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Chinese Medicine and Culture
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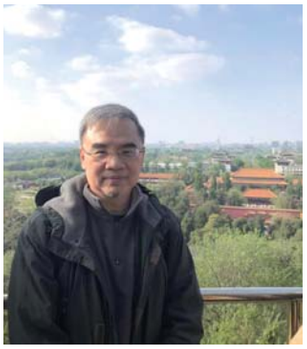
Special Issue: Encounter of Chinese Medicine and Modern Western Medicine in China

Guest Editors-in-Chief:

Michael Shiyung LIU (刘士永)



Michael Shiyung Liu is a distinguish professor of the History of Science and Philosophy, Shanghai Jiao Tong University and a professor of History of the Asian Studies Center, University of Pittsburgh. His research interests include Japanese medicine, East Asian environmental history, modern history of public health in East Asia. He is the author and co-author of books such as *Katana and Lancet: Japanese Adaptation of Western Medicine* (《武士刀与柳叶刀：日本西洋医学的形成与扩散（增订版）》), and textbook *Modern Medicine in East Asia* (《现代医学在东亚》) along with various monographic and journal articles related to above topics. In addition to these works, his latest manuscripts are on the themes of "international health during the Cold War East Asia" and "medical modernity in East Asian societies since late-19th century".

JIANG Yuhong (蒋育红)

Jiang Yuhong is an associate professor of School of Humanities and Social Sciences, Peking Union Medical College. She has been awarded several fellowships including Visiting Research Scholar of Fulbright. Her research interests now focus on medical humanities and history of medical and health exchanges between China and the United States. She was appointed the Visiting Associate Professor of Krieger School of Arts and Science of Johns Hopkins University in 2023. She has translated 4 books on medical history and co-edited the book *The Legacy of PUMC: Centennial Essays* (《北京协和医学院百年纪念文集》). In the past years, she published articles on the history of nursing in China, the history of the Peking Union Medical College, the history of China Medical Board, and on medical humanities in both English and Chinese. Currently, she is serving in the editorial board of *The Asian Journal of Medical Humanities*.

Purpose of the Issue

This special issue, "Encounter of Chinese Medicine and Modern Western Medicine in China", seeks to present the complexity of the interaction between Chinese medicine (traditional Chinese medicine) and modern Western medicine (biomedicine) from the late Qing period to the early period of the People's Republic of China. This issue intends to include the most recent research on the encounter of the two medicines in China spanning diverse social, institutional, and regional contexts. In addition, the issue aims to introduce original research with new ideas, as well as new data and research methods on a sound scholarly basis. The guest editors hope the collection of articles in this issue meets the purpose of presenting the scholarship of the authors. The encounter of the two medicines in China is particularly reflected in the multifaceted ways in which Chinese medicine responded to, negotiated with, and at times collaborated with Western medicine, reshaping the contours of medicine in China. The hybrid, adaptive, and interactive character of medical modernization in China is closely related to the encounter and is a major theme in articles of this issue. We are indebted to the journal of *Chinese Medicine and Culture* for providing a platform for scholars to share their recent scholarly work on this intriguing and significant theme. We hope this special issue will arouse further research interests on the theme both in and outside China in the future.

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General Information

AIMS AND SCOPE

Chinese Medicine and Culture is an interdisciplinary academic journal focusing on the study of Chinese medicine. It aims to promote communication and dialogue between researchers in the natural sciences and humanities of Chinese medicine. The objectives are to build an interactive platform for interdisciplinary research on Chinese medicine and to comprehensively reflect the high-level and latest research results of Chinese medicine in the fields of medical science research, cultural exchange and historical heritage conservation.

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Editorial

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MEDICINE AND CULTURE

OPEN

Encounter of Chinese Medicine and Modern Western Medicine in China

Michael Shiyung LIU[1,2], JIANG Yuhong[3,✉]

1 Introduction

The history of medicine in modern China has frequently been framed through a lens of "Westernization", in which traditional Chinese medicine (TCM) is portrayed as gradually yielding to modern Western medicine. Such a binary framework, however, oversimplifies the intricate realities of medical encounters in China. As Bridie Andrews observes, "Chinese medicine and Western medicine in China did not merely confront each other as rival systems; they also interacted in ways that led to redefinitions of practice and knowledge on both sides".[1] Far from disappearing, Chinese medicine demonstrated remarkable adaptability, continuously reinventing itself and, at times, engaging actively with biomedical concepts to produce hybrid forms of knowledge and practice. Li Tao, adopting a more conservative analytical perspective, identifies several key dimensions of the tension between Western medicine and Chinese medicine: the theoretical and epistemological differences—such as the classical yin-yang (阴阳) framework versus modern natural science; the capacity of each system to evolve and employ defensive strategies; and the socio-political competition between TCM and biomedicine.[2] These dimensions reveal a layered, dynamic process rather than a simple story of replacement.

This special issue, "Encounter of Chinese Medicine and Modern Western Medicine in China", seeks to illuminate these complex historical processes from the late Qing period through the early People's Republic of China, spanning diverse social, institutional, and regional contexts. The ten articles included here collectively demonstrate the multifaceted ways in which Chinese medicine responded to, negotiated with, and at times collaborated with Western medicine, reshaping the contours of both traditions. By moving beyond a simplistic narrative of Western dominance, this issue underscores the hybrid, adaptive, and interactive character of medical modernization in China.

2 Scientification and intellectual adaptations

In his influential work *Jing Dai Zhong Xi Yi Lun Zheng Shi* (《近代中西医论争史》 *The History of Modern Sino-Western Medical Controversies*), Zhao Hongjun (赵洪钧) observes that efforts to scientize Chinese medicine were closely connected to initiatives that uphold China's cultural heritage amid Western influence. These efforts were not merely intellectual exercises but reflected broader concerns about China's identity in a rapidly globalizing world.[3] Building on these insights, several contributions in this issue revisit the question of scientification from multiple perspectives. Michael Shiyung Liu (刘士永) situates the modernization of Chinese medicine within the broader East Asian intellectual landscape, illustrating how Japanese Kampo medicine offered a model for balancing traditional medical knowledge with emerging scientific principles. Li Panfei (李盼飞), focusing on the classic *Shang Han Lun*(《伤寒论》 *Treatise on Cold Damage*), demonstrates how scholars reinterpreted its *Liu Jing* (六经 six meridian) theory using the frameworks of bacteriology and physiology, thereby establishing a scientific foundation for TCM. Dawei (David) Chen (陈达维) reconstructs early research on the Chinese materia medica at the Peking Union Medical College, showing that what became a cornerstone of scientific inquiry arose less from top-down planning and more from contingent encounters, local experimentation, and missionary initiatives.

Other contributions emphasize the influence of evidence-based philosophy on clinical practice. Pi Kuo-li (皮国立) provides an intellectual history of cancer diagnosis, tracing the shift from inference-based observation in classical practice to modern imaging and laboratory

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analysis. Liang Qiuyu (梁秋语) presents the changes on the connotation of *Zang Xiang* (藏象 visceral manifestation) and organs in Chinese medicine that was influenced by the encounter of the two medicines. Pang Jingyi (庞境仪) examines the reception of Salvarsan, the first synthetic chemical medicine, and shows how TCM practitioners reclassified it within their own pharmacological frameworks. Far from being displaced by Western medicine, Chinese medicine selectively appropriated new therapies, ensuring both theoretical continuity and clinical relevance. Collectively, these studies demonstrate the dynamic interplay between tradition and modernity, revealing Chinese medicine's adaptability and its ongoing negotiation with Western medicine in the modern era.

3 Multidimensional medical contexts

Medical encounters in modern China were profoundly shaped by the interplay of social and institutional factors. Elisabeth Hsu once emphasizes that China's efforts to modernize Chinese medicine were not spontaneous but became systematic during the 1950s with the establishment of key institutional infrastructure, including research institutes, academic programs, and national professional associations.[4] This decade repeatedly draws scholarly attention because it marks a critical juncture in which state policy, scientific ambition, and cultural preservation intersected, producing a structured and state-supported modernization of Chinese medicine that set the stage for subsequent developments in both research and practice. The 1950s thus represent a pivotal moment in understanding the complex negotiation between TCM and biomedicine within the broader socio-political landscape.

Revealing a similar consideration, Patrick Chiu's (赵粤) account of Hong Kong demonstrates how laws, administrative structures, and public health crises—such as plague outbreaks and the sudden influx of refugees—systematically tilted the balance in favor of Western medicine. Yet despite these pressures, local populations continued to rely on and sustain TCM, illustrating that medical choice was neither uniform nor determined solely by official policy. This case highlights the nuanced ways in which social circumstances mediated the interactions between competing medical systems.

Jiang Yuhong (蒋育红) challenges the conventional narrative that biomedicine in the 1950s simply eclipsed Chinese medicine. Instead, she shows that Western medicine institutions of the period actively invested resources, knowledge, and technical expertise in the study of TCM, fostering new forms of collaboration. These interactions facilitated the expansion of both traditions, as Western medical methods were integrated selectively into TCM research while Chinese medical concepts informed clinical and pharmacological innovations within biomedicine.

In short, modern Chinese medicine adapted and collaborated with modern Western medicine, demonstrating resilience and ongoing transformation.

4 Conceptual interventions

A central challenge in translating TCM terminology lies in the fact that many concepts lack direct equivalents in Western languages, creating persistent and significant translation difficulties. Mengdi Qiao emphasizes that "the language of TCM itself is profound and complex, characterized by phenomena such as polysemy and overlapping concepts".[5] Terms such as qi (气), yin-yang, and zang-fu (脏腑) do not correspond neatly to Western biomedical categories, requiring translators to navigate layers of philosophical, cultural, and clinical meaning simultaneously. This complexity is compounded by the historical evolution of TCM language, in which interpretive flexibility and contextual nuance are central to practice.

Zhao Jing (赵璟) and Michael Shiyung Liu examines how a national unified textbook for acupuncture was developed in China from 1949 to 1961. The process shifted from regional to standardized teaching and transformed from a scientific approach back toward classical sources. It ultimately created a modern acupuncture framework by blending systematic, scientific, and practical elements, centering on *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation). However, the reality on bedside could be more complicated. In this special issue, Marta Hanson (韩嵩) and Victor Kumar further propose the concept of "medical bilingualism" as a new analytical framework to address these challenges. Analogous to linguistic bilinguals who navigate two languages without merging them, medical practitioners and patients often operate across multiple systems of knowledge and practice. This concept illuminates the fluid and pragmatic ways in which Chinese and Western medicine have historically interacted, highlighting moments of negotiation, adaptation, and mutual influence.

The ten articles in this special issue converge on a central insight: the encounter of Chinese and modern Western medicine was neither a clash of opposites nor a tale of unidirectional influence. It was a process of co-creation in which actors reinterpreted classical texts, appropriated modern therapies, reshaped institutions, and negotiated power. This history complicates our understanding of "modernization" and reveals the resilience and adaptability of Chinese medicine. At a moment when integrative medicine and global health debates are increasingly salient, these historical studies remind us that medical pluralism is not a new phenomenon but one continuously deeply rooted in China's past. The lessons of these encounters remain relevant today, as practitioners and policymakers grapple with the challenges

of combining diverse medical traditions in the pursuit of health.

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Ethical approval

This study does not contain any studies with human or animal subjects performed by any of the authors.

Author contributions

Michael Shiyung LIU wrote the anuscript. JIANG Yuhong revised the manuscript.

Conflicts of interest

Michael Shiyung LIU and JIANG Yuhong are Guest Editors-in-Chief of this special issue. The article was subject to the journal's standard procedures, with peer review handled independently of these Guest Editors-in-Chief and their research groups.

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Feature Article

CHINESE 中医药文化(英文)
MEDICINE AND CULTURE

OPEN

Scientific Chinese Medicine: Adaptation and Compromise in Modern East Asia, 1850–1949

Michael Shiyung LIU[1,2,✉]

Abstract

This paper examines the complex trajectory of Chinese medicine's scientification (科学化) during the late Qing and Republican periods (1850–1949), analyzing how traditional medical knowledge adapted to and negotiated with Western scientific paradigms. Through examination of institutional responses, knowledge transfer networks, and evolving research methodologies, this work demonstrates that the development of scientific Chinese medicine represented a sophisticated process of cultural adaptation rather than simple Westernization. The research identifies three distinct phases—early debates and responses, Japanese influence and knowledge transfers, and research methodologies and institutional development. The 1929 controversy over Yu Yunxiu's (余云岫) proposal to abolish traditional medicine marked a crucial turning point, catalyzing systematic modernization efforts within the traditional medical community. Japanese influence proved particularly significant through the development of scientific Kampo medicine and the establishment of research networks at institutions. Drawing on Pierre Bourdieu's concept of scientific fields and Bruno Latour's actor-network theory, the analysis reveals how different actors negotiated the transformation of traditional medical knowledge within changing social and political contexts. The study demonstrates that Japanese approaches to medical modernization, particularly in pharmacognosy research, provided an alternative model to Western biochemical analysis, emphasizing the preservation of traditional compound formulations while adopting modern scientific methods of converting Chinese medicine to modern. This study contributes to our understanding of medical modernization in East Asia by revealing the sophisticated ways in which traditional knowledge systems adapted to modern scientific requirements while maintaining their essential characteristics.

Keywords: Chinese medicine; Scientification; Medical modernization; Adaptation; Japanese influence; Chinese pharmacognosy

1 Introduction

This comprehensive study examines the complex trajectory of Chinese medicine's scientification (科学化) during the late Qing and Republican periods (1850–1949), analyzing how traditional medical knowledge adapted to and negotiated with Western scientific paradigms. Through extensive examination of institutional responses, knowledge transfer networks, and evolving research methodologies, this work demonstrates that the development of scientific Chinese medicine represented a sophisticated process of cultural adaptation rather than simple Westernization. The study highlights the role of Japanese medical modernization as a mediating influence in this transformation, while also examining the impact of colonial networks, wartime conditions, and international scientific exchange on the development of modern Chinese medicine. Later in the 1930s and beyond, the modernization and scientific development of Chinese medicine represented a complex historical process shaped by cultural and scientific forces. This essay examines the key reasons driving Chinese medicine's scientific development, analyzes internal conflicts that emerged during this process, and identifies distinctive features that characterize this transformation. Furthermore, the push to modernize Chinese medicine emerged from both internal needs and external pressures. As Elisabeth Hsu notes, China's efforts to modernize Chinese medicine began systematically in the 1950s with the establishment of national networks of Chinese medicine universities, hospitals and research institutes. This institutional foundation-building reflected the new Chinese government's determination to validate and strengthen Chinese medicine as part of nation-building efforts. Chinese medicine modernization was evident in Premier Zhou Enlai's (周恩来) 1954 invitation to foreign delegations to "come and see" China's dedication in this area. It manifested in rapid expansion of traditional Chinese medicine (TCM) infrastructure—between 1949

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and 1984, the number of TCM hospital beds increased dramatically from 84,625 to 2,412,362.[1]

The scientification of Chinese medicine during the late nineteenth and early twentieth centuries represented a crucial chapter in the global history of medical modernization. Recent historiography has moved beyond simple narratives of Westernization to reveal complex processes of knowledge adaptation and cultural negotiation. As Ruth Rogaski (罗芙芸) argues in her inspiring work *Hygienic Modernity* (2004), the transformation of East Asian medicine involved sophisticated negotiations between indigenous knowledge systems and emerging global scientific paradigms.[2] However, with most practical reasons behind, contemporary studies on China's vast TCM resources demanded systematic scientific study and management. Accordingly, legitimized TCM in China possesses 12,870 kinds of traditional medicine resources, including 11,146 species of medicinal plants, 1,581 species of medicinal animals, and 80 kinds of medicinal minerals. This extensive natural pharmacy represented both an opportunity and a challenge—while providing a rich foundation for therapeutic innovation, it required historical methods for knowing the socio-cultural resources to its authentication and sustainable utilization by Chinese population. Moreover, as Li Weifeng and his co-authors observe, "these medical reports known worldwide as the original source material of human pharmacology are very valuable to humans".[3] As scientific methods became essential for evaluating, validating and optimizing the vast empirical knowledge base of TCM, a deeper understanding to bringing sophisticated discourse and linkages with historical background could be equally essential. The later would compensate the oversimplification of the scientification of Chinese medicine while accompanying the hypothesis "Chinese medicine is an experienced-based practice".

This study employs a transnational approach to analyze the development of scientific Chinese medicine, examining how knowledge, practices, and institutions moved across national boundaries and were transformed in the process. Drawing on Pierre Bourdieu's concept of scientific fields and Bruno Latou's actor-network theory,[4] we analyze how different actors negotiated the transformation of traditional medical knowledge within changing social and political contexts. The analysis particularly focuses on what Fa-ti Fan terms "scientific hybrid cultures"—spaces where different knowledge traditions interact and produce new forms of understanding.[5]

2 Early debates and responses on Chinese medical modernization

The late Qing period witnessed increasing pressure for medical modernization as China encountered Western medical knowledge through various channels. The late Qing dynasty marked a critical period in the transformation of Chinese medicine, as China encountered Western medical science in that era. According to Croizier, this period witnessed intense debates about whether to preserve, reform, or abandon traditional medical practices.[6] Benjamin Hobson's (合信) medical translations in the 1850s and John Fryer's (傅兰雅) work at the Jiangnan Arsenal Translation Bureau (江南制造局翻译馆) in the 1870s introduced Western medical concepts to Chinese audiences.[7] The Self-strengthening Movement of 1861 to 1895 particularly catalyzed discussions about medical modernization as part of broader reforms. Key reformist intellectuals advocated for medical modernization while attempting to preserve traditional knowledge. Sean Lei's research reveals that these early reformers developed three main approaches: complete Westernization, pure traditionalism, and selective integration.[8] This tension between tradition and modernity would shape Chinese medicine's development throughout the twentieth century.

In the tumultuous period of early twentieth-century China, the debate over the scientization of Chinese medicine emerged as a critical battleground for competing visions of modernity. This discourse transcended mere medical practice, embodying fundamental questions about cultural identity, epistemological authority, and national sovereignty during China's engagement with Western modernization. The intellectual exchanges between traditionalists and modernizers reflected broader tensions in China's path toward modernization, revealing complex negotiations between indigenous knowledge systems and Western scientific paradigms. The New Culture Movement (新文化运动) during the 1910s and 1920s positioned science as the paramount intellectual authority in modern society. As Hu Shi (胡适) declared in 1923, science had achieved "almost supreme dignity" in Chinese intellectual discourse, becoming virtually unassailable in public debate.[9] This elevation of scientific authority created immediate tensions with traditional knowledge systems, particularly in medicine, where centuries-old philosophical frameworks confronted modern empirical methodologies.

The debate over Chinese medicine's scientific status revealed fundamental epistemological divisions within Chinese intellectual circles. Western-trained practitioners, exemplified by Yu Yunxiu (余云岫), argued that Chinese medicine's foundational theories of yin-yang (阴阳) and *Wu Xing* (五行 five elements) were incompatible with modern scientific verification. Yu contended that "Chinese medicine must adopt the scientific system and experimental methods if it wishes to gain international recognition".[10] This position reflected a broader modernizing impulse that sought to reconstruct Chinese knowledge systems according to Western scientific paradigms. Traditionalists and moderate reformers approached the scientization of Chinese medicine with varying strategies. Scholar-practitioners like Ding Fubao (丁福保) attempted to bridge the epistemological divide by integrating chemical analysis into traditional herbal medicine

while preserving core theoretical frameworks. Ding's *Zhong Xi Yi Fang Hui Tong* (《中西医方会通》*A New Compilation of Chinese and Western Medical Formulas*, 1910)[11] exemplified efforts to achieve what Li Yanchang terms "convergence" between traditional knowledge and modern scientific methods (Fig. 1).[12]

The debate extended beyond purely medical considerations into questions of cultural sovereignty and national identity. As Zhao Hongjun observes, the movement is closely connected to initiatives that uphold China's cultural heritage amid Western influence.[13] Medical knowledge reflected broader tensions in China's modernization project, as intellectuals sought to navigate between wholesale Westernization and cultural preservation. The push for scientific legitimacy led to significant institutional changes in medical education and practice. However, critics like Gu Zhishan warned that such transformations risked "diluting the philosophical essence of traditional medicine".[14] This resistance highlighted fundamental questions about whether Chinese medicine's holistic approach could survive integration with reductionist scientific methodologies. The debate over scientization revealed deeper epistemological challenges in reconciling different knowledge systems. As Benjamin Elman argues, attempts to validate traditional medicine through modern scientific frameworks often resulted in oversimplification or misinterpretation of complex theoretical systems.[15] This tension between holistic and reductionist approaches remains unresolved in contemporary discussions of medical knowledge and practice. The debate over scientific Chinese medicine carried profound implications for China's broader modernization efforts. It exemplified what Yu Xinzhong (余新忠) describes as the "formation of modern Chinese medicine since the late Qing", representing a complex process of negotiation between tradition and modernity.[16] The outcome of these debates influenced not only medical practice but also shaped approaches to cultural adaptation in other fields.

However, unlike Japan's systematic approach to medical modernization following the Meiji Restoration, China's engagement with Western medicine remained fragmented until the early twentieth century. The establishment of medical schools following Western models, such as Beiyang Medical School (北洋医学堂) in 1881 and Xiangya Medical School (湘雅医学校, also known as Yale-in-China) in 1914, created institutional bases for Western medicine in China.[17] However, these developments occurred alongside continuing strength in traditional medical practice and growing debate about the relationship between Chinese and Western medicine.[18] This was followed by the more influential Union Medical College (Peking) (1906) [协和医学堂(北京)], which Taylor identifies as a watershed moment in Chinese medical education reform (Fig. 2).[19] The introduction of anatomy and dissection posed particular challenges to traditional medical knowledge. As described by Heinrich in *The Afterlife of Images: Translating the Pathological Body between China and the West*, Chinese medicine had traditionally relied on

Figure 1 Book cover of *Zhong Xi Yi Fang Hui Tong* (《中西医方会通》*A New Compilation of Chinese and Western Medical Formulas*) (source with permission from: *A New Compilation of Chinese and Western Medical Formulas*[11])

Figure 2 Front gate of Peking Union Medical College (北京协和医学院) [source with permission from: CNBKSY(全国报刊索引), https://www.cnbksy.com/v2/browser/Journal?eid=null&bcId=null&pieceId=7e0de9183aa3bfe5828fcf7aa7eee394&ltid=7&activeId=686b-4f18a637e70d31336005&downloadSource=GENERALSEARCH]

subtle theories of qi (气) circulation rather than anatomical structures.[20] Anatomical knowledge acquired through dissection challenged traditional understanding while simultaneously providing opportunities for reinterpretation of classical concepts. The period also saw significant developments in pharmaceutical research. As Hu noted in the article "The modernization of Japanese and Chinese medicine (1914–1931)", new methods from the West helped establish a modern medical terminology, leading to new understanding of traditional remedies.[21] This early scientific investigation of Chinese herbs laid groundwork for later pharmaceutical research.

The tensions inherent in this transformation process emerged dramatically in February 1929, when Yu Yunxiu and others proposed motions at the National Health Conference, including "Abolishing old medicine to remove obstacles in medical and health affairs (《废止旧医以扫除医事卫生之障碍案》)" (Fig. 3). This proposal, affecting both professional dignity and livelihoods, faced immediate unified resistance from the Chinese medicine community and triggered widespread social opposition. In Shanghai, renowned traditional physician Zhang Zanchen (张赞臣) published a special "Chinese Medicine Struggle Issue" in his journal *Yi Jie Chun Qiu* (《医界春秋》*Springs and Autumns of the Medical World*) and organized a national medical organization conference on March 17th, gathering representatives from 17 provinces and cities, 242 organizations, and 281 delegates.[22] The resistance movement culminated in the formation of the "National Medical Organizations General Federation" and a petition delegation to Nanjing, meeting with Nationalist Government Chairman Chiang Kai-shek (蒋介石). On March 20th, they secured promises of "absolute support for Chinese medicine and pharmacy". The Ministry of Education agreed to recognize Chinese medical training institutes, while the Ministry of Health advocated for scientific improvement of Chinese medicine.[23] This sequence of events, as Xiao Fengbin (肖凤彬) noted, demonstrated that while the petition delegation may not have achieved all its goals, the Nanjing government, influenced by public opinion, temporarily shelved the abolition proposal.[24] The official responses revealed interesting nuances: while Chiang Kai-shek spoke of "Chinese medicine and pharmacy", the Education Ministry mentioned only "Chinese medicine", indicating potential openness to medical-pharmaceutical separation.[6]

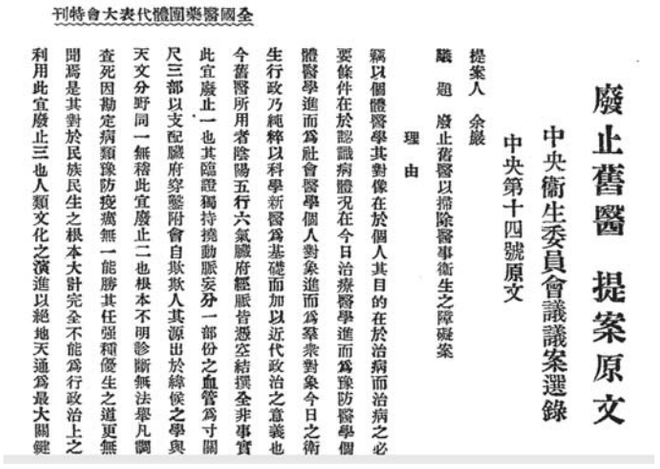
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Figure 3 "Abolishing old medicine to remove obstacles in medical and health affairs (《废止旧医以扫除医事卫生之障碍案》)" [source with permission from: CNBKSY(全国报刊索引), https://www.cnbksy.com/v2/browser/Journal?eid=null&bcId=null&pieceId=55e6e6b1fdaf27fbc1748460e51f934a&ltid=7&activeId=686b4fc3a637e70d3133621c&downloadSource=GENERALSEARCH]

A particularly contentious moment arose in 1929 with the proposal to abolish traditional medical practice. Research shows how this crisis served as a catalyst for the traditional medicine community's modernization efforts. In response, practitioners established professional associations and developed standardized curricula for medical education. They also implemented systematic research methodologies and launched modern medical journals and publications to document and disseminate their findings.[25] This comprehensive response to the abolition threat demonstrated the traditional medical community's ability to adapt and modernize while preserving their fundamental practices. The response to this crisis, as Lei demonstrates, marked a turning point in the modernization of Chinese medicine. Traditional practitioners began actively engaging with scientific discourse while asserting the unique value of their theoretical frameworks.[26] This period saw the emergence of what Scheid terms "hybrid practitioners" who could navigate both traditional and modern medical knowledge systems.[27] The continuing influence of these early debates is evident in contemporary discussions of Chinese medicine's role in global healthcare. Modern attempts to validate traditional practices through scientific research echo early twentieth-century efforts to reconcile different epistemological frameworks. As Yao and Jiang's research on meridian systems demonstrates, the challenge of translating traditional concepts into scientific terms remains relevant.[28] The debate over scientific Chinese medicine in early twentieth-century China represented more than a professional dispute over medical practice. It embodied fundamental questions about cultural identity, epistemological authority, and the nature of modernization. The various approaches to reconciling traditional knowledge with modern science reflected broader patterns in China's engagement with Western modernity, revealing the complexity of cultural adaptation in an era of rapid global change.

3 Knowledge sharing and technology transfer with Japan

The 1874 promulgation of the *Isei* (『医制』*Act of Medical Regulation*) by Japan's Meiji government established the legal basis for nationwide medical system Westernization (Fig. 4). As Hoi-Eun Kim demonstrates in *Doctors of*

Empire (2014), this legislation marked a crucial turning point in East Asian medical history, creating a model that would influence China's later reforms (Note 1).[29] However, while medical education rapidly Westernized, the pharmaceutical industry, including traditional medicine businesses, developed along a different trajectory through debates over medical-pharmaceutical separation. Most significantly, while medical practice rapidly Westernized, the pharmaceutical industry found opportunities for adaptation and transformation. The Japanese government's establishment of pharmaceutical schools in 1882[30] and implementation of licensing systems[31] created an institutional framework that initially seemed to favor Western medicine exclusively. Indeed, within five years, imports of Western pharmaceuticals increased nearly fourfold.[32] However, traditional medicine sellers, particularly established businesses like Toyama, Hino, and Tashiro medicine vendors,[33] maintained their presence through commercial resilience and strategic adaptation to new scientific standards.

A distinctive feature of Japanese scientific Kampo development was its emphasis on granular preparations rather than isolating specific active components from traditional medicines. This approach, building on prewar pharmacognosy and herbal medicine research, facilitated rapid post-war revival of Kampo medicine. The successful integration of traditional medicine into modern frameworks began, somewhat unexpectedly, through military medicine.[34] This military precedent provided crucial legitimacy for traditional medicines in modern institutional contexts.[35] Moreover, commercial transformation proved equally important. The evolution of the Osaka Medicine Market (大阪司药场) exemplifies how traditional medicine businesses successfully adapted to modern requirements. As detailed in contemporary records, traditional medicine sellers transformed into modern pharmaceutical companies, establishing research laboratories and developing standardized production methods. Companies like Dainippon Pharmaceutical (大日本制药) emerged from this process, combining respect for traditional knowledge with modern scientific standards. The commercial success of this approach was evident even before World War II. According to Nagakura Pharmaceutical Company president Nagakura Onzo (长仓音藏), women's medicines produced by companies like Takeda and Sato in the 1930s had established considerable social trust in scientific Kampo products. The economic constraints of the 1940s to 1950s actually accelerated adoption as scientific Kampo medicines provided cost-effective alternatives to expensive imported Western pharmaceuticals.[36]

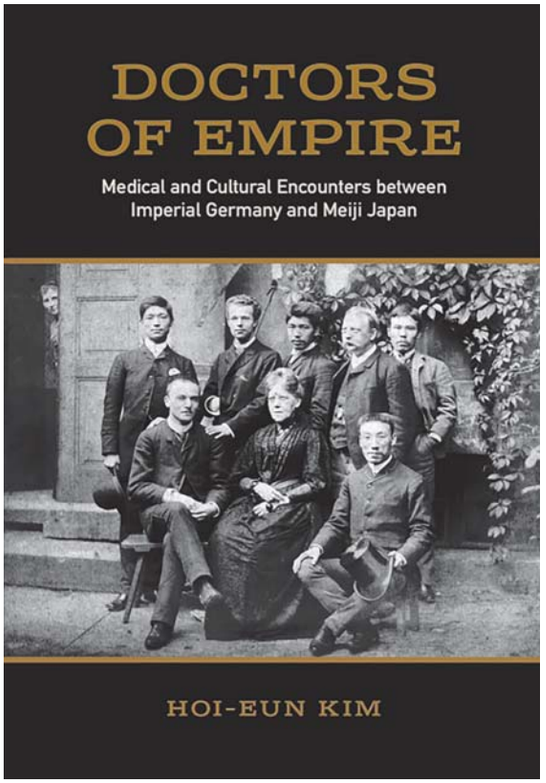

Figure 4 Front cover of *Doctors of Empire* (2014) (source with permission from: *Doctors of Empire*[29])

The knowledge networks also supported the research on developing scientific Kampo. Japanese pharmacognosy research expanded through multiple channels, particularly through Chinese students studying in Japan. They established numerous medical academic societies, published scholarly journals and popular books to disseminate new knowledge of modern medicine and present the latest advancements in the field within Japan. In 1906, Chinese students at Chiba Medical College (千叶医药专门学校) formed the Chinese Medical and Pharmaceutical Society, publishing *Yi Yao Xue Bao* (《医药学报》*The Medical and Pharmaceutical Journal*). The Chinese Pharmaceutical Association (中华药学会), established in 1907 as modern China's first national professional pharmaceutical organization, closely modeled its structure on the Japanese Pharmaceutical Society.[37] These knowledge transfer networks were further strengthened through academic publications and research exchanges. Japanese scholars like Asahina Yasuhiko (朝比奈泰彦) pioneered new methods for analyzing traditional medicines, while Chinese researchers trained in Japan brought these techniques back to China.[38] Zhao Yuhuang's (赵燏黄) academic journey was profoundly influenced by the progress in pharmacognosy in Japan. In 1929, he was appointed as a researcher at the Chinese Medicine Laboratory of the Institute of Chemistry, where he concentrated on the study of herbal medicine and pharmacognosy. He emphasized that the foundation of biopharmaceutical research should lie in "the investigation of the effects of Chinese materia medica",[39] utilizing the active components of Chinese materia medica in clinical pharmacological tests.This bilateral exchange created what historian Marta Hanson terms a "circulation of medical knowledge" that fundamentally shaped the development of scientific Chinese medicine.[40]

Generally speaking, the dawn of the twentieth century witnessed two distinct yet interrelated paths toward modernizing traditional East Asian medicine. While China sought to integrate Chinese medicine with Western approaches through gradual assimilation, Japan pursued a more systematic scientification of traditional medicine through the development of "scientific Kampo". These parallel developments offer rich insights for modern efforts to promote traditional medicine globally in the post-genomic era. In China, the initial phase of modernization emerged through what Chen and Xu identify as the "school of digestion and assimilation of Chinese medicine and Western medicine". This approach, championed by scholars such as Tang Zonghai (唐宗海), Zhu Peiwen (朱沛文), and Zhang Xichun (张锡纯), sought to find complementarity between traditional and Western medical systems. However, their efforts were initially constrained by technological limitations and cultural barriers, leading to what Chen and Xu describe as confusion "due to the limitations of scientific technology and cultural background".[41] Simultaneously in Japan, a more systematic approach to modernization was taking shape through the "scientific Kampo" movement. Japanese researchers pioneered the standardization of traditional herbal formulations into modern pharmaceutical preparations. According to Yakazu Domei (矢数道明), this process represented a turning point in the modernization of traditional medicine, establishing early models for quality control and standardization that would later influence Chinese approaches.[42] The contrasts between these approaches became particularly evident in their research methodologies. While Chinese scholars initially struggled with theoretical reconciliation, Japanese institutions like the Kitasato Institute's Department of Clinical Research on Kampo Medicine established systematic clinical research protocols as early as 1932. This methodological divergence would prove significant, as Japanese approaches to scientific validation eventually influenced Chinese research methods in subsequent decades. The educational sphere revealed further distinctions between the two approaches. Japan's integration of Kampo medicine into modern medical curricula by the 1930s demonstrated remarkable foresight.[43] In contrast, China's educational reforms took a different path, focusing more on preserving theoretical frameworks while gradually incorporating Western scientific methods.

These parallel developments crystallized different solutions to the fundamental challenge of modernizing traditional medicine while maintaining its essential characteristics. The Chinese approach emphasized theoretical preservation alongside practical integration, while the Japanese model prioritized standardization and scientific validation. As Tang and colleagues observe, both paths grappled with the challenge that "traditional medicine theory has many ancient terms that cannot be expressed in objective and modern scientific language".[44] The outcomes of these parallel approaches became evident by mid-century. China's integration efforts culminated in what Chen and Xu describe as significant achievements in treating various conditions, from cardiovascular diseases to acute conditions.[41] Meanwhile, Japan's standardization efforts had established a model for modernizing traditional medicine that influenced developments across East Asia.

4 Research methodologies and institutional development

The development of research methodologies for modern Chinese medicine since the mid-twentieth century represented a crucial step in its scientification process. As Farquhar documents, traditional diagnostic methods like *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation) were systematized and standardized to facilitate both teaching and research.[45] This systematization aimed to make traditional practices more amenable to scientific investigation while preserving their essential characteristics. The establishment of research institutes and standardized curricula marked a significant institutional development. According to Hsu, the period between 1956 and 1964 saw the creation of key TCM institutions and the development of standardized textbooks.[46] These institutions pioneered new research methodologies that attempted to bridge the gap between traditional practice and modern scientific requirements. From a historical perspective, in fact, the influence of Japanese pharmacognosy in China expanded through multiple methodological innovations. The introduction of pharmacognosy (生药学) to East Asian medical discourse through Oi Gendo's (大井玄洞) 1880 translation of German pharmacologist J.W. Albert Wingand's *Lehrbuch der Pharmakognosie* (『生薬学』*Pharmacology*) marked a crucial turning point (Fig. 5).[39] This translation initiated a systematic approach to studying traditional medicines using modern scientific methods while preserving traditional compound formulations.

Western medical missionaries had actually shown interest in analyzing Chinese medicines' effective components and pharmacological actions before Japanese pharmacognosy was introduced to China in the 1920s to 1930s. John Dudgeon (德贞), the first customs medical officer to conduct in-depth research on Chinese medicine, notably differed from his contemporaries in his "high approval of Chinese lifestyles, diverging not only from most Western doctors' negative views but also from mainstream British perspectives on Chinese culture".[47] However, during the period from the mid-1920s to the eve of the War of Resistance against Japanese Aggression, Japan cast a certain influence on Chinese medicine.

The outbreak of war paradoxically accelerated certain aspects of Chinese medicine scientification while constraining others. The urgent need for domestic pharmaceutical production created new opportunities for

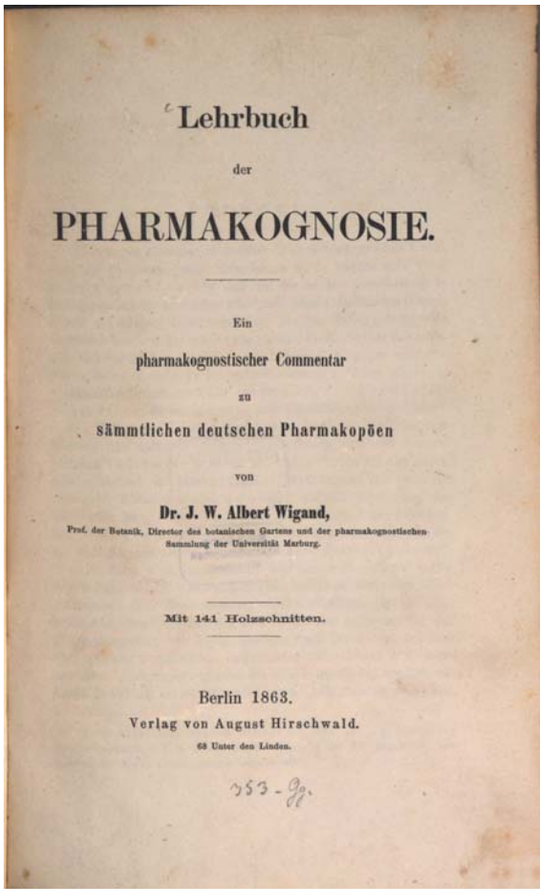
Lehrbuch
der
PHARMAKOGNOSIE.
Ein
pharmakognostischer Commentar
zu
sämmtlichen deutschen Pharmakopöen
von
Dr. J. W. Albert Wigand,
Prof. der Botanik, Director des botanischen Gartens und der pharmakognostischen Sammlung der Universität Marburg.
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Figure 5 Front cover of J.W. Albert Wingand's *Lehrbuch der Pharmakognosie* (source with permission from: Harvard University Library Collection)

traditional medicine development, yet resource constraints limited research capabilities. As Pi Kuo-li (皮国立) observes, while war promoted national medicine cultivation and research, these efforts largely ceased with war's end due to various conditions.[48] During this period, researchers like Liu Shaoguang (刘绍光), Feng Zhidong (冯志东), and Zhao Chengga (赵承嘏) relocated with the government to Chongqing, while Jing Libin (经利彬) and others at the rebuilt Chinese Medicine Research Institute in Kunming continued advancing scientific Chinese medicine. Their work expanded research from single-extract studies to clinical validation of compound prescriptions.[49] The War of Resistance against Japanese Aggression created complex networks of knowledge transfer and institutional development. Zhao Yuhuang's trajectory exemplifies these dynamics. Born in 1883, he developed interest in pharmacy after encountering works by Shimoyama Junichiro (下山顺一郎) during his studies in Shanghai. After entering Tokyo Pharmaceutical School in 1907 and later Tokyo Imperial University's Department of Pharmacy, he studied under two prominent Japanese pharmacognosy scholars—Shimoyama Junichiro and Nagai Nagayoshi (长井久义).[50] Even during heightened Sino-Japanese tensions, Zhao openly acknowledged Japanese contributions, noting that "research on Chinese medicine is most advanced in Japan... and seven or eight out of ten known chemical components of Chinese medicine... were discovered by Japanese researchers". His emphasis on animal experimentation for verifying Chinese medicine efficacy[51] aligned with Japanese approaches to scientific validation of traditional medicines.

The immediate post-war period brought new challenges to scientific Chinese medicine development. The influx of American medical aid reduced government support for scientific Chinese medicine development,[52] while private pharmaceutical companies, seeing little profit potential, hesitated to invest in genuine scientific Chinese medicine development.[53] During 1945–1949, despite ongoing discussions of Chinese medicine scientification, civil war conditions prevented significant research or manufacturing advances. As documented in contemporary sources, the abolition of key research institutions like the Ministry of Education's Medical Research Institute and the Military Medical Administration's Pharmaceutical Research Institute in 1945 significantly impacted both Western and Chinese medicine development.[52]

This period, however, saw important theoretical consolidation. Na Qi's (那琦) critique of American pharmaceutical research methods articulated fundamental differences in approach: "The American approach... seeks to extract the most effective medicinal materials from thousands of natural medicinal resources to solve specific problems. This differs completely from our goal of 'national medicine modernization.' Our approach aims to systematically organize thousands of Chinese medicinal materials, experimentally verifying and explaining their components and pharmacological actions for those with established reputations".[54] In sum, the historical trajectory of scientific Chinese medicine development reveals complex patterns of knowledge transfer, adaptation, and innovation in East Asian medical modernization. Japanese pharmacognosy and herbology maintained fidelity to traditional Chinese medical prescriptions, innovating primarily in production methods through granular preparations rather than fundamental reformulation before the 1930s.[55] This philosophical divergence from Western approaches highlights the distinctive characteristics of East Asian approaches to medical modernization. As leading scholars in the field have noted, the competition between European-American biochemical analysis and Japanese pharmacognosy research approaches in pre-1949 China represented not merely technical differences but fundamental philosophical distinctions in approaching traditional medical knowledge.[56]

5 An enduring impact

Japan's scientific approach to local traditional medicine cast an influence on the subsequent scientific

advancement of Chinese medicine. As Na Qi observed in the seminal work *Materia Medica Studies* (《本草学》): "Future Chinese medicine research faces challenges in discovering new medicinal plants. The main task lies in using ancient documents as research clues, bringing forth the new through the old, modernizing them systematically—this represents the greatest effort required of Chinese pharmaceutical community".[54] This intellectual heritage revealed kinship with Okanishi Tameto's (冈西为人) approach and highlighted fundamental differences from Western pharmaceutical research methods. The philosophical divergence illuminates enduring questions about the relationship between traditional knowledge and modern science.[57] The period's institutional developments created models for integrating traditional medicine into modern healthcare systems. Japanese experience with scientific Kampo demonstrated that traditional medical knowledge could be preserved and adapted to modern standards through appropriate institutional frameworks and technical innovation.[58] This model influenced subsequent developments across East Asia, particularly in research methodology integration, pharmaceutical standardization, clinical practice protocols, educational system development. The competition between European-American biochemical analysis and Japanese pharmacognosy research approaches in pre-1949 China continues to influence contemporary research paradigms. As Kim Taylor argues, these methodological tensions shaped subsequent developments in traditional medicine research.[19]

The scientification of Chinese medicine has left a complex legacy for contemporary practice. Barnes's analysis shows how early modernization efforts continue to influence current debates about TCM's role in global healthcare.[59] Modern challenges include quality control, research validation, and integration with biomedicine. Moreover, Lin's research examines the complex implications of TCM's modernization in contemporary practice. Her analysis reveals that developing appropriate research methodologies poses a fundamental challenge, as traditional healing concepts often resist quantification through conventional scientific methods. This methodological challenge directly impacts efforts to standardize traditional practices, as practitioners struggle to maintain consistency while preserving the individualized nature of TCM treatments. Furthermore, these standardization efforts are inextricably linked to growing concerns about quality control and regulatory compliance in the global marketplace. Perhaps most critically, as modern challenges include establishing international quality standards, developing appropriate research methodologies, and navigating complex regulatory environments remain, Annie Xianghong Lin argues that the field must carefully navigate the delicate balance between preserving traditional knowledge and fostering innovation, as excessive emphasis on either aspect could compromise TCM's therapeutic value and cultural integrity.[60] These interconnected challenges with issues of historical heritages continue to shape contemporary TCM's evolution in modern healthcare.

