

# Backgrounds, Contents, and Influences of *Xi Yi Yan Ke* (*Ophthalmology in Western Medicine*), the First Western Medical Monograph on Ophthalmology in China

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## Abstract

John Glasgow Kerr was the second director of the First Western-Style Hospital in China, which was an eye hospital. *Xi Yi Yan Ke* (*Ophthalmology in Western Medicine*), which is translated and compiled by Dr. Kerr and first published in 1871 and reprinted in 1880, was the first western medical monograph on ophthalmology in China. The book consists of 53 sections, covering symptom inquiry, symptom examination, cataract surgery, ophthalmoscopy, conjunctival disease, eye trauma, corneal disease, scleral disease, retinal, and optic nerve diseases, glaucoma, and others. There are 23 (groups of) pictures, mainly about the anatomy of the eyeball, eye muscles, optic nerve, various instruments for ophthalmic surgery, etc. As a western medical book, *Xi Yi Yan Ke* attached great importance to eye disease surgeries, which promoted the treatment of eye diseases and the development of western medicine in China. However, it also had some limitations due to the limitations of western medicine at that time.

## Keywords

John Glasgow Kerr, *Xi Yi Yan Ke* (*Ophthalmology in Western Medicine*), Ophthalmology, Western Medicine, First Monograph, China

## 1. Introduction

Philosophical thoughts have great influences on the formation and development of medical theoretical systems. The theoretical system of traditional Chinese medicine (TCM), which has the Primordial Qi (Yuan Qi) theory and Yin-Yang and Five Element theories as important components, was basically formed during the Spring and Autumn and the Warring States periods. As a branch of TCM, TCM ophthalmology also develops with it. The first ophthalmology monograph of TCM, known as *Long Shu Yan Lun* (*Longshu Treatise on Eye Diseases*), was produced in the Tang dynasty (618-907 CE), but the original book has long been lost. *Yan Ke Long Mu Lun* (*Long-mu's Ophthalmology*) (Figure 1), *Yin Hai Jing Wei* (*Essential Subtleties on the Silver Sea*) and *Fu Shi Yan Ke Shen Shi Yao Han* (*A Close Examination of the Precious Classic on Ophthalmology by Fu Renyu*) are all valuable academic books on TCM ophthalmology and among which, *Yan Ke Long Mu Lun* is the earliest existing monograph on TCM ophthalmology. Western medicine began to have an impact on TCM in the early nineteenth century. Benjamin Hobson compiled and published five kinds of western medicine books from 1851 to 1858 to systematically spread western medicine to China for the first time, but there was little about ophthalmology (Zhao, 1991). To our knowledge, *Xi Yi Yan Ke* (*Ophthalmology in Western Medicine*) (Figure 1 Left, Figure 2, and Figure 3) translated and compiled by John Glasgow Kerr in 1871 was the first western medical monograph on ophthalmology in China and the books that were reprinted in 1880 may be the oldest existing version. This paper attempts to analyze the backgrounds, contents, and influences of *Xi Yi Yan Ke*.

In most instances, books always have a preface after its cover page, offering the basic information such as the time and background when it was written to assist people in reading. However, there is no preface in *Xi Yi Yan Ke*, which



**Figure 1.** In the courtyard of Shandong Ophthalmology Museum, there is a wall, in Chinese, it is called “Zhao Bi (a screen wall facing the gate of a house)”. One side is made of wood material, engraved with the preface of the earliest ophthalmic book in traditional Chinese medicine, named *Yan Ke Long Mu Lun* (left); the other side is made of white marble, engraved with the cover, table of contents, and several pictures from the first ophthalmic book in western medicine, which is *Xi Yi Yan Ke* (right). The wall is a combination of traditional Chinese and western medical elements.

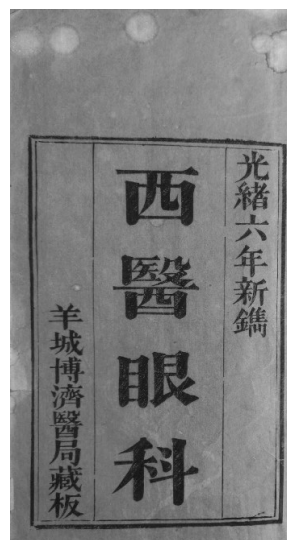


Figure 2. Cover page of *Xi Yi Yan Ke*.

