

DARWIN'S HERITAGE TODAY

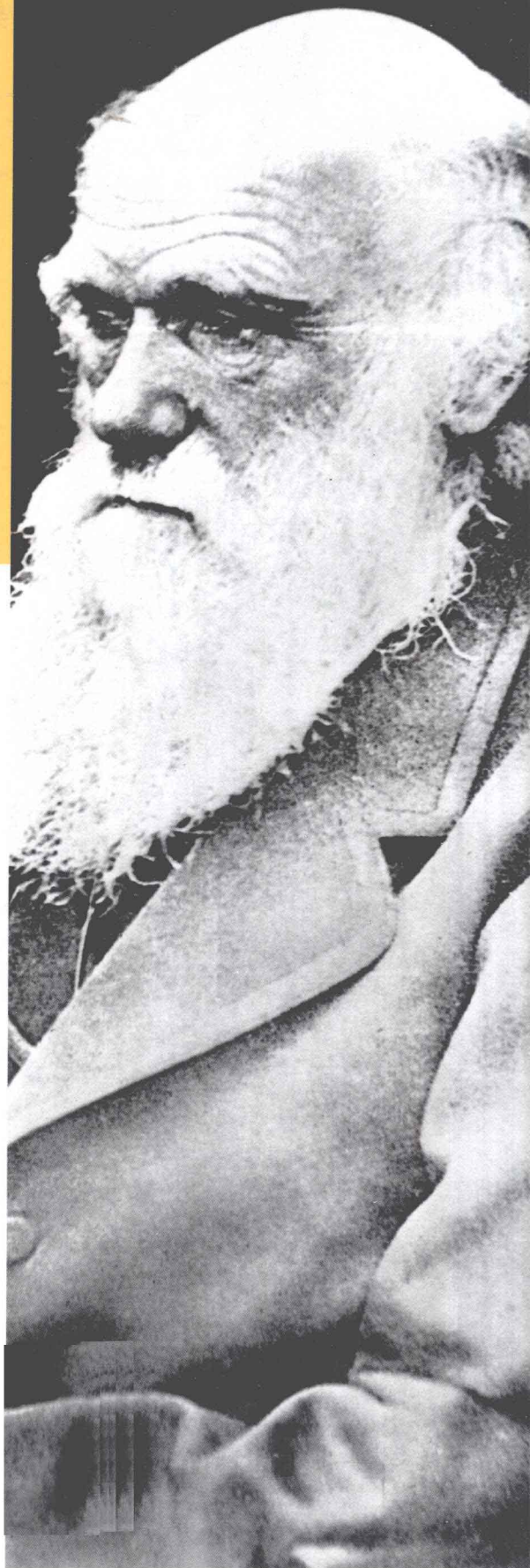
Proceedings of
the Darwin 200
Beijing International
Conference

Edited by

Manyuan Long

Hongya Gu

Zhonghe Zhou



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纪念达尔文诞辰200周年 国际学术会议论文集

2009年10月24~26日,演化生物学的科学家们从世界各国和中国各地相聚北京,参加主题为“达尔文200·北京”的国际学术会议,共同纪念达尔文诞生200周年和他的巨著《物种起源》出版150周年。几十位学者就演化领域主要分支——古生物学、系统演化、物种形成、群体遗传学、分子演化、发育演化、复杂性状遗传等方面的科学问题作了特邀报告。这些演讲包括对演化生物学历史的热情回顾,对新问题原创性的科学探索,以及对演化研究意义的哲学思考,对达尔文留下的科学遗产做出了全面评价。本论文集收集了此次会议的思想成果,特别是大会特邀科学家们关于达尔文科学遗产的思考和讨论。22位作者根据他们的发言和思考写出了纪念文章;40多位大会演讲者留下了宝贵的发言摘要。这些文献记载了国际和国内演化领域的著名科学家对达尔文及其巨著的历史和今天科学意义的看法,以及他们在相关领域的研究成果,对现今演化生物学的科学研究具有指导作用。此外,本书也收集了部分会议期间所拍摄的相片,包括所有参加者讨论发言时的照片和合影,记载了纪念活动感人的真情实景。文集还收集了一些具有历史价值的文献照片,以期展示达尔文在中国的传播和历史影响,进而反映达尔文及其巨著经久不衰的影响。

