中国辽宁中华侏罗兽的发现代表早期哺乳动物演化的一个新里程碑

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中文摘要:真兽类哺乳动物是现代最为丰富多彩的哺乳动物类群, 其起源和早期演化是国际科学界高度关注的科学问题之一。中国辽宁中侏罗世髫髻山组产出的中华侏罗兽是目前世发现的最古老的真兽类哺乳动物, 代表了早期哺乳动物演化的一个新里程碑。研究表明, 中华侏罗兽的发现将以前国际上的白垩纪化石记录提前了3500万年, 填补了早期哺乳动物演化石记录间隔, 帮助校正了现代基于DNA方法研究的哺乳动物演化历史, 并与基于DNA方法测定的真兽类哺乳动物起源时间的研究结果相吻合, 为哺乳动物演化历史建立了以化石为标点的新标尺。中华侏罗兽的精确年龄有助于确定真兽类哺乳动物与其它哺乳动物, 如后兽亚纲(它们的后代包括有袋类, 如袋鼠)和单孔类(如鸭嘴兽), 分异发展的时间。

中文关键词:真兽类 中侏罗世 辽宁 中国

Discovery of *Juramaia sinensis* (Eutheria) from Western Liaoning of China Represents a Ne Milestone in EarlyMammal Evolution

Abstract:The origin of placental mammals is the most important event in the mammalian evolutionary history because placentals make up more than 90% of all living mammals. Placental mammals are the world’s most diverse mammal group characterized by a placenta that provides nourishment for unborn young. From bats to whales from elephants to rodents, placental mammals are the most important mammal group of the world, playing crucial roles in modern ecosystems. Placental mammals are considered to be very important, because human and closely related primates are placentals. The problems as to when, where, and how eutherians (including placentals) originated in the Earth’s history are some of the most important aspects in understanding the evolution. Chinese and American paleontologists have now reported their discovery of a remarkably well-preserved fossil from Jianchang County, Liaoning Province of China in a paper published in the prestigious journal Nature. Named Juramaia sinensis or the “Jurassic mother from China,” this fossil from Middle Jurassic Tiaojishan Formation represents the earliest-known fossil of the eutherian-placental lineag shows that a new milestone in mammal evolution that was 35 million years earlier than the previous Cretaceous record. This new discovery fills an important gap in the foss records and helps to calibrate modern DNA-based methods of dating the mammalian evolution. The age of Juramaia sinensis helps to establish the date when eutherian mammals diverged from other mammals: metatherians (whose descendants include marsupials such as kangaroos) and monotremes (such as the platypus). Understanc the beginning of placental mammals is a crucial issue in the evolutionary studies of all mammals. The date of an evolutionary divergence—when an ancestor species splits two descendant lineages — is among the most important pieces of information that evolutionary biologists and paleontologists can have. Molecular studies can estimate th timing of evolution by a “molecular clock.” But the molecular clock needs to be verified and tested by the fossil record. Prior to the discovery of Juramaia, DNA evidence suggested that eutherians should have shown up earlier in the fossil record—around 160 million years ago. Yet, the oldest known eutherian was 125 million years ago, previously represented by Eomaia from the Early Cretaceous Yixian Formation. This gap between molecular evidence and fossils was an important issue to be resolved for evolutionary biology and paleontology. The discovery of Juramaia gives a much earlier fossil evidence to corroborate the DNA findings, filling an important gap in the fossil re of early mammal evolution and helping to establish a new milestone, known as fossil calibration point, for mammalian evolutionary history. This Jurassic fossil provides nev information about the earliest ancestors of today’s placental mammals. By the scientists’ analyses, Juramaia is either a great-grand-aunt or a ‘great-grandmother’ of placental mammals that are thriving today. The fossil has an incomplete skull of about 22 mm long, part of the skeleton, and, remarkably, impressions of residual soft tissue such as hairs. It was an insectivorous mammal as indicated by its teeth. It was estimated to have a body mass of 13 grams. Most importantly, Juramaia’s complete forelim and hand bones enable paleontologists to interpret that it is a climbing mammal. This shows that the earliest eutherian evolution is correlated with the new adaptations. Eutherian mammals were a new lineage for the Jurassic Period. The adaptive features of the eutherians may have helped the new lineage to survive in a Jurassic ecosyste