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From *Chinese Science Bulletin* to *Science Bulletin*: celebrate the coming 50th birthday

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As the only multidisciplinary journal supervised by Chinese Academy of Sciences and the National Natural Science Foundation of China, *Science Bulletin* will usher in its 50th anniversary in 2016. A fifty-year history for a journal is always remarkable. However, the more important reason to celebrate besides the great age is: the fifty-year old journal continues to be vigorous and influential.

Sixteen years after the establishment of the Chinese version of *Kexue Tongbao*, the version of foreign languages (mainly in English) was founded and named *Chinese Science Bulletin* in 1966, to further accomplish its role of introducing breakthroughs of Chinese scientists to the world. For a very long time (from 1966 to 2013), papers published in *Chinese Science Bulletin* are primarily or partially translated from their Chinese correspondences. To further distinguish these two versions and achieve their goals, respectively, the English version of the journal was re-launched with a new name—*Science Bulletin*, and the inaugural issue started to publish from January 2015, declaring a new era of this traditional journal with “the beginning of a rejuvenated excellence”, as said by Prof. Chunli Bai, in his editorial for the opening issue [1].

In its rather glorious history, *Science Bulletin* has published many landmark discoveries of Chinese scientists, including the synthesis of bovine insulin in 1966 [2] and the well-known Chen’s theorem on Goldbach conjecture [3]. In 1977, the journal published a paper entitled “A new

type of sesquiterpene lactone—artemisinin”. In this paper, scientists from the “Artemisinin structure research group” for the first time reported the synthesis of artemisinin, an anti-malaria chemical, which was later extensively applied as anti-malarial medicine [4]. The artemisinin research received many awards including the most exciting 2015 Nobel Prize in Physiology and Medicine awarded to Prof. Youyou Tu, one of the leading scientists of this project. In 1987, the journal reported another ground-breaking study on the superconductivity of Ba-Y-Cu-O [5] and greatly promoted the development of high-temperature superconductor materials world widely.

In those early days, *Science Bulletin* mainly published papers in the subjects of physics, chemistry and earth sciences, which reflects the key developing areas of the newly founded People’s Republic of China. After a long suspension period, the publication of *Chinese Science Bulletin* resumed in 1980 with its publishing scope expanded to every areas of life sciences, especially the following topics: plant and crop sciences, genetics, evolution, developmental biology, pathogen and human health, psychology and cognitive sciences, marine biology, ecology, etc. Some research fields are rather unique to China, for example the freshwater fish study, the conservative biology of panda and the golden monkey (*Cercopithecus kandti*). In this brief summary, we will review part of milestone studies published in *Science Bulletin*, focusing on life and medical sciences, to commemorate the glorious history of the journal.

1 Crop and plant sciences

To feed 22 % of the world population with only 7 % of the world’s total arable land, China has always given the

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highest priority to agricultural development and so as the research on crop and plant sciences. One of the most remarkable breakthroughs to increase grain production to date is the development and large-scale farming of hybrid rice. The preliminary research of hybrid rice originated from the discovery of male-sterile rice by Prof. Longping Yuan, who was later known as the “Father of Hybrid Rice.” His research paper about male sterility of rice published in *Chinese Science Bulletin* [6] opens the era of “Second Green Revolution” and revolutionizes rice cultivation in China, establishing China’s world-leading position in hybrid rice research and farming. Ever since then, studies about rice development [7–9], genetic analysis and disease resistance [10–17] have constantly been the focused disciplines of *Science Bulletin*. Together with rice, researches on other important crops, such as cotton [18–23], wheat [24–26] and the model plant *Arabidopsis* [27–32], have led to further understandings of plant physiology and the mechanisms of disease resistance.