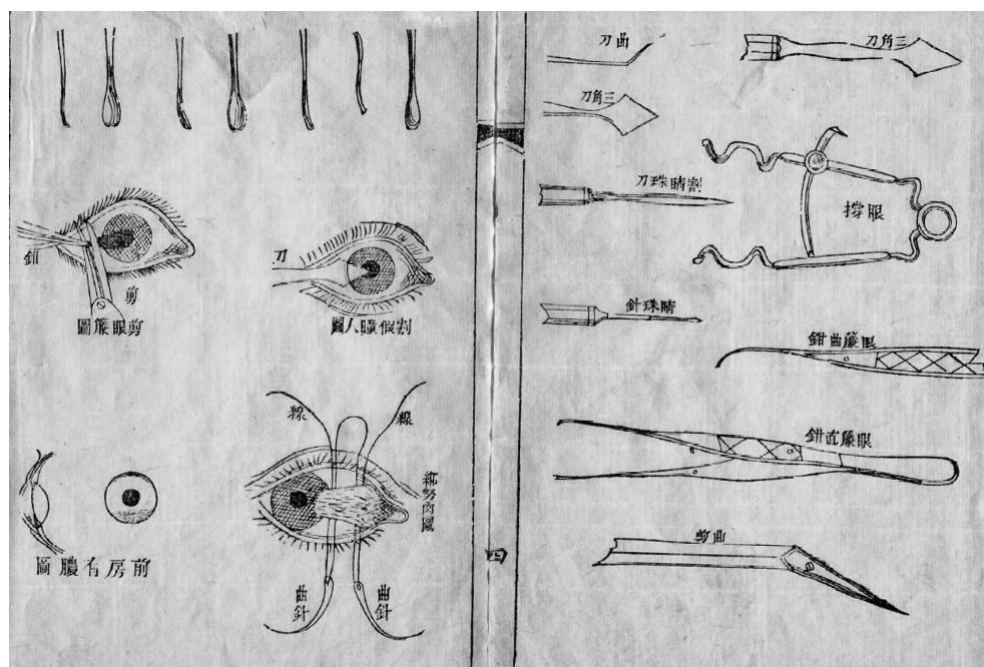


Figure 3. Schematic diagrams of ophthalmic surgeries and various instruments for ophthalmic surgeries.

makes it difficult for readers, including us while preparing for this paper, to understand the book and connect the book with the social backgrounds at that time. Therefore, we have consulted a lot of historical data about the medical activities of John Glasgow Kerr in China, including the history of the first western-style hospital in mainland China (known as Canton Pok Tsai (Boji) Hospital or Canton Hospital, growing out of the Ophthalmic Hospital in San-taulan street in Canton) (Chan, Liu, & Tsai, 2011) that he has worked in to restore the backgrounds of the book to the greatest extent and briefly introduce its contents and influences.

## 2. Backgrounds

### 2.1. Geographical Conditions and Social Backgrounds

Affected by the geographical environment, Lingnan area (south of the Nanling Mountains) has been a high incidence area of various diseases for thousands of years. Located in Lingnan area, Guangzhou is an important foreign trade port in China, whose large population, frequent personnel movements but weak health consciousness have made it a severely afflicted area in Lingnan area. In the middle of the Qing dynasty (1636-1912), the traditional medical system was not well established and the social medical resources were scattered. Traditional Chinese medical providers existed in the form of “providers at home or drug store” instead of “providers at hospitals”. Doctors practiced medicine alone and scattered. They usually provided medical treatment at their own home or drug store or at the patients’ home being invited. A lack of division of labor and collective collaboration led to low efficiency in medical activities, especially in the fields of surgery, ophthalmology, and obstetrics. The traditional medical system of China failed to meet the needs of the society in medical technology and management mode at that time. The social environment and medical conditions of Guangzhou in the middle of the Qing dynasty sparked the inner desire of the people for medical changes, which created opportunities for western missionaries to enter China with the aid of medical activities.

