

THE INTRODUCTION OF EXERCISE PHYSIOLOGY IN CHINA: IN SEARCH OF THE FIRST PUBLICATION

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The development of physical education and sports in China may have started in the 19th century and proliferated in the latter part of the 20th century. Because of the importance of physical culture (or physical education) in the People's Republic of China, institutes of physical culture were founded in all provinces, producing students and researchers in this area. In 1978, the Shanghai Communicate once again permitted Chinese scholars to interact with the rest of the world. There has been tremendous progress during the past 25 years in the field of physical education and sports, in both competition sports and in the academic professions. The current study focused on the development of exercise physiology in China, especially before 1940. We were interested in identifying the first publication and the first research topic in exercise physiology, as well as in determining which article on exercise physiology was first published in a Chinese professional journal. In comparison with China, research and related works in this field were published much earlier in Western countries (John & Richard 1997; Wilmore & Costill 1994; Brooks 1981). In addition to finding the roots of exercise physiology in China, this study aims to improve understanding of the public's interest and needs in this area, and thus to appreciate the challenges faced by pioneers in this field.

Keywords: historic milestone, public health, sports sciences

Introduction

Development of exercise physiology in Western countries

Some authors have suggested that the first textbook of exercise physiology was *The Physiology of Bodily Exercise*, written by Fernand Lagrange, in France, in 1888. It was, however, generally regarded as a popular book on

health and exercise, but with a 'scientific' title. Using the criterion that a textbook should provide sound scientific concepts and information about an academic subject, it was suggested that Andrew Combe's *The Principles of Physiology Applied to the Preservation of Health, and to the Improvement of Physical and Mental Education* (Harper & Brothers, New York, 1843) would be the correct choice (McArdle et al. 1999).

The first research laboratory in physical education was established by George W. Fitz, in 1891, at Harvard's Lawrence Scientific School. Under his leadership, experiments focusing on the effects of exercise on the human body were conducted. With the contribution of other notable research laboratories, exercise physiology became an established field of study at colleges and

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universities. The founding of the Harvard Fatigue Laboratory, at Harvard University in 1927, signified another milestone. Since then, more than 352 research papers, monographs, and a book dealing with basic and applied exercise physiology were published from the Laboratory, and scientists and scholars from more than 15 countries contributed in laying the foundation for future research in exercise physiology. The leadership of D.B. Dill at the Harvard Fatigue Laboratory further facilitated the development and growth of exercise physiology (John & Richard 1997; Brooks 1981; Horvath & Horvath 1973).

The earliest paper in exercise physiology might be a seminar paper on the physiology of exercise, written by William H. Byford, in 1855. He emphasized the importance of further research, but it would be several decades before serious research efforts were conducted in exercise physiology. In 1898, the first volume of the *American Journal of Physiology* contained three exercise-physiology articles (Cunningham 1898; Stewart 1898; Welch 1898); in that first volume, only three articles directly involved physical activity. A few years later, more research papers from university laboratories appeared, and they were mostly in basic sciences. The *American Journal of Physiology* was the front-runner from 1898 to 1921, and it then had to share the limelight when *Physiological Reviews* began publishing (John & Richard 1997; Brooks 1981).

Another important contribution from Fitz was his emphasis on the scientific aspects of physical education training, leading to the establishment in 1891 of the Department of Anatomy, Physiology, and Physical Training at Harvard University. Students of physical education studied anatomy, physiology, and exercise physiology, lending support to the development of researchers in this field (John & Richard 1997; Brooks 1981; Fitz 1908).

The first publication on exercise physiology in China

For many years, Cai Qiao's *Exercise Physiology* (1940) has been considered China's earliest book on exercise physiology, signifying the beginning of exercise physiology in the country. Recently, Nie Jinlei found a book at the Hong Kong Baptist University, entitled *Physiology of*

Gymnastics, by Cheng Hanzhang, written in 1929. This discovery aroused great interest in the field of exercise physiology, in China and led to our investigation. Was this the earliest book of exercise physiology published in Chinese? How did exercise physiology develop in China before the 1950s? What was the author's background? To answer these questions, The Society of Chinese Scholars on Exercise Physiology and Fitness (SCSEPF) had called members through its website to join force in determining whether Cheng's *Physiology of Gymnastics* was the first published book on exercise physiology in China (www.scsepf.org, 2005). Subsequent research included Internet library databases and library-catalog search.

During the first phase of the study, which lasted 6 months, more than 169 libraries in Taiwan, Hong Kong, and mainland China were searched. The library research in Hong Kong was conducted by Lu Kui and He Peilin; in Taiwan it was conducted by Li Zhengchang, So Mei, and Wang Shunzheng; on the mainland a group of graduate students under the supervision of Nie Jinlei and Lin Hua did the work. Although the search was not exhaustive, it covered all the major universities in the three territories. The results indicated that Cheng Hanzhang's *Exercise Physiology* (1924) was the earliest book on exercise physiology in China.

Using the Internet library database, researchers found no records of publications in exercise physiology in China from 1880 to 1911 (Li 2000). Another search was conducted for books published between 1911 and 1924 in the natural sciences, medicine, education, and physical education (Beijing Library Catalog, 1911–1949; 1985). Although several books related to sports science were found, the only one related to exercise physiology was Cheng's *Physiology of Gymnastics*, published in 1924, and again in 1929 and 1939. Among six book series related to physical education and training were "Modern Knowledge Library" (the 1st edition of Cheng's *Physiology of Gymnastics*, published in 1924), "The Complete Library" (the 2nd edition of Cheng's *Physiology of Gymnastics*, published in 1929), and "Physical Educational Library" (the 3rd edition of Cheng's *Physiology of Gymnastics*, published in 1939) (Shanghai Library Catalog, 1979).

