

About the Cover: A research team at the Shanghai Institutes for Biological Sciences has long delved into a mysterious process through which the parental genomes in a mammalian zygote loose their past-life memories to gain totipotency - DNA demethylation. Follow them to behold a surprising scenario occurring immediately after the fertilization. (Image by courtesy of Dr. XU, SIBCB)

# BCAS Vol.28 No.4, 2014 Pages 269 – 332

Honorary Editor-in-chief BAI Chunli Editor-in-chief **Executive Vice Editor-in-chief** Vice Editors-in-chief

YANG Le, ZHU Daoben,, TAN Tieniu, LI Ting, WANG Xingdong

**Editor** GUO Haiyan Associate Editors SONG Jianlan Design & Layout YUAN Miao

General Editorial Office Tel/Fax: 86-10-62542631 Email: bulletin@mail.casipm.ac.cn P.O. Box. 8712, Beijing 100190, China

Sponsored by the Chinese Academy of Sciences Published by Science Press

Domestic subscription (1 year): 100 yuan; foreign subscription plus postage extra: \$72.

The views expressed in the Bulletin of the Chinese Academy of Sciences are those of the authors, and are not necessarily those of the Academy or the editors.

# Contents



CAS reveals a drastic reform plan to restructure its 104 institutes in the hope of boosting research and collaboration efficiency.

# S&T Reform

- 270 CAS Launches Drastic Reform Initiative
- 272 Teamwork Key to CAS Reform

#### InBrief ==

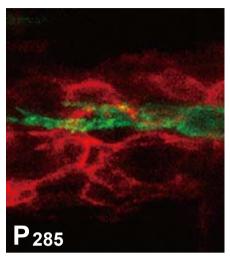
- 273 University of CAS Greets First Freshmen in
- 274 LI Jinghai Becomes New Vice President of
- 274 TAN Tieniu Elected into Royal Academy of Engineering
- 275 Volvo Environment Prize Goes to Chinese Climate Scientist
- 276 CAS Key Lab Approved to Launch Targeting **Emerging and Highly Infectious Diseases**

#### InFocus \_\_\_\_

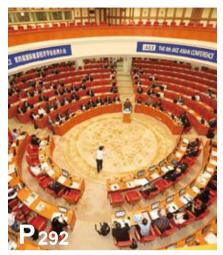
277 Racing Deathly Ebola

# Highlights **•**

- 279 Both Mom and Dad Genomes Actively Reform Themselves: New Scenario Revealed in DNA Demethylation of Mammalian Early Embryos
- 282 Circular RNA Signals More Complexity and Diversity in Gene Expression Regulation
- 285 Identification of Multipotent Mammary Stem Cells Fueling Hope for New Targeted Therapy of Breast Cancer



CAS scientists successfully identified a multipotent type of mammary stem cells in mouse mammary gland, shedding light on targeted therapies for a refractory subtype of breast cancer.



Sustainable development is facing new challenges especially in relation to energy use. Energy economics, an emerging and rapidly developing interdisciplinary field, will play a fundamental role in efforts aimed at coping with these challenges.



**Neonatal heart:** Largely, postnatal coronary vessels might not have expanded from preexisting embryonic vasculature as formerly believed – see what CAS biologists revealed in page 311.

•••••

# People

288 China's Spectrum Factory Gathers Momentum

# Forum \_

- 292 Energy Economics: New Challenges and Solutions
- 296 Global Energy Reforms Call for Innovations in Energy Economics
- 297 The Future Development of Energy-Environment-Economy Integrated Assessment Modelling
- 298 Energy Finance in the Age of Big Data
- 299 Dealing with Challenges of Energy and Climate Change: Policy-oriented Researches
- 301 Construct an Open International Oil Trading Platform and Improve an Effective Energy Market System
- 302 Emergence of Uncoventional Hydrocarbon Development in the United States: Global Implications on Oil & Gas Markets
- 304 Energy, Markets and Their Failures

# Science Watch

#### **Basic Science**

306 USTC Develops the First Quantum Memory that Records Orbital Angular Momentum of a Single Photon

# Life Science

- 308 Three Is Better Than Two, for Suffered Bacteria Living under Stress
- 309 Advances in phylogenetic study of Fungal Family Boletaceae
- 310 Robust Gene Dys-Regulation in Alzheimer's Brains
- 311 New Origin for Coronary Vessels Revealed

- 312 Novel Mechanism to Regulate Influenza A Virus Survival
- 313 CAS Structural Biologists Detail How Lipopolysaccharides Transport and Insert in Gram-Negative Bacterial Outer Membrane
- 315 New Technique Developed to Identify Clusters of Proteins on the Plasma Membrane of Immune Cells
- 317 SPOP Protein Revealed to Play a Key Role in Kidney Tumorigenesis
- 318 Conformational Elasticity Found to Facilitate TALE-DNA Recognition

#### Earth Science

- 319 Paleo-ecosystem Sealed in Amber: Paleobiota from Lower Eocene of Fushun, Northeastern China
- 321 Oxygen Escape Linked to Geomagnetic Reversals and Mass Extinctions

#### Environment

- 323 Moisture Controls Growth of Birch at Upper Timberline in Southern Himalayas
- 325 Scientists Establish China's Longest Tree-ring Chronology

#### Psychology

327 Moral Judgment and Cooperation in Children with Highfunctioning Autism

#### Technology

- 329 Researchers Propose AFM-based Virtual Nano-hand for Stable Nanomanipulation
- 331 Monitor *In Vivo* Dynamics of Avian Influenza Viruses Using Bioorthogonal-conjugated Near-infrared Quantum Dots