At the same time, western medicine developed rapidly in the West, especially in the fields of surgery, obstetrics, and ophthalmology, making them the first batch of western medicine branches introduced to China.

### 2.2. Peter Parker Founded the First Western-Style Hospital in China, The Ophthalmic Hospital in Canton

Dispatched by the American Board of Commissioners for Foreign Mission, Peter Parker (1804-1888), a physician, and missionary graduated from Yale University, arrived in Guangzhou on October 26, 1834 (Wang, 2003). Knowing that there were many ophthalmic patients in Canton, he also went to New York Eye Infirmary (now known as New York Eye and Ear Infirmary) to study ophthalmology (Yuan & Yan, 2016). After learning Chinese in Singapore, he returned to Canton in September 1835. Howqua (also known as Wu Bingjian), the wealthiest man in China during the nineteenth century, supported Dr. Parker by providing the place for hospital at San-taulan street. Dr. Parker then founded the Ophthalmic Hospital (also called Canton Hospital), mainly treating eye diseases for the common people. This is the earliest eye hospital in Canton and the first western-style hospital in mainland China, laying a foundation for the spread of western medicine, especially ophthalmology.

Dr. Parker’s medical degree thesis was about an eye disease. In addition, he selected eye diseases as the main field, not only because eye diseases, such as cataract and trachoma, were very prevalent in Canton at that time, but also because surgeries in western medicine had advantages over TCM in treating some eye

problems, such as cataract surgery, which can restore vision for the patients. Soon after the hospital opened, Thursday becomes the fixed day for surgeries.

### 2.3. The Name Changed to Pok Tsai (Boji) Hospital

In December 1853, John Glasgow Kerr (1804-1901), who was a graduate of Jefferson Medical College in Philadelphia and a Presbyterian medical missionary, left New York for China. He arrived in Guangzhou on May 15, 1854 and began his medical missionary work. In 1855, Dr. Kerr, a surgeon succeeded Dr. Parker to take charge of the Canton Hospital. However, the hospital was destroyed during the Second Opium War and Dr. Kerr had to return to the United States. In 1859, he came back to China and rebuilt the hospital in the suburbs of Guangzhou, named “Canton Pok Tsai (Boji) Hospital”. To develop the hospital into a regular modern western-style hospital, Dr. Kerr relocated it on Yan-tsai Street and officially named it “Pok Tsai (Boji) Hospital”. Since then, Dr. Kerr innovated hospital management, expanded medical services and hospital scale continuously, making Pok Tsai Hospital the largest and best western medicine hospital in East Asia at that time (Peng, n.d.).

After moving the hospital to the new place, Dr. Kerr began cultivating local medical students. Relying on Pok Tsai Hospital, Dr. Kerr founded Pok Tsai Medical School in 1866 (Fu, 2018), which trained the first batch of western medicine practitioners for China, and Pok Tsai Hospital was recognized as the cradle of western medicine education in China. In 1886, 20-year-old Sun Yat-sen, who served as the provisional first president of the Republic of China, enrolled in the medical school under the name of “Sun Yixian” and became a student of Dr. Kerr (Xu & Zhang, 2011). Now, the school is a part of the Sun Yat-sen University.

At that time, the process of cultivating local practitioners using western methods was very slow, which was determined by the situation the western medicine teachers was in. They were busy with medical practices and did not have enough time for teaching. Compiling medical books and founding medical journals were important ways the missionaries used to spread western health and medical knowledge in Guangzhou. The large-scale import of western medicine and health knowledge at the Guangzhou Port began in the middle of nineteenth century and Dr. Kerr had made outstanding contributions.