The research results led us to conclude that *Physiology of Gymnastics*, written by Cheng Hanzhang in

1924, was the earliest textbook on exercise physiology in China.

Cheng Hanzhang and his background

As a result of our findings, we searched for more information on Cheng's background. According to the records of Commercial Press (1992, 1987), Cheng Hanzhang was born in 1897 and worked as an editor for Commercial Press at Shanghai. During 1920 through 1923, he took part in writing and proofreading work in several textbooks for middle school and primary school students, such as *Xin Fa Jiao Cai*, *Xin Fa Jiao Ke Shu*, and *Xin Sue Zhi Jiao Ke Shu*. Later he wrote books about human physiology and hygiene, and also translated medical books. During the period from 1910 to 1950, Cheng published more than 30 books, many of which were republished several times in later decades. During the 1920s, the influence of the book series "Everyman's Library" (published in Great Britain) prompted Commercial Press to initiate publication of a similar book series in China to serve the general public. Many similar book series were published during the subsequent 6–7 years, including "Chinese Literature Library", "Medical Library", "Physical Educational Library", "Modern Knowledge Library", and "The Complete Library". Most of Cheng's books were published during the same period (Beijing Library Catalog, 1911–1949; Shanghai Library Catalog, 1979). Our findings also suggested that professionals and scholars in medicine and physical education were not interested in publishing textbooks that appealed to the general public. Cheng, an editor who had no training in exercise physiology, was responsible for writing the first textbook to introduce the effects of exercise on human body and its related mechanism.

Development of exercise physiology in China

As a result of the first Opium War and the Nanking Treaty, in 1841, China was forced to open up to the outside world. The preservation of traditional and native sports and the introduction of Western sports created no conflict, because there were many other major changes in China during this period. Freeman (1987) suggested that the development of sports and physical education in China was patterned after the "traditional practices and values of its past culture" and the "influence of the customs and

beliefs" of other nations, particularly when they have acted as colonial powers (Wagner 1989).

After the Opium War, many countries used "war payments" to introduce and support hospitals and schools in China, using European and American models (Van Dalen et al. 1953). During the late Qing Dynasty, some Chinese students were also sent abroad to study natural sciences. Some studied physical education, and since their return to China they have played an important role in introducing Western pedagogy and practices (Knuttggen et al. 1990). Furthermore, some schools and universities have been supported by the church and by nongovernmental organizations such as the Young Men's Christian Association (YMCA). The latter also played a prominent role in promoting the development of Western physical education in China (Fu 2000). As a result, the development of physical education and sports was facilitated; new sports venues, such as stadiums and exercise facilities, were constructed, more organized sports competitions were held, and more physical educational teachers were trained. All these efforts contributed to the importation of Western physical education ideology into China (Fu 2000).

At the beginning of the 20th century, the imperial examination system was abolished and "new-type schools" were introduced. Students in these schools were initially required to do 2 or 3 hours per day of military exercise, but this was subsequently removed from the public school curricula in 1922. Track and field, gymnastics, and other Western sports were offered as core subjects in primary and secondary schools, and physical exercise came to be known as "physical education" (Fu 2000; Bi 1998).

The State's Ministry of Education Physical Education Committee was in charge of standardizing physical education in colleges and schools. A national conference on physical education was convened, and the Law of Physical Education, the Plan for Implementation of the Physical Education Program, and a set of regulations concerning public physical education programs were decreed. These programs introduced national standards of physical education and resulted in substantial progress in the training of teachers, the acquisition of teaching materials, and the organization of sports competition and extra-curricular sports activities (Fu 2000; Bi 1998; Wagner 1989; Van Dalen 1953).

Many textbooks and articles were published as a result of the increasing popularity of “national physical education”. The Commercial Press (1992, 1987), for example, published more than 20 books on exercise and physical education during this period (1920–1940), including *Theory of Physical Education* (Cong 1929), *An Introduction of Physical Education* (Chen 1933), *Physiology of Gymnastics* (Cheng 1924), and *The Methods to Make Muscle Stronger* (Zhao 1934). Indeed, most books related to physical education were published by the Commercial Press during this 20-year period. The important role that publishing companies were able to play in the development of science and in meeting the people’s needs must not be overlooked.

Our search of both libraries and the Internet did not uncover any other books related to exercise physiology during the period of 1920–1940. Possible compelling reasons could be that there were no scientists conducting research in exercise physiology in China during that time, that research in physiology concentrated more on clinical findings and less on effects of exercise on the human body, and that Cheng Hanzhang was an editor rather than a researcher in exercise physiology. Although his book received good public attention, he was not able to contribute further to the development of exercise physiology.

Conclusions

The publication of the first textbook in exercise physiology by Cheng in 1924 did not represent the beginning of exercise physiology as an academic discipline in China. Research is an essential driving force in scientific development and acquiring knowledge from other research findings. Our review of the historical development of exercise physiology in the Western countries, such as the United States in the 19th and 20th centuries, has further supported this view.

From our study we conclude that, during the period 1920 through 1940, exercise physiology development in China was limited to the knowledge introduced from Western books. The major objective of the publications during this era was to provide the general public with information about exercise rather than to serve researchers and promote the development of exercise physiology.

The political and economic turmoil during this period further delayed any significant developments of physical education and sports, until the founding of the Peoples’ Republic of China, in 1949.

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