Looking toward modern global promotion efforts, these historical parallels offer valuable insights. The success of Japanese standardization efforts suggests the importance of developing rigorous quality control methods, while China's experience highlights the value of preserving theoretical foundations while adapting to modern scientific frameworks. As Uzuner and colleagues emphasize, modern promotion requires both "high-quality research" and sensitivity to traditional theoretical frameworks.[61] The contemporary challenge of promoting traditional medicine globally inherits lessons from both approaches. Japan's early success with standardization informs modern efforts to meet international regulatory requirements, while China's experience with theoretical preservation offers guidance for maintaining traditional medicine's holistic characteristics. These historical experiences suggest that successful global promotion requires synthesizing the best elements of both approaches: combining rigorous standardization with theoretical preservation.[62] As traditional medicine enters the post-genomic era, these parallel historical experiences offer a nuanced roadmap for global promotion. Modern efforts must balance the systematic scientific validation pioneered by Japanese researchers with the theoretical preservation emphasized in the Chinese approach. This historical perspective suggests that successful global promotion requires what Uzuner terms a "unified team" approach, combining different modalities and methods while respecting traditional foundations.[61] The parallel development of Chinese and Japanese approaches to modernizing traditional medicine in the early 20th century thus offers crucial lessons for contemporary promotion efforts. Their different emphases—theoretical preservation versus systematic standardization—represent complementary rather than competing approaches to modernization. Understanding these historical parallels can help guide modern efforts to promote traditional medicine globally while maintaining its essential characteristics and meeting contemporary scientific standards.

To conclude, the scientification of Chinese medicine represents a unique case of medical modernization that continues to evolve. Its development demonstrates the possibility of maintaining traditional medical knowledge while adapting to modern scientific standards.[63] The process has produced both successes and ongoing challenges that inform current efforts to integrate traditional medicines into global healthcare systems. The journey from early debates to contemporary practice reveals the complexity of modernizing traditional medical systems. Palmer's research suggests that this process offers valuable lessons for other traditional medical systems facing similar challenges of modernization and global integration.[64] The continued evolution of Chinese medicine's

scientification process demonstrates both the resilience of traditional medical knowledge and its capacity for adaptation to modern requirements.

6 Conclusion

The journey of Chinese medicine from an ancient healing system to a globally recognized medical practice represents one of the most fascinating transformations in medical history. For centuries, Chinese medicine evolved in its traditional formats and theoretical frameworks. These historical foundations provided the robust framework upon which modern scientification efforts would later build. The first significant encounter between Chinese and Western medicine occurred during the mid-17th century, marking the beginning of a complex relationship that would shape both traditions. When missionaries introduced Western natural sciences to China, they primarily focused on anatomical knowledge, triggering a response from Chinese scholars that would set the tone for future integration efforts. Early pioneers like Fang Yizhi (方以智, 1611–1671) and Wang Ang (汪昂, 1615–1695) developed a strategy of "digestion and assimilation", demonstrating remarkable foresight in recognizing the potential value of combining both medical traditions. The aftermath of the Opium War in 1840 marked a crucial turning point. This period of intense cultural and political upheaval sparked vigorous debate about Chinese medicine's future, giving rise to three distinct schools of thought. Some integrationists ultimately shape Chinese medicine's modern development by promoting a synthesis of Chinese medicine with Western medicine's strengths.[41] This intellectual ferment laid the groundwork for the systematic scientification efforts that would follow in the twentieth century.

From the mid-1920s to the eve of the War of Resistance against Japanese Aggression, various influence on Chinese medicine was profound and transformative in pharmacology and pharmacognosy, with implications that resonated far beyond the post-war societies. This medical exchange manifested through multiple channels, as Japanese medical texts were widely translated and circulated, Japanese-trained Chinese doctors became prominent figures in medical institutions, and Japanese medical education models were adopted by Chinese medical schools. Understanding the development of scientific Chinese medicine demands more than merely examining its socio-cultural background. A comprehensive analysis must consider the fundamental limitations and hypotheses of contemporary pharmacology and pharmacognosy as critical reference points. These scientific frameworks serve not just as modern analytical tools, but as essential benchmarks for understanding how traditional knowledge was interpreted, validated, and transformed during this period of medical modernization.

The legacy of this period extends beyond specific scientific achievements to fundamental questions about knowledge transfer, cultural adaptation, and institutional development in medical modernization. Contemporary efforts to integrate traditional medical knowledge into modern healthcare systems continue to grapple with issues first confronted during this period.[65] The historical experience of scientific Chinese medicine development provides valuable insights into the validation of traditional knowledge, the implementation of standardization and quality control, the integration of institutional models, and the preservation of therapeutic traditions while meeting modern standards. Looking to the future, this history illuminates several critical considerations. The value of maintaining methodological diversity in medical research remains paramount, alongside the importance of institutional frameworks that support traditional knowledge systems. The historical record demonstrates the possibility of cultural adaptation without wholesale transformation, while highlighting the essential role of international networks in knowledge development. In conclusion, the experience of scientific Chinese medicine development between late nineteenth century and mid-twentith century demonstrates that successful medical modernization need not follow a singular Western model. Instead, as this period shows, the preservation of therapeutic traditions and scientific advancement can proceed through careful adaptation and institutional innovation, guided by both historical understanding and contemporary scientific frameworks. The scientification of Chinese medicine represents more than just the modernization of an ancient healing system; it demonstrates how traditional knowledge can be preserved and enhanced through scientific investigation. The scientification of Chinese medicine has shown that different medical traditions need not compete but can instead complement each other, potentially leading to more effective and comprehensive healthcare solutions.

Note

1. Kim claims that the Meiji government's decision to follow German medicine was not made by the Japanese alone, as has thus far been conventionally accounted. Instead, it was "a historically contingent event, reflecting both the German 'push' factor ⋯ and the Japanese 'pull factor'".

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Feature Article

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Medical Bilingualism: Reframing the Overlap between Medical Systems in Recent Medical History and Anthropology

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Abstract

This paper explores increased use of the concept of "medical bilingualism" since 2015 as scholars, especially of East Asian medical history and anthropology, have applied it to engagements between two medical systems. It reveals an ongoing evolution in the way that scholars understand what a medical system is and how medical systems are differentiated and compared with one another. The image of culturally homogeneous systems of meaning and practice that dominated mid-twentieth-century scholarship on medical systems (especially using the category of ethnomedicines) has been giving way to a more culturally heterogeneous and cosmopolitan picture of how medical practitioners evolve, integrate, and differentiate medical concepts and practices in the context of contemporary societies and the new forms of life they engender. This reformulated concept of medical bilingualism emphasizes the ways in which medical systems overlap yet remain distinct. First, the paper summarizes results of an experiment with AI searches on medical bilingualism, then narrates its historiography both pre-COVID-19 and during COVID-19, and finally concludes with some reflections on language ideology, multilingualism, and medical pluralism.

Keywords: Medical bilingualism; Polyglot therapeutics; Tu Youyou (屠呦呦); Experimental AI searches; Medical systems; Medical pluralism; Metamodern

1 Introduction

The opinion piece, "Is the 2015 Nobel Prize a turning point for traditional Chinese medicine?",[1] brought new life to the old term "medical bilingualism". Prior use of the term in social scientific literature had focused on how multiple languages were or could be used in clinical settings. This earlier concept sought to understand the work of medical interpreters,[2] the value of bilingualism in medical education,[3] and the effects of bilingualism on clinical judgement,[4] brain development,[5] and nursing practice.[6] Hanson's essay, however, used the term to understand how people draw on and navigate between two distinctly different medical systems (e.g., modern biomedicine and traditional medicine). More specifically, Hanson used the term to describe how Tu Youyou's (屠呦呦) fluency with both modern biomedicine and traditional Chinese medicine (TCM) was a critical condition for her to produce what became Nobel Prize worthy research. For example, Tu famously said that a record of the anti-febrile properties of Artemesia annua in a fourth-century Chinese medical text inspired her to extract the biologically active ingredient from the plant—called Artemisinin—that then became an efficacious anti-malarial medicine that could be both clinically studied and cheaply produced on a large scale (Fig. 1).[7]

Several scholars explained the broader context of Tu Youyou's medical research as part of a covert operation to conquer malaria called Project 523.[8] By contrast, Hanson was one of the first to emphasize Tu's research within a traditional Chinese medical institution. Her opinion piece was quickly followed by a French translation,[9] responses,[10] and requests for interviews. By November, a journalist from *Caixin News* asked her to elaborate upon Tu Youyou being "medically bilingual".[11] In January 2016, a journalist interviewed Johns Hopkins scientist Liu Jun, who researched Chinese materia medica for anticancer medicines, and Hanson about the Tu Youyou case, as two examples of "When East meets West"[12] at Johns Hopkins School of Medicine.

Since then, historians and anthropologists of East Asian medicine have increasingly used this second sense of medical bilingualism in order to frame their theoretical approaches and to think through their specific

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Figure 1 A photo in the 1950s of Tu Youyou (屠呦呦, right) and her tutor Lou Zhicen (楼之岑) in a lab in the China Academy of Chinese Medical Sciences with a Chinese herbal opened on the table and surrounded by jars filled with Chinese medicinals (source with permission from: https://commons.wikimedia.org/wiki/File:Tu_Youyou_in_1950s.jpg)

findings. Of course, a vast literature already exists within Chinese academic circles on the integration of Chinese and Western medicine to develop effective medicines, the global dissemination of TCM in non-Chinese contexts, and general modernization of TCM. This new approach, however, has used the concept of medical bilingualism to clarify and explain different aspects of the complex interactions between medical systems. This discourse has to-date been not only largely in English but also mostly about interactions between East Asian medical systems and earlier western medical or modern biomedical systems and not, for example, Ayurveda in South Asia, traditional medicine in Southeast Asia, African traditional medicine, or CAM (complementary and alternative medicine) in the US. Although medical bilingualism had been circulating long before 2015 in its original formulation, and though people other than Hanson used the phrase several years before (Note 1)[13] and independently as well in 2015,[14] her 2015 opinion piece catalyzed a broader circulation of the term among historians and anthropologists of East Asian medicine.

Hanson had also suggested a need to rethink the relation between medical systems by asking, "is this Nobel Prize for Tu's discovery a signal that Western science has changed how it perceives alternative systems of medicine?" At the time, some people responded yes to this question,[15] while others replied resoundingly no,[16] whereas Hanson's response was "Perhaps, but only slightly". This is because that year the Nobel Prize committee chose Tu Youyou and her two fellow Nobel Laureates for the prize in medicine not because of their respective sources of inspiration (i.e., for Tu Youyou in Chinese medical sources) but mainly for their discoveries of life-saving medicines that had been particularly helpful for saving lives in the developing world (Note 2).[17]

Before we proceed further with the substance of this review essay, we first introduce how we came to collaborate on this history of the concept of medical bilingualism applied to the relation between medical systems since 2015 and suggest how we think it reframes existing views of medical pluralism.

1.1 Our collaboration

When the editors put out a call for papers in early 2024 on "Encounter of Chinese Medicine and Modern Western Medicine in China", they reached out to Hanson to write a review essay on medical bilingualism over the past decade since her 2015 essay on Tu Youyou. She agreed, began making a bibliography, and taking notes. Later that same year in June, Hanson and Kumar had a chance to meet during the Double Tenth-Joint Conference of the International Association of the Study of Traditional Asian Medicine (IASTAM) and the Asian Society of the History of Medicine (ASHM).[18] Kumar had received his Ph.D. in Anthropology from Johns Hopkins University in 2019 with a thesis on American Acupuncture[19] for which Hanson was an external examiner. He had since become an assistant professor in the Department of Sociology and Anthropology at Earlham College.

Inspired by new examples of "medical bilingualism" in the keynote addresses and many presentations during this conference, they agreed then that it made sense to combine their expertise in medical history (Hanson) and medical anthropology (Kumar) to co-author a review essay on the recent history of the concept of "medical bilingualism" in history and anthropology that was as exhaustive as possible of the relevant literature to date. After they had combined their respective bibliographies on the subject and drafted a structure for the essay, they decided to carry out experiments using the new AI technology.

At first these experiments were intended simply to find any citations that they may have missed using more traditional methods of building a bibliography, such as following leads in other scholars' lists of references and following up on scholars' unpublished oral presentations (i.e., those presented at the June Double-Tenth Joint Conference). The AI experiments did not end up finding additional relevant citations the authors did not already know about through traditional research methods.

Nonetheless, these experiments were determined to be useful heuristically in the following three ways: 1) to set up how the term "medical bilingualism" is deployed in two distinctly different ways (i.e., within one medical system or between two medical systems); 2) to distinguish between publications in which authors explicitly used "medical bilingualism" in the second sense from those who also discussed encounters between two medical systems but did not use the term and so should not be considered integral to the conceptual history of medical bilingualism; and 3) to sketch an overview of the widest

range of relevant publications that came up in the AI experiments before transitioning to the review essay on only the specific articles by scholars who explicitly engaged with the second sense of medical bilingualism about encounters between two medical systems.

1.2 Reframing medical pluralism

This article explores the rise since 2015 of "medical bilingualism" as scholars have applied it to engagements between two medical systems as revealing an ongoing evolution in the way that scholars understand what a medical system is and how medical systems are differentiated and compared with one another. The image of culturally homogeneous systems of meaning and practice that dominated mid-twentieth-century scholarship on medical systems (especially using the category of ethnomedicines) has been giving way to a more culturally heterogeneous and cosmopolitan picture of how medical practitioners evolve, integrate, and differentiate concepts and practices in the context of contemporary societies and the new forms of life they engender. This reformulated concept of medical bilingualism emphasizes the ways in which medical systems overlap yet remain distinct. One scholar phrased the issue as one of "recognizing the plausibility of medical pluralism" and added that "this would require that each system involved is able to conserve its diversity and distinctiveness".[20]

Older paradigms of medical pluralism that sought to clearly differentiate medical systems along axes organized by different regions (i.e., European and non-European), metageographic concepts (i.e., Eastern and Western medicine), historical periods (i.e., ancient and modern), or epistemological orientations (i.e., traditional and scientific) are far less useful in the current moment. One major reason for this is because practices, such as acupuncture and herbal therapies, are increasingly integrated into state healthcare systems, investigated within biomedical research institutions, subject to clinical trials, practiced globally, and produce new techniques and physiological theories all along the way. Compatibility expands yet distinctiveness remains.

In addition, we narrate a broadly sketched historiography of the medical bilingualism concept so as to better understand how scholars are reframing the interaction between medical systems. This means tracing and describing how the term has been used in the literature rather than focusing on our own version of the concept and how we think it can be applied retrospectively to scholars' work who did not explicitly use the term or to better understand new contemporary medical engagements. However, our approach can be confusing as some authors use medical bilingualism to understand epistemological difference while others focus on differences in epidemiology, therapeutic practice, the creation of pharmaceutical commodities, legal and regulatory differences, and cosmological differences between medical systems. We aim to explore these differences rather than resolve them.

Our method for building this historiography is based on our expertise in the field, scholarly database searches on key terms like "medical bilingualism" and related terms like "polyglot therapeutics", "metamodern", and "ecumenical medicine", and tracing citations and references from the archive of texts we've collected. We will also, however, introduce this historiography using a somewhat novel framing device that begins with summaries of the full-range of scholarship that came under "medical bilingualism" provided by the AI tools Google AI, ChatGPT, and DeepSeek (深度求索). At least in theory, the juxtaposition of these "large language models" can provide a useful model for identifying the kind of bilingualism Hanson theorized as being so important for Tu Youyou's ultimate success in isolating Artemisinin. This is namely, "the ability not only to read in two different medical languages but to understand their different histories, conceptual differences, and, most importantly for this unexpected news, potential value for therapeutic interventions in the present".[1] In practice, therefore using AI experiments as "large language models" in this way required a comparable oscillating between what we had previously synthesized from conventional research methods to build a bibliography on the conceptual history of medical bilingualism with what the AI searches generated guided by our inquiries.

The following essay has a tripartite structure. Part two thematically summarizes our very recent 2025 experiment with asking modern-day AI tools about the history of "medical bilingualism" as a concept applied to navigating two medical systems. Part three develops further upon the literature cited in part one but to narrate the pre-COVID-19 historiography of scholars who deployed medical bilingualism in their analyses of exchanges between modern biomedicine and traditional medical systems. Part four examines further developments in scholarship during the new medical context of COVID-19 when TCM became an important dimension of the integrated medical response to treating patients with COVID-19 in China. During that period, scholars engaged with this new situation by both confronting the conceptual limitations of the medical bilingualism framework and applying new analytical concepts, such as polyglot therapeutics (when multiple medical systems are allowed to be practiced within the legal and bureaucratic regimes of different nation-states), metamodern (a model that theorizes oscillatory movement across epistemological boundaries), and ecumenical medicine (when biomedicine and traditional medicines become integrated into one system), to further advance our collective understanding of medical pluralism in modern society. We conclude with some post-COVID-19 reflections on language ideology, multilingualism, and medical pluralism.

2 The limits and possible promises of online searches

AI tools, such as Google's general search engine AI, ChatGPT, and the recently released DeepSeek, have become powerful tools for both scholars and the general public. These tools are changing rapidly, however, and come with problems, especially for scholars looking for accurate and precise information. In fact, without expertise in the subject material, they remain woefully inadequate for crafting a serious historiography of concepts, like medical bilingualism, from over the past decade. Engaging with these new AI resources, however, is nonetheless instructive to reveal their current limitations and also to stimulate us authors—one a historian and the other an anthropologist—to better frame our analysis in terms of where the second sense of this concept originated (it turns out not to have a single origin) and how other scholars have utilized, modified, criticized, and gone beyond it.

AI and such search engines are integral to our present knowledge systems; they will only work better with better informed material. Our essay is conceived of as an effort to improve the broader public access to the work during the past decade of scholars using this concept in relation to interactions between biomedicine and traditional medicine. To be clear, our use of AI tools is more of a framing device and has in no way been the basis of our research findings. Instead, we have relied on our knowledge in the area, scholarly database searches, and examining the texts we've collected for references to other texts to trace the changing use of the second sense of medical bilingualism. With this in mind, we review our research findings from our experiments with Google, ChatGPT, and DeepSeek according to five themes: multiple languages within one medical system, cross-cultural medical exchanges, integrated medical expertise, AI-recommended references, and, finally, AI-generated errors, hallucinations, and misinterpretations.

2.1 Multiple languages within one medical system

When "medical bilingualism" was typed into the general Google search engine, AI Overview provided the following definition: "Medical bilingualism is when healthcare professionals speak more than one language, which can improve patient care and communication". AI Overview then summarized four benefits of hiring bilingual healthcare professionals: better doctor communication with patients, improved patient outcomes, reduced costs for hospitals as this reduces need for separate interpretation services, and more personalized care stemming from bilingual healthcare professionals understanding cultural factors that might influence their patients' care. AI Overview concluded with two examples of bilingual roles in healthcare: namely, medical scribes who translate medical documentation to ensure accurate patient records and care navigators who bridge communication gaps between patients and healthcare providers. As noted earlier, this AI generated definition and contextualization of medical bilingualism accurately describes how the term was most commonly used prior to Hanson's Tu Youyou article.

Under "All", the Google search engine offered further examples of "medical bilingualism" from the range of benefits of bilingual healthcare professionals[2] to the value of bilingualism in medical education[3] and even how using a foreign language, instead of one's native language, can influence people's medical judgements for preventative care.[4]

Under "News", most of the articles addressed comparable themes, such as how bilingualism affects the brain[5] and the need for Spanish-speaking and other bilingual nurses in the US to improve communication with patients and their health-care outcomes.[6] Within the context of everything else the Google search engine selected at that time, there was one outlier in this group that, if one didn't know better, could easily be deemed a sampling error. This was Hanson's 2015 opinion piece: "Is the 2015 Nobel Prize a turning point for traditional Chinese medicine?"

Although this article used the phrase "medical bilingualism" in a very different way from all the other books and articles that Google captured—namely, approaching two different medical paradigms as mutually exclusive languages—Google's AI overview did not capture this conceptual distinction in its initial summary. This description of medical bilingualism in terms of literal bilingualism (the use of two different languages) occurring in the clinical context of one medical system thus has a longer pre-2015 history in the literature. Because it does not engage with interactions among distinctly different medical systems, however, it is only marginally relevant to this review as exemplifying medical bilingualism's multivalence.

2.2 Cross-cultural medical exchanges

While Google's AI Overview was only able to provide us with the older definition of medical bilingualism, we used other publicly available AI tools between January and April of 2025 to see if we could draw out uses of medical bilingualism related to how both Hanson and Mason used it in 2015. Using ChatGPT 03-mini, ChatGPT 40, and DeepSeek, we experimented by using different prompts with different follow-up questions at different times. Our basic starting prompt was a variation on:

> I am a historian studying the concept of medical bilingualism as used by Marta Hanson in her paper, "Is the 2015 Nobel Prize a turning point for traditional Chinese Medicine" published in, *The Conversation*, Oct 5, 2015. Can you give me a summary and historiography of this medical bilingualism concept?

We then sorted through the resulting discussions to identify the different definitions of medical bilingualism created by these AI tools. One of the first to emerge was the notion that medical bilingualism "sheds light on the interactions between TCM and Western medicine, particularly during periods of cultural exchange" (ChatGPT 40—2025.04.06). This model is associated with a gap between medical systems at the "macro level", which is bridged by "micro-level discursive and practical fluency of individual practitioners" (ChatGPT 03-mini 2025.04.06). In other words, under this notion of medical bilingualism, medical systems like Chinese medicine and biomedicine remain epistemologically, ideologically, and/or conceptually distinct (and even incommensurable) at the macro-level of a system. But they nonetheless can be integrated by individual practitioners at the micro-level in the course of practice. Specifically, the differences between "the conceptual language of classical Chinese medicine [rooted in texts such as *Huang Di Nei Jing* (《黄帝内经》*The Yellow Emperor's Inner Classic*), with emphasis on qi (气), yin-yang (阴阳), *Wu Xing* (五行 five elements), etc. (Note 3)] and the frameworks of Western biomedicine (anatomy, physiology, pathophysiology, evidence-based practice)" (ChatGPT 03-mini 2025.04.06) made up the relevant medical systems viewed as conceptual languages.

Medical bilingualism in this sense allows focus to be placed on individual practitioners and the social spaces immediately around them. Although the AI tools we used never directly mentioned Mary Louise Pratt's notion of "contact zones", they nonetheless strongly implied her idea of "social spaces where cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power, such as colonialism, slavery, or their aftermaths".[21]

Specific examples of such historical contact zones were recognized in some of the AI responses such as "the Jesuit missions in China (16th–18th centuries) [at which time] European physicians and Chinese scholars engaged in the translation and adaptation of medical knowledge, creating hybrid medical practices" (DeepSeek 2025.03.12). In one instance of discourse with an AI, this notion of medical bilingualism was associated with historians. While the upcoming historiography section will show this association to be fairly weak, it does point to how the cross-cultural framework for understanding the interaction between different medical systems is well-suited to cross-cultural medical encounters from the 16th to early 20th centuries.

The central feature of this cross-cultural notion of medical bilingualism is how medical systems remain distinct as systems but are integrated or hybridized by individuals in the context of practice. This framework is broadly analogous to the difference between competence and performance as theorized in cognitive linguistics (Note 4). In that context, language competence means knowing the abstract rules of a language. Performance describes the ability of an individual to follow the rules of these languages within a particular "concrete" context. How an individual navigates these rules might include phenomena such as code switching, code mixing, accommodation, and other patterns of linguistic exchange (Note 5). The next example focuses more on the space or situation within which medical bilinguals make decisions.

2.3 Integrated medical expertise

Whereas this first AI-generated understanding of the two-medical-systems concept of medical bilingualism was associated with cultural and social exchange, we also saw the AI describe a second concept based on "postcolonial studies of science, especially the work of scholars such as Warwick Anderson, Bruno Latour, and Londa Schiebinger, who show how knowledge systems are deeply entangled with local cultures and power structures" (ChatGPT 40 2025.04.13). This model posits that "hybrid practices emerged from mutual influence and negotiation" (ChatGPT 40 2025.04.13) and thus medical bilingualism is not just a special case of a practitioner who is able to draw on two systems of medicine but is also a generative space in which these systems are actively shaped, identified, reconceptualized, integrated, and/or mutually redefined.

Crucially, the interaction between medical systems occurs through practices that seek to achieve particular material, social, or otherwise practical results. Such results might include curing the patient, alleviating symptoms, or developing new therapeutic innovations or pharmaceutical products. Here, medically bilingual individuals are less focused on following epistemic rules than on achieving therapeutic ends (although these are not mutually exclusive). If the previous version of medical bilingualism is analogous to linguistic notions of abstract competence and concrete performance, this version is more comparable with Pierre Bourdieu's idea of "situational" or "practical" competence in which fluency in a language depends more on developing an awareness of the situation than on an ability to follow rules.[22]

On the medical side of this analogy, we see how this version of medical bilingualism foregrounds clinical practices and research projects. The generative quality of these spaces is emphasized. Hanson's original description of medical bilingualism describes it as being familiar with two medical systems and their histories but also recognizes its "potential value for therapeutic interventions in the present".[1]

It is worth remembering that the very subject of Hanson's article is the celebration of Tu Youyou's medical innovation and an exploration of how this discovery represents an ongoing and complex interrelation between biomedicine and Chinese medicine. Part of the question at hand is if, and how, these systems might transform through engagement with each other. AI discussions

on the topic often noted how the medical bilingualism concept was a valuable tool for identifying "the agency of Chinese scientists in selecting, blending, and navigating medical knowledge systems [and] the hybrid nature of modern medical discoveries" (ChatGPT 40 2025.04.13).

2.4 AI-recommended references

Unsatisfied that the broad analysis provided by the various AI tools did not cite references beyond Hanson's 2015 opinion piece and did not identify who were the "scholars in both historical and anthropological fields" who had further "explored its implications", we asked ChatGPT to dig dipper with the following second question.

> Now give citations of historians and anthropologists who have used "medical bilingualism" in their published work.

ChatGPT provided the following answer by listing five articles and a hyperlinked URL to where each article could be found.

> Since the introduction of the term "medical bilingualism" by Marta Hanson in 2015, several historians and anthropologists have incorporated the concept into their research. Notable examples include:
> - In "An Ecumenical Medicine Yet To Come: Reflections on Needham on Chinese Medicine", the author references Hanson's concept of "medical bilingualism" to discuss the integration of Traditional Chinese Medicine (TCM) and biomedicine. journals.uchicago.edu
> - The article "The Pharmaceutical Assemblage: Rethinking Sowa Rigpa and the Herbal Pharmaceutical Industry in Asia" contrasts Hanson's proposal of "medical bilingualism" with the integration of Xizang medicine and biomedicine. journals.uchicago.edu
> - In "The Role of Chinese Medicine in Treating and Preventing COVID-19 in China", the author describes seasoned physicians as practicing "medical bilingualism" by navigating between divergent epistemological commitments of TCM and biomedicine. brill.com
> - The article "H1N1 Is Not a Chinese Virus: the Racialization of People and Viruses in Post-SARS China" draws parallels between "epidemiological bilingualism" and the "medical bilingualism" observed among Chinese biomedical practitioners and laypeople. pmc.ncbi.nlm.nih.gov
> - In "Meta-Approaches to Asian Medicine, Part 1: A Metamodern Approach", the author discusses individuals who navigate multiple medical paradigms with "medical bilingualism", highlighting the challenges of crossing epistemic boundaries. asianmedicinezone.com
>
> These works demonstrate the application of "medical bilingualism" in analyzing the interplay between traditional medical systems and modern biomedical practices.

ChatGPT accurately summarized Hanson's interpretation of medical bilingualism and provided titles of five articles relevant to, although not necessarily citing, her 2015 article. Although this could be a good start to developing a bibliography on "medical bilingualism" in the way that Hanson first deployed it, ChatGPT did not, however, provide complete citations, list them in chronological order, or, most importantly, summarize how each scholar had found "medical bilingualism" productive to think through their specific case studies.

In the first citation, for example, Kuo Wen-Hua published an essay in *Isis* in 2019 that engaged with Joseph Needham's idea of "ecumenical medicine" (which Needham had originally conceived of as when biomedicine and traditional medicines become integrated into one system), arguing that medical bilingualism offered another way of framing the relation between Chinese medicine and biomedicine. Kuo writes that in East Asia broadly "biomedicine has not absorbed traditional medicine; nor have the two become conflated into an ecumenical science. Rather, we find there a sort of dual system of health care; each system is both institutionalized and scientific".[23] As a concept, medical bilingualism suited well this way of modeling the overlap between two distinct and distinctly valid systems that Kuo sought to highlight. This "dual system" of healthcare could be juxtaposed with Needham's image of an "ecumenical medicine" in which different medical systems were brought together under one umbrella because they all are seen as participating in the same science of medicine.

The second article identified by ChatGPT is Stephen Kloos's paper on "The Pharmaceutical Assemblage" in Xizang medicine (藏医药). This article was published two years earlier than Kuo (2017) but, actually did not engage with "medical bilingualism" at all; rather it was the same Kuo Wen-Hua who cited Hanson in a 2019 article who here responded two years earlier to the Kloos paper. In that response, Kuo wrote that Kloos's concept of "the pharmaceutical assemblage" frames Xizang pharmaceuticals as global commodities operating within a series of transnational "domains". Kuo stated that the bilingualism concept, on the other hand, allows "the conceptual boundary between TCM and biomedicine" to be crossed while still maintaining their identities as systems of medicine. So, contrary to what ChatGPT summarized, it was not, in fact, Kloos who contrasts Hanson's proposal of "medical bilingualism" with the integration of Xizang medicine and biomedicine but rather Kuo who did this in his response to Kloos's article published as an addendum. Thus, while some aspects of what the AI presented fit with our own analysis, its conjecture cannot be seen as reliable due to its very superficial grasp of the texts involved and their use of the term.

The third article listed by ChatGPT, "The role of Chinese medicine in treating and preventing COVID-19 in China", was in fact written by two authors, not one, and originally included "in Hubei, China" not just

"in China" in the title.[24] Errors of citation aside, the authors Shelley Ochs and Thomas Avery Garran, did mention "medical bilingualism" in their parsing out of the different ways team leaders of the Chinese state-sponsored response to COVID-19 within the "Chinese-Western integrated medicine" community explained their clinical reasoning.

> "These seasoned physicians are all 'polyglots' or practice 'medical bilingualism' with respect to their ability to easily slide between categories and concepts that in fact are based on divergent epistemological commitments. At the same time, these explanations 'opened up unresolved clinical debates artificially closed in the standardization of the curriculum in the 1950s and 60s'." (Note 6)[25]

Later in this essay we will return to the origin and meaning of "polyglot" in this quotation, as it is one of the other key concepts applied today to understand engagements among multiple medical modalities.

For now, we return to the fourth article identified by ChatGPT. Katherine Mason's "H1N1 is not a Chinese virus: the racialization of people and viruses in post-SARS China", was published in 2015, well before the other three articles.[26] In fact, it was published several months before Hanson's article on Tu Youyou. In this article, Mason analyses how Chinese public-health professionals linked certain groups thought to be infectious along with the infections themselves.

For instance, these public health professionals considered SARS to be a Chinese or a Cantonese disease and, conversely, H1N1 was considered to be a more Euro-American one. First, Mason deployed the phrase "epidemiological bilingualism" to capture what she observed among her biomedically-trained informants who both "subscribed to standard epidemiological explanations of infectious disease spread at the same time that they subscribed to the views described in the previous section" (namely, linking SARS to Chinese or Cantonese people dominantly and H1N1 to Euro-Americans).[27]

Furthermore, Mason compared this epidemiological bilingualism as being "akin to the medical bilingualism common among Chinese biomedical practitioners and lay people" wherein "most Chinese patients and doctors move fluidly between Western and Traditional Chinese Medicine (TCM) explanations for disease ..."[27] that she credited Volker Scheid with describing in his 2002 monograph over a decade earlier.[28]

While the concept of medical bilingualism could be applied retrospectively to Scheid's argument, he did not use this, or any related term for that matter, to capture how TCM and biomedical practitioners in China toggle between the two medical systems so his scholarship cannot be considered part of the conceptual history of medical bilingualism from 2015 on. But Mason did independently use medical bilingualism in the same way Hanson did for Tu Youyou at roughly the same time to characterize Scheid's insights about how medical practitioners toggle between TCM and biomedicine in China. Although Mason's 2015 article is thus certainly part of the conceptual history of the second sense of medical bilingualism, it must be noted here that post-2015 scholars of medical bilingualism did not cite it.

Finally, the fifth article identified by ChatGPT "Meta-approaches to Asian medicine, part 1: a metamodern approach"[29] by Salguero cites Hanson on medical bilingualism as one strategy for confronting the problem of "irreconcilable epistemes" that is common in many of the social spaces around "Traditional Asian Medicines". Salguero claims, however, that such strategies do not overcome the ways in which "disciplinary rules limit our abilities to speak, or eventually to even think, across the epistemic boundaries". He advocates instead for an "oscillatory" model of "metamodernism" as proposed by Vermeulen and van den Akker,[30] which he argues allows such epistemological differences to "[coexist] in an unreconciled tension". For Salguero, this brand of metamodernism creates a "juxtaposition [that] is emotionally rich, exuberant, heartfelt, and most of all, fun".

Despite being out of chronological order and two omitting Hanson 2015 altogether (i.e., Kloos and Mason), ChatGPT's selection of five articles, nonetheless provides some unexpected insights on the history of "medical bilingualism" in Chinese, and more broadly, Asian medical history. For one, we see how the notion emerged from two sources around the same time (Mason 2015 & Hanson 2015). Furthermore, the concept is used to point to new historical configurations, as Hanson does to point out the potential new relation between biomedicine and Chinese medicine. In addition, medical bilingualism is used as a way of reframing older approaches as Mason does when she retrospectively applies the notion of "medical bilingualism" to Scheid's 2002 ethnography, an ethnography that did not itself use that or related phrases.

We also learn from these sources about two new concepts developed after medical bilingualism separately appeared in 2015 in both Hanson's and Mason's articles. Pierce Salguero (2020) used "metamodernism" to capture how people oscillate across epistemological boundaries, and Shelley Ochs and Thomas Avery Garran (2021) used "polyglots" for those physicians they wrote about who have the "ability to easily slide between categories and concepts that in fact are based on divergent epistemological commitments".

Although the above AI-produced list of citations can be informative, it is incomplete and, furthermore, each article would require a much more careful reading than the AI provides to produce a useful historiography.

2.5 Errors, hallucinations, and misinterpretations

While in our estimation various AI tools pointed in the right direction based on what we together knew about the conceptual history of the second sense of

medical bilingualism, other responses were deeply disturbing with what is often euphemistically called "hallucinating", such as making up out of thin air what look like legitimate complete citations for articles that do not, however, exist. In the response below, DeepSeek made, however, an interesting distinction between "Explicit Uses of 'Medical Bilingualism'" and "Implicit Engagements with 'Medical Bilingualism'" that captures well the point we raised above between scholars who actually used the term (Mason, Hanson, Kuo, Ochs and Garran, and Salguero) and those who had the concept based on the second sense of the term applied to their scholarship (Kloos and Scheid). We first analyze the explicit citations and then discuss the implicit engagements, as both responses illuminate problems with how DeepSeek answered the second question.

DeepSeek first gave the following five citations, each with an explanatory sentence, for what it labeled "Explicit Uses of 'Medical Bilingualism'":

> 1) Hanson, Marta (2015). "Is the 2015 Nobel Prize a turning point for traditional Chinese medicine?" The Conversation, October 5, 2015. This is the foundational text where Hanson first introduced the term "medical bilingualism" to describe the integration of traditional Chinese medicine (TCM) and biomedicine, using Tu Youyou's Nobel Prize-winning work on artemisinin as a case study;
> 2) Scheid, Volker (2017). "Chinese Medicine in East Africa: Between Marginality and Medical Bilingualism". In Global Chinese Medicine: New Perspectives on the History of Medicine in China, edited by Linda L. Barnes and TJ Hinrichs. Scheid explicitly references Hanson's concept of medical bilingualism to analyze how Chinese medicine is practiced and adapted in East Africa, particularly in contexts where it coexists with biomedical systems;
> 3) Zhan, Mei (2021). "Medical Bilingualism and the Politics of Translation in Global Health". Medical Anthropology Quarterly, 35(3): 321–339. Zhan builds on Hanson's concept to explore how medical knowledge is translated and negotiated in global health contexts, particularly in the integration of TCM and biomedicine during the COVID-19 pandemic;
> 4) Lei, Sean Hsiang-lin (2018). "Medical Bilingualism and the Making of Modern Chinese Medicine". In Modern Chinese Medicine: The Role of Tradition in the Making of Modernity, edited by Bridie Andrews and Mary Bullock. Lei uses Hanson's term to discuss the historical development of modern Chinese medicine, emphasizing how practitioners navigated between TCM and Western biomedicine during the 20th century; and
> 5) Hsu, Elisabeth (2022). "Medical Bilingualism in Practice: Ethnographic Insights from Contemporary China". Anthropology & Medicine, 29(2): 145–160. Hsu applies Hanson's concept to ethnographic studies of TCM practitioners in China, highlighting how they blend diagnostic and therapeutic approaches from both TCM and biomedicine in clinical settings.

Hanson's 2015 article is rightly listed first as a foundational source and is adequately summarized in one sentence, although, as we pointed out in our earlier section, Hanson (2015) is the central point of reference for subsequent scholars but is not the first to use this term in this way. When we first read this list, we were both struck by how many articles DeepSeek had found that neither of us had uncovered in our own database searches before conducting the AI experiments. Excited, we immediately began looking for these articles but soon discovered that they did not exist. DeepSeek had refashioned Zhan's 2009 book *Other Worldly* by making up a new title that resembled something she might have written.[31] Similarly, Hsu's 2022 article on "Medical bilingualism in practice" was never published in *Anthropology & Medicine*, nor anywhere else for that matter. Instead, we guess that DeepSeek appears to have been inspired by her well-known 1999 ethnography *The Transmission of Chinese Medicine*.[32]

Both of us were also sufficiently up-to-date on the two books co-edited first by Linda Barnes and TJ Hinrichs[33] and later by Bridie Andrews and Mary Bullock[34] to discern the pattern of fabrication, what is well-known in AI studies as hallucinations. Thus, Lei's alleged contribution to the edited book by Barnes and Hinrichs and Scheid's imagined contribution to Andrews and Bullock's book do not exist. Furthermore, Volker Scheid's alleged "Chinese medicine in East Africa: between marginality and medical bilingualism" really seemed farfetched as we had never read anything by Scheid based on research conducted on Chinese medicine in East Africa; rather Elisabeth Hsu published a short essay on "Chinese medicine in Africa" in chapter ten of Hinrichs and Barnes's 2013 *Chinese Medicine and Healing* textbook.[35]

We then turned our attention to the second half of DeepSeek's response on "implicit engagements". Here, at least, DeepSeek accurately explained that the cited scholars did not explicitly use the term "medical bilingualism" but rather had been selected because they engaged in "the integration of multiple medical systems". Here is how DeepSeek responded in the form that it was given: DeepSeek then gave the following five citations, again each with an explanatory sentence, for what it labeled "Implicit engagements with medical bilingualism" and specified "While not always using the term explicitly, many scholars have engaged with the idea of medical bilingualism by exploring the integration of multiple medical systems".

And then DeepSeek provided the following five key examples with explanations:

> 1) Farquhar, Judith (2018). "Knowing Practice: The Clinical Encounter in Chinese Medicine". Routledge. Farquhar's work on the clinical practice of TCM in contemporary China implicitly engages with the concept of medical bilingualism by examining how practitioners navigate between TCM and biomedical frameworks;
> 2) Barnes, Linda L. (2018). "Needles, Herbs, Gods, and Ghosts: China, Healing, and the West to 1848". Harvard University Press. Barnes explores historical instances of cross-cultural medical exchanges between China and

> the West, implicitly addressing the dynamics of medical bilingualism in early modern contexts;
> 3) Andrews, Bridie (2014). "The Making of Modern Chinese Medicine, 1850–1960". University of British Columbia Press. Andrews examines the modernization of Chinese medicine and its interactions with Western biomedicine, implicitly engaging with the concept of medical bilingualism;
> 4) Hinrichs, T.J., and Linda L. Barnes (eds.) (2017). "Global Chinese Medicine: New Perspectives on the History of Medicine in China". Routledge. This edited volume includes several chapters that explore the integration of Chinese medicine with other medical systems, implicitly engaging with Hanson's concept;
> 5) Pritzker, Sonya (2014). "Living Translation: Language and the Search for Resonance in U.S. Chinese Medicine". Berghahn Books. Pritzker's ethnographic work on the translation of TCM concepts into English and their integration into U.S. healthcare systems implicitly engages with the idea of medical bilingualism.

Finally, DeepSeek provided the following conclusion:

> Marta Hanson's concept of medical bilingualism has been widely adopted and expanded upon by scholars in the history of medicine, medical anthropology, and East Asian studies. While some authors explicitly use the term, others engage with the idea implicitly by exploring the integration of multiple medical systems. The concept has proven particularly useful for analyzing cross-cultural medical exchanges, the modernization of traditional medicine, and the role of translation in global health. As research in these areas continues to grow, medical bilingualism remains a valuable framework for understanding the dynamic interplay between different medical traditions.

We both consider the final conclusion adequate, particularly the claim that "medical bilingualism remains a valuable framework for understanding the dynamic interplay between different medical traditions". However, nearly all five of the citations listed under "Implicit engagements" are problematic, especially when trying to narrate a historiography of how scholars have used the concept of "medical bilingualism" as a conceptual tool since 2015.

For example, DeepSeek lists the publication date of Farquhar's *Knowing Practice* according to the eBook publication date of 2018, not the original publication date of 1994.[36] Similarly, Barnes's *Needles, Herbs, Gods, and Ghosts* publication date was listed as 2018 not 2005, even though no eBook or other version of it has been published after 2005.[37] Even worse, the co-edited book attributed to Hinrichs and Barnes is a complete refashioning of their 2013 edited volume, *Chinese Medicine and Healing: An Illustrated History*, with the publication date now set at 2017.[34] Only Andrews's *The Making of Modern Chinese Medicine*[38] and Sonya Pritzker's *Living Translation: Language and the Search for Resonance in U.S. Chinese Medicine*[39] were acceptable citations with the correct publication dates. Furthermore, all of these books were published before 2015.

To sum up, despite these citation errors, DeepSeek's selection for "implicit engagements with medical bilingualism" did, at least, cite some actual books and all were notably focused on Chinese medicine: Farquhar (1994) applied an anthropological lens to the clinical encounter in Chinese medicine; Barnes (2005) traced the European, and later US, encounters with Chinese understandings of illness and healing; Barnes and Hinrichs, ed. (2013) gathered 58 scholars for a multifaceted synthesis of 3000 years of medical history in China as well as the spread of Chinese medicine globally along with the Chinese diaspora; Andrews (2014) examined the complex Chinese-Western medical encounter from the mid-19th to mid-20th centuries; and finally, Pritzker (2014) used ethnographic analyses of how a wide range of people translate Chinese medicine into texts and practice in the modern-day US context.

Even the outright hallucinations in the selection for "Explicit engagements with medical bilingualism" had some basis as the four scholars listed after Hanson had indeed made significant contributions to the history (Lei) (Note 7)[40] and anthropology (Scheid, Zhan)[28,31] of Chinese medicine that also engaged implicitly, at least in part, with what Hanson used medical bilingualism to capture when people oscillate between Chinese medicine and western medicine (Note 8).