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DARWIN'S
HERITAGE
TODAY

To celebrate the 200th anniversary of Darwin's birth and the 150th anniversary of the publication of his book *On the Origin of Species*, evolutionary biologists gathered in Beijing from all around the world in October 2009 to attend "the Darwin 200 Beijing International Conference". Subjects from the enthusiastic retrospect on the history of evolutionary biology to the original researches to the philosophical pondering of the significance of the great science were presented by the scholars on a wide range of related topics in paleontology, systematics, speciation, population genetics, molecular evolution, developmental evolution, and genetics of complex traits. Twenty-two authors composed the articles based on what they talked and thought during the conference; More than 40 speakers left the abstracts of their speeches. These valuable documents record how scientists, in a unique combination of the leading scholars in evolution from the western and oriental worlds, thought of the science shaped by Darwin and his book. In addition, the collected photos in this book recorded the historical moments of the participants at the conference and the historical literature left from the dissemination of Darwin and his thoughts in China since the late 19th century.

Prologue



The year 2009 was destined to be an unusual year for evolutionary biologists, as it marked both the 200th anniversary of the birth of Charles Robert Darwin and the 150th anniversary of the publication of his great and influential work *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (London, 1859). No single scientist has ever made a contribution that can match the impact of Darwin's theory of evolution on the natural and social sciences, or even on politics, religions, and philosophy. Scientific debates over Darwin's theory have been stimulated ever since its first publication. For instance, is the mutation always small and accumulated gradually, or could it be a big and abrupt event? Could adaptation be resulted from random fixation of variable traits, or only from natural selection? As biological sciences develop, especially as more and more genomes have been sequenced, and more and more fossils have been excavated, we are more and more convinced that Darwin's evolution theory is still the backbone or the most fundamental theory of life sciences.

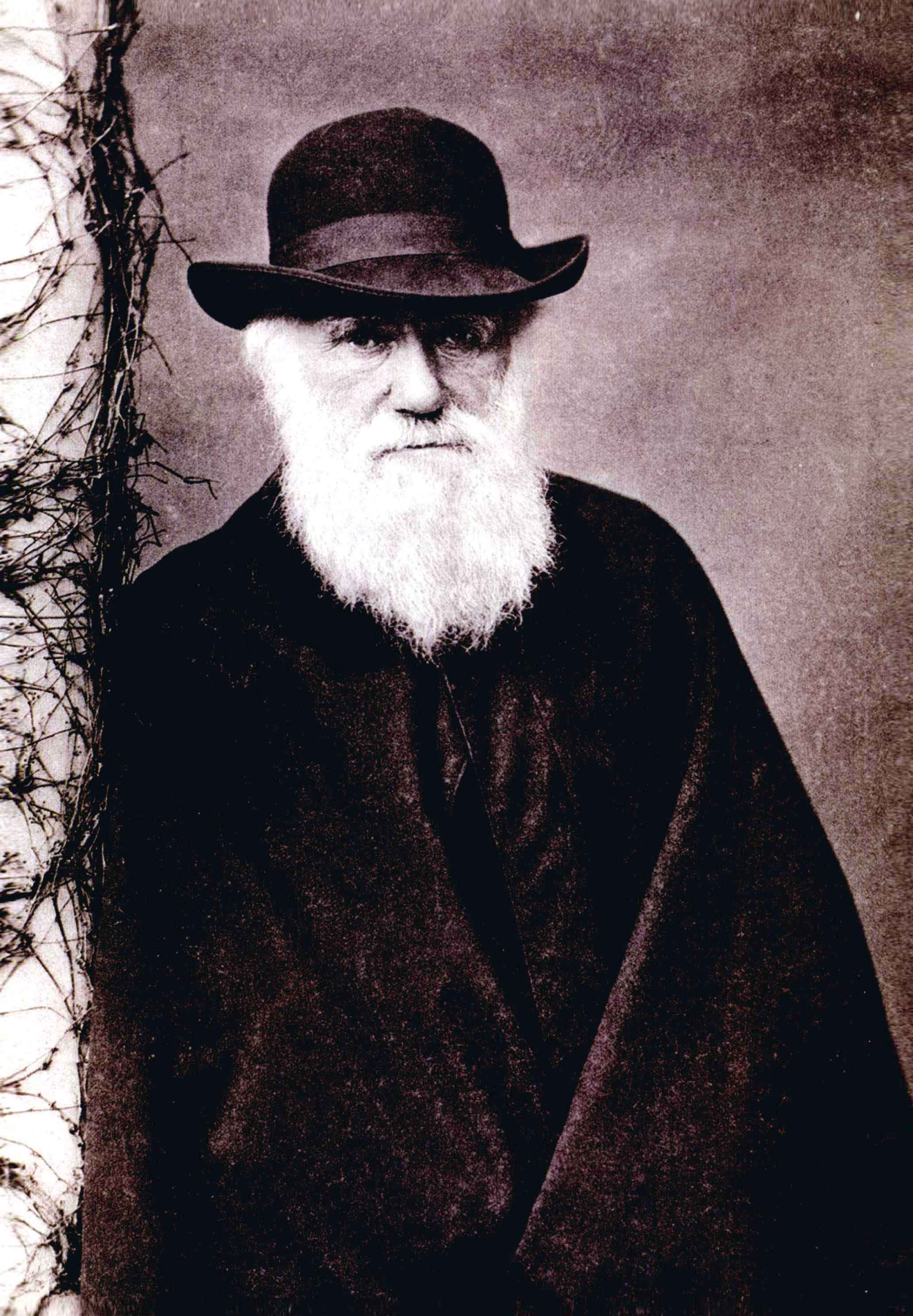
It is well-known that *On the Origin of Species* had been translated into German, French, Dutch, Italian, Russian and Swedish soon after it was published in London. But probably only a few people are aware that it was first introduced to China with important commentaries by Professor YAN Fu (严复), the first president of Peking University in 1895 in a book entitled “天演论” in Chinese. A detailed account of this history can be found in the paper by Professor Bailin Hao in this volume. Thanks to YAN Fu, the great pioneer of the modern Chinese intellectualism, Darwin's theory has been widely disseminated and embraced in China throughout its contemporary history, and has made a great impact on the evolution of modern history of China in both science and society.