2 Fish biology and fishery biotechnology

China has a long history of freshwater fish farming. As such, another world-leading research field of China is freshwater fish physiology and reproduction. Over the years, *Science Bulletin* published many papers about fish biology and fishery biotechnology, from genetic analysis [33], hormone-regulated growth of freshwater fish, ecological genetics and selective breeding in aquaculture animals [34, 35], to gene engineering fish [36]. These studies greatly boost the cell engineering technologies, such as genome manipulation in fish. The development of transgenic fish, especially, has greatly improved the growth, color, disease resistance, survival in cold and other physiological characteristics of fish. Led by Prof. Zuoyan Zhu, scientists from Chinese Academy of Sciences produced a transgenic triploid fish with a much faster growth rate and an increased forage utilization rate compared with the control carps. More importantly, the transgenic triploid fish is completely sterile. The completely sterile transgenic triploid carp such as the all-fish growth hormone (GH) transgenic carp is very suitable for industrialized conditions [34, 37–40]. Recently, the US Food and Drug Administration (FDA) has evaluated the ecological effects of current and potential uses of the field release of GH transgenic Atlantic salmon and concluded that the fish poses no foreseeable risk to nature. The approval of transgenic fish for human consumption by US FDA would in turn foster the scientific research on fish biology and other fields of hydrobiology.

3 Pathogens and disease mechanisms

Significant regional differences in life style as well as in the economical development make infectious diseases a major threat to China. Acting as a valuable showcase of China to the international science community, *Science Bulletin* reported a series of pandemic infectious diseases in the past years. The journal reported a quick method to detect SARS coronavirus using oligonucleotide microarray shortly after the pandemic of SARS [41] and the evolution and epidemiology of foot and mouth disease [42], avian H1N1 [43] and avian H7N9 influenza [44]. In 2013, *Science Bulletin* first reported the isolation and characterization of avian H7N9 virus [45], providing immediate information about the virus. Later, one of the senior authors, Prof. Hualan Chen from the Chinese Academy of Agricultural Sciences, was selected as “Ten people who mattered this year” by the *Nature* magazine because of her contribution to H7N9 study. In addition to infectious diseases, *Science Bulletin*’s publication interest reaches to almost every subfields of medicine, including but not limited to disease diagnosis and prognosis [46], pulmonary disease [47], cancer [48–50], heart disease and stroke [51].

One of the most striking findings in biomedical science in recent years is the identification of microRNAs (miRNA). miRNAs were found to act as effective regulators of transcription and translation [52] and cancer [53, 54]. In a special topic organized by Prof. Qimin Zhan in 2014 [55], the roles of miRNAs have been investigated in the pathogenesis in several types of human malignancies, such as esophageal cancer [56], gastric cancer [57] and liver cancer [58]. Furthermore, this special topic also discussed the functions of miRNA in maintaining genomic stability [59] and the hypoxic tumor microenvironment [60]. In response to different physiological status and environmental stimulations, the expression of miRNA alters differently [61, 62].

We noticed that, among the highly cited papers published in *Science Bulletin*, topics related to clinical medicine, immunology, microbiology, neuroscience and cognitive studies, and the developmental and reproductive biology of plants have received more intensive attention from our readers. These areas will remain as the main publishing interest of *Science Bulletin*.

4 Basic research and applications of stem cells

Stem cells sustain the capacity of self-renewal and offer exciting promises in both basic and applied research. Several well-known research laboratories have published their research work in *Science Bulletin*, which attracted tremendous attention from both general public and

scientific community. Articles about stem cells in *Science Bulletin* cover the following aspects: nuclear reprogramming [63, 64], mesenchymal stem cell differentiation [65], cell replacement therapy [66], induced pluripotent stem cell technology [67] and the generation of tetraploid complementation mice from embryonic stem cells [68, 69]. A recent special topic entitled “Stem cell, basis and application” [70] covers diverse aspects and topics on stem cell studies including cell sources for iPSC generation, epigenetic roles in somatic reprogramming and embryonic development, and cell source for treating diseases, which updates the information of current advances in stem cell biology.