We conclude that although our experiment with engaging with AI about the past decade's history of "medical bilingualism" had clear shortcoming—even fabrications—overall the exercise was productive in the following ways. It supported our original differentiation between the earlier use of medical bilingualism for navigating within one medical system from the new use for oscillating between two medical systems. What was cited, however, reenforced the impression that medical bilingualism in the second sense has to date primarily focused on engagements between Chinese medicine and modern biomedicine, whereas historians of different traditional medical systems have also deployed the term to clarify both historical and contemporary engagements. Despite the inevitable AI-generated hallucinations, it also differentiated relevant sources that directly cited medical bilingualism from those that, as DeepSeek specified, "implicitly engaged" with it.

Having set up the broad contours of the second sense of medical bilingualism, we now turn to narrating, to the best of our joint knowledge, its historiography. First, we review how several scholars found it productive to think through historical as well as contemporary examples of cross-cultural medical exchange before the COVID-19 pandemic made medical bilingualism relevant within a new epidemiological context.

3 Pre-COVID-19 historiography of medical bilingualism

Not long after 2015, several scholars applied medical bilingualism in the sense of navigating to two medical

systems but in two ways distinct from what Salguero, Mason, and Hanson previously had done. The first applied medical bilingualism historically as a conceptual tool to understand how certain Japanese physicians synthesized Sino-Japanese acupuncture and the new medical views on human anatomy and Dutch learning in the nineteenth century and also how early twentieth-century Korean medicine practitioners responded to Western medicine. The second, on the other hand, used medical bilingualism explicitly as a research agenda directed at three different but comparable processes in contemporary times: modern entanglements between Chinese and the Western pharmaceutical industry; Korean herbal medicines and the pharmaceutical industry; and how acupuncture is being integrated into biomedicine today.

3.1 Nineteenth-century Japanese and early twentieth-century Korean medical history

Historian of Japanese medicine, Mathias Vigouroux, found medical bilingualism productive to explain why the German surgeon Philipp Franz von Siebold (1796–1866) was so engaged with the acupuncture writings of the Japanese imperial physician Ishizaka Sōtetsu (石坂宗哲, 1770–1841) in the early nineteenth century (Fig. 2). Vigouroux set the stage by situating Ishizaka in early nineteenth-century Japanese medical debates in Edo (present-day Tokyo) between the new Western medicine of Dutch studies (兰学) represented by Sugita Genpaku's (杉田玄白, 1733–1817) translation of Western anatomy in *Kaitai shinsho* (『解體新書』*New Book on Anatomy*, 1774), on the one side, and Chinese medicine-educated Japanese physicians who were debating about what is authentic in these practices, on the other. Ishizaka uniquely responded to the then concerns of the Ancient Formulas School (古方派) that medicine of Chinese antiquity had been corrupted. He did this by applying the newly introduced western anatomy to recover what he thought was the true meaning of the Chinese medical classics. Specifically, Vigouroux argues that he rendered visible through western anatomical correlates otherwise invisible Chinese concepts of the human body. Vigouroux summarized Siebold's response to Ishizaka's synthesis in the following way:

> "This early stage of 'medical bilingualism', a term that Marta Hanson defines as 'the ability not only to read in two different medical languages but to understand their different histories [and] conceptual differences', explains perhaps why Siebold had so much interest in Ishizaka's acupuncture and used his writings to introduce Sino-Japanese acupuncture in Europe."[41]

Vigouroux thus distinguished what he terms an "early stage of 'medical bilingualism'" when one person—here the imperial physician Ishizaka in early nineteenth-century Edo Japan—was able to work with both classical Chinese medical views of the human body and

Figure 2 Portrait of German physician Philipp Franz von Siebold (1796–1866), done by Edoardo Chiossone (1833–1898) (source with permission from: https://commons.wikimedia.org/wiki/File:Chiossone_-_Philipp_Franz_von_Siebold.jpg)

Western anatomical views that Sugita had translated into Japanese in his *Kaitai shinsho*. Vigouroux persuasively argues that Siebold was not interested generally in Sino-Japanese acupuncture as were Siebold's predecessors—Willem Ten Rhijne (1647–1700) and Engelbert Kaempfer (1651–1716)—but rather he was specifically interested in Ishizaka's unique synthesis of Western anatomy and Sino-Japanese acupuncture, which Sugita's medical bilingualism had made possible.

Six years later, Vigouroux applied his idea of an "early stage" of medical bilingualism again to another Japanese acupuncturist—Nakashima Yūgen (中岛友玄, 1808–1876)—who navigated between Western medicine included in Dutch learning and Sino-Japanese medicine that was part of his broad medical education.

> "It can be said, therefore, that Nakashima's medical training was an example of this early stage of 'medical bilingualism'; in other words, he belonged to a new generation of doctors trained in both Dutch and Sino-Japanese medicine".[42]

Vigouroux based this interpretation on evidence that Nakashima formally trained in the multiple medical currents available in nineteenth-century Kyoto: the Ancient Formulas School of Chinese medicine, learned Dutch medicine, obstetrics, and external medicine. This article primarily focused only on Nakashima's acupuncture casebooks spanning between 1863 to 1870, however, and so did not develop further upon how Nakashima's medical bilingualism might have also manifested in his full clinical practice covering herbs, obstetrics, external medicine, etc. in his extant casebooks from 1834 on.

Comparable to Vigouroux's "early stage of medical bilingualism", James Flowers used "Incipient medical

bilingualism" in his Ph.D. thesis to describe how Korean Eastern-medicine doctors engaged with western medicine in the early twentieth century.[43] He found in the medical journals of the period targeted for Eastern-medicine physicians—*Eastern Medicine Mirror*, *East-West Medicine News*, and *Chosŏn Medicine*—that authors tended both to accept how western-trained doctors diagnose disease and to apply concepts from Eastern medicine in their clinics. Some physicians writing for these journals comfortably alternated between these two medical systems, integrating concepts from both into their medical discourse, without apparent anxiety about incommensurability.

In his subsequent article, he further articulated how "medical bilingualism" captured well how Korean practitioners of Eastern medicine in the 1910s "chose not to accept the hegemony of biomedicine epistemology" but rather "drew on a dual conceptual understanding" by combining disease analysis from Western medicine with Eastern medical concepts and treatment modalities.[44]

3.2 Medical bilingualism as a research agenda in the modern pharmaceutical industry

Historian of Chinese medicine, Kuo Wen-hua, used "medical bilingualism" not only in his response to Stephen Kloos's 2017 article on "pharmaceutical assemblages" and in his own 2019 article on Joseph Needham's idea of ecumenical medicine (which we briefly reviewed above) but also in an earlier 2016 article, which none of our experiments with AI searches had captured. And yet in that article, he used "medical bilingualism" to make the point that fluency in both biomedicine and TCM is necessary for TCM to be permanently part of respected present-day therapies.[45]

This is because TCM is, as Kuo wrote "a 'latecomer' in global pharmaceuticals", and so "is expected, if not forced, to pass the regulations that have evolved with the biomedical industry for over 50 years".[45] His case study focuses on what the Consortium for Globalization of Chinese Medicine (CGCM)—an international organization founded in 2003 by Chinese scientists—is doing to help TCM medicines pass through global and national medicine regulatory regimes. The CGCM is a particularly interesting case study in Kuo's analysis because by 2013, ten years since its founding, it became comprised of more than 130 member institutions, which also includes those in Europe, the US, and Australia, and it has continued to expand globally to 166 member institutes and 29 industrial affiliates.

At the center of this Consortium is its founder Cheng Yung-chi (郑永齐) who, as a biomedically-trained pharmacologist and successful medicine developer, only later came to apply his scientific knowledge to TCM medicine therapies (Fig. 3).

Whereas Kuo focuses on Cheng, and the global network he created through the CGCM to justify TCM medicines' efficacy through medicine regulatory regimes at a global level, historian of medicine in Korea, Ma Eunjeong, takes a comparable approach to how the government officially supports pharmacological approaches to the herbal formulas of traditional Korean medicine (TKM).[46] Ma, however, emphasizes what she terms "coerced medical/pharmaceutical bilingualism", which she argues "refers to the non-voluntary fusion of two medical traditions when the government enforces the pharmaceutical industry to commercialize Korean medicines into health products".[46]

Furthermore, Ma wrote about this phenomenon before she had the concept "medical bilingualism" or, in her new formulation "coerced medical/pharmaceutical bilingualism", to apply to the way the government has persuaded domestic pharmaceutical industries and research institutes to translate TKM herbs into biomedical products.[47] She writes about how the government has adopted medical and pharmaceutical bilingualism as an official policy guideline within a bifurcated medical system—TKM and biomedicine—which has ignited deep-rooted conflicts between the supporters of these two medical-pharmaceutical systems.

In the process, TKM herbalists have been excluded from the new socio-technical networks of biomedicine. This resembles what Sean Hsiang-in Lei argued had happened to traditional Chinese doctors during the "re-networking" process in China from the 1920s to the 1930s that made the Chinese herbal *Chang Shan* (常山 Radix Dichroae) into a new anti-malarial medicine.[48]

Even Ma's earlier work on debates about modern imaging technology in TKM clinics dealt, as DeepSeek

Figure 3 Photo of leader of Consortium for Globalization of Chinese Medicine (CGCM) Cheng Yung-chi (郑永齐) (source with permission from: Cheng Yung-chi, https://medicine.yale.edu/profile/yung-chi-cheng/)

phrased it, "implicitly" with medical bilingualism.[49] Ma followed up on this considerable scholarship since 2014 on TKM-biomedicine-pharmaceutic assemblages (using the concept from Kloos 2017) in modern-day Republic of Korea with a chapter in *Food Safety and Technology Governance* on government-driven market formations about whether things are classified as a food or medicine.[50]

In sum, Kuo's case study on the CGCM's global efforts to move TCM medicines through medicine regulatory regimes and Ma's case studies on the government's systematic efforts to do the same for TKM medicines in their domestic pharmaceutic industry and research institutes both provide models for a research program to which they continue to contribute from their unique perspectives within the East Asian region and which goes beyond the modern-day global pharmaceutical industry they have both studied.

3.3 Modern-day acupuncture as an example of Needham's ecumenical medicine

This is precisely the point that Kuo (2019) made about taking Needham's ideal of ecumenical medicine as a research method to understand what has actually happened with acupuncture today (discussed in section 2.4). Namely, his point is that modern-day acupuncture within biomedical context is an example of the titration that Needham projected could eventually transform into ecumenical medicine.[23] Although Florence Hsia and Dagmar Schäfer rightly observed that Needham's methodological metaphor of "titration" no longer inspired scholars,[51] Kuo argues here, however, that titration could nonetheless be historically productive for scholars of "Asian healing arts and their Western counterparts". This is, in short, because many scholars have demonstrated that "intellectual titrations" between these two medical systems—what Kuo equated with Hanson's medical bilingualism—continue into the present. Furthermore, Kuo argued that although Needham's concept of ecumenical medicine and later work on "intellectual titrations" (i.e., "medical bilingualism") complement each other as research agendas, whether the endpoint of such titrations would lead to Needham's vision of ecumenical medicine remains in question,[23] though as research agendas they remain no less instructive of modern-day traditional-biomedical assemblages.

In 2024, Kuo develops further upon this argument with a detailed case study of Lin Jaung-Geng (林昭庚), who was the first physician of Chinese medicine to be elected an academician at Academia Sinica, in no small part for his work defining safe margins of needling depth in acupuncture.[52] Kuo argues that Lin's medical bilingualism, "was one of the main reasons, in addition to his connections to biomedical colleagues and institutions, that Lin could be considered for and elected as an Academician in the category of life sciences, where biomedicine (both basic and clinical) dominates".[52] Kuo's initial 2016 article on the Consortium for Globalizing Chinese Medicine, 2019 essay on Needham's ecumenical medicine, and 2024 article on "Needham's legacy in clinical research" arguably provide both arguments for and models of how to carry out a research agenda based on medical bilingualism that undergirds such "intellectual titrations" (in Kuo's wording) and considers Needham's concept of "ecumenical medicine" no longer as merely an idealized goal but rather historically productive to think with as a conceptual tool.

Kuo has continued to expand upon this line of thinking of using Needham's concept of ecumenical medicine as a research method in 2025 with a talk at Harvard University's Asia Center in March on "From Needham to STS (and back to Needham): Why East Asian History Matters".[53] This was soon published in an essay in Chinese on the same topic published in two different online venues titled "From the 'Needham Problem' to Needham's Medical Problem".[54] Now we turn to the new situation that unfolded during the COVID-19 pandemic with respect to these issues and the scholars who sought to explain how some Asian medical systems were mobilized to respond.

4 Medical bilingualism and polyglot therapeutics during COVID-19

The onset of the COVID-19 pandemic brought renewed media attention to the workings of national healthcare systems especially their institutions of public health. Hanson was interviewed in early March 2021, for example, to expand upon more than she had published on medical bilingualism.[55] Then *Le Monde* journalist Stéphane Van Damme summarized her main arguments on medical bilingualism related to Chinese medical treatments for COVID-19 after hearing her presenting some ideas online during a contagion seminar at the European University.[56]

At the same time, scholars of these systems were reevaluating how they understood these systems especially in light of how they mobilized in response to the crisis and how different national responses compared with each other. The concept of medical bilingualism gained increasing traction amongst scholars of East Asian medical systems along with what Robert Peckman and Mei Li call the "twinned" concept of "polyglot therapeutics".[57] Historian of colonial and post-colonial Africa Helen Tilley coined polyglot therapeutics to analyze the different legal and bureaucratic regimes that establish the terms that allow different kinds of medicine to be practiced (i.e. integrated Chinese-Western medicine in China) within different nation-states.[58]

4.1 From homogenous to heterogeneous medical systems

The increasing use since the COVID-19 pandemic of the notions of "medical bilingualism" and "polyglot

therapeutics" seems to signal a shift in the way that "traditional" East Asian medical systems are understood. The image of culturally homogeneous systems of meaning and practice that dominated mid-twentieth-century scholarship on medical systems (especially ethnomedicines) has been giving way to a more culturally heterogeneous and cosmopolitan picture of concepts and practices that evolve, integrate, and differentiate themselves in modern societies. Consider, for example, Charles Leslie's use of the term "cosmopolitan medicine" to describe what today is commonly known as "biomedicine" in his 1976 edited volume, *Asian Medical Systems*.[59] Here Leslie follows Frederick Dunn's use of cosmopolitan in the same text to mean a worldwide system of medicine rather than a local or regional one.

Yet, the identity of biomedicine as "the" worldwide system of medicine turned out to be far narrower historically than these scholars anticipated. The use of "cosmopolitan medicine" was indeed short lived. Furthermore, the emphasis on the authenticity of a particular medical ideology determined within a distinctive historical and cultural context, such as that of Chinese medicine, is now complicated by an attention to the use of diverse medical repertoires and the complex social and pragmatic considerations that continue to reshape practices.

This shift in framework can be seen in both Hanson (2015) and Tilley's use of the terms. Hanson uses the notion of medical bilingualism in articulating her surprise that Tu Youyou won the Nobel prize in medicine for her "discovery of Artemisinin as an alternative malaria cure". Hanson marks this as a "turning point", if not a seismic shift, in how Chinese medicine is recognized on the global stage, especially by the institutions of biomedicine. In developing her notion of "polyglot therapeutics", however, Helen Tilley points out that Tu's achievement nonetheless portrays Chinese medicine as the inspiration behind a biomedical project.

The two medical systems are seen as partially compatible rather than as mutually exclusive or organized hierarchically with biomedicine extracting value from Chinese medicine. Both Hanson and Tilley describe Tu as operating within a network of institutions that were able to transform the insights of Chinese medicine into an internationally recognizable and financially sustainable pharmaceutical. In the context of Tu's research into artemisinin, and the resulting anti-malarial therapies, it is difficult to insist that biomedicine and Chinese medicine are two mutually independent and culturally "closed" medical systems.

For Tilley (2021), the imbrication of these two medical systems becomes even clearer when considering how legal and bureaucratic regimes set the terms under which medicine is practiced. Medical bilingualism draws our attention to how, in these points of overlap, medical systems have significant influence on each other while still maintaining their distinctiveness. Polyglot therapeutics expands upon this insight to capture what Tilley calls the "Janus-faced dynamic" of "diagnoses and descriptions that oscillate between worlds of meaning and unsettle boundaries around what is real and unreal, true, and false, effective and ineffective".[58] Medical historian Charles Rosenberg's nearly two-decade-old chapter on how scientific medicine navigates these boundaries in the US remains instructive from COVID-19 up to the present.[60]

4.2 Medical bilinguals and polyglot therapeutics in the COVID-19 context

The most important contribution to the issues we have discussed so far but in the COVID-19 context is the special issue on "Asian Medicine and COVID-19" of *Asian Medicine*, the journal of the International Association for the Study of Traditional Asian Medicine (IASTAM).[61] Michael Stanley-Baker and Ronit Yoeli-Tlalim's introduction provides a sobering reflection of what was at stake at that time in terms of misrepresentations of Asian medicines in the Anglophone media (Note 9) and also what had changed epidemiologically from its start in early 2020 to May 2021, when they wrote their essay.[62] One key issue they highlight is that while biomedicine for quite some time early on could not provide adequate explanations or therapeutic responses, Asian medical systems could and did. Four articles in this special issue address this issue by delineating those explanations, the therapies derived from them, and related policy positions.

Shelly Ochs and Thomas Avery Garran, for example, followed up on their timely book of translations of Chinese sources related to Chinese responses to COVID-19 nationally[63] with an article focused on Chinese medicine's role during the COVID-19 outbreak in Hubei locally.[24,25] Their article was the third ChatGPT's selection of five articles discussed previously. They focused on the people within the state-sponsored "Chinese-Western integrated medicine" institutions who were involved in providing explanations and clinical reasoning. Dr. Liu Qingquan (刘清泉)—president of Beijing Traditional Chinese Medicine Hospital, chair of the Cooperative Group of Key Specialties in Emergency Medicine of the National Administration of Chinese Medicine (NATCM), and a pioneer-advocate of Chinese medicine (CM) emergency medicine—exemplified those they considered polyglots and medical bilinguals.

They wrote:

> "He smoothly relates the two sets of disease causation, viruses, and Cold Damage or Warm Disease, without reducing one to the other, and so maintains the significance and 'reality' of disease causation in CM".[25]

Whereas the Chinese government was actively involved in mobilizing Chinese-medicine practitioners to help treat patients suffering from COVID-19, the government of Republic of Korea responses to COVID-19

completely excluded Korean-medicine doctors. James Flowers both contributed an opinion piece in the Hong Kong Free Press cautioning journalists not to dismiss Chinese medical treatments for COVID-19 in China[64] and tracked how TKM doctors actually responded in Republic of Korea.

He followed up his previous scholarship on how Korean-medicine doctors responded to Western medicine in 1910s Korea (see section 3.1) with an article on how comparable doctors just over a century later responded to COVID-19.[65] In this illuminating article, Flowers makes visible the otherwise unrecognized efforts TKM doctors made by volunteering their services, providing financial resources, and prescribing herbal medicines for free via telehealth to an estimated 20 percent of COVID-19 patients in Republic of Korea.

The two contributions to this special issue that focused on how practitioners of Xizang medicine responded to COVID-19 took completely different approaches. On the one hand, Anthropologist of Xizang medicine, Sienna Craig, worked with five colleagues to carry out a finely grained analysis of the audio diaries that Dr. Kunchong Tseten, then based in Queens, New York, made about what he was doing to respond to COVID-19 during the pandemic.[66] On the other hand, Anthropologist-practitioner Tawni Tidwell and physician Khenrab Gyamtso do not start from a specific place and person but rather focus on how people used Xizang medical paradigms to understand the emergence and manifestations of COVID-19. Although neither article referenced medical bilingualism or polyglot therapeutics, the protagonists in both navigated between biomedical and Xizang medicine explanations, related treatments, and translation issues during COVID-19.

5 Conclusion: on multilingualism and medical pluralism

In the concept of medical bilingualism, the ability of a speaker to use two languages serves as a model for understanding the ability of people to use two medical systems. Of course, the use of language as a metaphor for medical systems is not new. For instance, the concept of translation has been widely used and well-established in the study of medical systems and of bodies of knowledge in the sociology and history of science more broadly. Like medical bilingualism, translation is a specific empirically observable linguistic activity while also a model for understanding medical systems.

In the study of East Asian systems of medicine, scholars such as Pierce Salguero,[13] Sonya Pritzker,[39] and Mei Zhan[31] have all examined specific practices of translation while at the same time using the notion of translation to theorize how medical systems interact with each other. These scholars tend to see such interactions as cross-cultural moments in which medical systems are brought into contact or exchange. While the translation framework is extremely useful for understanding certain aspects of how difference operates between medical systems, it tends to assume that there is a preexisting gap between languages, which translation works to bridge.

Like with translation, the concept of medical bilingualism sometimes sees language use as an empirical site of inquiry but focuses more on the overlap rather than gap between two languages. It is worth considering then what assumptions go into this model or, put in a more sociolinguistic way, what language ideologies enable the linguistic metaphor to be applied to the study of medical practice. A language ideology, as commonly defined, is the set of ideas that ground what people understand a language to be, how that language is shaped by its speakers, and what kinds of things a language can do. A particular language ideology might assert, for example, that some languages are more precise than others, that speaking certain words have magical effects, or that each language is made up of arbitrary elements systematically organized to enable meaningful communication. This last notion of the arbitrariness of language is particularly central to modernist language ideologies.[67]

A language ideology correlate for medical systems might posit the range of what a medical system is and what kinds of disease and therapies are possible. Yet, we also need to be cautious about casually applying the language metaphor in the medical context. Modern linguistics largely assumes that the relation between a word's form and its meaning are arbitrary. Because of this arbitrariness, it makes sense that many of the formal characteristics of different languages need not converge. Within medical ideology, however, there is no general agreement that the workings and objects of therapeutic interventions are largely arbitrary.

Certainty, the ability to generalize the objectivity of disease and treatment has been reframed by the concept of "local biologies" introduced by Margaret Lock[68] and the "multiple ontologies" of the body as developed by Annemarie Mol.[69] These positions, however, have not been widely adopted by medical practitioners and the very notion of what a medical system is remains surprisingly open. Given this openness, we would suggest that medical bilingualism, as a concept, makes it easier to convey the partial compatibility of various medical systems and how the management of multiple therapeutic rationalities might be the rule rather than the exception for many practitioners.

This point is illustrated well in Kin Cheung's ethnography of his father, a Chinese American religious healer, who deploys an eclectic repertoire—Chinese *Qi Gong* (气功 qi therapy), spells, Japanese talismans, transnational *reiki*—but does not necessarily integrate their underlying rationalities. Cheng also used "medical bilingualism" to make a point about incommensurability when one cannot translate across medical languages and when some healers eclectically use whatever they think

might be effective without concern for epistemological dissonance or incommensurable rationalities.

> "I will push her term further to suggest that in instances when the ability to translate across medical languages become difficult or near impossible (analogously to translating poetic or comic effect), we have examples of incommensurable paradigms of health, due to their different underlying conceptions of the body and universe."[70]

For Cheung, these incommensurabilities apply not only to differences in medicine but also with respect to religious differences. In his analysis, Tilley's notion of polyglot therapeutics captures well how his father as a religious healer navigates heterogenous conceptual realities and modes of being in order to affect cure apparently without concern about underlying contradictions. We posit that here Cheung is acting as an epistemological bilingual in the way he makes his father's navigation across incommensurable paradigms visible for analysis.

This management of multiple therapeutic rationalities is especially true for contemporary practitioners of East Asian medicines for whom partial integration with local biomedical institutions, national health systems, and professional networks of specialists is expected. Much in the way that linguists have challenged the idea that, as Marcyliena Morgan puts it, "monolingualism—one language, one nation-state—is the canonical example of speech community",[71] medical bilingualism as well as polyglot therapeutics makes the heterogeneity and diversity of medical systems more legible.

This approach is not novel. Authors such as Volker Scheid[28] have been arguing for the essential pluralism of Chinese medicine for some time now just as Annemarie Mol's[69] well-known account of how easy it is to find an almost inescapable multiplicity within biomedical institutions as well. Concepts such as medical bilingualism, polyglot therapeutics, ecumenical medicine, metamodern, epistemological bilingual, and even possibly, an epistemological polyglot arguably fit into this broader set of frameworks. As the above historiography focused on the concept of medical bilingualism over the past decade demonstrates, scholars have used these concepts to better grasp the complexities of these entangled phenomena linguistically, materially, and bodily for both East Asian medicine and biomedicine up through the present. This new conceptual toolkit could be productive for scholars to further examine post-Covid-19 shifts in the policies of different nation-states toward how their traditional medical systems may be mobilized to respond to newly emergent acute infectious diseases in the future.

Notes

1. Although he chose not to continue using "medical bilingualism", his resulting book nevertheless deals centrally with translation choices between two different medical traditions. See: Salguero P. *Translating Buddhist Medicine in Medieval China*. Philadelphia: University of Pennsylvania; 2014.
2. See also: Tu Youyou and the Nobel Prize. A Sinica Podcast, October 21, 2015. Available from: https://www.chinafile.com/library/sinica-podcast/tu-youyou-and-nobel-prize. [Accessed on July 21 2025].
3. Conventionally, the Chinese concept of *Wu Xing* is translated as "five phases", which emphasizes the transformative processes it represents and not "five elements", which emphasizes elemental qualities more akin to the four elements in ancient Greek philosophy.
4. The distinction between competence and performance has a long history in linguistics but is first explicitly formulated by Noam Chomsky in *Aspects of the Theory of Syntax*. See: Chomsky N. *Aspects of the Theory of Syntax*. Cambridge: MIT Press; 1965.
5. As per David Crystal's *Dictionary of Linguistics and Phonetics*, code switching refers to the switch that bilingual or bidialectal speakers make between forms of a language (83), code mixing refers to "the transfer of linguistic elements from one language into another" (83), and accommodation refers to when "people modify their style of speaking (accommodate) to become more like or less like that of their addressee (6). See: Crystal D. *A Dictionary of Linguistics and Phonetics. 6th ed. The Language Library.* Oxford: Blackwell publishing; 2008.
6. They did not, however, cite Hanson's 2015 essay but rather her book and quoted a passage from it related to the earlier SARS pandemic. See: Hanson M. *Speaking of Epidemics: Disease and the Geographic Imagination in Late Imperial China*. New York: Routledge; 2011. p. 166.
7. Although this book was published before 2015, Lei explicitly responded to Hanson's second sense of medical bilingualism in the 2024 Chinese translation of his monograph. Lei responded to the debate over Tu Youyou in his preface to the 2024 Chinese translation of his monograph. See: Lei SH. *Neither Horse nor Donkey: Medicine in the Struggle over China's Modernity* (非驴非马：中医、西医与现代中国的相互形塑). Chen XH, translated. Taibei: Alluvius Publishing House; 2024. p. 16. Chinese.
8. This could be applied as well to some of the late twentieth-century and early twenty-first-century physicians engaging with Western medicine in: Scheid V. *Currents of Tradition in Chinese Medicine 1626–2006*. Seattle: Eastland Press; 2007.
9. For earlier reflections on this issue, see: Hanson M. Conceptual blind spots, media blindfolds: the case of SARS and traditional Chinese medicine. In: Leung AKC, Furth C, eds, *Health and Hygiene in Chinese East Asia: Publics and Policies in the Long Twentieth Century*. Durham: Duke University Press; 2010. p. 369–410.

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Conflicts of interest

Marta Hanson is an Editorial Board member of *Chinese Medicine and Culture*. The article was subject to the journal's standard procedures, with peer review handled independently of this Editorial Board member and her research groups.

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Feature Article

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Scientific Research of Modern Western Medicine in Traditional Chinese Medicine in China during the 1950s

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Abstract

This paper discusses the engagement of modern Western medicine in the development of traditional Chinese medicine (TCM) during the 1950s, specifically in its efforts on and research in modernizing TCM. Through complementing the studies of the 1950s with data and cases that have not been well studied in the previous publications, the author argues that modern Western medicine played an active and instrumental role in modernizing and scientizing TCM in the 1950s. TCM obtained attention not as merely a national treasure but underwent fast development of modernization in the 1950s. In modernizing TCM, Western medicine was not a bystander but served as an active partner. The professionals of Western medicine made good use of their strength in scientific studies in the development of TCM. Though scientization is part of modernization, the paper points out the scientific research by providing cases in the TCM research boom and discusses the significance. The scientific research not only linked TCM with modern scientific concepts and research methodology, but also expanded the research scope of the Western medicine, leading to breakthroughs in TCM medicines in the 1960s–1970s and to building the landscape of medicine in China.

Keywords: Traditional Chinese medicine; Modern Western medicine; Scientization; Modernization; History of medicine; Acupuncture; Chinese materia medica

1 Introduction

In retrospect, the 1950s was pivotal in the history of traditional Chinese medicine (TCM) development. A series of initiatives on TCM were launched which had profound and far-reaching impacts, not only on TCM but also on modern Western medicine (biomedicine), specifically in scientific medicine research institutions, medical care facilities, public health institutions, pharmaceutical research institutions, etc. The landscape of medicine was totally different from that in the past.

In June, 1954, Chairman Mao Zedong (毛泽东) made the statement that "When comparing traditional Chinese medicine and Western medicine, it is important to note that traditional Chinese medicine has a history spanning thousands of years, while Western medicine was introduced to China merely decades ago. Even today, over 500 million people in China still rely on traditional Chinese medicine for disease diagnosis and treatment, whereas only tens of millions depend on Western medicine (mostly in urban areas). Thus, in the context of China's historical healthcare and education endeavors, traditional Chinese medicine has made tremendous achievements and contributions [中西医比较起来，中医有几千年的历史，而西医传入中国不过几十年，直到今天我国人民疾病诊疗仍靠中医的仍占五万万以上，依靠西医的则仅数千万 (而且多半在城市里)。因此，若就中国有史以来的卫生教育事业来说，中医的贡献与功劳是很大的]".[1] He made another statement in 1958, "Traditional Chinese medicine is a great treasure, and efforts should be made to explore it and raise it to a higher level (中国医药学是一个伟大的宝库，应当努力发掘，加以提高)".[2] A series of efforts were made to modernize TCM. In the process of modernization, the Western medicine community extensively and actively involved through contributing its resources in manpower and research strength. The dynamic of the two medicines in 1950s laid the foundation for making TCM and Western medicine the two pillars in medicine and health in China afterwards.

In the past 6 decades, publications on the history and practice of the integration of TCM and modern Western medicine have been extensive, discussing broader

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contextual aspects of medicine in China in the 1950s.[3] Many publications about the 1950s and the 1960s explored the integration of modern Western medicine and TCM, in which they also wrote about the modern Western medicine doctors learning from TCM. However, few articles discuss how the Western medicine community reacted to the changes in this particular period, specifically what the medical research community did in the broader context.

The problems in the availability and accessibility of the data of medicine in China in the 1950s, particularly the archival records make the study of this period difficult. Fortunately, in 1959, the Ministry of Health (MOH) of China published two volumes of articles to commemorate the medical achievements in the 1950s. The volumes provide rich sources of data for the research of this article (Note 1). In May 1959, the Scientific Medical Research Council of the MOH (卫生部医学科学研究委员会) commissioned an editing committee, inviting over 200 established medical professionals in both Western medicine and TCM to write or collect articles on the medical achievements from 1949–1959. Over 700 medical professionals throughout the country were involved in the writing project. Within 5 months, the editing committee received over 600 papers. The leading national medical institutions in China—the Chinese Academy of Medical Sciences (中国医学科学院, CAMS), the Chinese Medicine Research Institute (中医研究院), the Chinese Medical Association (中华医学会), and the People's Medical Publishing House (人民卫生出版社) were the key institutions responsible for editing the articles. The four institutions were China's top institutions in biomedicine research, in TCM scientific research, in the professional association, and in medical publication, respectively. The committee finalized 214 articles and compiled them into two volumes. Five months later, the People's Medical Publishing House published the two volumes entitled *The Collection of Articles on the Achievements of Medical Sciences for the Celebration of the 10th Anniversary of the Founding of the People's Republic of China* (《庆祝建国十周年医学科学成就论文集》, short formed and referred to as *The Volumes* in this article) (Fig. 1).

According to the editing committee, though the articles were written in a very short time, they made an overview and comprehensive summary of the accomplishments in medicine and health in China in the 1950s.[4] One of *The Volumes* was totally on clinical medicine, and the other was divided into the following four categories: basic medicine, "Homeland Medicine (祖国医学, TCM)", preventive medicine, and materia medica. Most of the articles were reports on the work done, including graphs and charts that showcased the research methods and scientific findings in a modern biomedical way. These publications were typically authored not by individuals, but by collaborative teams of professionals within the same medical specialty. Articles in the category of Homeland

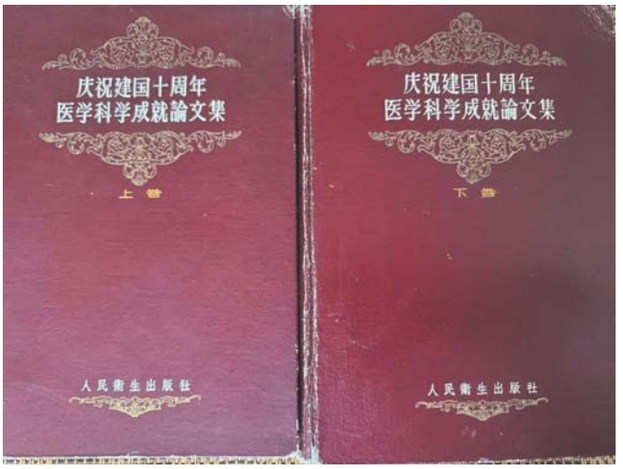


Figure 1 The covers of *The Collection of Articles on Achievements of Medical Sciences for the Celebration of the 10th Anniversary of the Founding of the People's Republic of China* (《庆祝建国十周年医学科学成就论文集》) (source with permission from: photo taken by the author)

Medicine adhered to this same genre and employed a similar style of specialization as seen in biomedical research.

According to the editing committee, the purpose of *The Volumes* was "... in order for the professionals in medicine, materia medica, and health to have a general idea of the accomplishments of medical sciences of our country and used them as important reference to the work and study in the future".[4] *The Volumes* was the result of the collective work of the academic community in medicine and health, and the extensive engagement of the medical, materia medica, and health professionals throughout the country. *The Volumes* provide rich and reliable resources in study medicine and health in China in the 1950s, not only in the aspects of their scientific and research accomplishments but also in the aspects of culture and social environment for the medical communities.

2 Medicines in the broader context of science and technology development in the 1950s

The foreword in *The Volumes* entitled "The development of science and technology of our country in the past ten years (《十年来我国科学技术事业的发展》)" started with writing about the reorganization of the new scientific organizations. Besides the establishment of the Chinese Academy of Sciences (Note 2), one significant step in medical sciences was the establishment of the Chinese Medicine Research Institute in 1955 and Chinese Academy of Medical Sciences in 1956 (Note 3).[5]

In 1952, "theory must link to practical application (理论联系实际)" was put forward and this guideline cast a profound and enduring influence over the scientific community. In addition, the Soviet Union served as the role model for China including the research and

administration of medicine. Modern medical education in China used the Soviet Union model in organization, pedagogy, and used Russian in education and scientific research. In 1953, the Ministry of Health called the medical society to study the Pavlov's theory. The Peking Union Medical College Hospital, for example, made wide use of Pavlov's theory in physiology and neurology, particularly in the explanation of acupuncture.

In 1956, "advancing toward science (向科学进军)" and "China's 12-year plan for the development of science and technology" were announced. China "has a long-term and comprehensive plan for science and technology. This is a significant event in the history of science and technology of our country".[5] The plan stated that China needed large supply of talents in science and technology, and that the success of the construction of the country depended on various kinds of science and technology.

3 Modernization of TCM and collaboration of Western medicine

3.1 Institutional juxtaposition: scientific research frameworks for TCM and Western medicine

Medicine has played a significant role in China's modernization. Following the May Fourth Movement, modern Western medicine came to be deeply associated with scientific advancement and modernity. By the 1950s, Western medicine had predominated China's medical care and public health systems. In the 1950s, the top-down initiatives were taken for the TCM to incorporate science and technology into its advancement. As early as in 1950 when the first National Health Conference was held, "Unite the Chinese medicine and the Western medicine (团结中西医)" was one of the three policies put forward (Note 4). The milestone for the concrete initiatives of promoting and landscaping TCM in China's health care system happened in June 1954 when Chairman Mao Zedong's pivotal instruction was given.[6]

Institutionalizing TCM was an urgent and important step. "Establish immediately the research institute for TCM, conduct research on TCM, send good Western medicine doctors to learn the Chinese Medicine, and jointly participate in research work (即时成立中医研究机构，罗致好的中医进行研究，派好的西医学习中医，共同参加研究工作)" was the national strategy and became an important task. On December 19th, 1955, the Chinese Medicine Research Institute was organized. The Institute had the following affiliating divisions: research division of the Internal medicine, research division of surgery, research division of acupuncture, research division of TCM medicine, and had a comprehensive affiliated hospital. The purposes of the Chinese Medicine Research Institute were specified as: "Inherit and carry forward the heritage of the Homeland Medicine; promote the people's health care; enrich modern scientific medicine; through the unite and cooperation of the Chinese and Western medicine, research and sort the knowledge and the clinical experiences of the Chinese medicine step by step with a plan and in a systematic way, and train the teachers who can teach courses of Chinese medicine in medical colleges and the talents who can do research into Chinese medicine and TCM materia medica".[7]

A year later in 1956, the CAMS was organized. Both the Chinese Medicine Research Institute and the CAMS were under the administration of the Ministry of Health. As stated by Qian Xinzhong (钱信忠), then vice minister of Ministry of Health in his article in *The Volumes*, both Chinese Medicine Research Institute and the CAMS were "of some scale and with modernized equipment", showing that TCM was as equally important as biomedicine.[8] In the following years, research institutes for TCM were established in many provinces. By 1959, there were 108 medical research institutes in China, 27 of which focusing on TCM including TCM medicines.

3.2 Institutionalization: TCM in health care and higher education

Institutionalizing the medical care of TCM and the education of TCM in higher education was another important step in modernizing the TCM. In the first half of the 1950s, Western medicine hospitals started to have TCM clinics or departments. As early as in 1954, the PUMC Hospital—a modern Western medicine hospital established the out-patient clinic of Chinese medicine. In addition, TCM specialized hospitals were set up. By 1959, there were over 300 TCM hospitals and over 900 TCM clinics or TCM departments in comprehensive hospitals or specialized hospitals in China. TCM was incorporated in the health care system in China in an official and institutionalized way.

In education, four TCM colleges in Beijing, Shanghai, Guangzhou, and Chengdu with 6-year programs were established and began to enroll students in 1956. By the end of 1958, more than 3,000 students were studying at TCM colleges or schools, which was a conspicuous achievement in TCM education in China.

3.3 Academic engagement: TCM in professional communities and publication

In 1955, the Committee of Academic Research into Chinese Medicine (中医学术研究委员会) was established. In the same year, the Chinese Medical Association, the top medical professional organizations in China, and the Chinese Pharmaceutical Association (中国药学会) required that TCM doctors be accepted as members—a breakthrough in the history of medicine in China. By 1959, the Chinese Medical Association had over 3,000 members specializing in TCM. The journals of these associations began to accept articles on TCM. This change was a big step forward.

In addition, the academic journals on TCM sprouted out. In Beijing alone, over 70,000 copies of TCM journals were sold every month. The number showed that TCM journals attracted a large number of readers. By August 1959, the People's Medical Publishing House had published over six million volumes of TCM works, including 90 kinds of classics and 132 kinds of modern TCM academic works. The Chinese Medicine Research Institute initiated the publication of TCM classics. One change was that the textbooks for TCM training courses of all kinds were required to be written in "modern language" not in classic Chinese.

3.4 Talent unity: knowledge integration of TCM and Western medicine

In his book, Croizier mentioned "... the Chinese Medical Association's (CMA) decision to set up a special liaison committee with traditional doctors".[9] Croizier did not write that this liaison committee officially announced its establishment on November 11th, 1953 under the official name of Academic Exchange Committee for Chinese Medicine and Western Medicine of the Chinese Medical Association (中华医学会中西医学术交流委员) (Note 5) as a collaborative effort of the CMA and the Beijing TCM Association. It was joined by "the old and new" professionals of TCM and Western medicine together to improve public health , to push forward the academic exchange between the two medicines and their improvement, and to serve the people.

The committee was composed of the specialists from the following five domains—TCM, TCM materia medica, modern Western medicine, materia medica of modern Western medicine, and acupuncture. The specialists from TCM were famous doctors led by Shi Jinmo (施今墨), totaling 21 in number. One specialist in acupuncture was in the committee. Biomedicine specialists were a combination of established specialists including clinicians, researchers, and three pharmacologists, totaling 24 in number headed by Fu Lianzhang (傅连暲). The launch meeting ended with the resolution of the committee charter and election of its executive members for the committee. The committee was among the very early initiatives of uniting the two medicines together, providing the platform for the two medicines to meet and work together. The way that the committee members were chosen from the five domains reflected the established landscape and commonly used categorization of medicine in China.

In December 1955, upon the establishment of the Institute, the Chinese Medicine Research Institute organized the first two-year course of training classes for doctors of Western medicine. The class enrolled 76 trainees to learn TCM in Beijing. The guideline for this course was "systematic exploration, comprehensive assimilation and subsequent organization and enhancement (系统学习，全面掌握，整理提高)". In 1957, six similar training classes rolled out in Shanghai, Tianjin, Guangzhou, Chengdu, and Wuhan, providing full time classes to train the backbones (303 trainees in total) in teaching and research in TCM.

Most of the trainees "were high-level experts in Western medicine".[10] The most representative of such high-level experts was Dr. Zhang Xiaoqian (张孝骞, 1897–1987) (Note 6), who was a well-known and a top Western medicine doctor specializing in gastrointestinal diseases in China from the PUMC Hospital (Fig. 2). He was among the head members of the Liaison Committee in 1953. Dr. Zhang enrolled in the full-time TCM training course class of the Chinese Medicine Research Institute in 1958, together with other 15 physicians of the PUMC Hospital. They wrote at least 36 articles about their TCM learning experiences, and they were published in the CAMS's periodicals in 1958. As a representative, Dr. Zhang connected TCM and Western medicine together, using his knowledge in physiology to interpret TCM. He acknowledged the deficiency of Western medicine and talked about the clinical potential of combining TCM into Western medicine.

In his article published in *People' Daily*, Dr. Zhang wrote:

> "The Homeland Medicine embodies the invaluable experiences accumulated by the working people in combating diseases in the past over thousands of years. It is an integral part of rich cultural heritage of our country and a great treasure.
> Studying *Zhong Yi* (中医 traditional Chinese medicine) has deepened my appreciation for its extensive practical foundation and down-to-the-earth dialectical materialist perspective. For thousands of years, *Zhong Yi* has achieved extremely brilliant accomplishments. In *Nei Jing* (《内经》*The Inner Canon*) which was the great work compiled over two thousand years ago, the description of the physiology of digestion, respiration, and circulation was mostly of no big difference from that of modern physiology. Particularly, when it comes to the explanation of the antagonism and unity of things and the interplay between internal activities and external environment, the *Yin Yang Wu Xing Xue Shuo* (阴

Figure 2 Dr. Zhang Xiaoqian was learning from a TCM doctor at the TCM Pharmacy in 1950s (source with permission from: Department of Publicity of the Peking Union Medical College Hospital)

阳五行学说 the theory of yin-yang and five elements) shares many similarities with the most advanced thinking of modern medicine.
In terms of invention, methods such as nasal vaccination for smallpox were widely practiced in our country by the 16th century. This method not only controlled smallpox but also opened up a broad path for modern clinical immunology. After it spread to the West, the British, based on the nasal vaccination, developed the cowpox vaccine 80 years later.
We are in a far more favorable position nowadays than the people in the past. We can dig out and summarize more essence from the great treasure of our Homeland Medicine than before, so that we can use it to address unresolved challenges in modern medicine.
Western medicine practitioners through learning *Zhong Yi* can significantly improve their expertise, not merely because of learning *Zhong Yi* enabling them to walk in two legs, more importantly, because of mastering TCM enabling them to make up the deficiency of Western medicine." (Fig. 3)[11]

The institutionalization of TCM between 1955 and 1956 developed rapidly. It laid the foundation for the landscape of the medical pluralism in the medical system nowadays. Establishing the research institute and hospitalizing medical care provided by TCM and including TCM in the formal education system in China were breakthroughs in the history of TCM. The "standardization of the knowledge of the Chinese medicine"[12] as Taylor characterized was significant in that TCM not only in that TCM entered the medical care, but also entered the modern education system in China. The efforts of making "new Chinese medicine"[13] aimed not at replacing either of the two medicines, but at making the best use of both medicines and at the "combination of the positive elements of Western and Chinese medicine... ".[14] The efforts tried to reform and revive the traditional medicine rather than to hoard an heirloom of the Chinese essence. In the fast development of the TCM from 1954–1959, Western medicine was used as the role model.

