of multiple ethnic groups.

The study also shows that Tibetan population shares an origin with the Qiang ethnic group, enjoying a skin texture closer to the northern cluster, implying that Tibetan population is originated from the northern cluster, rather than from India. ZHANG said that the Taiwan's Gaoshan ethnic group module is made up of a large collection of the Amei ethnic group and a much smaller one of the Kemalan ethnic group. Cluster analysis shows that ethnic groups in Taiwan are closer to the features of the northern cluster, which runs against the earlier conclusion that they are originated from Southeast Asia.

Diseases Tracing Signal Molecules

A study to develop new methods for preventing and treating cancer and cardiovascular diseases has recently passed an approval check at Daping Hospital under the No. 3 Military Medical School. The study has resulted in a range of laudable findings on the pathogenesis of cancers, including leukemia, liver cancer, and colorectal cancers, in addition to the new findings on the pathogenesis of hypertension, coronary heart disease, and arrhythmia, providing theoretical evidences for future clinical interference.

Thanks to two-year painstaking efforts, researchers have identified the key signal molecules that trigger up the occurrence of cancers and cardiovascular diseases, making treating major diseases through manipulating the key signal molecules and target protein possible. Researchers studied cancer prevention and treatment, using stem cell and stem cell injury technology. They screened out malignant tumors DNAs, identified target DNAs, and harvested the key target molecules that trigger up the formation of cancerous stem cells, with an improved understanding of the bioinformatics of cancer genesis and metastasis.

Additionally, researchers studied the mechanisms causing hypertension, coronary heart disease, and malignant arrhythmia, and unveiled the fact that G protein-coupled receptor kinase 4 gene variants may cause the malfunction of kidney dopamine receptor network. They found that the abnormally changed signaling pathway of the kinase that triggers up the apoptosis, and the increased synthesis of cholesterol caused by inflammation factors are associated with the occurrence of coronary heart disease. Researchers improved their understanding of the malignant arrhythmia that may result in an anoxic heart attack and heart failure, provided new strategies for preventing and treating the diseases.

NEWS BRIEFS

New Approach Betrays Cancer Metastasis

A team of scientists, led by Prof. LAI Maode at Zhejiang University School of Medicine, identified two proteins from the secretome of colorectal cancers cells, which may eventually be turned into a biomarker to predict the metastasis of colorectal cancers. According to a briefing on the findings that were published in the recent issue of journal *Proteome Research*, researchers applied a quantitative proteomics approach to compare the differential secretome of a primary cell line and its lymph node metastatic cell line from the same colorectal cancer patient. They found that the protein registered a concentration that was significantly higher in the metastatic cell line than in the primary cell line. An

analysis of 144 colorectal cancers patients and 156 controls shows that both biomarkers are highly sensitive and specific to predicting the metastasis of colorectal cancers.

Tea Tree Genome Sequenced

An initiative to sequence the tea tree genome was recently kicked off at CAS Kunming Institute of Botany. The study, the first of its kind in the world, will map up the genome of a kind of popular tea trees grown in Yunnan, in an attempt to understand the genome that shapes up the techniques applied in growing the tea tree, and unveil the functional DNAs that may lead to series findings, including decrypting its genetic code. The efforts will work out the major functional genes that may shape up a proprietary tea making industry, creating a molecular breeding platform for the purpose, and laying a ground for the future scientific development of the industry.

China Fifth in PCT Applications

Statistics published on February 8, 2010 by the World Intellectual Property Organization (WIPO) show that China filed 7,946 PCT applications in 2009, or 29.7% up compared with 2008, making China sit in 5th place in the world. In 2009, WIPO received 155,900 PCT applications, or 4.5% down compared with the preceding year. Affected by economic crisis, the United States, Germany, and the UK have seen noticeably declined PCT applications, though China, Japan, and the Republic of Korea have kept a sustained ascending trend. In 2009, the United States sat in first place for PCT applications, at 45,790, with an 11.4% decline compared with the preceding year, followed by Japan, Germany, the Republic of Korea, and China.

Water Cooling Unit Approved

A water cooling unit, designed and developed by Dunan Artificial Environmental Equipment for nuclear power station application, the first of its kind in the country, recently passed an approval check. As a water cooling subsystem, it provides cooled water for major air-conditioning and ventilation systems at a nuclear power station. It helps to confine the temperature of the instruments and major components in the master control room to an allowed level, either under a normal or abnormal condition. Researchers reported the R&D, design, performance, shock resistance, and standardization of the system at the approval check meeting, showing that it has mastered the key technologies for manufacturing the system.

Robot Lab Approved

Experts, organized by the Chinese Ministry of Science and Technology, inked on January 29, 2010 their approval to the successful operation of a national robotics lab physically located at CAS Shenyang Institute of Automation. The lab has worked on more than 40 projects financed by National Natural Science Foundation, National 973 Program, and National 863 Program, and 27 projects initiated by local authorities, with a sum exceeding RMB 200 million. Researchers at the lab published 37 papers that have been collected by SCI, and 238 by EI. It has achieved laudable progresses in the areas of polar robot, flying robot, submarine robot, rescue robot, and mini robot. The lab has been conferred with 48 national invention grants, and 1 second-place prize under the National S&T Advancement Award. Meanwhile, it recruited renowned specialists from abroad to be its research fellows, with an enhanced team capacity building and international exchange. The lab has so far completed the procurement, installation, and fine tuning of the large scientific instruments and facilities needed for innovation activities.

Comments or inquiries on editorial matters or Newsletter content should be directed to:

Department of International Cooperation, MOST 15B, Fuxing Road , Beijing 100862, PR China Tel: (8610)58881360 Fax: (8610) 58881364

<http://www.most.gov.cn>