Dr. Kerr started to translate and compile western medicine books as teaching materials in 1859 (Cadbury & Jones, 1935). In 1865, the early days after the relocation of Pok Tsai Hospital, Chinese people were still unwilling to accept thoughts and things that were new to them, so the number of patients coming to the hospital for western medicine treatment was relatively small. Dr. Kerr had more time to continue to translate books. By the time of Dr. Kerr’s death in China in 1901, he had trained 150 local practitioners (some of his students were women), translated and compiled more than 34 volumes of western medicine books, covering almost all fields of western medicine (Zhang et al., 2018). The books



greatly promoted the cultivation of western medicine practitioners and the spread of western medicine in China. Dr. Kerr has made great contributions to the development of medical treatment and health care in modern China (Chen & Zhang, 1997). He opened a Vaccine Department at the hospital in 1859 and opened the first mental hospital in China in 1899. In addition, Dr. Kerr published *Weisheng Yaozhi (Essentials to Hygiene)* which highlighted the priority of preventing illnesses through good hygiene in 1875. Considering the contribution that Dr. Kerr has made, he was also elected as the first president of the CMMA (China Medical Missionary Association) in 1886 and served as the first editor of *China Medical Missionary Journal*.

In the field of ophthalmology in western medicine in China, before Dr. Kerr compiled *Xi Yi Yan Ke*, there was only a few contents about eye diseases in Benjamin Hobson's book entitled *Xi Yi Lve Lun (General Introduction of Western Medicine)*, published in 1857. At that time, Dr. Kerr's motivation for translating and compiling this monograph on ophthalmology was mainly from the social background of the prevalence of eye diseases in China, and it was also closely related to his professional knowledge accumulated at school and his extensive experience in clinical practice.

### 3. The Main Contents and Influences of *Xi Yi Yan Ke*

#### 3.1. General Information of the Book

The book was printed in the sixth year of Guangxu Emperor (1880). Although *Xi Yi Yan Ke* was the first western medical textbook including western ophthalmology in China, Chinese traditional printing technology of woodblock printing was adopted. In China, woodblock was commonly used for traditional prints, which can be traced back to the Tang dynasty (618-907). Lithography developed after woodblock printing, which was introduced into China by missionaries in the 1820s and the 1830s. The reasons for the printing of the book adopting traditional woodblock printing instead of lithography might be related to the society's insufficient cognition and mastery of this new technology, the high cost and the lack of essential materials. The book used bamboo paper (a kind of paper made from bamboo, commonly-used for printing of books in Qing dynasty) and was a thread-bound book. Thread-bound book, which appeared in the middle of the Ming dynasty (1368-1644), refers to the type of books bound by threads. *Xi Yi Yan Ke* is 13 cm wide, 24 cm high and 1.3 cm thick.

The title on the cover of the book is "*Xi Yi Yan Ke (Ophthalmology in Western Medicine)*", but the title on the table of contents page and on the middle of each page is "*Xi Yi Yan Ke Cuo Yao (Abstracts of Ophthalmology in Western Medicine)*". The book has 98 pages, including 1 cover page, 6 pages of pictures and notes, 3 pages of the table contents, and 88 pages of the main body. The book consists of 53 sections, covering symptom inquiry, symptom examination, cataract surgery, ophthalmoscopy, conjunctival disease, eye trauma, corneal disease, scleral disease, retinal, and optic nerve diseases, glaucoma, and others. There

are 23 (groups of) pictures in this book, which are mainly about the anatomy of the eyeball, eye muscles, optic nerve, various instruments for ophthalmic surgery, schematic diagrams of ophthalmic surgery, schematic diagrams of ophthalmic diseases, and schematic diagrams of ophthalmoscopes (Figure 3).