4 Scientizing traditional medicine: research interests and applications

All the above contextual factors yielded incentives for modern Western medicine to engage in the scientific research in TCM. "Western doctors started to learn TCM to meet the goal of 'using modern scientific method to sort, study, and improve the great heritage of the Homeland Medicine".[15] According to Scheid and Lei, "scientization" was "systematization".[6] In the 1950s, laboratory scientific medical research was conducted to adapt to different circumstances and to meeting different needs. Take the PUMC as an example. "In 1955, the number of the research projects collected by all the departments was 361, and 7.5% of which was related to the military, 4.1% related to TCM, 14.6% related to the high nerves activities (because of the promotion of Pavlov theory), 52.2% on clinical diagnosis and treatment, and 21.6% of others".[16]

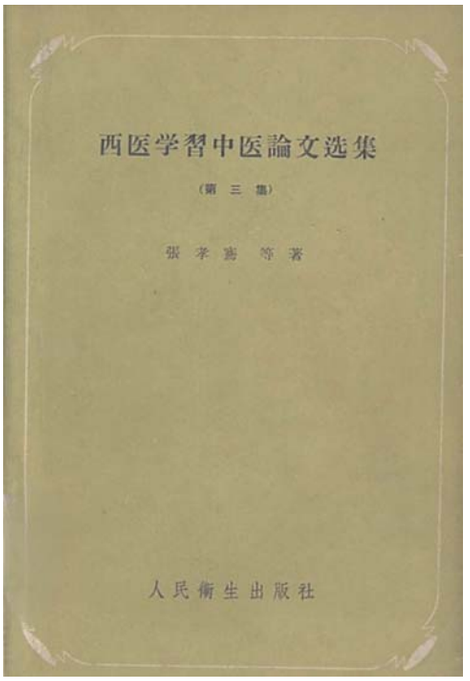


Figure 3 The cover of *Collection of the Academic Articles of the Western Medicine Learning from Chinese Medicine, Vol. 3* (《西医学习中医论文选集 (第三集) 》) edited by Zhang Xiaoqian, et al. (source with permission from: photo taken by the author)

At the institution level of Western medicine in China, research in TCM became research interest. As a result, different specialties in Western medicine all made the best use of their research potential to do TCM-related research. Before the 1950s, modern medical methods were used to discover the efficacy of the therapies and the herbs of TCM or to provide scientific explanation. For example, biomedical researchers conducted research into the mechanism of acupuncture and TCM medicines from 1920s to 1940s in the PUMC. Ralph Garfield Mills (密尔司) and Bernard Read (伊博恩), the two pharmacologists working at the PUMC in 1920s also conducted personal research on TCM herbs.[17]

In the 1950s, biomedical researchers continued to make Chinese herbal medicines and acupuncture as research interests. Western medicine had its own philosophical guideline and system of methodology, which were different from TCM. While TCM held a more wholistic view, reductionism prevailed in biomedicine. In research, each discipline of basic biomedical research conducted research in its own labs, using its own concepts, framework, methodology, and its own language in medicine. In the 1950s, the specialization of biomedical research—where disciplines worked independently within their own frameworks. Different disciplinaries of Western medicine linked their work with the TCM, but it was hard to link their work with other disciplinaries. On the other hand, different disciplinaries engaged their work with the TCM reflected both a growing scientific

interest in TCM and the relatively advanced development of biomedicine in China. The following section provides the concrete cases to show the scope and depth of the scientific research in TCM.

4.1 Physiological mechanisms of acupuncture and electro-needling

Researchers tried to demonstrate the mechanism of acupuncture using modern technology. The researchers of the China Academy of Sciences employed "bio-electricity" to trace *Jing Luo* (经络 meridians) and developed the meridian model. *Jiao Yan Zu* (教研组 teaching and research group) of Pathology and Physiology of Lanzhou Medical College completed a collection of mapping on acupuncture points. The Physiology Department of the CAMS used methods of isotope, electrophysiology histochemistry, and enzyme chemistry to explore the characteristics of meridian and yielded preliminary findings.[18]

In 1953, the whole country was studying and applying Pavlov's theory, and it shed light on the study of acupuncture mechanism. In clinical biochemistry, researchers did experiments on the mechanism of acupuncture treatment on the deficiency of breast milk secretion. They found that after acupuncture, prolactin in the blood of the nursing women increased. In addition, clinical studies demonstrated that acupuncture had a regulating function on the chronic gastric secretion for chronic gastritis and gastric ulcer.[18]

From 1953, electro-needling became popular and was extensively practiced in China. Electro-needling evolved from TCM acupuncture and was a combination of the mechanical stimulation of acupuncture with weak electric current to produce integrated function. Researchers either administered electro-needle on the innervations (biomedical terminology) or connected electrical needle to the acupuncture points (TCM theory). The research into the practice of electro-needling was popular, symbolizing the combination of modernity with tradition.

One research reported that the research used electro-needling on 870 clinical cases of the following illness: rheumatic, lumbar vertebra neuralgia, pains from injury, hypertension, facial nerve paralysis, and gastric neurosis. Results showed no side effect or worsened cases except three cases of allergy. Another researcher reported that there was an analysis on 636 cases using the electro-needling mainly on the following illness (apparently on disorders of the nerves system): neurasthenia, schizophrenia, hysteria, epilepsy, gastric ulcer, rheumatic, sciatica, prosopalgia, facial paralysis, hemiplegia, and nocturia. The review of the 110 cases study showed that electro-needling was most effective in psychoneurosis, various neuralgia, and nerve paralysis. The results were positive on rheumatic, rheumatalgia, and hypertension, too.

Electro-needling was also reported to be effective in some of the enduring chronic diseases, alleviating neuron pain, rheumatic arthritis, rheumatic pain, and other illness, even in acute bacteria dysentery or eye illness, such as myopia and retina.[18] Some researchers studied the correlation between the electro-needling therapy and the fluctuation in white blood cell count or blood sugar, trying to establish correlations between electro-needling and the Western medical system. Similar studies of reforming acupuncture using Western medicine was done before. In her book on modern Chinese medicine, Bridie Andrews wrote about using Western anatomy to redefine acupuncture points, and about the efforts of Cheng Dan'an (承淡安) in reforming acupuncture: "Drawing on Western anatomy and physiology to create a new understanding of how acupuncture worked, Cheng concluded that the tracts (or 'meridians') constituted a functional system that encompassed the nerves, blood vessels, and lymph glands of Western medicine".[19]

The most far-reaching research was done on application of electro-needling as anesthesia. "The analgesia effect of acupuncture had been long and widely known. A research team in Shanghai succeeded in replacing regional anesthesia with acupuncture, yielding good effect".[18] The finding of the research showed: "The use of electro-needling resulted in the less administration of antibiotics, demonstrating that electro-needling has an anti-infectious effect besides the anesthetic effect. In operations using electro-needling anesthesia, a lot of patients felt better and did not need any painkillers. Researchers reported that 'it needed further investigation as to the mechanism of electro-needling anesthesia'".[18]

In Beijing, Shanghai, Wuhan and places in provinces such as Shandong, Shanxi, Shenyang, research institutes used modern scientific method, techniques and indicators such as electrocardiogram, brain spot waves, electromyography, cardiac frequency to draw the conclusion that the needle stimulant impacted the movement and digestive functions of the digestive organs. Acupuncture increased the adrenocorticotropic hormone in patients with acute appendicitis and increased the acute leukocyte phage in the blood. All these proved that acupuncture on meridian points had a certain effect on adjusting human physiological functions and enhance the body's immune functions.[18]

One of the clinical experiments was on using electro-needling in clinical operations. It was reported that electro-needling was used in 7 out of the 10 operations, 5 of the 6 cases of gastric perforation suturing, 24 out of 32 inguinal hernia repair, 10 out of 16 appendectomy, 60 out of 125 tooth removal, and 11 out of 14 cleft palate lip repair operations. In Xi'an, 30 (out of 50) operations of various kinds and 70 (of 100) tooth removal used electro-needling. A comparative study done at Shan'xi Affiliation of CAMS found that the preliminary efficacy rate of electro-needle anesthesia on neurons (73.4%) was higher than that electro-needle anesthesia on acupuncture points (64%).[18]

To sum up, electro-needling studies and acupuncture anesthesia were the most popular research and practice of biomedicine on TCM done in the 1950s. This interest continued later in the 1960s and 1970s. They were considered the remarkable and internationally recognized medical achievements in the era. The findings of the research facilitated the integration of acupuncture into hospital surgical procedures, and provided research-based evidence to the national pride of acupuncture.

4.2 Biochemical foundations of the efficacy of TCM materia medica

Biochemistry researchers from all over China concentrated on the study of TCM materia medica. Studies demonstrated that *Dang Gui* (当归 Radix Angelicae Sinensis) enhanced the growth of uterus and ginseng fluid could enhance the glycolysist process of yeast. Researchers believed that the energy produced in the glycolysis process contributed to Ginseng's function of strengthening the body.[20] Liu Shihao (刘士豪), a talented and well established endocrinologist at CAMS led the study on the effect of a dozen herbs on blood sugar, including *Di Huang* (地黄 Radix Rehmanniae), *Bai Shao* (白芍 Radix Paeoniae Alba), *Cang Zhu* (苍术 Rhizoma Atractylodis), *Huo Ge Gen* (活葛根 Radix Puerariae Lobatae, root of kudzu wine) (Note 7), *Gan Cao Liu Jin Gao* (甘草流浸膏 the fluid extract of Radix et Rhizoma Glycyrrhizae) (Note 8) on the blood pressure, and the correlation between *Ren Shen* (人参 Radix et Rhizoma Ginseng), *He Shou Wu* (何首乌 Radix Polygoni Multiflori), and *Gan Cao* (甘草 Radix et Rhizoma Glycyrrhizae) with the function of adrenal cortex hormone (Note 9). Researchers used paper chromatography (纸层析法) to demonstrate that *He Shou Wu* extract might contain adrenal cortex hormone.[21]

In micro biochemistry research, researchers compared the antibiotic power and medicine resistance of over 100 single Chinese herb formulas and over 200 compound formulas. Researchers in Sichuan found that 125 of them had an antibiotic effect, which "proved the scientific property of administration method of compound formula of Homeland medicine which was summarized from long standing practice".[21] The study on the mechanism of antibiotic function observed that the compound formula of *Huang Lian* (黄连 Rhizoma Coptidis) could inhibit the respiration of Staphylococcus aureus and provide evidence of the antibiotic function of 11 Chinese herbs, including *Huang Lian Su* (黄连素 Astragalin), *Huang Bai* (黄柏 Cortex Phellodendri Chinensis), *Huang Qin* (黄芩 Radix Scutellariae), etc.[21]

4.3 Pathological research on TCM in treatment of cancer

Pathogenetic theories between Western medicine and TCM regarding tumors are quite different. However, tumors had been one of the health concerns that both medicines worked hard to find solutions The pathologists of CAMS studied electro-needling in blood count and hemogram (blutbild) change in the increase in phagocytic ability of the white blood cell, in the process of the stimulation and inhibition to the brain cortex, and in changes in electrocardiogram, fever, blood pressure, neurological system, and vagus nerve, focusing on the treatment mechanism of acupuncture on tumors.

Research institutions in China with the capacity of employing different methods and material conducted research on the single and compound formula of TCM materia medica about their anticancer functions. In 1956, researchers of the CAMS combined *in vivo* and *in vitro* method and conducted research on 20 TCM herbal medicines (Note 10). In 1958, CAMS researchers used esophagus feeding method and conducted *in vivo* screening for the anticancer functions of 153 compound formulas of herbal medicines and 88 single formula on Ehrlich ascites carcinoma (艾氏腹水癌, EAC) and Spindle cell tumor. They found that 38 compound formulas and 9 single formulas had over 50% of inhibition function to the above two tumors.

The major problem with cancer research by TCM was that "The anticancer TCM medicine research is at its infant stage, there are many problems, such as choosing the preliminary screening method fit for TCM materia medica, processing TCM materia medica and ensuring the stability of the efficacy of the medicines. Pathologists focused on the study of anticancer herbal medicines, particularly on experimental treatment and screening".[22] Despite the challenging research conditions, preliminary explorations in herbal experimental treatments and screening methodologies were made.

4.4 Microbiological studies of TCM therapies for infectious diseases

In China, infectious diseases were among the major threats to public health before and in the 1950s. The most practical area of medical microbiology during this period focused on epidemic diseases, a field in which the integration of Western medicine and TCM was most visibly realized through public health initiatives. In the prevention and treatment of bacillary dysentery, researchers used the comparative studies of biomedicine to break the subjects into four groups—the sulfanilamide group, the streptomycin group, dysentery phage group, and *Huang Lian* group. The finding showed that 231 of the 327 patients used *Huang Lian* with the best results. After an average of 5.5 days, the symptoms disappeared. The research also compared the effect of almost 10 different herbal medicines in treating dysentery. A traditional approach to treating dysentery, as documented in *The Volumes*, was the use of various folk remedies in certain regions. These included oral or topical applications of lotus seed, as well as the application of a paste made

from crushed snails onto the navel to draw heat downward. The microbiologists engaged in research on the effect of Chinese herbs on other commonly seen infectious diseases in China, too, including flu, measles, schistosomiasis, measles, malaria, typhoid, etc.

Research on TCM materia medica was also a focus. In his article entitled "The advancement of medical microbiology in New China (《新中国医学微生物学的进展》)", Professor Xie Shaowen (谢少文), an established microbiologist from the CAMS, wrote: "After studying several hundreds of TCM materia medica, we are certain that several materia medica had in vitro effect of anti-infection; however, it must be pointed out that we have to do further investigation into the function of the medicines to the organism in order to explain the efficacy of many TCM materia medica against the infectious diseases".[23] Interesting is that being an established microbiologist, professor Xie was a serious believer in *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation) of TCM during the 1950s. He studied the effect of the acupuncture and electro-needling on immunology. His researched continued after 1950s. In the 1980s, Professor Xie and his immunology research team again dedicated to the research into immunology using the integration of TCM and Western medicine (中西医结合).

4.5 Pharmaceutical dynamics in research on TCM materia medica

China has rich resources and tradition in medicinal plants, which was the basis for the boom in the R&D of pharmaceutics and medicinal plants in China in the 1950s. The main task then was to improve TCM preparation formulation (中药剂型改进). This innovation was achieved by using biomedical technology. TCM medicines are taken in different formulations for thousands of years: decoctions, small balls, raindrop-size kinds of pills, powder, paste, wine with medicines, etc. "The formulation of TCM medicines should be diversified and the applicability was the priority... The goal for the formulation improvement was to make formulation more convenient and portable, and must be done in 'modern scientific approach'".[24]

Different pharmacological institutions, colleges, and pharmacies used the formulation based on the ingredients and nature of the prescribed TCM materia medica, but the pharmacological action of the active ingredients for the majority of TCM materia medica remained unclear. Researchers tried to maintain the active ingredients, in most cases, using the proof formula after it demonstrated the efficacy in clinical practice. For example, researchers studied TCM formulas for anti-malaria medicines, for high blood pressure, treatment for cirrhosis, relieving cough, against infection, etc. In all the studies, the research methods used were similar—maintaining the original dosage and preparation requirement. They used two methods in dealing with prescribed medicines, one of which was to process all the prescribed medicines at the same time by mixing the medicines and then "boiling or filtering/extracting"; while the other was to processed the medicines separately, according to the features of the ingredients contained in specific medicines, choosing different infusion solvents or different methods to extract.

Researchers changed preparation methods for *Bai Tou Wen Tang* (白头翁汤 Pulsatilla Root Decoction) and *Shao Yao Tang* (芍药汤 Peony Decoction). Both decoctions were used for the prevention and treatment of dysentery. The researchers succeeded in making the decoctions into dried paste (干浸膏) without losing the clinical efficacy. The same method was used in the proven formulas against hypertension, *Er Xian Tang* (二仙汤 Double Celestial Decoction). The decoction was made into tablets by using the spray dehydration method to make it into powder then pressed into a tablet. Another improvement was on *Xiao Yao San He Ji* (逍遥散合剂 Free Wanderer Powder for menopausal symptoms). Researchers transformed it into fluid extract form. Others reported improvement formulation for *Ban Lan Gen* (板蓝根 Indigowoad Root)—TCM herbs against mumps, as well as the studies on antiseptic technique for TCM medicines.

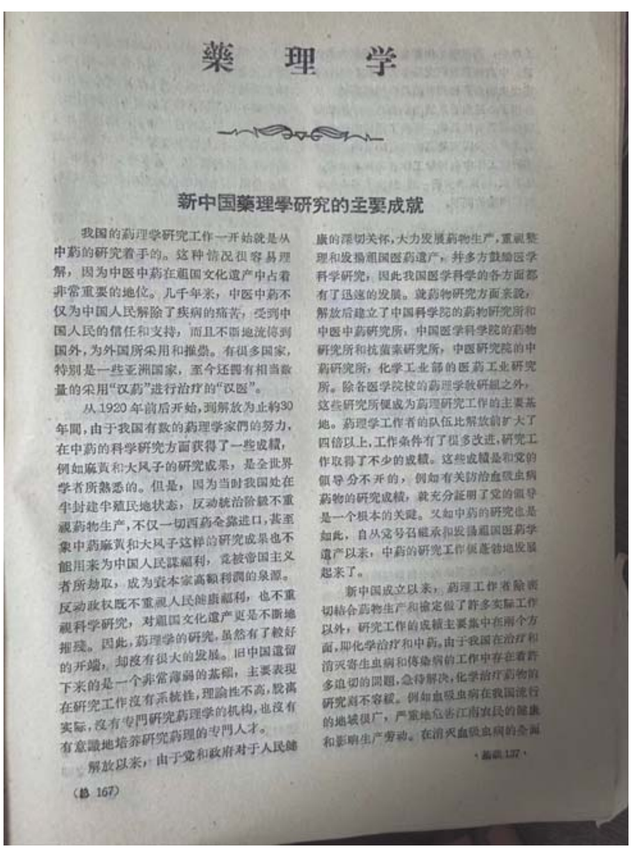
In medicinal chemistry for medicinal plants (most TCM medicines fall into the biomedical category of medicinal plants), researchers used different pharmaceutical techniques to study TCM. For example, they employed paper chromatographic analysis on the following four kinds of indigenous of *Ye Sheng Mai Jiao* (野生麦角 wild ergot): *Pi Jian Cao* (披碱草 lyme grass), *Lao Mang Mai* (老芒麦 Siberian wildrye), *Fo Zi Mao* (佛子茅 cogongrass), and *Lai Cao* (赖草 Leymus). Studies were also conducted to quantify alkaloid variations in ephedra and belladonna, leading to the successful isolation of ephedrine from pseudoephedrine. The polarimetric determination method was employed to analyze the total alkaloid content in ephedra as well as the concentration of ephedrine hydrochloride. Additional investigations focused on how the geographic origin and seasonal timing of collection influenced the active constituents in medicinal herbs. Furthermore, some research focused on *Bei Mu* (贝母 Bulbus Fritillaria), resulting in the development of an experimental formula for its alkaloid components. Other achievements included the isolation of active ingredient from wild *Luo Fu Mu* (萝芙木 Radix Rauvolfiae Latifrondis) which demonstrated that reserpine from *Luo Fu Mu* could reduce blood pressure and could be produced in large amount of cardiotonic medicines such as digitoxin (洋地黄毒苷)—a very popular medicine developed from TCM nowadays. Research also demonstrated that many herbal medicines, such as *Huang Lian*, *Shao Yao* (芍药 Radix Paeoniae), *Jin Yin Hua* (金银花 Flos Lonicerae Japonicae), *Da Huang* (大黄 Radix et Rhizoma Rhei), *Lian Qiao* (连翘 Fructus Forsythiae), *Ding Xiang* (丁香 Flos Caryophylli) had

antibiotic function, while *Yi Mu Cao* (益母草 Herba Leonuri) and *Dang Gui* were effective in clinical gynecology practice.

Research on traditional Chinese medicinal herbs has been an ongoing endeavor, with success stories extending well beyond the landmark discoveries of ephedrine and artemisinin. The extensive investigations done in the 1950s into Chinese materia medica provided a critical foundation for the breakthrough achievements that emerged in the 1970s and beyond (Fig. 4).[25]

In 1954, the Committee of TCM Materia Medica Administration (中药管理委员会) was organized, responsible for the planning of production and logistic of TCM materia medica in China. In addition, China Medicinal Materia Company (中国药材公司) was organized specifically on the business of TCM medicines.[26] The Institute of Materia Medica of CAMS led an investigation in compilation of medicinal plants, introducing over 100 kinds of tropic medicinal plants from outside China. Gradually, the focus shifted from experimental transplant of the wild medicinal plants to an increase in artificial cultivated plants, resulting in the decrease in import (e.g. artificial musk) (Fig. 5).

Biomedical research did impressive scientific investigation in acupuncture and on TCM materia medica. Researchers employed standard biomedical methodologies in their investigations. Both the research topics and outcomes held scientific significance for the subsequent advancement of TCM and modern Western medicine in China.


藥　理　学

新中国藥理學研究的主要成就

我国的药理学研究工作一开始就是从中药的研究着手的。这种情况很容易理解，因为中医中药在祖国文化遗产中占着非常重要的地位。几千年来，中医中药不仅为中国人民解除了疾病的痛苦，受到中国人民的信任和支持，而且不断地流传到国外，为外国所采用和推崇。有很多国家，特别是一些亚洲国家，至今还拥有相当数量的采用"汉药"进行治疗的"汉医"。

从1920年前后开始，到解放为止約30年間，由于我国有数的药理学家們的努力，在中药的科学研究方面获得了一些成績，例如麻黄和大风子的研究成果，是全世界学者所熟悉的。但是，因为当时我国处在半封建半殖民地状态，反动統治阶級不重視药物生产，不仅一切西药全靠进口，甚至象中药麻黄和大风子这样的研究成果也不能用来为中国人民謀福利，竟被帝国主义者所劫取，成为資本家高額利潤的泉源。反动政权既不重視人民健康福利，也不重視科学研究，对祖国文化遗产更是不断地摧残。因此，药理学的研究，虽然有了較好的开端，却沒有很大的发展。旧中国遺留下来的是一个非常薄弱的基础，主要表現在研究工作沒有系統性，理論性不高，脫离实际，沒有专門研究药理学的机构，也沒有有意識地培养研究药理的专門人才。

解放以来，由于党和政府对于人民健康的深切关怀，大力发展药物生产，重視整理和发揚祖国医药遗产，并多方鼓励医学科学研究，因此我国医学科学的各方面都有了迅速的发展。就药物研究方面来說，解放后建立了中国科学院的药物研究所和中医中药研究所，中国医学科学院的药物研究所和抗菌素研究所，中医研究院的中药研究所，化学工业部的医药工业研究所。除各医学院校的药理学教研組之外，这些研究所便成为药理研究工作的主要基地。药理学工作者的队伍比解放前扩大了四倍以上，工作条件有了很多改进，研究工作取得了不少的成績。这些成績是和党的領导分不开的，例如有关防治血吸虫病药物的研究成績，就充分証明了党的領导是一个根本的关键。又如中药的研究也是如此，自从党号召继承和发揚祖国医药学遗产以来，中药的研究工作便蓬勃地发展起来了。

新中国成立以来，药理工作者除密切結合药物生产和檢定做了許多实际工作以外，研究工作的成績主要集中在两个方面，即化学治疗和中药。由于我国在治疗和消灭寄生虫病和传染病的工作中存在着許多迫切的問題，急待解决，化学治疗药物的研究刻不容緩。例如血吸虫病在我国流行的地域很广，严重地危害江南农民的健康和影响生产劳动。在消灭血吸虫病的全面

(總 167)

Figure 4 The Introduction page of the Summary of the development of pharmacology in *The Volumes of Medical Achievements*, showing the typical genre of the articles in *The Volumes* (source with permission from: *The Collection of Articles on Achievements of Medical Sciences for the Celebration of the 10th Anniversary of the Founding of the People's Republic of China*[26])

Figure 5 The newly established experimental fields of medicinal plants of the Institute of Materia Medica of the Chinese Academy of Medical Sciences (source with permission from: collection of the History Museum of the Peking Union Medical College)

According to Lampton, medical research and traditional medicine were among the six key areas within healthcare. These two domains developed in parallel and became increasingly integrated during the 1950s. Lampton observed that the specialized expertise of highly trained medical professionals, together with their strong emphasis on innovative medical research, attracted considerable attention in the years after 1949. He noted that these experts "maintained continuity with past practices" and "conducted actual high-level professional work".[27] Scientific research on TCM contributed to this continuity.

5 Conclusion

In the 1950s, China took steps to modernize and scientize the traditional medicine in shaping the landscape of medicine in China. In the process, modern Western medicine was not a mere bystander but actively made its contributions. On January 25th, 1959, the editorial on *People's Daily* wrote: "In the Chinese medical community, a key challenge involves reconciling the relationship between Western medicine and TCM. Looking ahead, another critical issue concerns the integration of modern medicine with China's indigenous medical practices. These challenges have emerged from the unique historical context of China's medical and pharmaceutical development. It is essential to address both issues based on the actual health needs of China's population and through scientifically-grounded development."[28]

The intensive and extensive engagement of Western medicine research in TCM during this period was in favor of the development of TCM. TCM received attention in the academia community. Its status and identity transformed dramatically. China made significant progress in institutionalizing TCM and integrating it into mainstream in academia, including higher education,

professional associations, and scholarly publications. For Western medical researchers engaged in TCM studies, though their primary goal was set at the scientific validation of TCM, their research interests expanded and broadened at the same time. The research and development of Chinese herbal medicine from the 1960s to the present day were built directly upon the foundational work established in the 1950s.

Western medicine research in TCM during the 1950s was extensive. Such disciplines as physiology, biochemistry, pathology, microbiology, and pharmacology were actively engaged in the research, contributing its research strength to the scientific investigations. Most studies focused on herbal medicine as well as the efficacy and mechanisms of acupuncture. China developed a distinctive approach to reconcile the long-standing dichotomy between TCM and Western medicine. Scientific methods were employed to systematically study and modernize TCM. The aim of serving the health interests of the entire population extended to the 1960s. As Fang concludes, "In other words, the supposed integration of Chinese and Western medicine was actually a dynamic, unbalanced process rather than a static, symmetrical juxtaposition".[29]

Scientific research on TCM during the 1950s played a pivotal role in the development of TCM and modern Western medicine. The encounter of TCM and modern Western medicine in this period can be defined as constructive engagement that has ultimately served the health needs. Many biomedical researchers remain actively engaged in TCM-related studies, as exemplified by Professor Xie at the PUMC.

However, as what has been shown from the research in 1950s, biomedicine was limited in explaining the value of the TCM in spite of the extensive research of different disciplinaries. In conclusion, the decade of the 1950s left a lasting legacy on the landscape of healthcare in China and open up the possibilities for the development of both medicines.

Notes

1. Besides *The Volumes*, this article also uses published memoirs, published TCM textbooks, and institutional newspapers.
2. In 1949, the new government took over the Academia Sinica (中央研究院) and the Peiping Research Institute (北平研究院)—the top national research institutions of the Republic era and consolidated the two, creating the Chinese Academy of Sciences (中国科学院).
3. The government took over the National Institute of Health (中央卫生研究院) and later changed the institute to Chinese Academy of Medical Sciences in 1956. In 1957, CAMS merged the Peking Union Medical College (the PUMC), making the greatest use of the research strength and the modern equipment of the College.
4. The other two were "prevention focused" and "facing the workers, the peasants, and the soldiers".
5. The Academic Exchange Committee for Chinese Medicine and Western Medicine of the Chinese Medical Association consisted of the following experts, and their names were displayed in Chinese for different disciplines: Traditional Chinese medicine: 彭泽民、孔伯华、施今墨、赵树屏、朱颜、李振山、哈玉民、于道济、白啸山、董德懋、申芝塘、赵锡武、高凤桐、萨仁山、卢英华、魏龙骧、路志正、樊干乡; Traditional Chinese medicine materia medica: 乐松生、刘一峰; Acupuncturist: 朱琏; Biomedicine: 傅连暲、宫乃泉、方石珊、黄鼎臣、钟惠澜、李涛、胡傅揆、李宗恩、张孝骞、沈其震、龙伯坚、孟昭威、胡兰生、贾魁、黄胜白、严镜清、邓家栋、张松庆、计苏华、鲍敬桓、周泽昭; Pharmacist: 孟目的、薛愚、周梦白.
6. Zhang Xiaoqian graduated from Xiangya Medical School in 1921. Then, he worked at the PUMC as an assistant professor in internal medicine. In 1937, he was appointed acting director of the Xiangya Medical School. In 1948, he came back to the PUMC working as a physician-in-chief. He was among the leadership of the PUMC since then until he passed away. He was a very established physician.
7. The study found out that they had no function of reducing the blood sugar.
8. Liu reported in four cases of Addison's disease, after treated with fluid extract of glyeyrrhiza (甘草流浸膏), the blood pressure higher and serum sodium (血清钠) increased, so stamina was enhanced.
9. The study found that Polygonum multiflorum (何首乌), radix polygonati officinalis (玉竹) had the function similar to that of adrenal cortex hormone.
10. The studies are on Ehrlich's ascites carcinoma (艾氏腹水癌, EAC) and spindle cell tumor (梭形细胞肉瘤).

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This article does not contain any studies with human or animal subjects performed by the author.

Author contributions

JIANG Yuhong drafted and revised the paper.

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Original Article

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OPEN

Observation and Perception: Recognizing Malignant Tumors and Their Modern Changes of Traditional Chinese Medicine

PI Kuo-li[1,✉]

Abstract

This paper explores how traditional Chinese medicine (TCM), in the absence of modern medical instruments, employed observation and perception to understand and diagnose malignant tumors (cancer). It also reviews the evolution of relevant knowledge and treatment approaches since the introduction of Western medical technology. In ancient times, TCM primarily relied on external symptoms, palpation, and patient-reported experiences to infer internal masses, with a focus on gynecological disorders. Ancient TCM practitioners deduced internal conditions through patterns such as menstrual irregularities, abdominal masses, and abnormal discharges. Early descriptions of malignant tumors employed the character "癌 (cancer)" to symbolize rock-like cavities, yet the descriptions were chiefly limited to external manifestations, with limited understanding of internal pathology. With the introduction of Western medicine, Chinese society gradually expanded its comprehension of cancer and adopted surgical as well as other therapies. In contrast, modern TCM has increasingly emphasized its own therapeutic effects, even promoting claims of cancer cure, warranting further investigation. The paper highlights the transition in TCM from a diagnostic model based mainly on observation and perception to another model increasingly combined with modern imaging and laboratory techniques. The transition underscores the need for innovation in TCM's future development, while also revealing the diagnostic experience of ancient practice. Understanding TCM's historical recognition of malignant tumors from the perspective of history of medicine may provide insights for contemporary TCM approaches to cancer treatment.

Keywords: Traditional Chinese medicine; Western medicine; Tumor; Cancer; Diagnostics; Observation; History of medicine

1 Introduction

Thanks to the rapid advancements in modern medicine, humanity has been able to cure or control a number of ancient diseases, including numerous infectious diseases. It is perhaps one of the proudest chapters in the history of medical science in the 20th century. However, there remain many diseases that leave humanity feeling helpless and troubled, and one of them is the ancient ailment, cancer. Cancer, or malignant tumors ranked among the top three causes of mortality in health statistics across major advanced countries. The number of people diagnosed with cancer in Taiwan, China, is increasing.[1] Even though modern medicine has made progress with various targeted therapies, gene therapies, and surgical techniques, the cancer mortality rate remains high, making people fearful of cancer.

Research on history of medicine and history of diseases often starts from practical issues, and it should not be detached from reality.[2] Various malignant tumors are likely to continue posing significant risks and high incidence rates whether now or in the future. Therefore, historians should sort out traditional Chinese medicine's (TCM) understanding of them and the new changes since modern times. Initially, the author thought about how ancient physicians diagnosed and treated these diseases without the aid of modern instruments. After modern Western medicine was introduced to China, people began to compare TCM and Western medicine, leading to the saying that "TCM excels in internal medicine, while Western medicine excels in surgery". This is because, compared to Western medicine, though ancient Chinese medicine engaged in anatomical activities, they were mostly occasional or conducted with a mindset of torturing criminals, rather than being based on scientific concepts or rigorous procedures. As a result, it was difficult to accumulate or achieve innovations in physiological knowledge. However, what truly puzzles medical historians is that, without routine dissection and observation activities, and lacking advanced instruments

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like ultrasound or CT scans for medical imaging, how did ancient Chinese medicine practitioners manage to understand or describe things growing inside the body? To put it this way, various abnormal growths, including malignant and benign tumors, abscesses, or stones, could potentially develop inside the human body. Understanding these phenomena is probably beyond the scope of one academic essay. We can start by shifting our focus to women's history, an area that has received less attention from academia in the past, to see how ancient people described women's physiology and conditions, as well as those "invisible internal" bodily elements (Fig. 1).

The article explores the evolution of ancient understanding of cancer, focusing on the dual perceptions of diseases through observation and perception in TCM. Cancer manifests in many forms, each with distinct characteristics. Ancient practitioners were unable to differentiate between malignant and benign tumors. Therefore, the term *Ai* (癌 cancer) was used to describe them. In particular, this study examines tumors in the lower abdomen, which are more prevalent among women, referencing tumors in other body parts for clarification. The emphasis on historical female experiences allows for a richer observation of various tumors, as women's bodies often present multiple types. However, not all these tumors are malignant. It is essential to return to the historical context to understand how ancient Chinese people defined these symptoms, providing a clearer perspective on the transformations in knowledge since modern times. An old saying goes that "women suffer from diseases more than men (妇人感病倍于男子)", which could be attributed to the unique physiological structure of women. The Song dynasty medical text *Nyu Ke Bai Wen* (《女科百问》*One Hundred Questions on Gynecology*) (1220) read: "Yin gathers abundantly in women, and they often dwell with dampness. After the age of fourteen, yin overflows in women, leading to over-thinking in the heart and injuring the *Zang Fu* organs. It would impair their external appearances, fill the body with stagnant blood, and deplete women's vital energy (夫妇人者，众阴之所集，常与湿居，十四以上，阴气浮溢，百想经心，内伤腑脏，外损姿容，恶血内满，气脉耗竭)". This indicated that physicians of the time perceived the female body as characterized by negative factors such as *Yin Qi* (阴气) and dampness. Additionally, women were seen to possess a trait of being highly sensitive to various emotional stimuli, often troubled by over-thinking in the heart (百想经心). The various emotional responses of women were described as follows: "In general, women suffer from deep emotions and a lack of self control, due to their affection and attachment, as well as feelings of hatred, jealousy, worry, and anger. This creates a deep-seated root of illness, making recovery difficult and resulting in a higher incidence of sickness compared to men (大抵妇人以其慈恋、憎爱、疾妒、忧恚，染着坚牢，情不自制，所以为病根深，疗之难瘥，故倍于男子之病者此也)".[3] The observation aligned with the ancient theory of "seven emotions (七情)" affecting particularly women's bodies, serving as a primary reason for their greater susceptibility to disease. Furthermore, *Nyu Ke Bai Wen* noted that women are more easily startled, referencing *Nei Jing* (《内经》 *The Inner Classic*), which read: "The spirit of a person comes from blood and qi. When blood is insufficient, the spirit becomes unstable, thus leading to fear and anxiety (血气者人之神，血既不足，神亦不定，所以惊怖)".[3] Such theory suggested that women were regarded as particularly prone to blood deficiency, which could lead to emotional fluctuations. At the same time, women's heightened emotional responses contributed to their vulnerability to various diseases. Due to the anatomical structure of women, which includes an "opening in the lower body", external factors can easily invade the female body, resulting in health issues. For example, "winds can enter from below when walking or going to toilet, potentially leading to twelve chronic ailments (或行步风来，便利于悬厕之上，风从下入，便成十二痼疾)".[3] Conditions affecting women's bodies were numerous and complex. The ancient perspectives on potential cancers in women are diverse, and provide valuable insights that help clarify the intersections of observation and sensation in understanding these health issues.

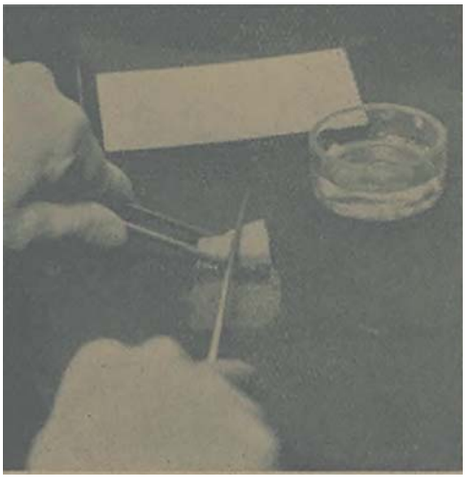


Figure 1 A photo of a test on cancer from *Knowledge Pictorial* (《知识画报》) published in 1937 [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=c714bf3d091c308985bdabe0a2396f0e&ltid=7&activeId=686d0cf819ef83726efa181f&downloadSource=GENERALSEARCH]

2 Ancient knowledge from observation and perception

Malignant tumors are not a modern disease. Instead, they are quite ancient, and TCM has long had various descriptions of them, though the terminology was not standardized. According to Zhang Gang's (张纲) studies, the term for *Ai*, originally pronounced *Yan* (岩), shares the same phonetic and semantic qualities as the word

for *Yan* (岩 rock). The character for cancer combines the radical for illness (疒) to indicate its nature as a disease. The original form of *Yan* is a pictographic character that originally referred to malignant tumors on the body's surface. Ancient people noted that these tumors often protruded, with the center decaying deeply, resembling jagged mountain rocks; thus, the term *Yan* (岩) was combined with "病 (illness)" to form the name for this disease. Zhang suggested that after Western medicine was introduced to China, the term *Yan Zheng* (炎症 inflammation) emerged. However, TCM did not possess a concept equivalent to *Yan Zheng*, and because *Yan* (炎 inflammation) shares a similar pronunciation with *Yan* (癌 cancer) at the time, it might lead to confusion that cancer was merely inflammation. Eventually, the pronunciation of *Yan* transformed to *Ai* (the current pronunciation of 癌). The translation of "cancer" in Western medicine borrowed the character "癌" from traditional Chinese characters, but a key distinction lay in the fact that ancient Chinese medicine primarily described tumors on the surface of the body, lacking effective methods for observing internal cancerous transformations.[4]

Existing research highlights *Wei Ji Bao Shu* (《卫济宝书》*The Treasure Book of Weiji*) from the Northern Song dynasty, as it first clearly defined the term for Cancer. The text stated: "Among the five types of swellings, one is called cancer (痈疽五发，一曰癌)". Early Chinese medicine regarded it as a surgical disease. In the Southern Song dynasty, Yang Shiying's (杨士瀛) *Ren Zhai Zhi Zhi Fang Lun* [《仁斋直指方论》*Treatise on (Yang) Renzhai's Direct Guidance on Formulas*] provided more vivid descriptions: "Cancer is characterized by a high surface and deep interior, resembling a rocky hollow, with clusters resembling tongues protruding and dark blue in color, caused by deeply rooted toxins that penetrate internally. In men, it commonly appears in the abdomen; in women, it mainly appears in the breast. It may also appear in the neck, shoulder, or arm, causing fainting if it is exposed out of the body (癌者，上高下深，岩穴之状，颗颗累垂，裂如瞽眼，其中带青，由是簇头，各露一舌，毒根深藏，穿孔通里，男则多发于腹，女则多发于乳，或项或肩或臂，外症令人昏迷)".[4] The descriptions revealed the external characteristics and perilous signs of cancer preserved by TCM. The Yuan dynasty text *Ge Zhi Yu Lun Ru Ying Lun* (《格致余论·乳硬论》 *Further Discourses on the Acquisition of Knowledge through Profound Study: Treatise on Hard Breasts*) specifically addressed the causes of *Ru Ai* (乳癌 breast cancer) stating that it was triggered by a woman's lack of affection from her husband or approval from her in-laws, coupled with accumulated feelings of worry, anger, and depression. Initially, *Ru Ai* took the form of benign lumps in the breasts, described by the book as "like large chess pieces (如大棋子)". If the disease was not diagnosed, after several decades, the lumps may develop into "sore cavities, called *Nai Yan* (奶岩 breast rocks)", named for their embedded and concave appearance, which made them difficult to treat. Interestingly, in TCM, the phrase "difficult to treat" implied that while it might be challenging, the disease was not beyond remedy. To provide treatment, at early stages, one should "calm the patient's heart and stabilize his/her spirit (使心清神安)". The author Zhu Danxi (朱丹溪) recounted that he once treated an 18-year-old relative in two months using a formula of "*Qing Pi Tang* (青皮汤 Green Tangerine Peel Decoction) combined with adjusted *Si Wu Tang* (四物汤 Four Substances Decoction) and decoctions regulating the meridians".[4] Zhu's case indicated that in addition to medical treatments, the patient's negative emotions, such as depression, anger, and anxiety, etc., would contribute to the development of cancer. He indicated that in the early stages, there were indeed treatment methods; however, it was crucial for the patient to maintain a joyful state of mind to enhance the chances of recovery (Fig. 2).

Ancient TCM concepts of "cancer" cannot be directly compared to modern definitions, as ancient references primarily pointed to visible malignant tumors on the surface of the body. Contemporary methods such as CT and MRI allow for the detection of internal cancers and malignant tumors, but these technologies were not available in ancient times. Nevertheless, TCM did possess a certain extent of awareness of internal cancers, albeit without the ability to visually observe their shapes. Ancient practitioners relied on symptoms to diagnose, often not using the term "cancer" to define the illness. For example, modern TCM scholars generally believe that ancient terms such as *Ye Ge* (噎膈 dysphagia and regurgitation) referring to esophageal cancer, *Yin Shi* (阴蚀 ulceration of the femlae genital area, with yellow fluid oozing) as cervical cancer, and *Shi Rong* (失荣 lumps around the neck and ear, patients would suffer a gaunt appearance and emaciated physique, resembling a tree without vitality) as similar to nasopharyngeal cancer, etc.[4] There

Figure 2 A series of picture persuading people not to be afraid of cancer from *Science Pictorial* (《科学画报》) published in 1948 [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=496fd6b-85027c2b89575c19e3e5dba4f&ltid=7&activeId=686d0c8623b0997f-480d9ae2&downloadSource=GENERALSEARCH]

were cases in which certain cancers were not described by using the term "cancer" in ancient texts, particularly those that did not exhibit the jagged characteristics of tumors. For instance, terms such as *She Gan* (舌疳) and *She Jun* (舌菌) were used to signify tongue cancer, while *Jian Chun* (茧唇) referred to lip cancer.[4] These diseases were believed to be induced by factors such as heat in the spleen and stomach, anxiety, and the constitution of qi depression. From the preceding discussion, it can be inferred that emotional disturbances such as anxiety, irritability, excessive heat, and excessive thinking may contribute significantly to the obstruction of qi and blood circulation within the body, serving as important factors in the onset of cancer. It suggests that ancient practitioners accumulated considerable observational experience regarding cancer over time.