The Darwin 200 Beijing International Conference was held at Peking University in October 2009, with a multidisciplinary participation. More than 40 invited speakers from eight countries delivered their speeches at the conference, covering the areas of paleontology, comparison and dynamics of genomics, molecular evolution and speciation, reconstruction of phylogeny, biogeography, and the origin of major groups. As the President of National Natural Science Foundation of China and an evolutionary biologist as well, I would like to express my gratitude and deep appreciation to all speakers in the conference and all who have contributed to the proceedings. The Conference and proceedings witness and highlight the impact of Darwin's theory on China and the world, and it would stimulate more international and multidisciplinary collaborations in the rapid-developing field of evolutionary biology in the future.

Yiyu Chen
President

A handwritten signature in black ink, appearing to read 'Yiyu Chen' in a cursive style.

National Natural Science Foundation of China
June 24, 2010



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	<i>Yiyu Chen</i>

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Introductions

Opening Speech

Zhihong Xu



Distinguished Guests, Dear Colleagues, Faculty and Students, Ladies and Gentlemen,

Good morning! Welcome all of you to the Darwin 200 Beijing Conference, and welcome to Peking University.

Today is a special day at Peking University. We are gathering here to celebrate the 150 anniversary of the publication of Darwin's *On the Origin of Species*, and cherish the memory of Darwin for his birth, 200 years, since he is not only a great scientist dedicating his life to the science, but also a great man, due to his tremendous work and contributions to the society and the civilization of the world.

The first person who introduced Darwin's theory of "Natural Selection and Struggle for Survival" to China is Mr. YAN Fu, the first president of Peking University when it adopted its currently name, in early twenty century. The university has a history closely linked with the history of modern China. Mr. YAN, whose picture is on the cover page of conference program, translated some parts in Thomas Huxley's *Evolution and Ethics*, and Darwin's Natural Selection into Chinese 《天演论》 (*The Theory of Natural Selection*). In his work, he combined Herbert Spencer's social Darwinism and his own interpretations. The theories in his book 《天演论》 suited the need of the society at that time. Many politicians such as reformists LIANG Qichao, or revolutionists SUN Zhongshan (SUN Yat-sen) were influenced by Mr. YAN's work and adopted Darwin's natural selection theory in their own political creeds. Mr. YAN's translation of "struggle for survival" and "natural selection" as "物竞" "天择" are well known terms in China now.