There is a controversy about whether the book was directly translated from an English medical book on ophthalmology or not. Dr. Kerr studied medicine at Maysville, Kentucky in 1842 and graduated from Jefferson Medical College in Philadelphia in 1847. He had practiced medicine in southern Ohio for seven years before he went to China (Xu, 2011; Zheng & Liu, 2016). We proposed that the book was directly translated from an English book, because it was almost impossible for a doctor who was not an ophthalmologist, like Dr. Kerr, to write a Chinese monograph on ophthalmology. The contents of the book confirmed that it was a translation work, but Dr. Kerr also combined his own thoughts and clinical experience. The following are two evidences supporting this hypothesis. Firstly, on the table of contents page and the middle of each page, the name of the book was *Xi Yi Yan Ke Cuo Yao* (*Abstracts of Ophthalmology in Western Medicine*), two more Chinese characters compared with the name on the cover page. According to the explanation on the *Modern Chinese Dictionary*, the meaning of “Cuo Yao” is “brief points or abstracts”, so the book may be a translation and compilation of English books. There are possibilities that Dr. Kerr only translated the main parts of several English medical books and then compiled the book. In other words, *Xi Yi Yan Ke* is a translation work but not a word for word translation. More direct evidence is that on page 23 of the main body, Dr. Kerr mentioned that he had practiced medicine in Guangzhou for more than 20 years and treated many difficult diseases, which he had recorded in a book and he also wanted to translate *Xi Yi Yan Ke Cuo Yao* and introduced it to China. In this part, Dr. Kerr used the phrase which means “translate” in Chinese. He also added rare cases after the theoretical knowledge to provide references for students. Therefore, the book is likely a translation and compilation work, containing main contents from English ophthalmology books and the author’s medical experience, which makes it more practical compared with pure translation works. However, it is not yet possible to determine which book(s) was translated based on the information currently collected.

While translating and compiling the book, Dr. Kerr used simple and concise language and focused on the readability and practicality. In ancient China, people used classical Chinese (Literary Chinese) in written and oral language. With time passed by, people gradually abandoned classical Chinese that was difficult to understand. Vernacular Chinese was first used in oral language and then in the late Ming dynasty to the Republic of China, people started using vernacular Chinese in written language. Classical Chinese attached great importance to parallelism and rhythm and used literary and cultural allusions extensively, thereby contributing to the difficulty of comprehension. Compared with classical Chinese, vernacular Chinese is simple and easy to understand for the public, which is more

conducive to spreading information. *Xi Yi Yan Ke* was written at the end of the Qing dynasty, the beginning stage of using vernacular Chinese in written language. In order to facilitate the readers' understanding and to spread western medicine and culture to the greatest extent, Dr. Kerr tried to use as much vernacular language as possible in his translation. As Dr. Kerr had a good command of Chinese and was assisted by Chinese native speakers, the book is not obscure for the readers living 140 years after its publication. Except that some terms need to be converted into the corresponding terms that were currently used, there are no stumbling blocks in reading.

In order to integrate into Chinese society, missionaries learned Chinese, followed Confucian rituals and dressed in Confucian clothes. While writing this book, Dr. Kerr also tried to follow Chinese expression habits. For example, in the prescriptions of some medicines, Dr. Kerr used "Liang", "Fen", "Qian", which are the measuring units commonly used in TCM prescriptions. These kinds of units are simple and well-acceptable by the Chinese doctors and the public, making western medicine knowledge easy to understand, learn, and practice.

Although the book was translated from English materials, there was no punctuation mark in the whole book, which is a typical characteristic of ancient Chinese texts. Ancient Chinese learned "Ju Dou" (pausing at the end of a phrase or sentence) before reading texts. "Ju" (a circle, or a full stop) was used at the end of a sentence, and "Dou" (a punctuation mark similar with comma) was used in a sentence where a pause was needed. Students learned how to make pauses from their teachers with a red writing brush at the beginning stage and with their ability improved; they can read texts without "Ju Dou".

### 3.2. Advancements and Limitations of *Xi Yi Yan Ke*

In the field of ophthalmology, compared with TCM, western medicine has its advancements in surgery. In most cases, TCM makes use of herbs and herbal formulas to treat eye diseases. Although there are records of couching for cataract and pterygium surgery in *Yin Hai Jing Wei*, a classic fifteenth century text on Chinese ophthalmology, in the actual treatment, there were relatively few surgeries performed by traditional Chinese doctors. *Xi Yi Yan Ke* attached great importance to the surgery of eye diseases. Surgeries in the book were treated for cataract, pterygium, symblepharon reconstruction, various eye trauma, intraocular tumor, glaucoma, enucleation. Interestingly, surgical views, and principles are quite similar to those of modern surgeries.