However, not all pathological lesions in the human bodies could be "seen" directly. In the field of gynecology, various benign and malignant tumors exist. Focusing on benign tumors, such as fibroids, the incidence among middle-aged women, particularly those aged 40 to 50, is notably high, reaching 50% to 77% at maximum. Furthermore, many individuals who have not undergone examinations may go unrecorded, suggesting that the real figure could be even higher, not to mention the additional statistics for malignant tumors. Therefore, how did ancient people detect and describe these conditions, especially those detectable only through advanced diagnostic tools? Research on the history of gynecology indicated that at least since the Han dynasty, knowledge had been gradually formed regarding women's menstruation and vaginal secretions to identify health issues. Typically, if there was any irregular growth on the internal or external reproductive organs, most women would experience increased menstrual flow, with severe cases referred to as *Beng Lou* (崩漏 metrorrhagia and metrostaxis) or *Lou Xia* (漏下 metrostaxis), and severe bleedings around the genital organs. Moreover, if various colors and foul-smelling secretions were observed, the ancient people termed this condition *Dai* (带 leucorrhoea, literally meaning strip), named for its strip-like appearance. These symptoms indicated the potential presence of irregular growths within the female reproductive system.[5] If firmness and fullness in the abdomen were noted, possibly even with an external protrusion, it could be inferred that there was irregular growth inside the body. Wang Shuhe (王叔和) from the Western Jin dynasty pointed out that such particular set of symptoms was quite challenging to treat during his time.[6]

The medical terms mentioned above are primarily based on symptoms that can be observed externally to infer internal conditions. However, ancient practitioners did not necessarily attribute all these symptoms directly to internal fibroids. In fact, certain disease terms were specifically used to describe palpable masses within the body. For instance, the term *Zheng Jia* (症瘕 abdominal masses) was employed to denote abdominal masses in women, and external palpation could reveal the presence of lumps or swellings. The term represented a crucial initial observation by ancient practitioners. Works such as *Nei Jing* (《内经》 *The Inner Classic*) and *Shen Nong Ben Cao Jing* (《神农本草经》*Shennong's Classic of the Materia Medica*) recorded descriptions pertinent to this topic. For example, *Su Wen* (《素问》*Basic Questions*) stated: "In case of disorders of the Ren meridian, men suffer from internal accumulations leading to seven types of hernias, while women experience intangible mass accumulation during leukorrhea (任脉为病，男子内结七疝，女子带下瘕聚)".[7] This statement particularly highlights *Nei Jie* (内结 internal accumulation), referring to the presence of lumps within the body. There were various synonymous terms for these conditions, including names such as *Zheng Jia Ji Ju* (症瘕积聚 accumulation of abdominal masses), *Shan Jia* (疝瘕 masses and hernia), *Xue Jia* (血瘕 blood lump), *Fu Yang* (伏阳 hidden yang), etc.

The term *Jia* (瘕 masses) is often associated with various medical diagnoses, such as *Shi Jia* (石瘕 stony masses), which refers to irregular masses within the uterus. Its etiology is attributed to "cold qi invading the cervix, causing a blockage in the uterus, which prevents the normal discharge of blood. As a result, stagnant blood accumulates, presenting symptoms similar to pregnancy, and menstrual cycles become irregular. The symptom is observed in women, and would be treated by resolving stagnation (寒气客于子门，子门闭塞，气不得通，恶血当泻不写，衄以留止，日以益大，状如怀子，月事不以时下，皆生于女子，可导而下)".[8] Notably, Ming dynasty physician Zhang Zhicong (张志聪, 1616–1674) proposed that external cold would intrude women's bodies through the vagina, hinder the discharge of blood from the uterus, leading to its aggregation into masses. He believed that resolving stagnation was effective for the treatment. In other words, to prevent the accumulation of masses in the abdomen, the uterus should not be invaded by coldness. In modern terms, this might relate to the caution advised to women against consuming cold beverages during menstruation, as well as the importance of adequately expelling menstrual blood to prevent uterine fibroids from forming. Additionally, the term *Chang Tan* (肠覃) is documented in the Han dynasty medical text *Ling Shu* (《灵枢》*The Spiritual Pivot*), describing the pathology associated with cold qi affecting the intestines. The text states: "Qibo said: cold qi invades the outer intestines and collides with defensive qi, leading to an inability to nourish the body. When disrupted, it binds and produces phlegm, resulting in the formation of polyps. Initially, they resemble chicken eggs and grow larger, taking on the appearance of pregnancy. Over time, they may solidify and shift upon pressure, and menstrual cycles occur regularly (歧伯曰: 寒气客于肠外，与卫气相搏，气不得荣，因有所系，癖而内着，恶气乃起，瘜肉乃生。其始生也，大如鸡卵，稍以益大，至其成，如怀子之状，久

者离岁，按之则坚，推之则移，月事以时下，此其候也)".[8] This description suggests early anatomical observations of internal bodily conditions, even before comprehensive medical texts were developed.

In the Qing dynasty, the physician You Yi (尤怡, 1650–1749) further elucidated these disease processes in his work *Yi Xue Du Shu Ji* (《医学读书记》*Medical Reading Notes*), interpreting *Tan* (覃) as a dissemination of polyps that are difficult to treat. He echoed *Ling Shu* in postulating the physical characteristics of *Tan* within the body but highlighted the lack of historical documentation from physicians who might have witnessed polyps within the uterus or intestines. Modern interpretations may associate this condition with ovarian cancer due to the interconnected nature of uterine and intestinal tissues,[9] presenting challenges for ancient practitioners, who could only formulate their understanding through experiential observations. Other historical conditions noted include abdominal masses in women, namely *Zheng Qi* (正气 health qi) characterized by hardened lumps, irregular menstrual cycles, alternating chills and fevers, and significant weight loss, indicating the complexities of gynecological diseases as historically difficult to treat.[5]

From the Han dynasty to the Wei, Jin, and Southern and Northern Dynasties, several significant discoveries illustrated how ancient physicians could deduce the presence of internal growths by combining external palpation with patients' subjective main complaints. Firstly, physicians described cases where patients reported experiencing fetal movements, but the physician felt a cold sensation upon palpation, contrasting with the warmth of actual fetal movements. This tactile discrepancy indicated a state of lifelessness. Secondly, irregular menstruation, marked by both amenorrhea and intermittent bleeding, suggested the presence of *Zheng Jia Ji Ju* (症瘕积聚 accumulated abdominal masses). This was because amenorrhea due to genuine pregnancy does not involve intermittent bleeding. This diagnostic approach involved external visual observation, the patient's bodily sensations, and the physician's tactile assessment, together forming a technique for identifying "invisible" internal pathologies.[5] The Tang dynasty marked a significant turning point in terms of treatment. After this period, discussions about internal growths expanded beyond mere descriptions of symptoms to include numerous therapeutic formulas. *Nyu Ke Bai Wen* in the Song dynasty stated that, "Accumulations and gatherings arise from disharmony of yin and yang, weakness of the internal organs, and susceptibility to pathogenic wind, which then coalesce within the organs, combating qi in *Zang Fu* organs (积聚者，繇阴阳不和，腑脏虚弱，受其风邪，搏于腑脏之气所为也)". Consequently, it prescribed "*Bie Jia Wan* (鳖甲丸 Turtoise Shell pill) treating accumulations in the lower abdomen, which were as large as a seven or eight-inch plate, rotating up and down, with unbearable pain (鳖甲丸，治小腹中积聚，大如七八寸盘面，上下周旋，痛不可忍)", which makes one example.[3] Many more peculiar disease names deserved exploration and discussion. For instance, both Tang and Song medical texts mention *Gui Tai* (鬼胎 ghost fetus), referring to the expulsion of serpent-like, shrimp egg-like, or chicken egg-like substances from a woman's lower body, accompanied by secretions resembling bean juice or a white ointment. Some scholars suggest this resembles what is known today as "hydatidiform mole", while others propose that these could be fibroid-like growths that have been expelled.[5]

Further descriptions can be analyzed to understand how physicians diagnosed internal accumulations based on unusual discharges from the female lower body. For example, the Qing dynasty medical text *Tai Chan Xin Shu* (《胎产新书》*New Book on Pregnancy and Childbirth*) noted that if a woman's "monthly menstruation resembles fish marrow, and she experiences pain in both feet so that she cannot move, this indicates a deficiency and coldness in the Yuan-primordial qi in the lower Jiao, compounded by intuition of pathogenic wind. Promoting blood and qi circulation is advisable (每月经来如鱼髓，双脚疼痛，不能移动，此乃下元虚冷，更兼风邪所致，行血行气为宜)".[10] Similarly, in cases of *Beng Lou*, "if menstruation is incessant and accompanied by the discharge of fragments resembling the membrane of a cow, and the patient falls to the ground in a coma, this is due to the congealing of blood and qi. Although the symptoms are alarming, there is no cause for concern (经来不止，兼下牛膜一样片色，昏迷倒地，乃血气结聚，变成此症。症虽惊人，却无事)".[11] The cases illustrated that physicians in ancient China had observed various substances, including those resembling fish marrow or fragments of membrane of a cow, discharged from the female lower body. Moreover, if a woman's menstruation included foul-smelling substances reminiscent of spoiled summer food, ancient TCM physicians attributed this to weakness of blood, exacerbated by the consumption of excessively hot and dry foods. TCM offered a vivid description of this condition: a woman with weakened blood and a frail body experienced a decrease in blood volume, resembled a ditch without a fresh water supply. The lack of circulation leads to blood stagnation, resulting in putrid substances.[11] The imaginative understanding of the internal body made up for the diagnostic reasoning in TCM.

Uterine contents, including fibroids, can indeed prolapse through the vaginal opening, according to modern medicine. Historical records from the Qing dynasty also documented such occurrences. For instance, "a patient experiences a persistent menstruation, when *Rou Bao* (肉胞 fleshy sacs), three to five in number and the size of chicken eggs, prolaspse from her lower body. These sacs are as soft as cotton. Upon incision, the flesh resembles pomegranate seeds. Though the woman may be in a stupor, there is no danger. Apply *Shi Quan Da Bu Tang* (十全大补汤 Perfect Major Supplementation Decoction) for five doses, and the patient recovers (经来不止，忽

然下肉胞三五个，如鸡子大，其软如絮，用刀割开，肉似石榴子，其妇昏迷，亦不妨，用十全大补汤，五帖即安)".[11] The nature of *Rou Bao* remains unidentified, yet the possibility of them being fibroids cannot be dismissed. Clinically, the prolapse of fibroids through the vagina is a documented, albeit startling, phenomenon. Prolapsed fibroids typically remain connected to uterine tissue. Therefore, the internal examination via incision of the mass as recorded above required a complete removal by surgical excision. In the record, however, the absence of subsequent surgical removal was observed. Nevertheless, the description of the internal contents resembling "pomegranate seeds" was suggestive of a fibroid's core, potentially indicating a malignant uterine sarcoma. Overall, the record represented an unusual and peculiar case. Such descriptions were notably distinctive in TCM records.

Following the Song dynasty, treatments became more diversified. In *Fu Ren Da Quan Liang Fang* (《妇人大全良方》*The Complete Compendium of Fine Formulas for Women*) compiled by Chen Ziming (陈自明) in 1237, there was a case report stating: "A daughter-in-law of my family suffered from a disease where a large mass with the size of a cup, was in her abdomen. It caused unbearable pain with each episode. At the time, she was of noble status, and all the skilled doctors in the capital had come to treat her, but their medications were ineffective. Chen Ziming, courtesy name Yingzhi (应之) said: 'This is blood lump'. He administered three pills of *Hei Shen Wan* (黑神丸 Black Divinity Pill), and the mass completely disappeared. The disease never reoccur for the rest of her life (余族子妇病，腹中有大块如杯，每发痛不可忍。时子妇已贵，京下善医者悉，常服其药莫愈。陈应之曰：此血瘕也。投黑神丸三丸，杯气尽消，终身不复作)".[11] The case indicated effective therapeutic formulas for treating fibroids in the Song dynasty. Interestingly, while Western medicine typically uses hemostatic agents to manage excessive menstrual bleeding caused by uterine fibroids, TCM regards menorrhagia as a manifestation of "erratic movement of disordered meridians. Rushing to staunch the bleeding may lead to accumulation and stagnation (经脉错乱妄行，若先用急敛之方，恐有积聚凝滞之患)".[11] In other words, TCM believes that hasty hemostasis could potentially exacerbate the formation of masses. Therefore, TCM emphasizes guiding the blood, prioritizing the normalization of the menstrual cycle as the treatment approach. Zhang Zhicong (张志聪) of the Qing dynasty believed that both intestinal carbuncles and abdominal masses were gynecological diseases that can be treated by downward drainage.[12] While some practitioners preferred aggressive medications like *Tao Ren Jian* (桃仁煎 Peach Kernel Decoction) to expel blood lumps and fluids, this method was unsuitable for women with qi and blood deficiency. Throughout history, physicians have generally advocated for the cautious use of aggressive medications.[9]

3 Knowledge updating through gradual exploration

As modern China approached, people's understanding of cancer gradually became influenced by Western medicine. The five medical books by Benjamin Hobson (合信, 1816–1873) introduced to China during the Xianfeng (咸丰) era of the Qing dynasty, were likely the most important text for the introduction of Western medicine in the late Qing dynasty. Dr. Hobson progressively introduced Western medicine to China from 1851 to 1858, which resonated greatly with TCM practitioners. He translated five works related to Western medicine, the last of which was *Fu Ying Xin Shuo* (《妇婴新说》*New Treatise on Women and Infants*). The book included a vivid analogy, just as a cold would cause a runny nose and intestinal disease would cause turbid excrement, vaginal discharge or foreign objects would indicate diseases in the uterus. If the uterus is ulcerated or develops "fibroids" that cause vaginal discharge, it is considered "dangerous and difficult to treat". The treatments discussed by Hobson in the book were quite simple, mainly involving astringent medications. These included mixtures of alum, catechu, ginger powder, or opium paste with vinegar, taken orally or administered vaginally using a "water syringe (水节)". Hobson noted that the "water syringe" was unique to Western medicine and not found in TCM, suggesting it was a syringe-like medical device. However, based on the text, Western medicine at the time also used conservative internal medicine treatments for internal tumors or ulcerations, rather than surgery. Moreover, the text indicated that treatments at the time primarily addressed symptoms rather than eliminating the fibroids themselves.[13] It was not until the 1860s that more Western physicians began to pay attention to various tumors of the endometrium, leading to increased research.[14] Since the early 20th century, there has been an increase in medical and popular science articles introducing cancer, with *Ai* remaining the most commonly used character. Organ-specific pathological terms, such as liver cancer (肝癌), stomach cancer (胃癌), lung cancer (肺癌), breast cancer (乳癌), colon cancer (肠癌), uterine cancer (子宫癌), and esophageal cancer (食道癌), became established and were generally referred to by combining the body organ with *Ai*. Some also used *Liu* (瘤 tumor) or *Zhong Liu* (肿瘤) in translation. However, *Liu* was a broader term, whereas *Du Liu* (毒瘤 poisonous tumor) was used to specifically denote malignant tumors or cancer (Fig. 3).[15]

The earliest Chinese descriptions of external factors causing cancer may have appeared in the *Shen Bao* (《申报》) in 1911, noting that "smoking damages the lips and throat, causing the mucous membrane to dry and redden and the gums to swell and bleed, so that cancer is likely to occur where the lips hold the smoke (烟熏口唇、咽喉，则黏膜干燥发红，牙肉肿账流血，且两唇含烟之处易生癌症)".[16] It might be the earliest record in Chinese

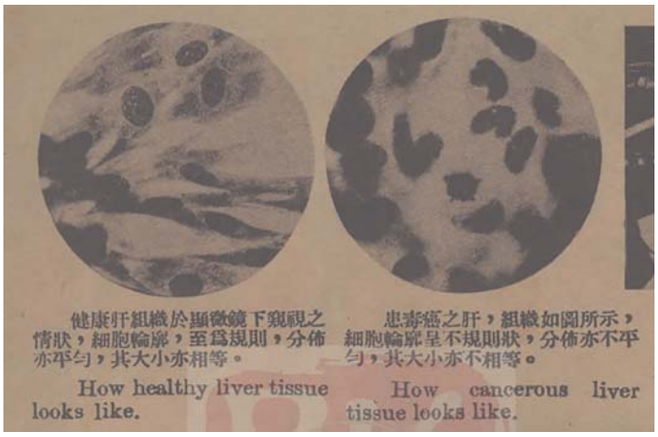


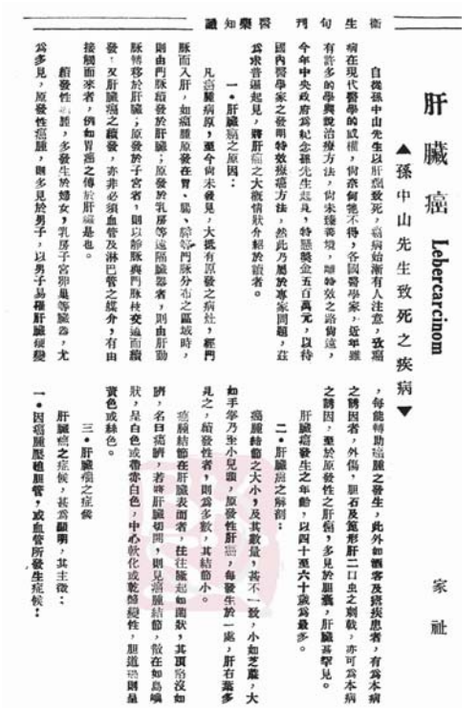
Figure 3 A comparison of health liver tissue and cancerous liver tissue from *Youth Science Pictorial* (《青年知识画报》) published in 1939 [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=0bf95b4e71d173fd72b19db3768f9f38&ltid=7&activeId=686d0ebb23b0997f480db7a3&downloadSource=GENERAL-SEARCH]

linking smoking to cancer, and the use of terms such as "cancer" and "mucous membrane (黏膜)" suggests Western medical influence, as TCM did not use the term "mucous membrane". During the Republican era, newspapers often featured Western health knowledge. For example, a 1919 article stated, "Leeks are particularly effective in treating hematemesis, epistaxis, hematuria, stomach cancer, diarrhea, etc. (治吐血、衄血、尿血、胃癌症、下痢等，均为韭之特有效能也)".[17] This record of using leeks to fight stomach cancer can be regarded as one of the earliest dietary therapy records under the influence of Western perspectives on cancer. Overall, the understanding of cancer among Chinese people at that time was still relatively slow. A few local Western-trained doctors began to introduce new Western scientific research to China; for instance, Yu Fengbin (余凤宾), a Western-trained doctor in Shanghai, introduced breast cancer, stomach cancer, and intestinal cancer in newspapers. Yu noted that stomach cancer was caused by stomach ulcers, and intestinal cancer was characterized by constipation and blood in the stool. Yu believed that many cancers occurred due to repeated external injuries that are left untreated or whose symptoms were ignored, such as severe injuries or sudden lumps on the body that did not heal over time, which were precursors to bone cancer. In other words, cancer arised from minor injuries that, when continuously stimulated, would lead to the growth of tumors. Yu emphasized that, "early treatment is an essential method for preventing cancer (早治实为预防癌肿之一要法)" and believed that "cancer did not occur in completely healthy organs or invade strong constitutions, but rather in areas plagued by illness. Therefore, it was important to pay attention to repeated internal and external injuries and to detect potential cancer development from minor ailments (癌肿之病，虽身体各部均可发生，但决不能发生于完全无恙之脏腑，亦不能侵袭康健强固之体质。必藉疾病纠缠之区域，以作其祟，可见蹉跎疏忽之，足以促成斯疾也)".[18] Depression and emotional distress were still considered important causes of cancer. A news report from 1935 mentioned that the actor Lin Xuehuai (林雪怀) who was a hit at the time developed "cancer due to depression" because of the decline in his acting career and marriage, reflecting the general public's perception at the time. Although this piece was gossip news at first glance, it would indicate that psychological factors and their relationship with physiology and pathology were being gradually recognized.[19]

One of the biggest cancer-related news in the early Republican era was Sun Yat-sen's (孙中山) diagnosis of liver cancer in early 1925. The news spread nationwide, making the general public aware that "cancer is incurable (癌症无药可医)". *Shen Bao* reported on Sun's condition, stating that "Pathological examination has confirmed Mr. Sun having a liver cancer. Modern medicine currently has no treatment methods for cancer. Therefore, though Mr. Sun's condition may not show much change temporarily, it is ultimately not optimistic (病理检验已证为肝癌、现世医对于癌症、尚无治疗方法、故先生之病虽一时无甚变象、然始终未能乐观也)".[20] Sun later passed away on March 12th of the same year. Newspapers also reported that Sun wished to preserve his body, not to become an immortal, but because Sun believed that both Chinese and Western medicine were helpless against cancer at the time. Therefore, Sun's will stipulated that his body be preserved for medical research.[21] Many TCM practitioners were involved in Sun's liver cancer treatment or provided traditional prescriptions. However, Sun himself and his close associates did not favor using Chinese medicine to treat liver cancer, so TCM could only participate in the treatment briefly and did not have much practical effect.[22] From these controversies, it could be observed that TCM did not consider liver cancer or cancers to be incurable at the time. They later criticized Western medicine for not allowing TCM to participate in the treatment of Sun's cancer, which led to the tragic ending of Sun's illness. This story later became a case study used for comparison in debates between TCM and Western medicine (Fig. 4).

Another passage highlighted the reasons why liver cancer was drawing attention at the time. An article published in *Shen Bao* discussed cancer, noting that:

> "After Hu Hanmin (胡汉民), a senior figure in the Nationalist government, suffered from hypertension, many ordinary people began to worry about high blood pressure. This led to a general increase in public awareness of hygiene and health, with people paying attention to their blood pressure. Similarly, liver cancer gained attention due to the death of Huang Yongbai (黄庸白), a prominent military and political figure, from the disease. The public's memory of Sun Yat-sen, a revolutionary leader who also died of liver cancer was not fading away. While it might seem logical for prominent figures to suffer from serious illnesses, it is not uncommon for people from all walks of life to die from liver cancer or other



肝臟癌 Lebercarcinom

▲孫中山先生致死之疾病▼

家社

Figure 4 A report on Sun Yat-sen's (孙中山) mortality due to liver cancer from *Guangxi Hygiene Biweekly* (《广西卫生旬刊》) published in 1934 [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=19f627aa2ba9532a46d34707d967e1c6&ltid=7&activeId=686d100223b0997f480dd134&downloadSource=GENERALSEARCH]

cancers. However, these cases often go unnoticed without the influence and attention associated with famous individuals. Cancer is both fortunate and unfortunate depending on who is affected. The debates between Chinese and Western medicine practitioners regarding the diagnosis and treatment of Huang Yongbai's liver cancer were quite lively, yet ultimately ineffective, as Huang succumbed to the illness.

自从过去的党国元老胡汉民氏，闹着高血压症后，民间比较有饭吃，少事做的人们，也纷纷的跟着起了血压过高的疑心病。人人一时留意着叫医生们仔细地量量血压；为未雨绸缪之计。社会上一般人们于无形中增加了一椿普通的卫生常识。跟着这个症候，有同样的作用也引起人们一时的视听与相当的注意的，是肝癌一症。这是新近军政人物外交名家黄庸白先生，为了他丧失生命的恶魔。不健忘的人们，也应该还记得革命导师，党国元勋的孙中山氏，在革命尚未成功之秋，也是被肝癌夺去了他璟宝似的生命．大人物患大症虽似合乎逻辑！可是实际上并不怎样稀奇。自平民以至于上等人，准大人等等之患肝癌或其他癌症而致命者，一年中正不知有多少，不过没有引起人们注意与视听的力量和机会而已。症因人显！也是癌症的有幸与有不幸了。单就黄先生病时，诊断将定已定之际，中西医者，为着诊治而发生的空头论战，笔墨官司，真也够热闹而奇妙。可惜药石无灵，黄委员终于病与人终，撒手西归，只落得了一个肝癌的诊断。”[23]

The news highlighted a critical condition, that diagnosis was merely a confirmation of an incurable condition, no matter the identity of the patient. Drawing from Western reports, the author analyzed various types and causes of cancer, including congenital factors that cause cancer in certain young children. The author also discussed the imperfection or degeneration of tissues, such as sclerosis, repeated irritation, or ulcers. Citing Japanese reports, the author observed that cancer, particularly liver cancer, was not uncommon among Chinese and Japanese populations, with a high prevalence and a greater susceptibility to cancers of the digestive system. It was a novel discovery, and triggered discussions.[24] However, the lack of new knowledge about cancer was obvious, so that another author lamented that “in today's scientifically advanced world, the common knowledge of cancer is still not widespread in China, which is regrettable (在科学昌明的今日，癌症的常识在中国还不很普及，又不得不感到可怜)”.[25] This underscored the insufficient investigation and reporting on cancer prevention at the time.

4 New treatment and prevention methods

Although the public was gradually becoming aware of the nature of cancer, many types of cancers were still considered “new diseases” for most Chinese people, and the general public was not clear about how to treat them. From a Western medical perspective, as early as 1918, an article in *Fu Nyu Za Zhi* (《妇女杂志》*The Journal of Women*) pointed out that uterine tumors could lead to excessive menstrual bleeding, which was quite similar to current description of fibroids. The article stated that if medication was ineffective, surgery should be performed, indicating that there were already similar surgical treatments available in the late 1910s.[26] In 1921, a physician stated that fragments of the uterine lining in menstrual blood could metastasize to other locations through the bloodstream. Later, it was confirmed that this was incorrect, as benign tumors do not exhibit metastasis.[15] Based on existing literature, after the 1920s, Western medicine began to perform more surgical examinations and operations to treat uterine diseases and produce more relevant knowledge, including being able to distinguish between inflammatory adnexal tumors, general adnexal tumors (including fibroids), and cancerous tumors.[27] Furthermore, in 1928, uterine fibroids were classified as benign tumors and were included in gynecology textbooks.[28] But, Western medicine at the time also admitted that many conditions could only be diagnosed after surgically opening the lower abdomen. Due to the lack of abdominal ultrasound, hysteroscopy, and other well-known high technology instruments, surgery was necessary to explore the internal condition.

In the 1920s, if symptoms caused by various tumors, such as menorrhagia, could not be managed with conservative treatments, patients were advised to have all internal reproductive organs removed to avoid complications. Statistics showed that surgical treatment was used in approximately 26.3% of all cases of uterine inflammatory tumors in the West, with a surgical mortality rate of around 4.7%.[28] These theories and related

surgeries were introduced and increasingly performed in China from the 1930s. In 1934, Dr. Hu Zhiyuan (胡志远) of Shanghai Municipal Hospital wrote an article, pointing out that because antibiotics were not yet widely available, Western physicians, when faced with uterine or ovarian inflammations and tumors, did not advocate delay to prevent the inflammatory condition from becoming uncontrollable. They would advocate decisively removing the uterus or other reproductive organs. However, Dr. Hu pointed out that he had seen many Western-trained doctors in China arbitrarily removing female reproductive organs. As surgeries were performed to prevent inflammation from infecting other organs, more organs and tissues beyond inflammation had to be removed. This would lead to the almost complete removal of female reproductive organs, resulting in lifelong infertility, which was a significant blow to women at the time. At the same time, such surgery had a high mortality rate. Therefore, the necessity of surgery should be carefully considered.[29] In contrast, many Western physicians believed that female fibroids should not be left unattended. Although fibroids were benign, they could still lead to excessive bleeding, even cerebral ischemia and stroke, and should not be ignored simply because they were benign. Surgical removal should be performed.[29] After the 1940s, in addition to surgery, male hormones or radiation therapy could be used to treat fibroids, but the former was expensive, and the latter was dangerous and had poor therapeutic effects.[15]

It is notable that the TCM diagnostic methods of "observation and perception", title of the article, continued to play a role during this period. Taking gynecological uterine cancer as an example, TCM practitioners at the time would still observe symptoms such as bleeding, leucorrhea, and abdominal pain.[30] However, the advent of new diagnostic techniques and methods, such as internal examinations in Western gynecology,[31] appeared to enable earlier confirmation of specific internal cancers. By the late 1940s, techniques like smear tests were already being introduced.[32] Consequently, many TCM cancer treatment cases from this era involved patients who had already received a Western medical diagnosis before seeking TCM consultation. Therefore, even though TCM continued to utilize its traditional diagnostic approaches, the novel diagnostic techniques in Western medicine presented considerable challenges to TCM diagnostics (Fig. 5).[33]

In 1927, a notice was published in a newspaper stating that his wife had been diagnosed with uterine cancer by both Chinese and Western doctors. He hoped for traditional secret recipes or renowned doctors from home and abroad who could help, and requested them to send letters to the newspaper office, so he could personally visit them. The notice illustrated the complexity of the disease.[34] It goes without saying that Western medicine generally distrusted TCM at the time. In search for treating cancer, Western medicine eagerly awaited new

Figure 5 A photo of a doctor of Western medicine in a lead suit handling radium, from *Knowledge Pictorial* (《知识画报》) [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=8b6e4d-91b709ad675052c1973774c4b2&ltid=7&activeId=685b630d23b-0997f4893bae3&downloadSource=GENERALSEARCH]

Western medicines. For example, after the 1930s, with the prevalence of hormone therapies in China, medical reports indicated that "hormones" could treat cancer. Some even suggested that taking vitamins to supplement certain nutrients might combat cancer. Such suggestions germinated from the interpretations of the factors contributing to the occurrence of cancer by the Western medical community at the time. A prevalent theory was that cancer was caused by nutritional deficiencies, so many anti-cancer methods were conceived from the perspective of supplementing nutrition.[35] Various new treatment methods constantly emerged, indicating the increasing fear of cancer and the expectation of inventing effective medicines as soon as possible. Unfortunately, these therapies were later proven to be of little use.[36]

Despite limited treatment options, reports from the time revealed a desire to better understand and prevent cancer. In 1931, the Shanghai Young Women's Christian Association organized a hygiene campaign emphasizing women's health. This campaign specifically advised women over 40 to seek immediate medical attention if they experienced shortened menstrual cycles or foul-smelling leucorrhea, highlighting the importance of early diagnosis for life preservation.[37] The explicit attention to female cancers was rare in the popular media of the Republican era. Cancer was not intentionally ignored. Rather, many patients succumbed to the disease before a definitive diagnosis could be made. Consequently, in 1934, the French League against Cancer requested the National Medical Association of the Republic of China to investigate the prevalence of cancer in China. Unfortunately, the outbreak of the War of Resistance against Japanese Aggression disrupted this initiative, leaving the overall incidence and prevalence of cancer in China unknown.[38] In contrast to Western

medicine, TCM attributed conditions such as abdominal masses, *Beng Lou*, internal accumulations, and uterine tumors to imbalances caused by external cold, leading to qi and blood stagnation, blood heat, or blood stasis. Other perceived causes included dietary indiscretions, immoderate sexual activities, or complications arising from childbirth. However, TCM did not prioritize the direct removal of tumors or fibroids as a primary treatment strategy.[9] Conversely, Western medicine's approach of surgically removing tumors and fibroids was considered the most direct method for treating and eliminating symptoms. Yet, due to the limitations of surgical techniques and diagnostic equipment at the time, people harbored significant reservations about the removal of internal organs.[39] The fear of surgery, in part, led to the preference for internal medicine approaches which boasted characteristic of TCM, in the treatment of malignant tumors.

Different approaches to treating cancer spurred the emergence of new phenomena. For instance, TCM practitioners began promoting their therapies as a "beacon of hope" for cancer treatment, a trend that gained momentum after 1940, with some even claiming the ability to cure cancer. One such example is Chen Susheng (陈苏生), a TCM practitioner in Shanghai, who advertised in newspapers:

> "Renowned physician Chen Susheng, residing in Shangxianfang, Xiahfei Road, is highly skilled in the art of traditional medicine and specializes in treating difficult and complex diseases. A Ms. Song from Lane 358, Xiafei Road, suffered from uterine cancer with symptoms of metrorrhagia, edema, and palpitations, making it difficult for her to eat and sleep. After treatment by Dr. Chen with his secret medicine *Zuo Yao*, all symptoms disappeared within a month. She has since returned to her hometown of Hankou to recuperate. Cancer is the most terrible disease for women, causing great suffering. This treatment success is worthy of attention.
> 名医陈苏生、寓霞飞路尚贤坊、精岐黄术斐声海上、擅治疑难重症、有霞飞路三五八弄宋氏者、患子宫癌崩带悸肿、已寝食俱艰、经陈医诊治予以秘制坐药、不阅月而诸恙霍然、月前已遄返汉口原籍休养安、癌症为妇人最惨之症、患者痛苦非常、此种治绩、固值得注意者也。"[40]

This Ms. Song, diagnosed with uterine cancer, purportedly recovered after using Chen's self-made medicine *Zuo Yao* (坐药 suppositories inserted into the vagina or anus).[41] Another TCM practitioner, Zhang Jitian (张霁天), began advertising himself as a "cancer expert" in newspapers and magazines in 1948, claiming to specialize in treating breast, stomach, liver, and intestinal cancers, asserting that his medication could cure these diseases, regardless of ulceration, with no recurrence.[41] Such claims were indeed astonishing. Another perspective highlighted the perceived limited methods and formulas of Western medicine in treating cancer, contrasting it with TCM. While TCM did not claim to have specific cancer-curing formulas, it offered a number of approaches based on *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation) tailored to patients' symptoms. For instance, gastric cancer could be addressed by prescribing formulas dispelling blood stasis and promoting blood circulation.[42] Some TCM practitioners also adopted strategies like clearing blood, cooling blood, and invigorating blood circulation for gastric cancer, claiming remarkable efficacy based on decades of clinical experience. These TCM approaches were presented in stark contrast to the perceived lack of effective Western medical treatments at the time.[43]

To sum up, in an era when Western medicine offered little hope for cancer patients, TCM treatments provided a glimmer of possibility. Western medical professionals recognized the urgent need to establish specialized hospitals for cancer research and treatment. Dr. Xu Jingbo (徐惊伯), for example, noted: "China lacks talent in cancer treatment. We have developed a plan to use this hospital as a training center for specialists in radium and X-ray therapy. If funding is sufficient, we will add free beds, with the aim of expanding the hospital into a center for cancer treatment. We also plan to launch a cancer prevention campaign to increase public awareness of cancer". Xu's words indicated that the existing specialized cancer hospital, the "Sino-Belgian Radium Therapy Institute", was insufficient to meet the growing demand for patients with cancer, highlighting the need for specialized treatment centers and increased public awareness of cancer as the number of cancer cases continued to rise daily.[44]

5 Conclusion

The article primarily explores the presentation of TCM knowledge concerning the diagnosis and treatment of malignant tumors. It also examines the changes arising from the dissemination and integration of Western medical techniques, compounded by social and cultural factors. A key question that warrants continued investigation is whether TCM can genuinely treat cancer. Is this a mythologized construct within the history of Chinese medicine, or a legitimate and promising avenue for further exploration? Persuading desperate cancer patients to take Chinese medicines may not be difficult, but convincing Western medical practitioners of TCM's efficacy in cancer treatment is considerably challenging. The article touches upon the diagnostic observation and treatment of malignant tumors, largely adhering to rudimentary sensory perception and the transition from traditional visual inspection to machine-based and imaging-based medicine. Due to various constraints, the current study can only address the former, with the latter's development requiring separate discussion. It is worth contemplating that, with the advancement of modern medicine, it is difficult for TCM to independently handle all aspects of a patient's cancer journey, from examination and diagnosis to treatment and recuperation. How to collaborate with Western medicine in fighting cancer, and at what point to intervene

in treatment, coordinating with the overall treatment process in modern hospitals, has become an unavoidable issue for TCM in the new era. While traditional visual inspection methods have become outdated and inaccurate, the perception and judgment of the body still dominate our interpretation of diseases. For instance, in Ma Guangya's (马光亚) experience in treating uterine cancer in 1953, TCM still relied on the patient's perception of their own physical discomfort to make judgments, and then methods such as soothing the liver, calming the wind, and unblocking blood collaterals were applied for treatment. These practices did not seem to be mere visual inspections. Notably, similar to the fear of surgery prevalent in the early Republic of China, patients often seek TCM internal medicine treatment only after a Western medical diagnosis. This implies that patients have already undergone a "visual inspection" by Western medicine, highlighting the different understandings of diseases between TCM and Western medicine.[45]

From the Song dynasty, an "internal shift" trend emerged in the etiological explanations of many TCM practitioners. This trend emphasized internal bodily causes, which, in effect, limited subsequent medical practitioners' imagination and potential exploration of internal tumors.[5] Following this trend, physicians could only "infer" the presence of growths within the body through classical knowledge and experience. However, they could not accurately diagnose the benign or malignant nature of internal tumors, nor could they specifically describe their morphology. Consequently, they would not conceive of or invent methods for excising or removing tumors, and instead continued to rely on internal medication.

The fascinating aspect of history of medicine lies in its ability to reveal how today's medicine, particularly TCM, has evolved into its current form. As the methods of knowledge discovery and transmission change, the very essence of medicine also transforms. Modern TCM can no longer solely rely on "perception" or "visual inspection" to predict the prognosis and classification of cancer, because the refined development of medical knowledge has incorporated Western medical elements. Readers should not be surprised by the differences between modern and traditional TCM, but rather focus on how to anticipate and plan each stage of TCM's developmental strategy. In what kind of era are we living? This is the retrospective tracing and inspiration that medical history provides for real-world issues, which is worthy of further consideration.

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This article does not contain any studies with human or animal subjects performed by the author.

Author contributions

PI Kuo-li drafted and revised the paper.

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When Traditional Chinese Medicine Meets Western Medicine: The Practice of Scientification in Modern *Shang Han Lun* Theory

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Abstract

Against the backdrop of the modern-era conflict between traditional Chinese medicine (TCM) and Western medicine, during which Western medicine gradually gained administrative authority over public health, Chinese medicine faced an existential crisis. Due to *Shang Han Lun* (《伤寒论》 *Treatise on Cold Damage*) being characterized by its emphasis on clinical efficacy rather than metaphysical speculation, and under the influence of Japanese Kampo medicine, which highly valued the study of *Shang Han Lun* and promoted Chinese-Western integration, *Shang Han Lun* Theory emerged as a primary breakthrough point for the scientification of TCM. Modern-era scholars of *Shang Han Lun* Theory developed innovative interpretations of the six meridians from multiple perspectives, including reinterpretation based on syndromic patterns, organ structures and physiopathological mechanisms, the Stage-based Model, and pathological location and nature. They also incorporated new scientific knowledge such as bacteriology, physiology, pathology, and pharmacology to reinterpret the etiology, medicinals, and formulas within the *Shang Han Lun*.Moreover, these scholars pioneered the clinical co-application of Western pharmaceuticals with *Shang Han Lun*–based formulas, introduced Western diagnostic instruments into TCM clinical practice, and explored institutional models of the Integration of TCM and Western Medicine. These innovations and transformations led to the formation of a new research paradigm within *Shang Han Lun* Theory, which not only countered the criticisms from Western medicine, thereby preserving the academic and clinical space for TCM, but also initiated a new educational model for *Shang Han Lun* studies. More importantly, it laid a crucial theoretical and practical foundation for the post-1949 development of the Integration of TCM and Western Medicine, marking a significant milestone in the modern history of Chinese medicine.

Keywords: *Shang Han Lun* (《伤寒论》 *Treatise on Cold Damage*); *Shang Han Lun* Theory (伤寒论学); Scientification; Traditional Chinese medicine; Western medicine; Kampo medicine; Modern era

1 Introduction

Shang Han Lun Theory (伤寒论学) refers to the academic framework developed through the systematic study of *Shang Han Lun* (《伤寒论》 *Treatise on Cold Damage*), one of the core classical texts of traditional Chinese medicine (TCM). In the late Qing dynasty, Western medical knowledge was systematically introduced into China. Following the establishment of the Republic of China, Western medicine gained dominant control over health administration, resulting in widespread discrimination, suppression, and even attempts to abolish TCM. The profession faced an existential crisis unparalleled in its millennia-long history. Amid intense debates between Chinese and Western medicine—and in an atmosphere where calls for the abolition of TCM were growing increasingly vocal—*Shang Han Lun*, with its emphasis on clinical efficacy over abstract theorization, emerged as a potent intellectual and practical resource. It became a key instrument for reviving TCM scholarship and resisting the hegemony of Western medicine in the name of cultural survival. Modern scholars of *Shang Han Lun* engaged in a reinterpretation of the text through the integration of Western scientific and medical knowledge. In doing so, *Shang Han Lun* Theory became a major frontier for the scientification of TCM and a crucial platform for advancing TCM reform in the modern era.

"Scientification of TCM (中医科学化)"[1] was an intellectual movement that arose within the TCM

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community in modern China, shaped by broader historical contexts such as the "Save the Nation through Science (科学救国)" campaign and the "Chinese Scientization Movement (中国科学化运动)".[2] Although the concept lacked a universally accepted definition, many TCM scholars engaged in rich theoretical elaboration and practical experimentation. Broadly speaking, the movement aimed to reform classical TCM and develop new paradigms that could meet the demands of the time.

While existing research has touched on the scientification of modern *Shang Han Lun* Theory and the integration of TCM and Western medicine, such studies have mostly remained at the level of general description, focusing primarily on prominent figures and key texts. They have yet to undertake a systematic investigation into the broader social conditions and structural features underlying the scientification of *Shang Han Lun* Theory. Why did the TCM community choose *Shang Han Lun* Theory as the principal arena for advancing the scientification of TCM in the modern era? In what specific ways did modern *Shang Han Lun* Theory undergo innovation and scientific transformation, and what were the overarching features of this process? What impact did this movement have on the overall development of TCM in modern China? This paper seeks to explore these questions in depth, with the aim of uncovering the pivotal role played by modern *Shang Han Lun* Theory both in preserving TCM during a period of crisis and in advancing its scientific transformation.

The term "modern" can carry multiple meanings depending on the context. In this paper, however, "modern" specifically refers to the historical period in China from 1840 to 1949.[3]

2 Reasons and motivations for the reform of modern *Shang Han Lun* Theory

2.1 The debate between Chinese and Western medicine and the existential crisis of TCM

During the late Qing dynasty, Western missionaries established Western medical hospitals, founded medical schools, and translated Western medical texts, thereby initiating the gradual introduction of Western medicine into China. Rooted in modern natural sciences, the perceived "scientific nature" of Western medicine came to be highly esteemed in subsequent decades. The dissemination and acceptance of Western medical knowledge in China also marked the beginning of a period during which TCM was increasingly questioned and marginalized. Some TCM scholars in the late Qing period recognized the anatomical advancements of Western medicine and were among the first to advocate for the integration of Chinese and Western medicine. They attempted to compensate for the perceived deficiencies of TCM by incorporating anatomical and other scientific knowledge from Western medicine. Prior to the twentieth century, the influence of Western medicine remained limited, and the debate between Chinese and Western medicine was still in its infancy. However, with the onset of the twentieth century, many medical professionals who had studied abroad returned to China, and institutions such as the Beiyang Medical School, Beiyang Army Medical Academy, and various church-affiliated medical schools began training a substantial number of locally educated, Western-trained physicians. During the major plague outbreak in northeastern China at the end of the Qing dynasty, the epidemic prevention measures implemented by figures such as Wu Lien-the (伍连德), based on Western medical approaches, convincingly demonstrated the efficacy of Western medicine. With the continued increase in Western-trained medical personnel and healthcare institutions, and the growing acceptance of Western medical concepts, the government of the Republic of China—following the Xinhai Revolution (辛亥革命)—largely modeled its public health system on Western paradigms, implementing a new framework of medical governance. The choice of medical paradigm became closely tied to the state's institutional framework for healthcare, which itself reflected prevailing ideological currents. As Western medicine continued to gain ground and become more deeply embedded in Chinese society, an oppositional dynamic gradually emerged between TCM and Western medicine, ultimately giving rise to the modern debate between the two systems (Fig. 1).