5 Evolution and conservative biology

Biodiversity is abundant in China, but human activities have endangered many species, reducing numbers to the brink of extinction. Biological conservation study and survey provide essential and important scientific data for the government to draw up effective conservation policies. One of the top endangered animals in China is giant panda. The report about giant panda in *Science Bulletin* can be traced back to 1981, about the histology of newborn panda [71]. In 2013, a special issue entitled “Adaptive evolution and conservation ecology of wild animals” was published. This special issue focuses on diverse hot topics in conservational biology including the influence of China’s economic development on giant panda [72], factors that affect the natural regeneration of arrow bamboo in giant panda habitat [73], ranging pattern and population composition of *Rhinopithecus bieti* in Tibet [74], impacts of grassland fence on the behavior and habitat area of the *Przewalski’s gazelle* [75]. Several questions in adaptive evolution were also addressed at molecular level, from the natural selection of leptin [76], variation and trans-species polymorphism MHC [77, 78], to the molecular phylogenetic analysis of mitochondrial gene fragments in Chinese viviparid genus *Margarya* [79].

Another interesting topic in conservative biology is the effect of climate changes on protected animals, especially on bird distribution and migration in China [80, 81], which depends largely on the development of remote sensing technology. Prof. Peng Gong’s laboratory at Tsinghua University and Chinese Academy of Sciences published a series of papers to introduce the application of satellite remote sensing in the protection of national wetland reserves and greenes in China [82–85]. These researches represent a key frontier advancement of current conservative biology.

6 Genomics

Rapid advances in genetic research are ushering us into the genome sequence era, where an individual’s genome information is utilized for clinical practice. Chinese scientists have made a major contribution to genomics research, especially the human and rice genome sequencing projects (partially summarized by Youyong Lu in 2015) [86]. The first report of genome sequence in *Science Bulletin* was about duck mitochondria by Prof. Tong Shen in 1982 [87]. Later, other papers published subsequently, for example, the draft sequence of rice [88], genome sequence of SARS coronavirus [89], sequence analysis of the vomeronasal receptor *V2R* genes in mouse genome [90] and the identification of male non-coding RNA genes in the drosophila genomes by comparative genomic analysis [91]. The most spectacular results of the human genome study have been provided by genome-wide association studies (GWASs). Genome analysis revealed the secrets of sex and lifestyle in caterpillar fungus [92], and uncovered disease resistance mechanisms in *Medicago truncatula* [93]. Recently, a study using functional genomic analysis afforded a clue to reveal the special living strategies of microbial community from sea surface to deep sea in Hawaii [94]. In plant science, as *WRKY* transcription factors are important molecules in regulating plant development and resistance. Genome-wide analysis of *WRKY* gene family in *Arabidopsis lyrata* demonstrated a vital role of *WRKY* gene in plant adaptation [95].

Transgenic technology allows a gene of interest to be introduced into the genome, providing an extremely powerful tool in genetic studies. Over the past decade, efficient genome editing has been developed for a wide range of experimental systems ranging from plants to animals. A review from Prof. Jiarui Wu provided an overview of the current existing methods for making targeted transgenic mouse models [96]. Invited by the Editorial Office, Prof. Jiankang Zhu’s laboratory published their detailed procedure for CRISPR/Cas9-mediated gene editing in *Arabidopsis thaliana* in *Science Bulletin* in 2015 [97].

The history of *Science Bulletin* reflexes the 50-year development of science and technology in China; besides the advancement in life and medical sciences, the journal has published many papers in every field of natural sciences and engineering and witnessed the growth of generations of Chinese scientists. It is still a stimulating experience to read some of these articles even they were published half century ago. Preparing this summary gave us a unique opportunity to look into the history of *Science Bulletin*. Comparing with 50 years ago, so much has changed. However, *Science Bulletin* remains itself as a major voice within the science and technology community in China, and it manages to retain this role in the future.

There have been many challenges, today perhaps more than ever with the fast-growing scientific publishing industry. *Science Bulletin* will continue its primary initiative to serve as a platform and a bridge for Chinese and international researchers to communicate their original ideas and share their breakthroughs.

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