Although in the diagnosis and treatment of eye diseases, western medicine had advantages over TCM, however, it also had some limitations, which mainly due to the limitations of western medicine at that time. For example, both TCM and western medicine have described the symptoms of certain systemic diseases that affect eyes (such as measles), conjunctival, and corneal inflammatory diseases, and realized that they could be infectious. However, the understanding of infectious diseases was limited by their knowledge of microorganisms: Robert



Koch discovered the anthrax bacillus in 1876 and *Mycobacterium tuberculosis* in 1882; regarding neonatal suppurative conjunctivitis, which was the most harmful eye diseases to new-borns, the pathogen was not separated from the eye until 1879; antibiotics were not clinically used until the 1940s; small viral microorganisms were first observed in 1935-1939; *Chlamydia trachomatis* was first discovered in 1958. The lagging understanding of the nature of the diseases made western medicine also have many limitations in the treatment of eye diseases caused by microorganisms.

## 4. Influences of the Book

### 4.1. Influences on the Development of Ophthalmology

By the time of his death in 1901, Dr. Kerr translated or compiled 34 books on western medicine, which played an extremely important role in promoting the spread of western medicine in China. *Xi Yi Yan Ke* was the earliest batch of medical books translated by Dr. Kerr, for which there may be three reasons. Firstly, Pok Tsai Hospital grew out of Ophthalmic Hospital in Guangzhou, which attached great importance to ophthalmology. Secondly, Dr. Kerr was a general practitioner, had skilled at diagnosis and treatment of eye diseases. According to the record on July 1, 1875, Dr. Kerr performed 8 surgeries, among which 4 were ophthalmic surgeries. His clinical activities in this field promoted the translation of this ophthalmology book. Thirdly, Guangzhou has a humid subtropical monsoon climate, where epidemics and eye diseases are common, so Dr. Kerr chose subjects according to the regional diseases and translated relevant books such as *Xi Yi Yan Ke* and *Re Zheng (Heat Symptom-complex)* as teaching materials. As the first monograph on ophthalmology, *Xi Yi Yan Ke* led the development of ophthalmology in western medicine in China.

Part of Pok Tsai Hospital turned into the current Zhongshan Ophthalmic Center of Sun Yat-sen University, the first modernized multifunctional ophthalmic center to combine medical care, teaching, research, and preventive ophthalmology in China. Zhongshan Ophthalmic Centre of Sun Yat-sen University has ranked first in the Top 10 Ophthalmology Hospitals in China released by the Hospital Management Institute of Fudan University in the past 10 consecutive years. The outstanding achievements of Zhongshan Ophthalmic Center of Sun Yat-sen University are closely related to its solid foundation laid by Pok Tsai Hospital and the early western medicinal education in Guangzhou.

### 4.2. Influences on the Development of Western Medicine

While spreading ophthalmology knowledge in the book, *Xi Yi Yan Ke* also promoted the dissemination of western medicine in China. Although Pok Tsai Hospital grew out of an ophthalmic hospital, it covered almost all the clinical fields after development (Lin et al., 2012). In 1875, Pok Tsai Hospital had approximately 1000 inpatients, and since then, the number of patients each year has reached 18,000 (Li & Liu, 2017). The hospital also cultivated 120 physician assis-

tants. In 1866, after moving to the new address, Pok Tsai Hospital opened a medical school, which was the first professional western medical school in mainland China. In 1879, the medical school was independent from Pok Tsai Hospital and officially renamed Nan Hua Yi Xue Xiao (Canton Medical College), specializing in medical teaching. The college trained a large number of students, most of whom were active in southern China after graduation. They directly engaged in clinical activities as doctors or medical education as teachers, greatly promoting the spread of western medicine in the region. The educational mode that western medicine adopted has also broken the inefficient model of cultivating medical practitioners, which was handed down from masters to favored apprentices, which had been existing for thousands of years in the development of TCM.

The establishment of the first western-style hospital and its development to and as a general hospital are backgrounds of the appearance of *Xi Yi Yan Ke*. Dr. Kerr's passion for saving lives, translating books and promoting education contributed a lot to the publication of the book. *Xi Yi Yan Ke*, as the first western medicine book on ophthalmology in mainland China, has greatly stimulated the development of ophthalmology and other disciplines in western medicine in China. The culture and concepts of the west were also brought into China and spread gradually.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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