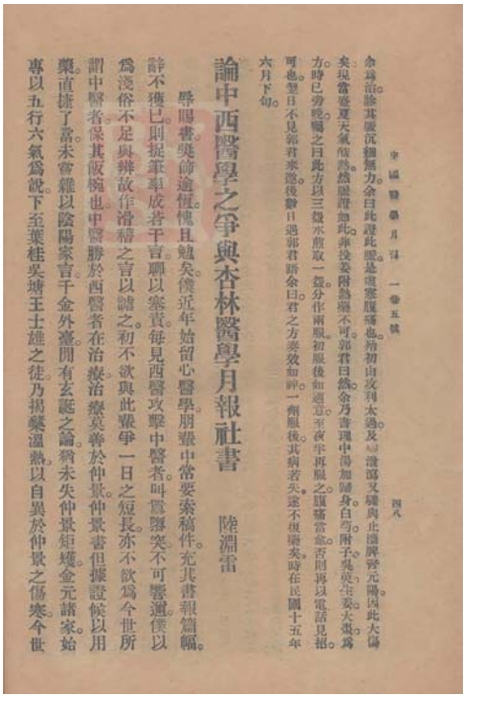

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Figure 1 Articles by Lu Yuanlei (陆渊雷) on the "Debate between traditional Chinese medicine and Western medicine (中西医论争)" [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=aac31bca6bbaa5493f43bb2963a40200&ltid=7&activeId=686dcfd1f74f7f2228eeb093&downloadSource=GENERALSEARCH]

In July 1912, the Beiyang government convened the National Interim Education Conference, which formulated various policies and detailed regulations for education in the Republic of China. Notably, however, no provision was made for TCM.[4] In response, the TCM community criticized that "the regulations for medical schools set by the Ministry of Education emphasize Westernization, completely disregarding our country's traditional medicine (教育部所定医药学校章程专重欧化主义，置我国旧有之医药于不顾)".[5] Beginning in 1913, TCM practitioners initiated petitions urging legislative and administrative bodies to find ways to preserve national medicine (国医), marking the first organized resistance from the TCM community against the dominance of Western medicine in state medical administration.

In January 1914, the Ministry of Education issued a reply, stating: "There is no discrimination between Chinese and Western medicine (并非于中医西医有所歧视)".[6] Although the joint petition did not succeed in incorporating TCM education into the national education system, it successfully prevented the immediate abolition of TCM schools. Nevertheless, criticism of TCM continued to grow, with the central charge being that TCM was "unscientific". For instance, in 1915, Chen Duxiu (陈独秀, 1879–1942) wrote in his article "A letter to youth (《敬告青年》)": "Chinese medicine does not understand science; it neither comprehends the structure of the human body nor engages in the chemical analysis of medicinal substances, let alone possesses knowledge of germs and infectious diseases (医不知科学，既不解人身之构造，复不事药性之分析，菌毒传染，更无闻焉)".[7] This wave of criticism intensified as increasing numbers of Western-trained medical students returned from abroad. As Lu Yuanlei (陆渊雷, 1894–1955) observed: "Chinese people who study Western medicine, having studied in Japan, Europe, and America, return in great numbers with doctoral and master's degrees, which gave rise to the debate between Chinese and Western medicine (国人之习西医者，留学日本欧美，纷纷得博士硕士归，医学于是乎有中西之争)".[8] Among these critics, Yu Yan (余岩, 1879–1954) was the most representative. In 1917, he published *Ling Su Shang Dui* (《灵素商兑》 *Critique of "Spiritual Pivot" and "Basic Questions"*),[9] in which he explicitly declared intellectual war on TCM. Under the influence of Yu Yan and others, the debate between Chinese and Western medicine reached a climax in 1929 with the proposal entitled "Abolishing old medicine to remove obstacles in medical and health affairs (《废止旧医以扫除医事卫生之障碍案》)", submitted at the first meeting of the Central Health Commission of the Nanjing National Government. In the proposal, Yu argued that TCM "goes against the laws of natural science (背乎自然科学之法则)",[10] "hinders scientific progress (阻遏科学化)",[11] and should "be reformed through true scientific experimentation in order to eliminate its harmful effects (以真正科学实验之方法，整理而停毒之)".[12] The "Abolition of TCM case" marked a turning point in the Chinese-Western medicine debate: from an academic dispute to a political initiative in which Western medicine attempted to eliminate TCM through administrative means. This incident triggered a strong wave of petitions and organized resistance from the TCM community, which ultimately succeeded in preventing the Nationalist government from abolishing TCM.

Faced with growing criticism that TCM was "unscientific", and under the broader social context of the pursuit of "scientification" since the New Culture Movement (新文化运动), some progressive scholars within the TCM community consciously adopted modern scientific research methods to critically examine, reorganize, and reform traditional medical knowledge. By around 1930 at the latest, the scientification of TCM had already gained strong momentum, becoming the dominant discourse within the TCM field. Numerous prominent slogans and assertions emerged during this period, such as: "to completely discard the theories of yin-yang and the five elements, and to use science to explain TCM (一洗阴阳五行之说，欲以科学解释中医)";[13] "the scientification of TCM, and the sinicization of Western medicine (中医科学化，西医中国化)";[14] "Chinese medicine must urgently be explained, interpreted, and systematically compiled using scientific methods (中国医学……宜亟以科学方法阐明之，讲通之，整理而辑述之)";[15] "to reform TCM with scientific methods and cultivate specialized professionals (以科学方法整理中医，培植专门人才)".[16] These statements reflect the strong intellectual and institutional push for the scientification of TCM, which became a major force driving TCM's transformation in modern China.

Where should the scientification of TCM begin? Amid the ongoing debate between Chinese and Western medicine and the push for academic reform, TCM scholars began to exhibit a distinct intellectual orientation toward "valuing the practical over the theoretical (黜虚崇实)".[17] Because *Shang Han Lun* emphasized clinical efficacy and "rejected empty theorizing in favor of empirical investigation (不尚空谈，实事求是)",[18] it stood out among numerous classical TCM texts. Medical scholars increasingly focused on and placed their trust in *Shang Han Lun*, making it a powerful vehicle for revitalizing TCM and countering the growing influence of Western medicine. For instance, Yun Tieqiao (恽铁樵, 1878–1935) advocated: "To achieve integration between Chinese and Western medicine, and to absorb the essence of the latter, one must rigorously study *Su Wen* (《素问》 *Basic Questions*) and *Shang Han Lun*; without such study, there is no path forward (欲求中医与西国医学相化合，而吸收其精华，不精研《素问》《伤寒》，其道亦无由矣)".[19] Lu Yuanlei similarly remarked: "TCM surpasses Western medicine in treatment, and no one surpasses Zhang Zhongjing (张仲景) in this regard. *Shang Han Lun* prescribes treatments based solely on syndromic patterns, directly and decisively, without

entanglement in yin-yang speculation (中医胜于西医在治疗，治疗莫善于仲景，仲景书但据证候以用药，直截了当，未尝杂以阴阳家言)".[20] Zhang Taiyan (章太炎, 1869–1936) also affirmed: "The superiority of TCM over Western medicine lies, above all, in *Shang Han Lun* (中医之胜于西医者，大抵伤寒为独甚)".[21] These voices collectively represented the rising academic endorsement of *Shang Han Lun* Theory. Among them, Lu Yuanlei was especially influential. In 1930, he published *Modern Interpretation of Shang Han Lun* (《伤寒论今释》), the first work explicitly committed to the study of *Shang Han Lun* through the lens of scientification. In the preface, Lu explained: "In my medical practice, I extract factual content from ancient texts and reinterpret it through the lens of scientific understanding. This is the rationale behind the title *Jin Shi*, modern interpretation (是以鄙人治医，取古书之事实，释之以科学之理解，此《今释》之所以命名也)".[8] This publication marked the beginning of the modern phase of scientific exploration of *Shang Han Lun* Theory.

2.2 The introduction and inspiration of Japanese Kampo medicine

In addition to the influence of Western medicine and the broader intellectual movement toward the scientification of TCM in modern China, the introduction of Japanese Kampo medicine (日本汉方医学) offered Chinese scholars a compelling vision for the potential integration of Chinese and Western medical systems. This transnational exchange profoundly shaped the scientific study of *Shang Han Lun* in China. Kampo medicine in Japan developed into three major schools: the Ancient Formula School (古方派), the Textual Research School (考证派), and the Eclectic School (折衷派). Among them, the Ancient Formula School revered Zhang Zhongjing and focused intensively on the close textual study of the *Shang Han Lun*. Following the Meiji Restoration, Japanese medical reformers implemented policies to abolish Kampo medicine, which triggered a series of resistance movements among Kampo practitioners—a situation strikingly similar to the later abolitionist movements against TCM in Republican China.[22] One of the leading figures in defending and revitalizing Kampo medicine was Wada Keijūrō (和田启十郎), who published *Iron Hammer of the Medical World* (『医界之鉄椎』) in 1910. In this work, Wada emphasized the idea that "Kampo is not obsolete (汉方非陈腐)",[23] and sought to reinterpret the *Shang Han Lun*'s theory of interior and exterior (表里) using Western physiological concepts. He also systematically compared the understandings, diagnostic principles, and treatment methods of Western medicine and Kampo medicine, contributing to early comparative medical studies.

Wada's student, Yumoto Kyūshin (汤本求真), not only inherited Wada's comparative methodology but also deeply absorbed the philological and clinical rigor of the Ancient Formula School. Between 1927 and 1928, Yumoto authored *Kokan igaku* (『皇漢医学』*Imperial Kampo Medicine*), in which he developed a novel approach to *Shang Han Lun* by exploring its relevance through a synthesis of Chinese and Western medical thought. This work soon reached Chinese audiences. In July 1929, Liu Siqiao (刘泗桥) began serializing his Chinese translation of *Imperial Kampo Medicine* in *Zi Qiang Yi Kan* (《自强医刊》*Self-strengthening Medical Journal*), followed by a printed edition from Shanghai Dongdong Xueshe Press in July 1930. Another version, translated by Zhou Zixu (周子叙), was published earlier in September 1929 by the Shanghai Zhonghua Book Company.

At a time when the Chinese TCM community remained uncertain about how to advance the scientification of TCM, Yumoto Kyūshin's interpretation of *Shang Han Lun* through the framework of integration between Chinese and Western medicine brought fresh inspiration for TCM reform. His work offered new research perspectives and methodological tools to counter the growing skepticism from the Western medical establishment. Consequently, *Imperial Kampo Medicine* was enthusiastically embraced by the Chinese TCM community upon its translation, with many regarding it as a significant reference text capable of both alerting those blindly following Westernized medicine and contributing to the improvement of TCM. For example, Feng Chao (冯超) noted that the book "explains the teachings of earlier masters using scientific principles, integrating Chinese and Western medicine (以科学原理解释先辈之说，融会中西)", and that it could "awaken those infatuated with Europeanized modern medicine from their delusions (醉心欧化之新医，可以一醒其迷梦)".[24] The TCM community called for broader reference to Kampo literature, stating: "If our medical community seeks reform, the most suitable sources are the writings of Japanese Kampo practitioners (我国医界而欲求改进，最适宜之参考，厥为日本汉医之述作)".[25]

The popularity of *Imperial Kampo Medicine* in China was evident from its frequent reprinting. After the Zhonghua Book Company first published the book in 1929, it was quickly reissued in 1930, 1931, 1932, 1934, 1935, 1936, and 1939.[26] This wave of publications reflected the enthusiastic reception of Yumoto Kyūshin's ideas in Chinese medical circles. Many Chinese scholars of *Shang Han Lun* Theory began studying and emulating Yumoto's research methods, initiating a shift away from traditional modes of scholarship. This new approach transformed the study and clinical application of *Shang Han Lun* into a potent academic weapon for defending TCM against the campaign for its abolition led by proponents of Western medicine.

In summary, *Shang Han Lun* emerged as the principal locus for the scientification of TCM in modern China for two main reasons. First, the text itself is characterized by its emphasis on clinical efficacy and its aversion

to abstract theorizing—embodying the ideal of "avoiding empty talk and focusing on practical outcomes". Second, it was profoundly influenced by Japanese Kampo medicine, which had pioneered a model of Chinese-Western medical integration centered precisely on the *Shang Han Lun*. Of course, the choice of *Shang Han Lun* as the entry point for such integration was no accident; it stemmed directly from the text's own practical and empirical orientation. Nevertheless, the development of this model in Japanese Kampo medicine significantly accelerated efforts within China to pursue scientific approaches to TCM, beginning with *Shang Han Lun* as the foundation (Fig. 2).

3 The practice of scientification in modern *Shang Han Lun* Theory

3.1 Innovative interpretations of *Liu Jing* (六经) in *Shang Han Lun* by modern scholars of *Shang Han Lun* Theory

Liu Jing (六经 six meridians) constitute the most fundamental framework in the study of *Shang Han Lun*. As Yun Tieqiao remarked, "The most important aspect of *Shang Han Lun* lies in *Liu Jing*, and likewise, *Liu Jing* are the most difficult to comprehend (《伤寒论》第一重要之处为六经，而第一难解之处亦为六经)".[19] Throughout history, scholars engaging with *Shang Han Lun* have regarded the interpretation of *Liu Jing* as a primary issue. In the modern era, scholars of


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梧州中醫譚次仲

第三九〇首

唉。我們親愛的同胞啊。一般有生命的國民啊。我們國裏的醫學問題。已經是混鬧了許久了。如今大家研究辯論的結果。中西醫都異口同聲。說中醫裏有相當的好處。也有相當的壞處。故此一致主張採用科學方法來改善他。中醫科學化這一句話。就是統中西雙方的醫學專家。一致承認改善中醫的一條光明大道。用不着我們去懇求他。平心於如何適用科學方法來改善中醫。那應更是中西醫方醫學專家的唯一責任。亦無須去理會他。但是其應叫做科學。用科學化中醫有其麼好處。這層倒要我們明白一點見。因此鄙人就拿顯淺單簡一說來大人都了解的。和我們親愛的同胞。一般有生命的國民來講講。願大家垂聽垂聽。其應叫這科學呢。第一要古人幹得到。今人更要幹得到。或者還要勝過他。若果祇說古人如何起死回生。如何神奇奧妙。今人却一絲也幹不來。不要講他是說謊。就算古法真個幹得。究竟已失不可復得。說來何益。這就是不合科學。第二是要有一種共同信守的道理。若果彼說一樣。此說一樣。又以個子。師以傳徒。那麼父子師徒的講說。都是意辯爭。都是憑臆說。這就是不合科學。第三是要有憑有據。拿得出來看的。一切影響揣度的大異棱的

Figure 2 Articles by Tan Cizhong (谭次仲) on the "Scientification of traditional Chinese medicine (中医科学化)" [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=45f82d50ca90dc1fb039ec828376027a&ltid=7&activeId=686dd16619ef83726e2b7b99&downloadSource=GENERALSEARCH]

Shang Han Lun Theory began to reinterpret *Liu Jing* using emerging forms of scientific and medical knowledge, resulting in diverse and innovative approaches. Broadly speaking, these include interpretations based on syndromic patterns (证候群), organ structures and physiopathological mechanisms (脏器组织、生理病理), the stage-based model (阶段说), and the pathological location and nature (病位病性) of disease. This flourishing of perspectives—what may be described as a "hundred schools of thought contending"—has broken through the constraints of traditional interpretations and propelled the innovative development of *Liu Jing* theory.

3.1.1 Interpreting Liu Jing through syndromic patterns

The concept of syndromic patterns originates from Western medicine. Among modern scholars who interpreted *Liu Jing* through the lens of syndromic patterns, Lu Yuanlei and Tan Cizhong (谭次仲) are particularly representative. LuYuanlei rejected the traditional interpretation of *Liu Jing* as literal meridians, arguing instead that they symbolized six distinct syndromic patterns. As he explained: "If *Liu Jing* are understood as six types of syndromic patterns, then for any acute febrile disease, treatment can be determined by identifying the corresponding pattern. In this way, clinical application becomes inexhaustibly useful. For instance, epidemic influenza and the diseases discussed in this text all conform to the syndromic pattern of Taiyang disease (太阳病); malaria and pleurisy correspond to the pattern of Shaoyang disease (少阳病); and diseases such as cholera and febrile cardiac insufficiency align with the Shaoyin disease (少阴病) pattern. Other conditions can be inferred analogously".[27]

Abandoning traditional meridian theory, Lu adopted the framework of syndromic patterns and applied Western medical theories—especially from pathology—to reinterpret *Liu Jing* in *Shang Han Lun*, developing a distinctive scholarly approach. Lu characterized the Taiyang disease (太阳病) pattern by symptoms such as "fever", "aversion to wind and cold", "headache and stiff neck", "floating pulse", and "generalized body pain, lumbar pain, and joint pain", and proposed sweating therapy as the appropriate treatment. The Yangming disease (阳明病) pattern, in his view, included "high fever", "flooding and rapid pulse (脉洪而数)", "irritability", "profuse sweating", and "dry tongue with thirst". He regarded Shaoyang disease (少阳病) as an intermediary pattern between Taiyang and Yangming, characterized chiefly by "alternating chills and fever", and treated with *Chai Hu*-based formulas (柴胡剂). He described Taiyin disease (太阴病) primarily as a condition of "spleen and stomach deficiency cold", with core symptoms such as "abdominal fullness, vomiting and diarrhea, poor appetite, and intermittent abdominal pain". For Shaoyin disease (少阴病), a Lu identified it with "cardiac weakness", featuring symptoms like "aversion to

cold", "fine and weak pulse", "a desire to sleep", "diarrhea with undigested food (自利清谷)", and "pale white tongue coating". Lu's interpretation of Jueyin disease (厥阴病) was particularly unconventional. He argued that Jueyin was a fabricated category, stating: "In my humble opinion, apart from Taiyin and Shaoyin, there is no such thing as Jueyin (愚以为阴证除太少而外，更无所谓厥阴)".[8] He elaborated further: "Originally, the yin disorders in *Shang Han Lun* referred solely to Shaoyin. To fulfill the numerical requirement of *Liu Jing*, a third yin category was forcibly created under the name of Jueyin (盖伤寒阴证，本只少阴一种，必欲成六经之数而分为三阴，故勉强足之以厥阴之牵凑)" (Fig. 3).[8]

In addition to Lu Yuanlei, Tan Cizhong also adopted the syndromic pattern perspective. Tan argued that "All diseases discussed in *Shang Han Lun* are in fact modern acute infectious diseases, and *Liu Jing* serve merely as designations for the various syndromic patterns observed in these diseases (伤寒皆今之急性传染病，六经乃急性传染病中诸症候群之代名)".[28] He explained that Zhang Zhongjing "established terms such as *Liu Jing* to serve as labels for groups of symptoms, primarily for the convenience of academic discussion and research (立六经等名词，取为一群症状之代名，乃当时为讨论研究之便利)".[28] Tan further emphasized: "From an anatomical perspective, there is no such meridian as Taiyang or Yangming; from a pathological standpoint, there is likewise no specific disease entity corresponding to Taiyang or Yangming. Therefore, terms like Taiyang and Yangming are simply nominal representations of symptom clusters (况从解剖学言之，既无所谓太阳与阳明之一经，从病理学言之，尤无所谓太阳与阳明病之一症，故余谓太阳、阳明等不过名词，此一名词乃用以代表一症状群之名词而已)".[28]

In his work *Commentary on Shang Han Lun* (《伤寒评注》), Tan provided a detailed reinterpretation of *Liu Jing* using the syndromic pattern framework. He suggested that Zhang Zhongjing used "Taiyang" to denote symptoms such as fever, aversion to cold, floating pulse, headache, and body aches; "Shaoyang" to represent alternating chills and fever, chest and hypochondriac fullness (胸胁苦满), dizziness, bitter taste in the mouth, and dry throat; and "Yangming" to indicate tidal fever, intolerance to heat, and delirium (Fig. 4).

3.1.2 Interpreting Liu Jing through organ structures and physiopathological mechanisms

Some physicians reinterpreted *Liu Jing* of *Shang Han Lun* through the lens of Western medical knowledge, particularly concepts related to organ structures and physiopathological mechanisms. Representative scholars of this approach include Deng Baiyou (邓柏游), Zhang Zhihe (张治河), Huang Zhuzhai (黄竹斋), Yan Derun (阎德润), and Zhang Taiyan (章太炎).


自強醫藥月刊 第十三號 附刊

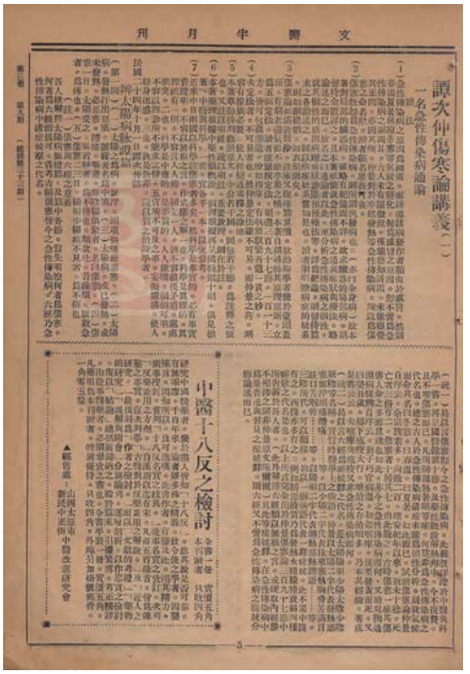
附刊

傷寒論今釋序例

七略序方技爲四種。醫經。經方。房中。神僊。仲景書蓋經方之流也。房中神僊。非疾醫所守。其事亦涉由怪迂。君子弗道。醫家所講肄者。惟醫經經方二種。醫經之書見存者。黃帝內經十八卷。原人血脈經絡骨髓陰陽表裏。以起百病之本。死生之分。若是面冠於方技之首。誠曰不宜。雖然。血脈經絡骨髓。深邃而不可見也。陰陽表裏。闇昧而難微瑜也。今有病厥者。嗜笑無節。舉措失常。而醫經家指爲心病。其持之有故。其言之成理。聞者則以爲心病矣。有病內分泌者。肌膚黯淡。支體羸敝。而醫經家指爲腎病。其持之有故。其言之成理。聞者則以爲腎病矣。心腎之不能言。夫孰與發其隱奧。故醫經之論。其言可聞。其效不可得見也。經方以草石湯液療病。親視候以投方。投方中。則覆杯而瘉。不中。則不死爲劇。豈若醫經之空言泛論。大而無當者哉。七略著錄經方十一家。今亡佚不存。皇甫士安云。伊尹以元聖之才。撰用神農本草。以爲湯液。漢張仲景論廣湯液

一六

Figure 3 Serialized cover images of *Modern Interpretation of Shang Han Lun* (《伤寒论今释》) by Lu Yuanlei (陆渊雷) [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=dcca47e2105083ebe3daa8673975ed5e&ltid=7&activeId=686dd16223b09962deadcf2b&downloadSource=GENERALSEARCH]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譚次仲傷寒論講義（二）

一名急性傳染病通論

中醫十八反之檢討

Figure 4 Serialized cover images of *Lecture Notes on Shang Han Lun* (《伤寒论讲义》) by Tan Cizhong, also titled *General Treatise on Acute Infectious Diseases* (《急性传染病通论》) by the author [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=5cf6832cf275ac3701032e1b431fd685&ltid=7&activeId=686dd27b19ef83726e2bcb38&downloadSource=GENERALSEARCH]

Deng Baiyou, Zhang Zhihe, and Huang Zhuzhai employed anatomical and physiological concepts from Western medicine to offer new interpretations of *Liu Jing*. Deng Baiyou proposed that each meridian was essentially a symbolic name for a specific group of internal organs or systems. For instance, he regarded the Taiyang meridian (太阳经) as a collective term for the skin, kidneys, lungs, and large intestine, aligning with what Western medicine defines as the excretory system.[29] Deng further argued: "Shaoyin (少阴) refers to the heart, blood vessels, blood, spleen, and *Yang Qi* (阳气), which corresponds to the circulatory system in Western medicine (少阴者，是心脏、血管、血液、脾脏、阳气，即西医所谓循环系也)".[30] Here, "heart", "blood vessels", "blood", and "spleen" are clearly derived from Western biomedical terminology, whereas *Yang Qi* is rooted in TCM theory. Deng's juxtaposition of these concepts reflects the transitional state of modern TCM scholarship—seeking integration with Western medical science while still partially embedded in traditional frameworks.

Zhang Zhihe provided a detailed reinterpretation of *Liu Jing* grounded in physiology and pathology, emphasizing the mechanisms underlying their primary syndromes. Taking the Shaoyang meridian (少阳经) as an example, Zhang posited that the symptoms described in *Shang Han Lun* arise from pathological changes in the lymphatic system, stomach, and brain. He wrote: "Toxin accumulates in the lymphatic system, causing fullness in the chest and hypochondriac regions; when it affects the stomach, vomiting occurs; bile reflux results in a bitter taste in the mouth; when the brain is involved, dizziness and hearing loss follow; dysfunction of the central nervous system impairs thermoregulation, leading to alternating chills and fever or even rigors; spasm of the sympathetic nerves in vascular walls leads to a wiry and thready pulse (毒聚淋巴，故胸胁苦满，侵及胃脏，故发呕吐，胆汁上溢，故觉口苦，侵及脑筋，故觉目眩耳聋，中枢经受困，失其调节体温之能力，故时寒时热，甚至发战，血管壁之纤维神经痉挛，故脉呈弦细)".[31]

Huang Zhuzhai also interpreted *Liu Jing* in anatomical terms. He suggested that they are symbolic references to distinct body regions, akin to how heavenly stems and earthly branches in traditional Chinese cosmology represent numbers. Specifically, Huang proposed the following correlations: the skin surface with the Taiyang meridian, the gastrointestinal tract with the Yangming meridian (阳明经), the interspace between body wall and internal organs with the Shaoyang meridian, the muscles and adipose tissues with the Taiyin meridian (太阴经), the circulatory system with the Shaoyin meridian (少阴经), and the nervous system with the Jueyin meridian (厥阴经).[32]

Other physicians applied Western physiopathological concepts to elucidate the nature of *Liu Jing*. For instance, Yan Derun, a physician trained in Western medicine, argued that Taiyang disease (太阳病) corresponds to general febrile illnesses, Yangming disease (阳明病) primarily reflects gastrointestinal disorders, and Shaoyang disease (少阳病) corresponds to conditions centered on gastric dysfunction.[33] Likewise, Zhang Taiyan (章太炎) equated Jueyin disease (厥阴病) in *Shang Han Lun* with relapsing fever as understood in Western medicine.[34]

3.1.3 Interpreting Liu Jing through the Stage-based Model

Zhu Weiju adopted a distinctive path by interpreting *Liu Jing* in *Shang Han Lun* through a Stage-based Model. This novel framework set him apart within modern *Liu Jing* scholarship and exerted a notable influence. Zhu conceptualized *Liu Jing* as representing five sequential stages in the dynamic struggle between pathogenic qi (邪气) invading the body and the counteracting force of the body's vital qi (正气). According to Zhu, the Taiyang (太阳) stage marks the initial activation of the body's resistance; Shaoyang (少阳) indicates a weakened or incomplete resistance; Yangming (阳明) reflects an excessive or overcompensated response. Both Taiyin (太阴) and Shaoyin (少阴) correspond to insufficient resistance, while Jueyin (厥阴) denotes the final effort of the body's defenses.[35] As a result, Zhu consistently emphasized the significance of vital qi and especially *Yang Qi* in both pathogenesis and treatment. This focus became a defining feature of Zhu's medical philosophy, often summarized as "valuing *Yang Qi* (重阳气)". It also underpinned his renowned expertise in the clinical use of *Fu Zi* (附子 Radix Aconiti Lateralis Praeparata)—Aconitum, a warming herb frequently employed to restore yang qi, thus illustrating the practical embodiment of his theoretical model.

3.1.4 Interpreting Liu Jing through pathological location and nature

Cheng Dan'an (承淡安) advanced the interpretation of *Liu Jing* through the lens of Pathological Location and Nature, offering substantial inspiration for later developments in *Shang Han Lun* Theory. Cheng defined pathological location (定病位) using the spatial categories of exterior (表), interior (里), and half-exterior-half-interior (半表半里).[36] Meanwhile, he determined pathological nature (定病性) based on the overarching framework of yin-yang classification.[36] Accordingly, Cheng categorized Taiyang disease as an exterior yang condition, Shaoyin disease as an exterior yin condition, Yangming disease as an interior yang condition, and Taiyin disease as an interior yin condition. He further identified Shaoyang disease as a half-exterior-half-interior yang condition, and Jueyin disease as a half-exterior-half-interior yin condition.

This framework transcended the limitations of traditional meridian-viscera theory, while still aligning with TCM principles of pattern differentiation. At the same time, Cheng actively incorporated insights from Western medicine into his understanding of *Liu Jing*.

For example, he interpreted Shaoyin disease as "a state of weakness in the nervous and circulatory systems".[36] Cheng Dan'an's work stands as a compelling example of how modern *Shang Han Lun* Theory both inherited classical knowledge and embraced innovation.

The modern reinterpretation of *Liu Jing* arose largely in response to the intellectual and clinical pressures of the "debates between Chinese and Western medicine". Scholars of *Shang Han Lun* were compelled to integrate new knowledge—especially from Western medicine—to break free from the constraints of classical doctrine and explore novel conceptual paths. This compelled transformation catalyzed a new research paradigm, promoting the scientification of TCM and driving the development of modern *Shang Han Lun* Theory.

3.2 Integration and application of Western medical knowledge and technologies by modern *Shang Han Lun* scholars

The proposal of the slogan for the scientification of TCM was, in essence, a self-preserving response by TCM to its deteriorating sociopolitical environment—a survival strategy born out of necessity. As a key breakthrough in this process, *Shang Han Lun* Theory became the focal point for reform-minded scholars who sought to reinterpret it through the lens of modern scientific knowledge, including bacteriology, anatomy, pharmacology, physiology, and pathology. These scholars also introduced *Western medicine* tools, pharmaceuticals, and diagnostic methods into TCM clinical practice. Such efforts contributed to the creation of new academic paradigms within TCM and helped secure its continued relevance and viability in a modernizing world.

3.2.1 Introduction of bacteriological knowledge

One of the central challenges faced by modern scholars of *Shang Han Lun* Theory in the process of promoting the scientification of TCM was whether to incorporate the theory of bacterial pathogenesis. In TCM, the etiology of externally contracted diseases had traditionally been framed in terms of *Liu Yin* (六淫 six excesses), or climatic pathogenic factors. This led to intense debates within the TCM community over whether the pathogenic agents in *Shang Han Lun* should be understood as *six excesses* or as bacteria, and whether bacteriology ought to be integrated into TCM discourse.[37]

Most reform-minded scholars of the modern era came to accept bacteria as the pathogenic agents described in *Shang Han Lun*, and consequently reinterpreted the conditions recorded therein as acute infectious diseases. For instance, Lu Yuanlei asserted: "Warm diseases and cold damage—collectively termed febrile diseases in *Nei Jing* (《内经》 *The Inner Classic*)—are classified as acute infectious diseases in Western medicine. Among febrile diseases resembling cold damage, more than twenty distinct types can be identified through careful differentiation (温病、伤寒，《内经》统谓之热病，西医书统谓之急性传染病。急性传染病而发热，病状近似伤寒者，细别之可二十余种)".[19]

Tan Cizhong (谭次仲) similarly maintained that bacteria were the primary cause of acute infectious diseases, while *Liu Yin*—viewed as climatic variations—were only secondary causes. He contended that ancient physicians, lacking access to microscopes, were only able to observe these secondary factors and thus could not identify bacteria, the principal pathogenic agents. As a result, such conditions were labeled as *cold damage*, though they were in fact acute infectious diseases.[28] This perspective not only introduced the framework of bacteriology into TCM but also critically engaged with the traditional theory of *Liu Yin*. Rather than replacing the older theory with bacterial pathogenesis, reformers used *Liu Yin* to address the explanatory gaps of the bacterial model—an exemplary case of successfully incorporating new knowledge into TCM while retaining a traditional epistemological standpoint.

Zhu Weiju (祝味菊) also identified bacteria as a key pathogenic factor in *Shanghan* diseases, but introduced a distinction between inorganic and organic pathogens. He interpreted the traditional *Liu Yin* as inorganic pathogens and bacteria as organic ones, thereby articulating a dialectical relationship between classical and modern etiologies.[35] Cheng Dan'an likewise drew on bacteriological concepts in his specific interpretation of *Shang Han Lun*. For example, in explaining the pathogenesis of Taiyang disease, he attributed its symptoms to bacterial or viral invasion, which stimulates the nervous system, increases body temperature, accelerates blood circulation, contracts superficial microvasculature, and results in increased blood flow to the head and neck. These physiological responses, Cheng argued, give rise to the hallmark symptoms of Taiyang disease—floating pulse, stiff and painful nape, headache, and aversion to cold.[35]

3.2.2 Introduction of pharmacological knowledge

Compared with theoretical innovations in *Shang Han Lun*, the modernization of its pharmacological content was even more thorough. In the early twentieth century, some scholars of *Shang Han Lun* Theory introduced modern knowledge of medicinal origins, specifying botanical classifications and even assigning the Latin binomials of the herbs. They also provided detailed analyses of chemical constituents and pharmacological effects. For example, in his *Commentary on Shang Han Lun* (《伤寒论评释》), Yan Derun stated that he used "scientific methods and recent chemical discoveries" as guiding principles for interpreting formulas, systematically verifying and compiling their content.[33] For each individual herb, Yan not only discussed traditional materia medica functions and historical annotations but also included modern knowledge such as botanical taxonomy, chemical components, and pharmacodynamic effects.

In 1935, Zhang Cigong (章次公) published a serialized article on *Ma Huang* in a medical journal, detailing its effects on the gastrointestinal tract, blood vessels, sweat glands, and respiratory system. He used this to explain its efficacy in "relieving cough and calming asthma".[38] By the 1930s, the cardiotonic and anesthetic properties of *Fu Zi* were already well established. As a result, many Shanghan scholars emphasized its dual action—stimulating cardiac function and producing neuroanesthesia. They generally held that its cardiotonic action precedes its anesthetic effects. In contrast, *Western medicine* primarily employed *Fuzi* for its antipyretic and anesthetic effects, thereby failing to realize its full therapeutic potential. On this basis, *TCM* scholars criticized the Western approach, arguing that Chinese methods applied *Fuzi* with greater efficacy.[39]

In his *Commentary on Shang Han Lun*, Tan Cizhong offered modern pharmacological interpretations of the text's herbal treatments, explicitly stating that his purpose was to "demonstrate the present-day applicability of ancient theories".[28] Tan's interpretations maintained a strong clinical focus and provided valuable guidance for modern therapeutic use. For instance, he wrote, "*Yin Chen* (茵陈 Herba Artemisiae Scopariae) is a specific herb in TCM for the treatment of jaundice, likely promoting bile secretion (茵陈为中医治黄专药，想有促进胆液分泌之作用)".[40]

With the development of modern pharmacology, researchers gained an increasingly precise understanding of the chemical constituents and pharmacological actions of individual herbs. This progress made it possible to elucidate the mechanisms underlying *TCM* compound formulas. During the period of scientification *of TCM*, reform-minded scholars of *Shang Han Lun* began to explore the pharmacological basis of its formulas, representing a landmark moment in both the academic history of *Shang Han Lun* and the broader development of TCM. Given that the formulas in *Shang Han Lun* typically consist of relatively few ingredients, the mechanisms behind these prescriptions are comparatively easier to investigate. As such, frequently used formulas with simple compositions became key subjects of study—formulas such as *Cheng Qi Tang* (承气汤 Purgative Decoction), *Ma Huang Xing Ren Shi Gao Gan Cao Tang* (麻黄杏仁石膏甘草汤 Ephedra Almond Gypsum Licorice Decoction), and *Xiao Qing Long Tang* (小青龙汤 Minor Green Dragon Decoction).

For example, in 1941, Chen Guoxiong (陈国熊) published an article titled "A study on *Da Cheng Qi Tang* (《大承气汤研究》)" in the journal *Traditional Chinese Medicine Monthly* (《中国医药月刊》), offering a detailed analysis of its mechanisms. From the perspective of modern experimental pharmacology, many of his conclusions now appear to be strikingly consistent with contemporary laboratory findings.[41] Similarly, Yuan Yunrui (袁云瑞) analyzed the mechanism of *Xiao Qing Long Tang* by considering the pharmacological effects of each herb. Yuan suggested that *Ma Huang* in *Xiao Qing Long Tang* could raise blood pressure, promote blood circulation, relax sweat glands, induce sweating, and detoxify the body, while *Shao Yao* (芍药 Radix Paeoniae) and *Wu Wei Zi* (五味子 Fructus Schisandrae Chinensis) could reduce swelling and suppress phlegm secretion.[42]

3.2.3 Clinical application of Western pharmaceuticals

The use of Western medicine knowledge to interpret the mechanisms of TCM compound formulas undoubtedly reinforced the perceived "scientific nature" of TCM. Following the introduction of Western pharmaceuticals into China in the modern era, some progressive TCM scholars began to experiment with the co-administration of Western drugs and classical Chinese formulas. Zhang Xichun (张锡纯) was a pioneer in the combined use of Chinese and Western medicines. In his *Lectures on Shang Han Lun* (《伤寒讲义》), Zhang recorded multiple instances of using aspirin in conjunction with Chinese herbal formulas—for example, replacing *Gui Zhi Tang* (桂枝汤 Cinnamon Twig Decoction) with a combination of finely powdered *Shan Yao* (山药 Rhizoma Dioscoreae) and aspirin.[43]

Zhang's approach to integrating Chinese and Western pharmacology reflects his broader vision of "the integration of Chinese and Western medicine", and it directly inspired later *Shang Han Lun* scholars to explore the clinical application of Western medicines. Lu Yuanlei, for example, emphasized this synergy. When commenting on Clause 297 of *Shang Han Lun*, Lu recommended simultaneous use of *Fu Ling Si Ni Tang* (茯苓四逆汤 Poria Frigid Extremities Decoction) and injectable Western hematinics,[8] indicating his recognition of the urgent efficacy of Western therapeutics. Similarly, Yu Wuyan (余无言), in his interpretation of Clause 183, argued that when patients suffer from severe constipation and cannot tolerate strong purgatives, glycerin suppositories or glucose injections should be administered first, followed by *Ma Ren Wan* (麻仁丸 Cannabis Seed Pill) for gentle purgation.[44] This demonstrates Yu's view that Western medicine can effectively compensate for the limitations of certain TCM interventions.

The practice of combining Western medications with formulas from *Shang Han Lun* by modern scholars represented a major academic innovation within TCM. It not only advanced the scholarly development of *Shang Han Lun* Theory, but also laid a practical and theoretical foundation for the broader movement of Chinese-Western medical integration. Modern clinical practices that employ combined therapies, as well as the development of new integrative pharmaceuticals, can be directly traced to these early explorations.

3.2.4 Application of Western diagnostic instruments and technologies

In the process of pursuing the scientification *of TCM* in modern times, some progressive physicians began utilizing basic *Western medicine* diagnostic instruments to support clinical diagnosis. Reformist advocates of *Shang Han Lun* placed considerable emphasis on tools such as stethoscopes, sphygmomanometers, and thermometers. For instance, Tan Cizhong explicitly acknowledged the limitations of traditional TCM's four diagnostic methods—inspection, listening and smelling, inquiry, and palpation—and argued that Western diagnostic tools could effectively compensate for these deficiencies: "From a scientific perspective, instruments can supplement the insufficiencies of tactile perception in many ways. Is palpation alone truly sufficient for the full art of disease diagnosis (若以科学言之，器械补助触觉所不逮者尤多，切仅为触诊中之一种方法，而可以尽诊察疾病之能事乎哉)".[28] Tan thus advocated for incorporating stethoscopes, thermometers, and watches into clinical practice in TCM.[28]

Yun Tieqiao also wrote extensively on the clinical use of stethoscopes and sphygmomanometers. For example, in his discussion of arterial sclerosis, he noted, "If measured with a sphygmomanometer, elevated pressure would be detected (若用血压计量之，则见高压)". He also described auscultating pulmonary water sounds as a diagnostic reference.[16]

Lu Yuanlei placed particular emphasis on auscultation, distinguishing it sharply from the traditional TCM method of "listening diagnosis (闻诊)". He noted, "Auscultation involves subtle, inaudible sounds that require specific methods to detect, whereas speech or coughing falls outside its scope. Thus, listening diagnosis is natural, while auscultation is artificial; the former is passive, and the latter is active (听诊乃微细不可闻之声音，医师用方法以听取者，而语言咳嗽等反不在听诊范围之内。故闻诊为天然的，听诊为人为的；闻诊为被动的，听诊为主动的)".[8] While teaching at the Shanghai National Medical College (上海国医学院), Lu explicitly stated in his syllabus that students must master Western diagnostic techniques such as auscultation, percussion, palpation, and physiological and chemical testing.[45]

The adoption of Western diagnostic devices and techniques by modern *Shang Han Lun* Theory scholars compensated to a certain extent for the limitations of TCM's four traditional diagnostic methods. This represented a major innovation in both *Shang Han Lun* Theory and broader diagnostic practices in *TCM*. Since then, stethoscopes, sphygmomanometers, and thermometers have become indispensable tools in clinical TCM diagnosis.

In summary, modern reformist scholars of *Shang Han Lun* Theory launched a radical critique of traditional research paradigms. They rejected the classical *Liu Jing* framework, as well as foundational TCM theories such as the meridian-viscera system, *Wei Qi Ying Qi* (卫气营气 defensive qi and nutritious qi) dynamics, and *Wu Yun Liu Qi* (五运六气 five movements and six qi). Proponents of scientification sought to reinterpret the etiology in *Shang Han Lun* through bacterial pathogenesis, to elucidate formula mechanisms using modern phytochemistry and pharmacology, and to enhance diagnostic precision by incorporating Western medical instruments. These efforts laid a new theoretical foundation, research perspective, and methodological framework for modern *Shang Han Lun* Theory. The scientification of traditional *Shang Han Lun* not only highlighted the scientific potential and adaptive capacity of *TCM*, but also facilitated a paradigmatic transformation in its academic development.

4 The impact and significance of the scientification of TCM in the practice of *Shang Han Lun* Theory in modern times

4.1 Preserving a space for the survival of TCM

The 1929 movement to abolish TCM marked the most intense moment in the modern debate between Chinese and Western medicine. In response, the TCM community mobilized a wide range of countermeasures. After sustained and arduous efforts, the plan to abolish TCM ultimately failed. This was a landmark event in the modern survival and development of TCM. While the broader TCM community responded to the debate in a multifaceted manner, the pioneering role played by modern *Shang Han Lun* Theory should not be underestimated.

A key impetus for the rise of modern *Shang Han Lun* Theory was precisely the confrontation between Chinese and Western medicine. Modern *Shang Han* scholars firmly upheld the belief that "TCM surpasses Western medicine in therapeutic efficacy, and no treatment is superior to that of Zhang Zhongjing (中医胜于西医在治疗，治疗莫善于仲景)",[20] and that "Of all Chinese medical texts, the most valuable and most esteemed by the modern scientific medical community is Zhang Zhongjing's *Shang Han Lun* (中国医籍之最有价值而为近世科学医界所推崇者，厥惟张仲景之《伤寒论》)".[46] They also asserted that "Efforts to modernize TCM must begin with the study of Zhang Zhongjing's classical formulas and his approach to syndrome-based treatment (改进中医必须致力于仲景经方及主证治疗的研究)".[47] With these convictions, they launched comprehensive and innovative research on *Shang Han Lun*.

It is fair to say that virtually every major innovation in modern *Shang Han Lun* Theory was stimulated by critiques from Western medicine. For example, Western medicine criticized concepts such as yin-yang and *Wu Xing* (五行 five elements) as unscientific metaphysics; in response, *Shang Han* scholars distanced themselves from the mystical aspects and instead emphasized the dialectical logic of yin-yang opposition. Western

critics dismissed *Liu Jing* as pseudoscientific; *Shang Han* scholars responded by reinterpreting and reconstructing this framework. Western medicine accused TCM of ignorance regarding bacteriology; *Shang Han* scholars actively adopted bacterial theory and proposed that *Liu Yin* were the basis for bacterial proliferation. Western critics claimed TCM lacked knowledge of physiology and pathology; *Shang Han* scholars incorporated these fields to reinterpret disease mechanisms in *Shang Han Lun*. Western medicine argued that the pharmacological mechanisms of TCM treatments were unclear; *Shang Han* scholars applied modern pharmacology to explicate the mechanisms of Zhang Zhongjing's formulas.

In the sustained intellectual confrontation with Western medicine, *Shang Han* scholars not only completed a fundamental transformation of *Shang Han Lun* Theory, but also preserved the academic integrity of TCM.