I have served as the president of Peking University for 9 years, now I am a professor of plant sciences in the School of Life Sciences, Peking University. I have been very keen in observing and studying plant growth, development, and propagation, even since I came into Peking University as an undergraduate student. As a student, and as a plant scientist, I have read some original works written by Darwin. In addition to his great work of *On the Origin of Species*, lots of his books are about plants, such

Zhihong Xu was the president of Peking University (1999,11 – 2008,11).

as *Fertilization of Orchids*, *Climbing Plants*, *Variation under Domestication*, *Insectivorous Plants*, *Cross and Self Fertilization*, *Different Forms of Flowers*, and *The Power of Movement in Plants*. All these works, based on his scientific explorations and his own experiments and observations on the plants grown in his garden and greenhouse, involve in plant genetic diversity, artificial selection, pollination biology, floral development, phototrophy, self-incompatibility, relationship between plant and insects, and etc. They impressed and influenced me greatly to dedicate my life to plant science. Most of them are still the classical works for plant researchers and students today. We are very pleased to see that as bio-science and biotechnology develop, many genes controlling the traits observed by Darwin have been cloned and studied; such as some genes controlling self-incompatibility, fertilization, heterosis; and also some genes responsible for the traits under artificial selection such as plant dwarfism, plant architecture, plant organ size, and etc.

We are celebrating the 150th anniversary of Darwin's *On the Origin of Species*. We have an excellent program on evolution in a broad spectrum in the coming three days. Although the time is quite short, we will still be able to feel from the presentation of every speaker the great impact of Darwin's theory on life sciences, paleontology, philosophy, and even social sciences, and the influence the development of modern society and the civilization of the world.

I would like to quote what Ernst Mayr said to conclude my remarks: "Darwin developed a set of new principles that influence the thinking of every person: the living world, through evolution, can be explained without recourse to supernaturalism."

Finally, I would like to thank all invited speakers, guests and all participants for taking part in this important conference. I wish the conference a great success. Wish all of you a pleasant stay in Beijing and enjoy the beautiful scenery at Peking University.

Thank you!

Congratulation from MOST of China

Xian'en Zhang



Good morning, Ladies and Gentlemen.

First of all, on behalf of the Ministry of Science and Technology of the People's Republic of China, I would like to congratulate the opening of Darwin 200 Beijing Conference. With the 200th anniversary for the birth of Charles Darwin and 150th anniversary for the publication of his work *On the Origin of Species*, we are gathering here to celebrate his role as the father of evolutionary theory.

On the Origin of Species, Darwin's most famous book, was published in 1859. Within 20 years it convinced most of the international scientific community that evolution was a fact. And during last half century, study of molecular biology and genomics even provided more solid evidences to the theory.

As we learned, Darwin is a self-taught naturalist, a naturalist by nature. In 1831, Darwin jumped at the offer to become a naturalist onboard a survey ship named the Beagle, an experience he would later characterize as "the first real training or education of my mind". He had no awareness that he had embarked on a trip that would forever transform the biological sciences. The 57-month around-the-global journey produced no moment of sudden realization, but provided exposure to the natural world and ample time for contemplation, that shaped his later thinking.

Darwin saw that random variations in organisms provided fodder for evolution. Modern scientists are revealing how that diversity arises from changes to DNA and can add up to complex creatures or even cultures. In Darwin's theory, evolution is driven by natural selection for inherited changes; but how those variations arise was a mystery in Darwin's time. Today we know that random changes in DNA can give rise to changes in an organism's traits, providing a constant source of variation. Biologists working with the most sophisticated genetic tools are demonstrating that natural selection plays a greater role in the evolution of genes than even most evolutionists had thought. Random genetic mutations having neither positive nor negative effects were once thought to drive most changes at the molecular level. But recent experiments show that natural selection

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