Despite the spread of Western medicine in modern China, it did not demonstrate clear superiority over TCM in treating internal disorders and was often less effective in managing epidemics. Moreover, Western-trained physicians remained scarce and were largely confined to major urban centers. For the vast majority of the Chinese population, especially in rural areas, TCM remained the primary and most reliable form of medical care. As a result, modern research on *Shang Han Lun* emphasized not only theoretical innovation but also the practical advantages of therapeutic efficacy, thereby securing a continued space for TCM's survival.

In 1939, for instance, Jiangsu Province Governor Chen Zemin (陈则民) explained the rationale for establishing the Suzhou National Medicine Hospital (苏州国医医院) as follows: "The purpose of establishing this hospital is, first, to provide medical aid to the poor, alleviating the burden of medical expenses and reducing the mortality rate; second, to apply classical formulas to achieve clear and measurable clinical results and to compile statistical reports; and third, to promote and carry forward the rich cultural legacy of our nation and preserve this enduring heritage (故今兹创设国医医院之意旨，一欲以救济贫民，使免受医药之负担，而减少死亡率，一欲以运用经方，俾集明确之效果，而制作统计表，更欲以发挥光大吾国固有之文化，保存千古相传之衣钵也)".[48] This statement demonstrates the practical value of *Shang Han Lun* Theory in the modern medical system. The hospital's emphasis on *Shang Han Lun*–based medical practice even earned recognition from proponents of the anti-TCM movement. For instance, Wang Qizhang (汪企张) praised its work: "The contributions of the Suzhou National Medicine Hospital lie here. Its achievements lie here. In the future, we look forward to further advancement, deeper knowledge, and continued innovation. Its prospects are boundless (苏州国医医院之工作在此，功绩亦在此，今后更冀望入室升堂，知新温故，宏途必无限量)"(Fig. 5).[49]

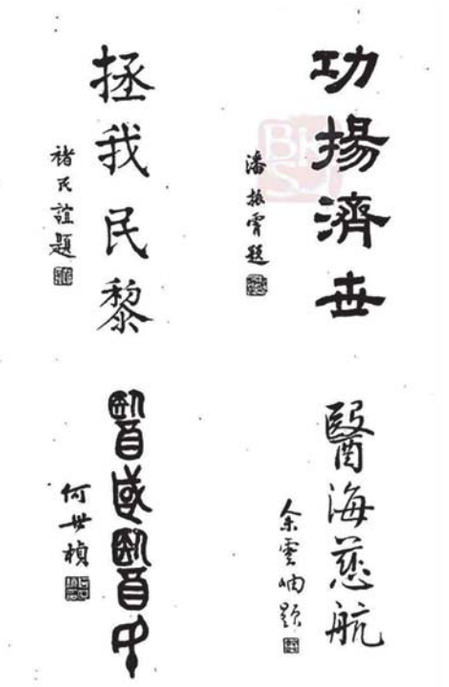

Figure 5 Inscriptions by Chu Minyi (褚民谊), Yu Yunxiu (余云岫), and others in support of the "scientification" efforts of Suzhou National Medicine Hospital (苏州国医医院), published in its official journal [source with permission from: CNBSKY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=1d85e1c-4c56f225b30db0e08736b495f&ltid=7&activeId=686dd3d623b-09962deadea88&downloadSource=GENERALSEARCH]

Through the tireless efforts of modern *Shang Han* scholars, *Shang Han Lun* Theory reached a new apex. In the face of intense criticism from Western medicine, it preserved the academic foundation of TCM. In clinical practice, it proved indispensable and helped maintain a vital space for TCM's continued survival. This, indeed, represents the most profound contribution of modern *Shang Han Lun* Theory.

4.2 Pioneering a new educational model for *Shang Han Lun* Theory

The scientification of modern *Shang Han Lun* Theory achieved remarkable progress, and in order to promote academic dissemination and talent cultivation, scholars who advocated for scientification of TCM actively worked to incorporate their research findings into the compilation of *Shang Han Lun* teaching materials. Many influential scholars not only authored textbooks themselves, but also had their works directly adopted as instructional texts, thereby facilitating the modern transformation of *Shang Han Lun* Theory education. For instance, Lu Yuanlei's *Modern Interpretation of Shang Han Lun* was used as a lecture manual at the Shanghai National Medical College (上海国医学院); Yu Wuyan's *New Interpretation of Shang Han Lun* (《伤寒论新义》) served as lecture notes for both the Suzhou National Medical Research Institute (苏州国医研究院) and the Shanghai Chinese Medical College (上海中国

医学院).[50] Tan Cizhong's *Commentary on Shang Han* functioned as the core curriculum of his Correspondence School of National Medicine (函授国医学社);[51] Cheng Dan'an's *New Annotations on Shang Han Lun* (《伤寒论新注》) originated from his teaching manuscripts during wartime instruction at the Deyang National Medical Training Institute (德阳国医讲习所).[52]

During this period, scholars advocating scientification actively promoted textbook development and institutional teaching practices, decisively transforming the traditional mode of *Shang Han Lun* instruction—which had long depended on oral transmission through master-apprentice or family lineages—into a new model centered on formal medical education institutions. On one hand, this transformation enabled an increasing number of TCM professionals to systematically engage with new academic perspectives and research paradigms in *Shang Han Lun*; on the other hand, the process of "scientifying" *Shang Han Lun* served as a leading example that encouraged broader reflections within the TCM community on how to advance the scientification of TCM both in theory and in practice.

This emerging educational model not only contributed to the systematic dissemination of *Shang Han Lun* Theory achievements, but also laid an institutional and practical foundation for the large-scale, high-level instruction of *Shang Han Lun* in colleges and universities after the founding of the People's Republic of China. It marked a significant turning point as *Shang Han Lun* Theory transitioned from private oral traditions to a system of public education.

4.3 Laying the foundation for the integration of TCM and Western medicine

In the process of the scientification of TCM, Chinese medical scholars were not only engaged in theoretical exploration but also actively promoted the transformation of TCM clinical models through institutional reforms in clinics and hospitals. These efforts were concrete manifestations of how modern *Shang Han Lun* Theory adapted to both modern medical system and societal transformation, and they also served as early and significant explorations of the *Integration of TCM and Western Medicine* as a clinical model.

For example, in 1937, Zhu Weiju, in collaboration with the German physician Dr. Lanner (兰纳博士) and Western-trained physician Mei Zhuosheng (梅卓生), co-founded the "Chinese-Western Joint Medical Clinic (中西医会诊所)", a model distinguished by its unique approach. Zhu often engaged in discussions with the two Western doctors to explore the respective strengths of TCM and Western medicine and their clinical complementarity. They conducted joint consultations, determined treatment plans collaboratively, and applied both Chinese and Western therapeutic methods concurrently.[53]

In April 1939, the Suzhou National Medicine Hospital was established with a particular emphasis on the scientification of *Shang Han Lun* and the integration of Chinese and Western medicine. The hospital implemented rigorous statistical systems to evaluate clinical outcomes and to test the practical efficacy of *Shang Han Lun* in real-world settings: "based on ancient records, efficacy was re-evaluated through modern verification (依据古代之记载，从新核定其实效)".[54] This represents a notable example of modern Chinese medical scholarship that upheld the academic prestige of *Shang Han Lun* while practicing the principles of TCM scientification (Fig. 6).

Suzhou National Medicine Hospital also incorporated a wide array of Western diagnostic tools and technologies. It purchased glass slides and test tubes for diagnosing diseases such as malaria and typhoid, as well as "white wide-mouth bottles for storing urine and white glass cups for sputum and vomit samples (白色广口玻瓶以贮小便，白色玻杯以贮痰及呕吐物等)".[55] To facilitate the diagnosis and documentation of rare diseases, the hospital also acquired a camera.[56]

Given the shortage of trained nurses, the hospital not only hired Western-trained nurses but also initiated its own nurse training program. At the first hospital administrative meeting, a resolution was passed: "Invite Mr. Ye Juquan (叶橘泉) to collaborate with physicians in compiling a concise textbook, based on scientific principles and integrating both Chinese and Western medical knowledge. Once materials are collected, classes shall

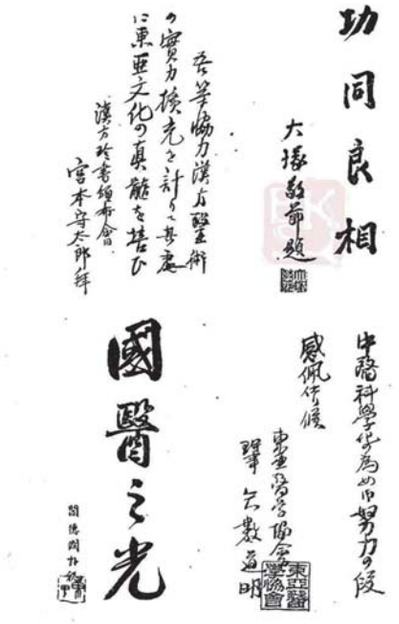

Figure 6 Inscriptions by Japanese physicians Ōtsuka Keisetsu (大塚敬节) and Yakazu Dōmei (矢数道明), praising the "scientification" work of Suzhou National Medicine Hospital, published in its official journal [source with permission from: CNBKSY (全国报刊索引), https://www.cnbksy.com/literature/browsePiece?eid=null&bcId=null&pieceId=25021a0390753f5fde09f899f3153e90&ltid=7&activeId=686dd3d623b09962deadea88&downloadSource=GENERALSEARCH]

commence on a fixed schedule (请叶橘泉先生会同各医师依据科学原理，参酌于中西医之间，编就简明讲义，克日上课，先行搜集材料编齐讲义，定期开始训练)".[55] The curriculum combined elements of Western nursing education with instruction in TCM nursing practices to better support physicians' work.[56]

In short, many prominent figures advocating for *scientification* actively introduced new knowledge, technologies, and paradigms, conducting comprehensive and in-depth studies of *Shang Han Lun*. They reinterpreted its theoretical framework using Western disciplines such as pathology, physiology, and pharmacology, and explored institutional innovations in diagnostic and therapeutic models that bridged Chinese and Western medicine. These efforts contributed to the modernization and transformation of both *Shang Han Lun* Theory and the broader discipline of TCM.

Although the process of TCM scientification slowed during the outbreak of the War of Resistance against Japanese Aggression, the academic explorations and achievements of this period were not lost. On the contrary, the deep-rooted practices of scientification within *Shang Han Lun* Theory laid a valuable theoretical and practical foundation for the *Integration of TCM and Western Medicine* strategy adopted after the founding of the People's Republic of China.

5 Conclusion

Against the backdrop of the introduction of *Western medicine* in modern China, *TCM* faced an unprecedented existential crisis. Among the classical texts of Chinese medicine, *Shang Han Lun* stood out due to its emphasis on practical efficacy rather than abstract speculation, becoming a central platform for the modern exploration of the scientification *of TCM*. Modern scholars of *Shang Han Lun* Theory reinterpreted *Liu Jing* and introduced new scientific knowledge—such as bacteriology, physiology, pathology, and pharmacology—into their studies on the etiology, medicinals, and formulas found in *Shang Han Lun*. Additionally, they pioneered the combination of Western pharmaceuticals with classical prescriptions from *Shang Han Lun*, applied *Western diagnostic instruments* in TCM clinical settings, and conducted important institutional and clinical explorations of the *Integration of TCM and Western Medicine*. This series of scientification practices not only powerfully countered external criticisms of TCM as "unscientific", thereby securing its survival space, but also catalyzed innovation and transformation across multiple dimensions of *Shang Han Lun* Theory and Chinese medicine at large—including theory, education, clinical practice, and institutional structure.

The deep-rooted practice of scientification *of TCM* within *Shang Han Lun* Theory in the modern era demonstrates not only the academic self-awareness and reformative capacity of TCM in response to Western challenges, but also laid a crucial theoretical and practical foundation for the establishment of "Integration of TCM and Western Medicine (中西医结合)" policy in the early years of the People's Republic of China. This holds great significance in the historical development of modern Chinese medicine.

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Ethical approval

The study does not contain any studies with human or animal subjects performed by the authors.

Author contributions

LI Panfei contributed to drafting, designing, and revising the manuscript. ZHU Deming contributed to the design and supervision of the study. All authors approved the final version to be published and agree to take responsibility for all aspects of the work.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

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Original Article

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OPEN

Zang Xiang and Organs: The Encounter of Chinese and Western Medicine and Its Impact of the Connotation of *Wu Zang*

LIANG Qiuyu[1,✉], ZHOU Linqi[1], HUANG Zusheng[1]

Abstract

In the context of Western medicine, *Xin* (心 heart), *Gan* (肝 liver), *Pi* (脾 spleen), *Fei* (肺 lung), and *Shen* (肾 kidney) are five specific organs, while in ancient Chinese medicine, they are five kinds of *Zang Xiang* (藏象 visceral manifestation), often referred to as *Wu Zang* (五藏 five zang-organs), representing five interrelated structural-functional systems. There are both differences and connections between visceral manifestations and organs, which are reflected in the theories of *Wu Zang*. The specific connotation of *Wu Zang* are determined by the specific context in which they are located. With the accumulation of practice, the *Wu Zang* of the human body structures and functions, as well as the relationship between the *Wu Zang* have been in constant development and change. The encounter of Chinese and Western medicine in the 19th century dramatically changed the connotation of *Wu Zang*, from emphasizing visceral manifestations and neglecting substance to an organs-oriented perspective. This article examines how the encounter of Chinese and Western medicine in China influenced Chinese medicine. By analyzing three key aspects: (1) the interpretation of *Wu Zang* in pre-16th century texts; (2) the evolution and dissemination of Western medicine during the Ming and Qing dynasties; (3) the shifting conceptualization of *Wu Zang* in late Qing medical literature—the study elucidates the transformative impact of this cross-cultural medical encounter on the theory and practice of Chinese medicine.

Keywords: *Wu Zang* (五脏 five zang-organs); *Zang Xiang* (藏象 visceral manifestations); Organs; Encounter of Chinese and Western medicine; Culture translation

1 Introduction: divergences in the understanding of human body structure and function between Chinese and Western medicine

Zang Xiang (藏象 visceral manifestation) is one of the core concepts in Chinese medicine, referring to the internal organs and their external manifestations in both physiological and pathological conditions. The theory of *Zang Xiang* takes *Wu Zang* (五藏 five zang-organs)—*Xin* (心 heart), *Gan* (肝 liver), *Pi* (脾 spleen), *Fei* (肺 lung), and *Shen* (肾 kidney)—as the core, linking each *Fu* (腑 fu-organ) and meridian to form a holistic functional system that is non-anatomical. This theory formed the foundation of ancient Chinese medicine to understand the human body. Yu Chang (喻昌) in the Qing dynasty summarized in *Yi Men Fa Lyu* (《医门法律》*Medical Laws*): "When treating disease, if the internal organs and meridians are not clear, the diagnosis and treatment must be wrong (凡治病，不明臟腑经络，开口动手便错)". The internal organs and meridians here refer to the functional system of *Zang Xiang* centered on *Wu Zang*, which is the foundation of Chinese medicine to understand the human physiology and pathology.

In contrast, anatomy is the foundation of Western medicine. In ancient Greece, Galen relied on the dissection of Barbary apes as the basis for understanding the internal organs of the human body. However, due to religious constraints, Western dissection of the human body did not formally begin until the 16th century.[1] In 1543, *De Humani Corporis Fabrica* (*On the Fabric of the Human Body*) by Andreas Vesalius, based on his own dissection and study of cadavers, was published, marking the establishment of anatomy as a modern descriptive science. Vesalius emphasized the primacy of dissection, arguing

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that the nature of the human body's internal functioning was based on its structure.[2]

The essential differences between the theoretical systems of Chinese medicine and Western medicine are most clearly demonstrated in the comparative study of visceral manifestation and anatomy. Existing studies have revealed the characteristics of *Wu Zang* as functional models from an epistemological perspective (Joseph Needham,[3] Li Jianmin,[4] et al.), compared the differences in Chinese and Western conceptions of the body from a cultural and philosophical perspective (Nathan Sivin[5]), and reviewed the process of knowledge transformation from a historical and practical perspective (Fan Xingzhun[6]). However, these studies generally have two limitations: (1) the anatomical dimension that is inherently included in Chinese medicine's understanding of *Wu Zang* is neglected; (2) the dynamic nature of the theory of visceral manifestation has not yet been fully understood. Therefore, this article, based on the two historical spreads of Western medicine to the East, systematically investigates the dynamic evolution of the concept of the five zang-organs and the visceral manifestation theory, aiming to provide a new perspective for understanding the complex process of the encounter of Chinese and Western medicine.

2 Diverse interpretations of *Wu Zang* (五脏 five zang-organs) in Chinese medicine before the 16th century

2.1 Textual research: the early Chinese conception of *Wu Zang* and *Liu Fu* (六腑 six fu-organs)

Generally, anatomy belongs to observational knowledge, and the ancients could gain the accumulation of relevant experience through life practices such as hunting, war, sacrifice, and animal slaughtering. The Chinese knowledge of the coelomic organs can be found in ancient Chinese characters. Oracle bone script is the earliest mature writing system found in China to date, which was mainly popular during Shang-Zhou period. Bronze script appeared a little later than oracle bone script, matured as bronze culture became the dominant culture, and co-existed with oracle bone script in the Shang dynasty, the Western Zhou dynasty, the Spring and Autumn period, and the Warring States period. By the time the script was unified during the Qin dynasty, the whole country used the *Xiao Zhuan* (小篆 small seal script), which later evolved into different scripts such as *Li Shu* (隶书 clerical script), *Cao Shu* (草书 cursive script), *Xing Shu* (行书 running script) and *Kai Shu* (楷书 regular script). The characters of coelomic organs appeared in oracle bone script include *Xin*, *Wei* (胃 stomach), and *Jiao* (焦, equals to 膲, a fu-organ without shape), while *Gan*, *Pi*, *Fei*, *Shen* and *Chang* (肠 intestines) were first seen in *Jin Wen* (金文 bronze script). The characters of *Dan* (胆 gallbladder) and *Pao* (脬 urine bladder) appeared only in the period using seal script, which is around the time of the Warring States period.

Shuo Wen Jie Zi (《说文解字》 *Explaining Graphs and Analyzing Characters*) by Xu Shen (许慎) in the Eastern Han dynasty (finished in 121 CE) is the earliest dictionary in China, which contains a large number of ancient Chinese characters writing and Chinese vocabulary. This dictionary documents the meaning system, meaning evolution and cultural connotations of ancient Chinese characters. In *Shuo Wen Jie Zi*, there were already complete Chinese characters about coelomic organs: *Wu Zang* and *Liu Fu* (六腑 six fu-organs), with the following textual exegesis (Table 1):

(1) *Xin* (心 heart)

Shuo Wen Jie Zi: "心, human heart, corresponds to *Tu* (土 earth), and is located in the center of the body. The character '心 (Pinyin: *Xīn*)' is a hieroglyph. There are also learned men who believe that the heart corresponds to *Huo* (火 fire). And all Chinese characters related to the heart use '心' as a Chinese character component (人心，土藏，在身之中。象形。博士说以为火藏。凡心之属皆从心)".

(2) *Gan* (肝 liver)

Shuo Wen Jie Zi: "肝, corresponds to *Mu* (木 wood). Its Chinese character component is '肉 (Pinyin: *Ròu*, meaning human flesh or tissue)' (月, as the Chinese character component of '肉'), and its phonetic component is '干 (Pinyin: *Gàn*)'(木藏也。从肉干聲)".

The thick trunk can be used as a defensive weapon, so the character "干 (Pinyin: *Gān*)" evolved from its original reference to subject of things into functional weapon. Hence, the Chinese phrase "干戈 (Pinyin: *Gān Gē*, meaning shield and spear)" appeared, which means weapon of war. When constructing character "肝", it has been associated with military and force.

(3) *Pi* (脾 spleen)

Shuo Wen Jie Zi: "脾, corresponds to *Tu*. Its Chinese character component is '肉, and its phonetic component is '卑 (Pinyin: *Bēi*)' (土藏也。从肉卑聲)".

Table 1 Chinese character reference

Chinese Pinyin	Modern Chinese Character	Script
Xīn	心	
Gān	肝	
Pí	脾	
Fèi	肺	
Shèn	肾	
Cháng	肠	
Cháng	長	
Wèi	胃	
Jiāo	焦	
Dǎn	胆	
Pāo	脬	

"卑 *Bēi*" means too small to identify, as it can not be easily found.

(4) *Fei* (肺 lung)

Shuo Wen Jie Zi: "肺, corresponds to *Jin* (金 metal). Its Chinese character component is '肉', and its phonetic component is '市 (Pinyin: *Fú*)' (金藏也。从肉，市聲)".

Shuo Wen Jie Zi: "市 refers to '韠 (Pinyin: *Bì*)', which means leather clothing that covers the front of the body in the ancient times. When covering the front with clothes, it looks like the character '市'. The emperor wears vermilion clothes, the feudal lords red clothes, and the scholar-bureaucrats use cyan accessory for hanging jade plate. Its Chinese character component is '巾 (Pinyin: *Jīn*)', like a belt. And all Chinese characters related to the covering or clothing use '市' as a Chinese character component (市，韠也。上古衣蔽前而已，市以象之。天子朱市，诸侯赤市，大夫葱衡。从巾，象连带之形。凡市之属皆从市)".

In the period using seal script, the character "*Fei* (肺)" was gradually formed. The character "*Fei*" in seal script consists of human flesh, tissue, organ and stripped plant fibrous, which originally refers to the two sponge-like, sac-shaped respiratory organs in the chest.

(5) *Shen* (肾 kidney)

Shuo Wen Jie Zi: "肾, corresponds to *Shui* (水 water). Its Chinese character component is '肉', and its phonetic component is '臤 (Pinyin: *Qiān*)' (水藏也。从肉，臤聲)".

The character "肾 (Pinyin: *Shèn*)" is an ideograph. As a Chinese character component, "月" looks like a piece of flesh, indicating that the kidney are the main organs for urine secretion in the human body. As a phonetic component, "臤 (Pinyin: *Qiān*)" indicates the pronunciation of the character and may signify the strength and importance of the kidney. Meanwhile, "臤" has the meaning of strength, indicating that the renal tissues are firmer than the tissues of other internal organs.

(6) *Chang* (肠 intestines)

Shuo Wen Jie Zi: "腸, refers to small and large intestine. Its Chinese character component is '肉', and its phonetic component is '昜 (Pinyin: *Yáng*)' (腸，大小肠也。从肉，昜声)".

The character "*Chang* (肠 intestines)" probably did not have a separate construction in oracle bone script, and was formed gradually as the Chinese character system matured. By the period using bronze script, the character "*Chang* (肠)" began to appear as a pictophonetic character. And its Chinese character component "肉" indicates that it is related to body organ.

"長 (Pinyin: *Cháng*)", a radical and phonetic component, refers to large distance, long.

"肠 (Pinyin: *Cháng*)" in large seal script consists of "肉 (Pinyi: *Ròu*)" and "長 (Pinyin: *Cháng*)".

The original meaning based on the construction of the character "*Chang* (肠)" is a part of the digestive organ, shaped like a long, thin tube, with the upper end connected to the stomach and the lower end to the anus. In seal script, the character "長" is written as the phonetic component "昜", which was first appeared in the seal script of the Warring States period.[7]

(7) *Wei* (胃)

Shuo Wen Jie Zi: "胃, is grain storehouse. Its Chinese character component is '肉', and the character *Wei* (胃 stomach) is a hieroglyph."

"絮 (Pinyin: *Zhù*)" (which means clothing made from ramie fibres) in oracle bone script looks like a pouch with "rice (grain)". The original meaning based on the construction of the character "胃 (Pinyin: *Wèi*)" is a pouch-shaped digestive organ between the oesophagus and the small intestine. The addition of the character "肉" (referring to body) in bronze script emphasizes that the "rice pouch" is a body organ. In seal script, the character in bronze script continues to be used. And in clerical script, the 'rice pouch' in seal script is simplified to "田 (Pinyin: *Tián*)".

(8) *Jiao* (焦 burner)

Shuo Wen Jie Zi: "焦, refers to state after being burned by fire. Its Chinese character component is '火 (Pinyin: *Huǒ*, referring to fire)'".

Ling Shu Jing (《灵枢经》*The Spiritual Pivot*): "The flow of disease to flesh and joints, will weaken and emaciate the skin and flesh".

Guang Yun (《广韵》*Rhyming Dictionary of the Song Dynasty*): "膲 (Pinyin: *Jiāo*), triple burner of the human body".

Ji Yun (《集韵》*Chinese Rime Dictionary with Single-character Entries*): "*San Jiao* (三膲 *The Triple Burner*), refers to invisible house, its loan-character is 焦 (Pinyin: *Jiāo*)".

Yun Hui (《韵会》*Chinese Rime Dictionary*): "*Nan Jing* (《难经》*The Classic of Difficulties*): 'The upper section of the triple burner extends from below the heart downward through the diaphragm and ends at the upper opening of the stomach. It is responsible for intake but not for discharge. The central section of the triple burner is located in the central duct of the stomach; it does not extend further upward or downward. It is responsible for the spoiling and processing of water and grains. The lower section of the triple burner begins exactly at the upper opening of the urinary bladder and extends downward. It controls discharge but not intake, and it serves as a transmitter. The triple burner encompasses the passageways of water and grain in the organism. It represents the conclusion and the start of the course of the qi.'; *Huang Ting Jing* (《黄庭经》*The Yellow Court Classic*): 'The triple burner is the channel between the *Wu Zang*.'; *Yun Ji Qi Qian* (《云笈七签》*Severn Tablets in a Cloudy Satchel*): 'The liver, the heart and the lung(s) are triple burner. The burner, refers to heat. It pronounced with falling tone. Its dysfunction may lead to muscle wasting or malnutrition.'."

Based on the above, the meaning of "膲" with the Chinese character component "肉" is extended to the space inside the body.

The character "焦 (Pinyin: *Jiāo*)" is an ideograph, in bronze script. The upper character is "隹 (Pinyin: *Zhuī*)", referring to short-tailed bird, and the lower character is "火 (Pinyin: *Huǒ*, referring to fire)". The whole character "(Pinyin: *Jiāo*)" looks like putting the bird on the fire. And the original meaning is that the substance turns yellow or into charcoal when burnt.

(9) *Dan* (胆 gallbladder)

Shuo Wen Jie Zi: "膽, is the house connected to liver. Its Chinese character component is '肉', and its phonetic component is '詹 (Pinyin: *Zhān*)'".

"胆 (Pinyin: *Dǎn*)" in seal Script consists of "詹 (Pinyin: *Zhān*, referring to forward-looking, vanguard)" and "肉". The original meaning based on the construction of the character "胆" is body guardian, that is, a sac-shaped digestive organ with disinfectant and sedative functions.

(10) *Pao* (脬 bladder)

Shuo Wen Jie Zi: That's what the bladder. Its Chinese character component is '肉', and its phonetic component is '孚 (Pinyin: *Fú*)'."

Guang Yun: "The bladder, storehouse of water in the abdomen".

Shi Ji (《史记》 *Records of the Grand Historian*): "The Empress Dowager of the Qi State fell ill and summoned medical practitioner (Bian Que 扁鹊) for pulse diagnosis. Bian Que said, 'The wind-heat invaded the bladder, with symptoms: difficulty in urinating and defecating, and hematuresis'".

The characters in the pre-Qin period involve heart, liver, spleen, lung(s), kidney(s), stomach, intestines, gallbladder, bladder and other organs. Although the specific organ corresponding to the spleen is controversial,[8] most of them have been inherited by modern medical literature. With the detailed records of surgical procedures in unearthed texts, such as *Wu Shi Er Bing Fang* (《五十二病方》 *Recipes for Fifty-two Ailments*), it is evident that in the pre-Qin period, the Chinese had already accumulated a wealth of physiological knowledge and treatment experience for *Wu Zang* and *Liu Fu* regarding as coelomic organs.

2.2 Systematization of *Huang Di Nei Jing* (《黄帝内经》 *The Yellow Emperor's Inner Classic*): the allocation of the five elements and the construction of their functional network

Zang Xiang is the core component of Chinese medicine.[9] *Zang Xiang* was first seen in the "Discourse on the six terms of a year and on phenomena associated with the condition of the depots" (Chapter 9) of *Su Wen* (《素问》 *Basic Questions*) of *Huang Di Nei Jing*: "Di: What are phenomena associated with the condition of the depots? Qi Bo: The heart is the basis of life, it is responsible for changes of the spirit, its effulgence is in the face, its fullness manifests itself in the blood vessels, it is the major yang in the yang, it communicates with the qi of summer ....." This discourse lists the phenomena stored in the five depots: "the heart", "the liver", "the spleen", "the lung(s)", and "the kidney(s)". In the "Generation and completion of the five depots" (Chapter 10) of *Su Wen*, it is mentioned that "the phenomena associated with the conditions of the five depots, they can be deduced from objects of the same kind".

The character "臟 (Pinyin: Zàng)" evolved from "藏 (Pinyin: Zàng)" (Fig. 1). "藏" originally meant storage, while "臟" referred to the tangible internal organs. These two characters were often used interchangeably, sometimes to refer to organs in the body, and sometimes to refer to structures or functions containing some kind of phenomena. *Zhou Li Ji Yi* (《周礼·疾医》 *Rites of Zhou: Physician for Internal Diseases*) recorded the history of the physicians who used the bipolar thinking of yin and yang to judge the pathological changes of the nine orifices and referred to the changes of the nine internal organs. This indicates that there were already nine internal organs in the human body in the Western Zhou dynasty. Nine internal organs may include heart, lung(s), liver, gallbladder, spleen, stomach, intestines, kidney(s), and bladder in the body cavity. In the "Discourse on the six terms of a year and on phenomena associated with the condition of the depots" (Chapter 9) of *Su Wen*, there is the statement that "the physical depots are four, the spirit depots are five. Together this makes nine depots to correspond to them". Also, other chapters in *Huang Di Nei Jing* include the different statements: "the four depots are correspondence with the qi of the four seasons" in the "Comprehensive discourse on regulating the spirit in accordance with the qi of the four seasons" (Chapter 2 in *Su Wen*), "the twelve depots engage each other" and "the eleven depots receives their decisions from the gallbladder" in the "Discourse on the hidden canons in the numinous orchid chambers" (Chapter 8 in *Su Wen*), "some consider the brain and the marrow to be depots; others consider the intestines and the stomach to be depots; still others consider them to be palaces" in the "Further discourse on the five depots" (Chapter 11 in *Su Wen*), and "the eight winds match the eight

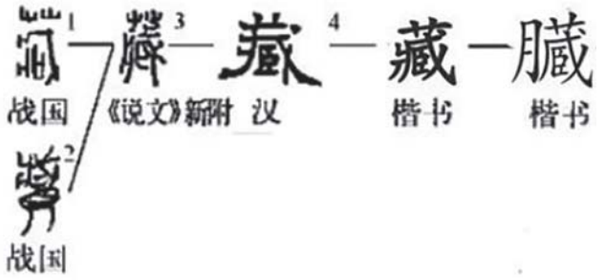

Figure 1 Evolution of the character "藏—臟" [source with permission from: *Zi Yuan* (《字源》 *Character Origins*), collection of the Library of Macau University of Science and Technology]

depots" in the "Nine temples and eight winds" (Scroll 11, Chapter 77 in *Ling Shu Jing*). Besides, *Nan Jing* recorded: "Usually one speaks of six short-term repositories, but actually there are five short-term repositories. Although one commonly speaks of five long-term depots, there are also arguments pointing out an existence of six longterm depots. They state that the kidney consist of two long-term depots" (*The Thirty-Ninth Difficult Issue*). All these reflect the academic contention of a hundred schools of thought and the blossoming of a hundred flowers in the pre-Qin period.

After the academic reform of "proscribing all non-Confucian schools of thought and espousing Confucianism as the orthodox state ideology (罢黜百家，独尊儒术)' by Dong Zhongshu (董仲舒), the basic theoretical framework of Chinese medicine centered on the yin-yang (阴阳) and *Wu Xing* (五行 five elements) corresponding to *Zang* (藏) and *Fu* (腑)[10]. The categories of the visceral manifestation in *Huang Di Nei Jing* are as shown in Table 2 (Table 2):

The above categories involve organs, functions, time, space, nature, etc., forming a huge system that connects the inside and the outside the body.

The core of the visceral manifestation theory is *Bi Lei Qu Xiang* (比类取象 systematic analogy through symbolic correlation). This theory is similar to analogical reasoning in formal logic, and the conclusion of analogical reasoning is not inevitable, it requires certain experiences to determine whether "藏" refers to an organ. For instance, in the "Roots of acupuncture points" of *Ling Shu Jing* (Chapter 2), "the lung comes out at minor shang", "it flows to fish border", "it continues to major abyss", "it moves to channel ditch", "it enters into cubit marsh", etc. The lung(s) here refers to the lung(s) in the visceral manifestation, specifically *Jing Qi* (经气 meridian-qi) of the lung channel of hand greater yin; and "the lung are coupled with the large intestines, the bowel (*Fǔ* 腑; 府 in another edition) which is the path for transport...", the lung(s) here refers to the lung(s) in the visceral manifestation, that is, a series of functions stored in the element *Jin* (金 Metal), while the large intestine refers to an organ. What is stated here is not exterior-interior relation of meridians, as "pericardium" is not mentioned, and is therefore a correspondence between visceral manifestation and organs. Due to the uncertainty of xiang-based analogy and categorization, the connotations of *Xin*, *Gan*, *Pi*, *Fei*, and *Shen* will be changed. As visceral manifestation or organs, they need to be carefully examined using the knowledge of the human body's structure and functions.

As for the correspondence of the five elements, *Wu Zang* and other things with each other, there are different points of view all through the ages, at least from the beginning of the contention between school of ancient text learning (old text school) and school of classic learning (new text school) in the Han dynasty. For instance, *Shuo Wen Jie Zi Xi Zhuan* (《说文解字系传》*Initial Commentary on Explaining Graphs and Analyzing Characters*) interpreted the Chinese word *Xin* as follows: "The human heart, corresponds to *Tu*, and is located in the center of the body. The character '心' is a hieroglyph. There are also learned men who believe that the heart corresponds to *Huo*. And all Chinese characters related to the heart use '心' as a Chinese character component (人心，土藏，在身之中。象形。博士说以为火藏。凡心之属皆从心)". Xu Kai said: "Antares is considered to be related to fire, so the heart is of the *Huo* (心星为大火，然则心属火也)",[11] that is, the old text scholars consider the heart to be of *Tu*, while the new text scholars consider the heart to be of the *Huo*. According to the knowledge of anatomy and physiology, it is very easy to understand the followings: when the "heart" is regarded as an organ, it corresponds to *Tu*, because the heart is mainly composed of cardiac muscle, which stores the phenomena of *Tu*; and when the "heart" is regarded as the "official functioning as ruler", it corresponds to *Huo*, because conscious thinking and mental activity are always changing, which stores the phenomena of *Huo*.

2.3 Separation and connection: academic debate on visceral manifestation and organs

As mentioned above, starting from *Huang Di Nei Jing*, the structure and functional systems of the human body centered on *Wu Xing* and *Wu Zang* has basically been determined. However, the correspondence in this system is not unchangeable. The relation between *Wu Zang* is not solely based on the reasoning of engendering and restraining of *Wu Xing*, but is constantly discovered and summarized through long-term practice. Therefore,

Table 2 Categories of the visceral manifestation in *Huang Di Nei Jing*

		In Nature					In Human Body					
Five Elements	Five Zang-organs	Qi-transformations	Five Orientations	Five Notes	Five Colors	Five Flavors	Zang-organs/Yin	Fu-organs/Yang	Five Sense Organs	Five Body Constiuents	Five Emotions	Five Voices
Wood	Liver	Born	East	Mi	Green	Sour	The liver	Gall bladder	Eye(s)	Tendon	Anger	Breath
Fire	Heart	Grow	South	Sol	Yellow	Bitter	The heart	Small intestine	Tongue	Vein	Over-joy	Laugh
Earth	Spleen	Transformate	Center	Do	White	Sweet	The spleen	Stomach	Mouth	Flesh	Thought	Sing
Metal	Lung	Contract	West	Re	Black	Acrid	The lung	Large intestine	Nose	Skin	Sorrow	Cry
Water	Kidney	Store	North	La	Red	Salty	The kidney	Bladder	Ear(s)	Bone	Fear	Groan

medical practitioners of all generations have created the theories such as "*Wu Xing Hu Han* (五行互含 mutual hiding of the five elements)"[12], "*Wu Zang Pang Tong* (五脏旁通 five zang-organs extraordinary connection)", and "*Wu Zang Chuan Zao* (五脏穿凿 separation and connection of the five zang-organs)". They have also pointed out the complex relation between visceral manifestation and organs, which are both connected but difference, from different perspectives.

(1) From the Six dynasties to the Sui and Tang dynasties: *Wu Zang* and *Liu Fu* approaching-connection

Sun Simiao (孙思邈, 560-around 680) in the Tang dynasty proposed that the relation between the *Wu Zang* and *Liu Fu* is very complex and difficult to know specifically.[13] Therefore, he sorted out the relevant documents that he could be collected at that time, and attached them to the framework of the *Wu Zang* and *Liu Fu*, so that later scholars could quickly find related things with this framework. Those relating to the *Jin Liang* (斤两 weight) of five zang-organs, *Jin Liang* of *Liu Fu* (actually five fu-organs, without *San Jiao* (三焦 the three jiao), dimensions and capacities refer here to organs. And as for the related meridian, acupoint, spirit, odour, pulse and emotion, *Wu Zang* and *Liu Fu* have formed functional systems in the sense of the visceral manifestation (the *Liu Fu* are the yang of the zang-organs).

Similar content can be found in Chinese medical classics from the Six dynasties to the Sui and Tang dynasties, such as *Mai Jing* (《脉经》*The Pulse Classic*), *Zhong Zang Jing* (《中藏经》*The Central Treasury Canon*), *Ming Tang Wu Zang Lun* (《明堂五藏论》*Charts for Treatise on the Five Zang-organs*), *Zhang Zhong Jing Wu Zang Lun* (《张仲景五脏论》*Zhang Zhongjing's Treatise on the Five Zang-organs*), *Wai Tai Mi Yao Fang* (《外台秘要方》*Arcane Essentials from the Imperial Library*), and *Huang Ting Nei Jing Wu Zang Liu Fu Tu* (《黄庭内景五脏六腑图》*Illustration of Five Zang-organs and Six Fu-organs in the Classic of the Yellow Court*).[6]

(2) During the Song and Ming dynasties: Viscera-bowels extraordinary connection

Zhong Guo Yi Ji Kao (《中国医籍考》*Research on Chinese Medical Books*) by Japanese Tamba no Mototane (also known as Taki Mototane) records that there were a number of writings or drawings on the *Wu Zang Pang Tong* during the Tang and Song dynasties, including *Sun Shi Si Miao Wu Zang Pang Tong Ming Jian Tu* (《孙氏思邈五脏旁通明鉴图》*Illustration of Sun Simiao's Five Zang-organs Extraordinary Connection*), *Wu Zang Pang Tong Dao Yang Tu* (《五脏旁通导养图》*Illustration of Health Preservation with Five Zang-organs Extraordinary Connection*) and *Pei Shi Wang Ting Wu Se Pang Tong Wu Zang Tu* (《裴氏王庭五色旁通五脏图》*Illustration of Pei Wangting's Connection of Five Colors and Five Zang-organs*). Unfortunately, these works have been lost.[14]

In the third year of the Wanli period (1575), Li Chan quoted from *Wu Zang Cuan Zao Lun* (《五脏穿凿论》*Discourse of Wu Zang Chuan Zao*) in his *Yi Xue Ru Men* (《医学入门》*Introduction to Medicine*), which is thought to be a statement about the extraordinary connections among *Wu Zang*. "*Xin* is connected with *Dan*, *Gan* with *Da Chang* (大肠 large intestines), *Pi* with *Xiao Chang* (小肠 small intestines), *Fei* with *Pang Guang* (膀胱 bladder), *Shen* with *San Jiao* (三焦 three jiao), and *Shen* with *Ming Men* (命门 life gate), which is a harmonious and unified whole system (心与胆相通，肝与大肠相通，脾与小肠相通，肺与膀胱相通，肾与三焦相通，肾与命门相通，此合一之妙也)". Li Chan's explanation and interpretation for above text are as follows:

> "*Wen Dan Tang* (温胆汤 Gallbaldder Warming Decoction) for heart diseases with severe palpitations; tonifying heart for gallbladder diseases with shiver and mania. Promoting large intestine function for liver diseases; pacifying liver channel for large intestine diseases. Clearing small intestine fire for spleen diseases; nourishing earth (tonifying spleen) for small intestine diseases. Promoting urination through the bladder, then separating clear and turbid for lung diseases; dispersing lung qi with emetic therapy for bladder diseases. Harmonizing triple burner for kidney diseases; tonifying kidneys for triple burner diseases. Powerfully tonifying the right kidney for stomach and fluid deficiency (心病怔忡，宜温胆汤为主; 胆病战栗癫狂，宜补心为主。肝病宜疏通大肠，大肠病宜平肝经为主。脾病宜泻小肠火，小肠病宜润脾土为主。肺病宜清利膀胱水，后用分利清浊; 膀胱病宜清肺气为主，兼用吐法。肾病宜调和三焦，三焦病宜补肾为主。津液胃虚，宜大补右肾)."

In *Yi Xue Ru Men*, there is no further detailed explanation and interpretation of the theory of the viscera-bowels extraordinary connection. However, many people have used this theory to open up new avenues of clinical treatment.[15] In later generations, two schools of thought arose: School of "*Shi Zhi* (实质 substance) theory" represented by Tang Rongchuan and school of "*Qi Hua* (气化 qi transformation) theory" represented by Yang Weijie.[16] The substance theory regards the internal organs as specific organs in the body cavity, and the qi transformation theory regards the internal organs as visceral manifestation of meridians and collaterals. Although these two theories have good results in clinical application, they do not fully explain the text of the *Wu Zang Cuan Zao Lun* or Li Chan's explanations and interpretations. In the substance theory, the "life gate" was deleted due to uncertainty as to what it is. The qi transformation theory is limited to acupuncture treatment, and it proposed that the kidney channel was connected with the triple burner channel, and the pericardium channel with the stomach channel.

This change reflects the separation of *Zang Xiang* and organs in the connotations of *Wu Zang* in Chinese medicine after its encounter of Western medicine in China. The background of this phenomenon is further introduced below.

3 The two historical transmissions of Western medicine to the east and the response of Chinese medicine

During the Ming and Qing dynasties, missionaries to China were the main force in the eastward spread of Western medicine, and anatomy was the primary subject introduced by them. Due to their lack of cultural dominance, missionaries such as Matteo Ricci conducted missionary work only about knowledge in China. They worked with Chinese scholars to translate Western writings by means of interpreting on the part of the missionaries and writing on the part of the Chinese scholars. In the late Qing dynasty, European natural science ideas and innovative technological achievements provided a new methodology for natural theology to study the creation of nature and human beings by "God". Meanwhile, physiological and anatomical knowledge, which represented the achievements of Western science, was used by the missionaries as a powerful weapon to criticize and negate Chinese medicine and Chinese culture.[17]

3.1 The limited spread of Western medicine in China during the late Ming and early Qing periods

After the Renaissance, European societies tended to place a high value on academic research. The Catholic theology of the time strongly advocated that God should be known through reason, and anatomy belonged to Physica, which was the foundation for studying the existence of the human body and soul and their functions.[18]

In 1543, the publication of Andreas Vesalius's *De Humani Corporis Fabrica* marked a revolutionary breakthrough in human anatomy, but the influence of anatomy on medicine remained largely indirect. For missionaries, anatomy was a tool for exploring the body, the soul, and God, all of which revealed the omniscience and omnipotence of the Creator. Thus, anatomy became the main content of the eastward spread of Western medicine.

In the third year of the Jiaqing period (1569), the first Western medicine hospital in China was established in Macao,[19] marking the beginning of the first eastward spread of Western medicine. However, over the next 200 years, there were very few translated versions of Western medical works. Only two anatomical works were published, namely, *Tai Xi Ren Shen Shuo Gai* (《泰西人身说概》*Outline of the Human Body in the Western Knowledge*) translated by Johann Schreck (邓玉函, 1576–1630) and *Ren Shen Tu Shuo* (《人身图说》*Illustrated Explanations of the Human Body*) translated by Giacomo Rho (罗雅谷, 1593–1638) and edited by Johann Schreck. In 1693, the Emperor Kangxi (康熙) contracted malaria and was cured by the cinchona powder presented by missionaries Joannes de Fontaney (洪若翰,) and Claude de Visdelou (刘应). As a result, he developed a strong interest in Western medicine and summoned missionaries Jean-François Gerbillon (张诚, 1654–1707) and Joachim Bouvet (白晋, 1656–1730) to explain human anatomy and compile an anatomical work in Manchu-language script (1690). Later, Dominique Parrenin (巴多明, 1665–1741) took over Joachim Bouvet's translation work and completed *Qin Ding Ge Ti Quan Lu* (《钦定格体全录》*dergici toktobuha ge ti ciowan lubithe dergi yohi* in Manchu, translated from *Atlas D'anatomie Humaine*) in 1703. There were four extant manuscript copies of the book, yet they have all remained unused and did not gain circulation.[20]

Generally, the introduction of Western physiological and anatomical knowledge in the late Ming dynasty was mainly confined to the scholar-official class. and had limited influence on Chinese medicine.

3.2 The authoritarianization of Western anatomy in the late Qing dynasty

After the 18th century, anatomical and physiological understandings of health and disease had become the mainstream of Western medicine. This trend was further strengthened in the 19th century.[21] In the early 19th century, Western medicine was reintroduced to China on a large scale, forming the wave of the second eastward spread of Western medicine, and exerting a far-reaching influence on the Chinese intellectual and medical circles.

In 1845, missionary Benjamin Hobson (合信, 1816–1873), a doctor, founded the missionary hospital in Hong Kong and set about writing textbooks on Western medicine. In 1851, in *Quan Ti Xin Lun* (《全体新论》*An Outline of Anatomy and Physiology*), Hobson explained modern anatomical knowledge to the Chinese and pointed out the uncertainties regarding the records of internal organs in Chinese medicine.[22] He not only established medical terms, but also proposed the principle of naming medical terms. Meanwhile, he started the trend of promoting natural theology and criticizing Chinese medicine and Chinese culture with anatomy and physiology. After Benjamin Hobson, there was a proliferation of translated versions of Western medical works. Without exception, all of them launched ruthless criticism and denial of Chinese medicine on the grounds that there was no anatomy in Chinese medicine.

In the context of a changing society, many Chinese scholars began to accept Western criticism of Chinese medicine's view of the body, and Chinese medicine groups revised their original observation methods and cognitive system, and began to use anatomical concepts and knowledge to reconstruct the traditional concept of the body. Wang Qingren's (王清任, 1768–1831) *Yi Lin Gai Cuo* (《医林改错》*Correction on Errors in Medical Classics*) and the convergence of Chinese and Western medicine by Tang Zonghai (唐宗海, 1846–1897) are typical examples of the above.

4 Transmutation in the connotation of *Wu Zang* in the late Qing period: from functional symbols to anatomical entities

From the late Qing period to the Republic of China, Chinese society was subjected to a comprehensive impact from the West, which aggravated the existing social, economic, and political contradictions. Some people believed that only a comprehensive social revolution could solve the comprehensive crisis. Under the premise of such revolution, the criticism and transformation of Chinese medicine naturally became an integral part of the solution to the comprehensive crisis. Therefore, it became particularly important for medical practitioners in China to transform Chinese medicine through Western knowledge. Wang Qingren and Tang Zonghai are representative figures of Chinese medicine in the late Qing period, their works provide a glimpse of the way in which the spread of Western medicine in China transformed the concept of *Wu Zang*.

4.1 Wang Qingren's (王清任) simplified logic: returning to organ morphology

Wang Qingren wrote *Yi Lin Gai Cuo* based on his observations of corpses. This work marked an important development in the history of Chinese anatomy.

After reading a large number of ancient Chinese medical books, Wang Qingren had difficulty in agreeing with the misunderstandings and self-contradictions in the knowledge of organs in Chinese medicine. He bluntly used the term "blind man walking in the night" to describe the consequences of the lack of understanding of the human anatomy for the development of Chinese medicine. From an anatomical point of view, although he did not personally use the lancet to dissect and decompose human corpses, he could be regarded as one of the earliest medical practitioners and anatomists with advanced anatomical awareness. In the general context of Chinese medicine thinking, he observed the corpses of death row inmates and animals by himself, and did not care about the views of ordinary people. Under the view that practice makes perfect, he put forward a strict criticism of Chinese medicine, "Once I read the theoretical descriptions and drawings, these ancient descriptions of the organs show that there are plenty of contradictions in them".[23] In such a situation, he aimed to identify any "errors" in the knowledge of organs in Chinese medicine and to use anatomy as a tool to reconstruct *Wu Zang* in Chinese medicine.

Wang Qingren's "correction" of Chinese medicine is a wholesale rejection of *Wu Zang* as a collection of images, while simplifying the collection system of the *Wu Zang* and *Liu Fu* into the "viscera" as the organs in the human body cavity. For instance, regarding the location of the liver, he believes that when Chinese medicine describes the location of the liver, it is always confused with the concept of the liver meridian, which is at odds with the location he observes in practice. For the liver, there are two meridians, which are actually blood vessels, on the left and right side of the human body, and they begin to circulate from the two ribs, up through the eyes and the head, down from the lower abdomen around the genitals, and finally to the big toe of the foot. It is said that there are two meridians for the liver on the left and right side of the human body, why is it also said that the liver is located on the left and that the left rids belong to the liver? So the statement that the liver is divided into left and right is erroneous in this regard.

Huang Di Nei Jing basically determined the structure and function of the human body, with the *Wu Zang* as the core. Later medical practitioners generally agreed with the *Huang Di Nei Jing*'s statement that "the liver is born on the left side", and it is not difficult to see that the "liver" here refers to the *Zang Xiang* of the liver—a set of structural and functional attributes associated with the liver—rather than the anatomical organ itself. Like the characteristics of a tree, rather than the liver. Hua Shou (滑寿, 1304–1386) in the Yuan dynasty, a medical practitioner, pointed out the difference between the *Zang Xiang* and the organ in his book *Shi Si Jing Fa Hui* (《十四经发挥》*The Fourteen Meridians in Action*): "The *Zang Xiang* of the liver, its treatment is mainly on the left side, and its organ is located in front of the right rids and the right kidney".[24] This statement clearly shows that Chinese medicine recognized the actual anatomical location of the liver but emphasized its functional relationships instead, adopting a more philosophical framework for interpretation.

This contradiction, which emphasizes numerical and symbolic imagery, puzzled Wang Qingren, who based his work on "empirical evidence". Therefore, he reconstructed the anatomical chart and concept of the liver based on his own practice: "The liver has four valves, with the gallbladder attached to the second valve on the right side of the liver. The organ-pancreas is located above the stomach, with the liver above the organ-pancreas. The larger surface of the liver faces upward and is connected to the spine at the back. The liver is solid in texture, unlike the intestines, stomach, or bladder, and it certainly cannot store blood".

From the perspective of modern anatomy, Wang Qingren's theory is undoubtedly correct. Not only did he recognize that the liver has four valves, but he also provided a more accurate description of the location of the gallbladder (Fig. 2 and 3), and he put forward the organ-pancreas, which has not been described by previous Chinese doctors. At least, "these corrections" of Wang Qingren are very successful and thorough.

However, Wang Qingren also admitted that *Yi Lin Gai Cuo* was not an encyclopedia of treatment. It can be seen that understanding the shape and location of the internal organs of the human body is not enough to influence and

reform the thinking and methods of Chinese medicine in treating diseases. At that time, Chinese medicine was widely criticized for lacking anatomical knowledge. In a word, Wang Qingren was appreciated by Chinese and foreign scholars because of his anatomical awareness in his thoughts.

Figure 2 Liver and gallbladder in *Yi Lin Gai Cuo* (《医林改错》*Correction on Errors in Medical Classics*) (source with permission from: *Yi Lin Gai Cuo*[23])

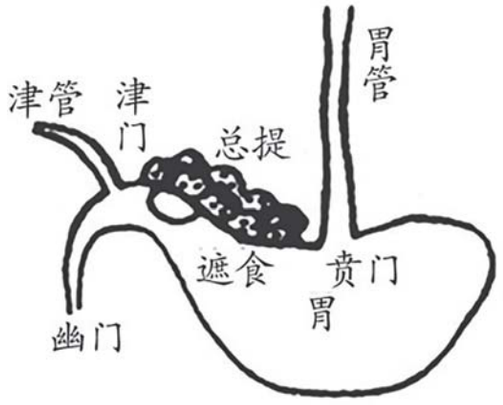

Figure 3 Stomach in *Yi Lin Gai Cuo* (source with permission from: *Yi Lin Gai Cuo*[23])

4.2 Tang Zonghai's (唐宗海) compromise: interpreting the organ-pancreas as the spleen and *San Jiao* as the smentum

In comparison to Wang Qingren, Tang Zonghai had greater access to Western medicine. Peter Parker, a missionary, established hospitals in China. Benjamin Hobson's five types of medical books were widely distributed, including *Medical Vocabulary* (1849), *An Outline of Anatomy and Physiology* (1851), *First Lines of the Practice of Surgery in the West* (1857), *Practice of Medicine and Materia Medica* (1857) and *Treatise on Midwifery and Disease of Children* (1858). These books introduced internal medicine, surgery, gynaecology and anatomy systematically. Additionally, medical journals emerged to facilitate the dissemination of Western medicine. Tang Zonghai was a staunch proponent of Chinese medical theory.

If Wang Qingren merely proposed that the *Wu Zang* of Chinese medicine were erroneous within the context of anatomy, the issue was placed directly at the centre of the discourse between Chinese and Western medicine with the further proliferation of Western medicine in China. Consequently, Tang Zonghai's approach can be summarized as follows: firstly, to address the anatomical questions surrounding the *Wu Zang* of Chinese medicine; secondly, to elucidate the physiological and pathological characteristics of the aforementioned *Wu Zang* within the context of anatomical and physiological principles.

The core of Tang Zonghai's medical theory is the integration and comparison of Chinese and Western medicine, supplemented by other specialized medicine and treatment techniques.[25] In his book *Zhong Xi Yi Hui Tong Yi Jing Jing Yi* (《中西医汇通医经精义》 *Convergence and Assimilation of Chinese and Western Medicine*), the understanding of the human anatomy and physiology in Chinese medicine was discussed in chapters, such as "The origin of *Wu Zang*", "The nature of *Wu Zang*", "The functions of *Wu Zang*", "The combination of *Zang Fu*" and "The governance of *Zang Fu*". And he also adhered to the theory of Chinese medicine's ontology, there *Wu Zang* based visceral manifestation, and used this as a basis to think about possible interpretations of Western medicine's view of the body.

In terms of anatomy, Tang Zonghai argued that most of the viscera diagrams of Chinese medicine were drawn by people after the Song and Yuan dynasties, and their shapes and qualities do not match the internal organs of the human body. Therefore, the description of each organ must first quote the Western anatomical description to discuss the pros and cons of the description of the body cavity organs in Chinese medicine, and is accompanied by graphic explanations. The example of the liver is shown below (Fig. 4). As stated in the chapter on the liver: "The old saying that the liver has seven valves and is located under the left rids is incorrect. Western medicine says that the liver has four valves, lies against the spine at the back, and connects to the diaphragm at the front, with the gallbladder attached between the short valves of the liver, with the diaphragm attached to the

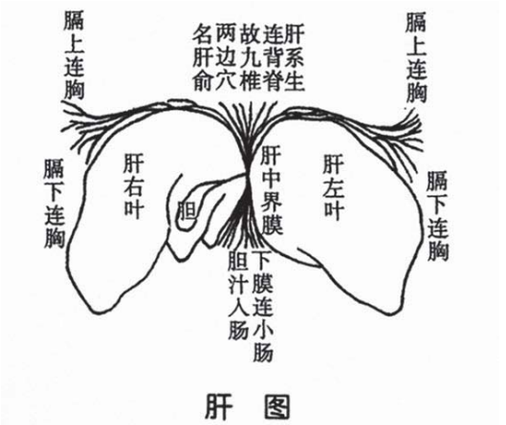

Figure 4 Liver in *Zhong Xi Yi Hui Tong Yi Jing Jing Yi* (《中西医汇通医经精义》 *Convergence and Assimilation of Chinese and Western Medicine*) (source with permission from: *Zhong Xi Yi Hui Tong Yi Jing Jing Yi*[26])

spine and connected to the liver, from the liver to he chest cavity at the front. The liver is actually half above and half below the diaphragm, and it is not located solely on the left side. The statement that the liver is on the left is merely because it corresponds to the eastern direction of the Hexagram Zhen (☳), and should naturally be associated with the left".

The liver is both discussed in Chinese and Western medicine. Tang Zonghai could still achieve the "convergence" of Chinese and Western medicine. But what about organs not described in Chinese medicine? *Tian Rou Jing* (《甜肉经》*The Classic of the Pancreas*) of *Quan Ti Xin Lun*, written by Benjamin Hobson, records the size, location, shape and relationship of the organ-pancreas with the surrounding organs, and because the organ-pancreas tastes sweet, it is called sweet meat. There is a big difference between the "pancreas" recorded in Chinese medicine and the organ-pancreas described by Benjamin Hobson. Tang Zonghai had to explain this difference. He wrote: "There is no 'sweet meat' in Chinese medical books, but sweet taste belongs to the spleen, which is a certain reason. As for sweet meat in Western medicine, I do not know sweet meat that is of the spleen." Although he admited that China does not have the concept of sweet meat in the anatomy of Western medicine, he described it as a "sweet" flavor through its name and attributed the function of the organ-pancreas to the spleen, in an attempt to create a phenomenon that is not described in Chinese medicine but can be reasonably explained through Chinese medical theories. He further explained, "All ointments and oils are produced by the Spleen, ointment can transform water, and the pancreas can transform oil. The spleen is called the earth of wetness, referring to the pancreas and the ointments". The ointments and oils belongs to the middle burner in his *San Jiao* theory, where the spleen is located, and the qi of the spleen can produce the ointments and oils. So through the function of the *San Jiao*. He integrated the function of the pancreas into the spleen, and the spleen-pancreas theory became Tang his theory of the pancreas.

In addition, Tang Zonghai's study of *San Jiao* led to the development of both Chinese and Western medical theories. For *San Jiao*, "Chinese medicine only talks about its meaning, but not its form, and it is especially important to point out the signs in the Western method". He was a proponent of the tangible theory of *San Jiao*, and attacked Wang Qingren and Western medicine for not recognizing the *San Jiao* theory. He believed that *San Jiao* is the so-called "omentum" in Western medicine—the *San Jiao* contacts many internal organs, including the kidney, bladder, large intestine, gastric epigastric region, small intestines, liver, stomach, gallbladder, heart, lung, throat, etc. In addition, he was influenced by Western medicine and further expanded the scope of *San Jiao* by proposing that the cerebral cortex also belongs to *San Jiao*.

Therefore, Tang Zonghai's great contribution is that he took the initiative to introduce anatomical terminology to expound the *Zang Xiang* theory. He extracted the five viscera and six bowels, which are the organs in the body cavity, from the *Zang Xiang* of the *Wu Zang*, and analyzed them with the concepts of Chinese and Western medicine. He adhered to the holistic and systematic view of Chinese medicine, retaining the thinking mode of *Zang Xiang*, which holds certain developmental significance for both Chinese and Western medicine.

4.3 Summary: modern dilemma of the *Zang Xiang* theory

Against the historical background of comprehensive social change, Chinese medicine practitioners in the late Qing dynasty chose to actively learn anatomy, trying to make Chinese medicine learn the "language" of Western medicine. Wang Qingren's approach was to abandon and deny the *Zang Xiang* theory, and simplify the *Wu Zang* system into the anatomical organs of the heart, the liver, the spleen, the lung, and the kidney. Later, Tang Zonghai came to recognize that the conceptual ambiguity of *Wu Zang* posed challenges for the application of scientific language to Chinese medicine. So he tried a cultural translation based on the analysis of concepts, as well as communicated, explained and created the inconsistencies between Chinese and Western medicine in the understanding of human body structure. Besides, he tried to retain the thinking mode of *Bi Lei Qu Xiang*, but in the social context of the time, this effort failed to resist the trend of substantialization and organification of the concept of *Wu Zang*.

5 Conclusion: insights and reflections on the transformation of medical knowledge

Studies have shown that the understanding of the five zang-organs in Chinese medicine has evolved from early anatomical observations to the *Zang Xiang* theory. In Chinese medicine before the Wanli period of the Ming dynasty, the concept of *Wu Zang* had the dual attributes of anatomical entities and a functional system. However, the knowledge transformation triggered by the full-scale eastward spread of Western learning led to the reabsorption of anatomical knowledge into the concept of *Wu Zang* in Chinese medicine, and even to their reconstruction by anatomy, which has had a profound impact on the connotations of the *Zang Xiang* theory in today's Chinese medicine. Undoubtedly, it needs to be pointed out that the so-called scientism or Western medicine as an authority cannot negate or be totally applied to Chinese medicine. The substantialism of anatomical science in Western medicine and the functional system theory of *Zang Fu* in Chinese medicine, respectively, constitute two distinct paradigms of life cognition,

which in turn forms different practical logics and strategic paths. However, in the interactive evolution of time and space, what we can perceive is the gradual integration of Chinese medicine and Western medicine as two entities transcending authority, rather than an either-or choice. This diachronic examination reveals the dynamism and plurality of Chinese medical theory itself, providing a new perspective for understanding the complex process of the encounter of Chinese and Western medicine.

The evolution of *Wu Zang* is not only a change in medical knowledge, but also reflects the dilemma of adapting Chinese medicine and culture to Western science since modern times. The attempts of Wang Qingren and Tang Zonghai have shown that solely pursuing anatomical accuracy or mechanical convergence may lead to the alienation of theory. Future research should transcend this simplified scientific path of "organ-disease" correspondence, and instead ask: how to reactivate the *Zang Xiang* thinking of Chinese medicine to make it another kind of wisdom that complements the limitations of modern medicine? This requires the joint exploration by scholars, clinical practitioners and cultural researchers, and is a continuation of the unfinished questions of this article.

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Ethical approval

This study does not contain any studies with human or animal studies performed by any of the authors.

Author contributions

LIANG Qiuyu devised the project, the main conceptual ideas, proof outline, encouraged all to investigate and supervised the findings of this work. ZHOU Linqi developed the theoretical framework and worked out almost all of the translational details. LIANG Qiuyu took the lead in writing the manuscript and HUANG Zusheng provided critical feedback and helped shape the research, analysis and manuscript.

Conflicts of interest

The authors declare no financial or other conflicts of interest.

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The Controversy between Classics and Science: Unification of Acupuncture Textbooks in China, 1949–1961

ZHAO Jing[1], Michael Shiyung LIU[2,3,✉]

Abstract

The creation of a national unified textbook on acupuncture was a critical effort by China to standardize traditional Chinese medicine. In the early People's Republic of China, the development of acupuncture textbooks followed a complex trajectory. It began with Zhu Lian's (朱琏) *Xin Zhen Jiu Xue* (《新针灸学》*New Acupuncture and Moxibustion*), extending the Yan'an (延安) tradition, and moved to *Zhen Jiu Xue* (《针灸学》*Acupuncture and Moxibustion*, 1957), a localized effort from the Jiangsu Provincial Chinese Medicine School. This culminated in the national *Zhen Jiu Xue Jiang Yi* (《针灸学讲义》*Lectures on Acupuncture and Moxibustion)*. This process reflects a shift from regional teaching to a standardized national model, as well as a pedagogical transformation from a scientific approach to a return to classical sources. The textbook centers on *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation), blending systematic, scientific, and practical elements, and represents the era's fusion of Chinese and Western medicine, helping to shape a modern acupuncture framework.

Keywords: *Xin Zhen Jiu Xue* (《新针灸学》*New Acupuncture and Moxibustion*); *Zhen Jiu Xue* (《针灸学》*Acupuncture and Moxibustion*); *Zhen Jiu Xue Jiang Yi* (《针灸学讲义》*Lectures on Acupuncture and Moxibustion*); Scientization of acupuncture; *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation)

1 Introduction

China has consistently prioritized acupuncture education. In 1947, following the establishment of the Liberated Area of the Central Plains (中原解放区), a structured training model for acupuncture was initiated, organized around a "column-brigade-regiment-company" framework. Acupuncture classes at North China Health School (华北卫生学校) were established to train doctors and address wartime medical resource shortages. After 1949, there were efforts to share acupuncture teaching experiences across regions. However, inconsistencies in the quality of teaching materials emerged, particularly after Chinese medicine courses were introduced. Colleges and universities began compiling their own lecture notes on acupuncture, leading to conflicting viewpoints among instructors. This lack of uniform teaching standards resulted in suboptimal educational outcomes and highlighted the need for standardized textbooks. In response, the Ministry of Health (卫生部) proposed harmonizing acupuncture textbooks. Despite the challenges faced, a unified edition titled *Zhen Jiu Xue Jiang Yi* (《针灸学讲义》*Lectures on Acupuncture and Moxibustion*) was completed in 1961. This textbook has become a crucial resource for standardizing and preserving acupuncture knowledge, representing a significant advancement in the field and laying the groundwork for a theoretical system in the historical context. Current research focuses primarily on the Republic of China period (民国时期) and the characteristics of the unified compilation,[1] but historical investigations into the unification process itself after 1949 have been largely overlooked.

This paper focuses on the compilation and distribution of Zhu Lian's (朱琏, 1909–1978) *Xin Zhen Jiu Xue* (《新针灸学》*New Acupuncture and Moxibustion*), the 57th edition of *Zhen Jiu Xue* (《针灸学》*Acupuncture and Moxibustion*), as well as the inaugural edition of the unified textbook *Zhen Jiu Xue Jiang Yi* (Fig. 1).[2] The objective of this study is to delve into the historical context during the early days after 1949, elucidate various stages in the process of textbook unification, and explore the reasons behind the deviation of government-led

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A B C

Figure 1 The covers of three books: A Zhu Lian's *Xin Zhen Jiu Xue* (《新针灸学》 *New Acupuncture and Moxibustion*); B The 57th edition of *Zhen Jiu Xue* (《针灸学》 *Acupuncture and Moxibustion*); C The inaugural edition of the unified textbook *Zhen Jiu Xue Jiang Yi* (《针灸学讲义》 *Lectures on Acupuncture and Moxibustion*) (source with permission from: taken by the author)

acupuncture textbooks from their initial "scientific" trajectory towards a retrospective approach. Moreover, this research aims to understand how traditional medicine has been transformed after 1949, thereby enhancing the understanding of the contemporary academic system regarding acupuncture and the history of higher education in this field.

2 Keeping Yan'an tradition: The transition in Zhu Lian's *Xin Zhen Jiu Xue* (《新针灸学》 *New Acupuncture and Moxibustion*)

Acupuncture gained widespread popularity and underwent significant development during the Yan'an period, owing to its simplicity, affordability, and effectiveness. This practice played a crucial role in addressing the severe medical shortages in the Border Regions. In 1944, the Frontier Region government convened a symposium on Chinese and Western medicine (中西医座谈会) to promote "scientification of Chinese medicine and popularization of Western medicine (中医科学化 西医大众化)". During this event, Ren Zuotian (任作田, 1886–1950) delivered a speech highlighting the need for the Western medical community to rigorously investigate acupuncture's efficacy in treating diseases. He was also committed to providing acupuncture training to Western doctors, enabling them to conduct further research into its therapeutic applications. Zhu Lian and Lu Zhijun (鲁之俊, 1911–1999) were among the first Western-trained doctors to study Chinese medicine, establishing acupuncture classes and developing instructional materials. Their efforts played a pivotal role in popularizing acupuncture within the Chinese military, while also exploring scientific approaches to these techniques, thereby laying the groundwork for acupuncture education after 1949.

2.1 *Xin Zhen Jiu Xue* as the official reference and textbook

In the early years, faced with the enormous challenges of medical care and preventive health work, Chairman Mao Zedong (毛泽东, 1893–1976) consistently underscored the nation's health conditions and advocated for the continued implementation of the "Chinese-Western medicine cooperation (中西医合作)" policy, which had been established during the Yan'an period. This policy was crucial to sustaining the military medical and healthcare efforts initiated during War of Liberation. In October 1949, the inaugural National Health Administration Conference prioritized the "strengthening of unity and reforming Chinese medicine". In alignment with this, Lu Zhijun, vice minister of Health in the Southwest Military Region, delivered a report titled "Integration and transformation of Chinese and Western medicine (《中西医结合与转化》)", which compared the two medical systems in terms of convenience, cost-effectiveness, and efficacy, while also addressing their respective strengths and limitations. He emphasized that "to follow the cooperative path between Chinese and Western medicine as directed by the Ministry of Health of the Central People's Government, unity rather than division is essential". Later, at the first National Health Conference, Zhu De (朱德, 1886–1976) expounded on the issue of "scientization of Chinese medicine and localization of Western medicine in China", and commended Lu Zhijun, a doctor of Western medicine who learned acupuncture during the Yan'an period.[3] Li Dequan (李德全, 1896–1972) provided a formal definition of "scientific Chinese medicine" and emphasized the critical need to combine ancient clinical experience with modern scientific knowledge in the study of Chinese acupuncture. He further advocated for the establishment of Chinese medicine training schools.[4] The policy of "unity of Chinese and Western medicine" thus laid the foundation for the

emergence of "scientific acupuncture", which became a guiding principle for the future development of acupuncture and was promoted through Chinese medicine training initiatives.

In the same year, following the recommendation of Liu Bocheng (刘伯承, 1892–1986), Lu Zhijun undertook the revision of his wartime instructional materials, culminating in the publication of *Xin Bian Zhen Jiu Xue* (《新编针灸学》 *Newly Compiled Acupuncture and Moxibustion*). Liu Bocheng, in his foreword, asserted "it is necessary to organize Chinese medicine with modern scientific methods".[5] Echoing this sentiment, Deng Xiaoping (邓小平, 1904–1997) remarked "It is a highly important task to critically accept and organize our vast scientific heritage". The revised edition, in contrast to its 1947 predecessor, notably excised references to the traditional concepts of "meridians and pulse", instead of adopting standardized disease nomenclature in line with contemporary scientific discourse. Moreover, it posited that the popularization, application, and ongoing refinement of acupuncture techniques could constitute a practical synthesis of "science and theory". Despite its alignment with the dominant "scientific" paradigms of the era, the text was not widely embraced as a formal teaching resource for acupuncture. This lack of adoption can be attributed to the manual's predominant focus on clinical practice, which came at the expense of a robust theoretical framework. Furthermore, Lu Zhijun's limited clinical authority further diminished the potential for acupuncture to gain broader institutional prominence during this period.

During the same period, Zhu Lian undertook the revision and organization of the initial draft of acupuncture teaching materials from the North China Health School. These notes represented a deliberate departure from traditional theories of meridians, collaterals, and the dichotomy of acupuncture tonics and purgation. Instead, they integrated contemporary scientific knowledge drawn from Soviet and Japanese medical frameworks to explore and elucidate the mechanisms of acupuncture in accordance with modern scientific principles. This effort culminated in the development of a systematic approach known as *Xin Zhen Jiu Xue*. On February 15th to 16th, 1951, two articles by Ma Jianxing (马健行)—"Acupuncture treatment for schizophrenia in China (《中国针灸术治好了"精神分裂症"》)" and "How acupuncture cures schizophrenia (《针灸术治愈"精神分裂症"的经过》)"—were published in *People's Daily* (《人民日报》), documenting Zhu Lian and his student Xu Shiqian's (许式谦) successful application of acupuncture in treating schizophrenia. These reports garnered considerable attention from the Ministry of Health. In the following days, *People's Daily* ran a series titled "The significance and principles of acupuncture therapy (针灸疗法的重要性及其原理)", further promoting the New Acupuncture system. The official release of *Xin Zhen Jiu Xue* in March, 1951 was marked by inscriptions from Zhu De, Vice Premier Dong Biwu (董必武，1886–1975) of the Government Administration Council, and Zhang Panshi (张磐石, 1905–2000), head of the Publicity Department of the North China Bureau, as part of the preface. The involvement of these high-ranking figures indicated substantial endorsement from the government's leadership. This media campaign ignited the first wave of public discourse on acupuncture, catapulting Zhu Lian and his *Xin Zhen Jiu Xue* to national prominence.

On March 7th, the Ministry of Health convened a symposium on acupuncture therapy, attended by prominent figures such as He Cheng (贺诚, 1901–1992), Huang Dingchen (黄鼎臣, 1901–1995), and Zhu Lian. The symposium facilitated a cross-disciplinary dialogue between experts in Chinese and Western medicine, focusing on the efficacy of acupuncture, the selection of acupuncture points, and stimulation techniques. During the meeting, Zhu Lian elaborated on the reasons for the growing prominence of acupuncture, as advocated by *People's Daily*. He critically examined the factors contributing to its popularization, highlighted ongoing challenges in contemporary acupuncture research, and called for empirical studies to determine the "physiological, anatomical, and pathological effects of acupuncture". This symposium underscored the government's commitment to advancing acupuncture therapy, promoting a harmonized understanding between Chinese and Western medical traditions, and fostering collaborative research. Furthermore, the event marked a significant step in advancing scientific applications within acupuncture, laying the groundwork for the integration of acupuncture into formal medical curricula. Following this, the Chinese Medicine Association organized a "Committee for Acupuncture Research" meeting, where Zhu Lian stressed the importance of sterilization practices in acupuncture and the urgent need to train qualified practitioners. At the behest of Dong Demao (董德懋), Zhu Lian was tasked with establishing acupuncture courses. On April 21st, the Acupuncture and Moxibustion Committee was officially established to align with the health policies and outline the future trajectory and objectives of *Xin Zhen Jiu Xue*. The committee's efforts attracted a considerable number of physicians interested in enrolling in acupuncture courses, thereby further institutionalizing acupuncture within the medical field.

On July 22nd, the Acupuncture and Moxibustion Committee inaugurated the first Acupuncture Research Class at the Beijing School for the Further Education of Chinese Medical Practitioners (北京中医进修学校). This intensive three-month program encompassed a broad curriculum, including courses in physiological anatomy, pathological diagnostics, bacteriology, disinfection, *Xin Zhen Jiu Xue*, and social sciences. Zhu Lian, a leading figure in the field, was specially invited to lecture on *Xin Zhen Jiu Xue*, emphasizing the vital role of integrating politics and technology to enable acupuncture to fully serve the people and realize its potential. The

primary aim of the Acupuncture Research Class was to advance practitioners' knowledge in physiological anatomy, pathological diagnosis, and disinfection practices, in line with the principle that "Chinese medicine should embrace scientific diagnostic methods and modern medical tools while adhering to the laws of social development. Ultimately, the program sought to chart a new course for academic progress within Chinese medicine, enhancing its capacity to serve the needs of the people".

The recent series of *Xin Zhen Jiu Xue* courses were co-taught by Zhu Lian, Wang Xuetai (王雪苔, 1925–2008) and Ma Jixing (马继兴, 1925–2019), comprising 12 sessions divided between theoretical instruction and clinical practice. On October 4th, the Ministry of Health and the Ministry of Education jointly issued curriculum standards, incorporating clinical studies in Chinese medicine alongside courses on acupuncture and bone-setting. Further advancing this initiative, the Ministry of Health issued the "Regulations on the organization of the schools and classes for the further education of Chinese medical practitioners (《关于组织中医进修学校及进修班的规定》)" on December 27th, mandating that specialized courses in acupuncture research prioritize *Xin Zhen Jiu Xue* as the core text. These regulations also called for the inclusion of foundational medical subjects such as anatomy, physiology, pathology, bacteriology, and disinfection. With the official designation of *Xin Zhen Jiu Xue* as the authoritative reference for traditional Chinese medicine (TCM) training institutions, the textbook now serves as the cornerstone for acupuncture education across the country.

2.2 The acclaim and dissemination of *Xin Zhen Jiu Xue*

Xin Zhen Jiu Xue served as a crucial "emergency transition" in early education. As Tang Xuezheng (唐学正) observed, "Medical professionals across the nation are actively engaged in studying acupuncture therapy, while general readers are turning to Zhu Lian's *Xin Zhen Jiu Xue*". To support self-directed learning, Tang compiled reference materials that delineate effective study methods, foundational concepts, and essential perspectives.[6] Lin Fangmei (林方梅), from the Health Department of Hengyang City in Hunan Province, emphasized the scientific rigor of *Xin Zhen Jiu Xue*, stating "Comrade Zhu Lian's work is rich in scientific content, which led me to select it as the textbook for my acupuncture courses in the class for the further education of Chinese medical practitioners". This endorsement underscores the text's vital role in shaping acupuncture education and its integration into professional practice.

As the teaching of acupuncture progresses, challenges regarding educational materials have begun to emerge. First and foremost, *Xin Zhen Jiu Xue* was best suited for experienced Chinese medicine practitioners who have completed foundational training and possess clinical experience. There remained a pressing need to revise textbooks to better accommodate students from lower-income areas, whose educational backgrounds may vary significantly. Additionally, the incorporation of Chinese medicine courses within Western medicine curricula was limited, typically adhering to a condensed model of "theoretical study + clinical practice". This approach has led to fragmented and superficial knowledge of *Xin Zhen Jiu Xue*, lacking the coherence necessary for comprehensive instruction. As Li Qianxia (李倩侠) noted, "The content is intricate and diverse, with some aspects appearing outdated and insufficiently coherent for practical application in clinical treatment, rendering it unsuitable for beginners".[7] Consequently, there was a growing trend toward the diversification of teaching materials for *Xin Zhen Jiu Xue*, aimed at addressing these gaps and enhancing the overall educational experience. This evolution was essential for ensuring that acupuncture education is both accessible and relevant to practitioners at all levels.

For instance, Ma Jixing, a key contributor to *Xin Zhen Jiu Xue*, compiled the acupuncture section of *Jian Yao Zhen Jiu Zheng Gu* (《简要针灸正骨》 *Essentials of Acupuncture, Moxibustion and Bone-setting*) for short-term training programs. This work emerged amid growing interest in Pavlovian theory in China. Ma, leveraging his expertise in anatomy and physiology, explained acupuncture mechanisms through Pavlov's theory of the advanced function of the nerves, emphasizing precise stimulation point localization and establishing a scientific foundation for "systematic organization of *Xin Zhen Jiu Xue*". The 1954 revised *Xin Zhen Jiu Xue* included cerebral cortex physiological activity, elucidating acupuncture principles via Pavlovian theory and addressing Japanese misinterpretations. Mao Zedong endorsed this approach, stating, "Pavlov's theory provides crucial insights into acupuncture treatment, while acupuncture offers abundant practical evidence". This synthesis of acupuncture with Soviet medical theory exemplifies efforts to modernize Chinese medicine in mid-20th century China, reflecting the intersection of political ideology, scientific advancement, and medical practice. Ma's work significantly contributed to establishing a scientific theoretical foundation for acupuncture in this period. The official designation of *Xin Zhen Jiu Xue* as a textbook further enhanced its stature, attracting Soviet experts to China to study acupuncture using this authoritative reference. Moreover, several educational institutions, including the Acupuncturist Training Class of the Ministry of Health in Central South, the Health Department of Shanxi Province, the Schools for the Further Education of Chinese Medical Practitioners in Jiangxi, Liaodong, Chongqing and Anhui province have incorporated *Xin Zhen Jiu Xue* into their curricula, ensuring its widespread adoption and influence in acupuncture education.

Prior to comprehensive compilation textbooks, acupuncture education primarily followed Zhu Lian's *Xin Zhen Jiu Xue* while maintaining structural links to Yan'an-era traditions. These texts omitted classical literature and meridian theories, instead incorporating Soviet Pavlovian theory. The curriculum emphasized practical aspects like disinfection, acupoint anatomy, and treatment point selection. This blend of acupuncture techniques and scientific theories, aligned with goals to "modernize TCM" and "efficiently cultivate skilled acupuncturists". This approach reflected the convergence of political ideology, modernization efforts, and pragmatic medical needs in contemporary China.

3 Local initial exploration: *Zhen Jiu Xue* (《针灸学》*Acupuncture and Moxibustion*, 1957)

In 1954, Chinese medicine education remained prevalent across most regions, having undergone a significant transformation. The First Congress of Chinese Medicine in the Central South Region, convened in June 1953, marked a historical turning point in Chinese medicine policy.[8] This event reflected the Ministry of Health's shifting inclination towards Chinese medicine, subtly deviating from the medical policies established during the Yan'an period. Subsequently, the Third National Health Administrative Conference in December proposed to "enhance the efficacy of TCM and adequately leverage its potential in preserving Chinese medical heritage", as well as to "expand research efforts on acupuncture while organizing training programs for it". In response to this decision, Ke Qingshi (柯庆施, 1902–1965), the party secretary of Jiangsu province who had attended the November Politburo meeting and comprehended Mao Zedong's strategic direction, organized an informal gathering on New Year's Eve. He invited numerous Chinese medicine experts to engage in a comprehensive discussion on pertinent Chinese medicine-related issues within their own homes.[9] Ke proposed the establishment of a hospital and a school of Chinese medicine, assigning responsibility for these matters to Lyu Bingkui (吕炳奎, 1914–2003), who was designated as the "commander of Chinese medicine".

3.1 The preparation for Jiangsu Chinese Medicine School

In March, Lyu Bingkui organized the inaugural symposium for Chinese medicine representatives in Jiangsu province, inviting renowned practitioners such as Zou Yunxiang (邹云翔, 1896–1988), Cheng Dan'an (承淡安, 1899–1957), Qiu Maoliang (邱茂良, 1913–2002), and Ye Juquan (叶橘泉, 1896–1989) to deliberate on specific issues.[10] In the autumn of that year, Lyu Bingkui was appointed as the director of Jiangsu Provincial Department of Health, subsequently embarked on the challenging task of training Chinese medicine teachers and developing teaching materials for the establishment of Chinese Medicine School. The "doctors of TCM learning Western medicine (中学西)" training course, previously organized by the Department of Health, served as the foundation for each city and county to select young Chinese medicine practitioners to participate in the Class for the Further Education of Trainee Teachers in Chinese Medicine (中医师资进修班). The course adopted an innovative teaching approach known as the "alternating teaching method", which involved teacher-led instruction, student-led peer learning, and collaborative teaching between teachers and students. Additionally, the textbook was developed through group discussions, setting a precedent for other schools to emulate.

The Jiangsu Provincial School for the Further Education of Chinese Medical Practitioners (江苏省中医进修学校) was established on October 15th, 1954, with Cheng Dan'an as its inaugural president. Although the initial purpose was not explicitly clear, Cheng Dan'an, a pioneer in modern acupuncture education, had previously established the China Acupuncture Research Centre (中国针灸研究社), reformed its curriculum content, and propagated academic excellence in this field. In the early days of PRC, he upheld the benevolence of acupuncture to "promote public health", demonstrating extensive experience in educational administration and a compassionate approach to medicine, making him well-suited for this responsibility. Upon assuming his position, Cheng perceived himself burdened with a novel ideological responsibility and faced the formidable task of advancing the legacy of Chinese medicine. Despite his deteriorating health, he exerted unwavering dedication to strategizing for the advancement of Chinese medicine education. During the school's preparatory period, confronted with a shortage of teachers and teaching materials, Cheng and education experts deliberated on issues pertaining to "education policy", "teaching focal points and subject names", and "compilation regulations for teaching materials". The inconsistency between old and new teaching materials posed a challenge. The proposition of "old learning" was presented, candidly emphasizing the remarkable treatment efficacy rooted in traditional medical theory. During discussions on education issues with Zou Yunxiang and Cao Minggao (曹鸣皋), Cheng emphasized the importance of incorporating ancient Chinese medical texts such as *Huang Di Nei Jing* (《黄帝内经》 *The Yellow Emperor's Inner Classic*), *Shang Han Za Bing Lun* (《伤寒杂病论》 *Treatise on Cold Damage and Miscellaneous Diseases*), *Shen Nong Ben Cao Jing* (《神农本草经》*Shen Nong's Classic of the Materia Medica*), and *Jin Gui Yao Lue* (《金匮要略》*Essentials from the Golden Cabinet*) [following the "Four Classics (四课)"] to preserve. This approach was not regressive or conservative but rather aimed to advance Chinese medicine by making it more

scientifically oriented.[11] This continued the educational concept established by the China Acupuncture Research Centre, regarding classical Chinese medicine as a compulsory course. With government approval, Sun Yanru (孙晏如, 1907–1960) , Qiu Maoliang, Li Chunxi (李春熙, 1899–1988), and additional former colleagues of Cheng with extensive academic experience were invited to join the school as teachers.

Concurrently, Cheng utilized various opportunities to consult colleagues nationwide during the first meeting of the second session of the National Committee of the Chinese People's Political Consultative Conference (December 21st to 25th, 1954). He sought advice from Shi Jinmo (施今墨, 1881–1969), Chen Bangxian (陈邦贤, 1889–1976), and Zhao Yuqing (赵玉青) regarding the textbook. Their consensus was that "It is imperative to compile modern teaching materials, as there is a scarcity of individuals proficient in the discourse of Chinese medicine classics (非新编不可，原本恐少有人能讲云)". Cheng visited Lu Zhijun and Zhu Lian to engage in discussions on their expertise in school administration. Zhu Lian provided guidance on enhancing teaching materials through the implementation of "listening record + listening experience" and "special report + discussion" teaching methods. The visit to the acupuncture facility in Shanghai and the observation of its diverse operational methods appeared to be essential for comprehending integrated acupuncture practice.[11] Upon his return to Nanjing, Cheng submitted teaching materials and exchanged views from Beijing and Shanghai. He held separate discussions with Wu Jihou (吴基厚), Qiu Maoliang , Sun Yanru, and Li Chunxi regarding the compilation of teaching materials for the acupuncture specialty class. Subsequently, he identified nominees for course and internship supervision.

On February 8th, 1955, the report delivered by Lyu Bingkui emphasized the necessity for Western medicine practitioners to commence their study of Chinese medicine from the classics, while Chinese medicine practitioners should prioritize studying and understanding the Four Classics. Cheng Dan'an stated, "In order to advance the development of Chinese medicine, it is imperative to thoroughly examine the Four Classics, enhance comprehension and application of Chinese medicine theory, optimize therapeutic outcomes, and systematically summarize achievements. This entails conducting scientific research to uncover the truth, integrating with modern medicine to establish a genuinely scientific Chinese medicine system, and ultimately evolving into an independent new medical discipline. We must be well aware of the necessity to review the past and acquire new knowledge (发扬中医固然首先要温习四课，加强中医学理认识与运用，提高疗效，总结成果，乃付诸科学研究得出真理，乃能与现代医学会流，而成为真正的科学化中医，再进一步成为独立的新医，因此必须要在温故之中有知新的必要)".[11] The emphasis on clinical practice of acupuncture served as the catalyst for Cheng's transition to a scientific approach in the field, thereby paving the way for Lyu Bingkui to formally propose and advocate for the future review of Chinese medicine courses. This further highlight Cheng's teaching proposition rooted in tradition and reverence for classical texts. However, while they appear to coincide, there exists a subtle deviation in internal comprehension, which also exerts a significant influence on the classical reconstruction of acupuncture textbooks.

A discussion on textbook compilation and editing took place on February 15th. Regarding the nomenclature of diseases in the textbook, it was decided that "Chinese medicine disease names should take precedence as the primary focus, while Western theories should not be adopted within each disease's outline. In narrative materials, comparisons with Western medicine should be included".[11] This decision deviated from the conventional approach to naming diseases in both Chinese and Western medicine as presented in Zhu Lian's *Xin Zhen Jiu Xue*. The Jiangsu Provincial School for Further Education of Chinese Medicine Practitioners, which officially opened on March 13th, successfully overcame numerous challenges in implementing acupuncture courses and practice methods. Simultaneously, the inaugural phase of TCM training began with the commencement of acupuncture classes. Students for this program were carefully selected from a pool of highly experienced Chinese medicine doctors, while exceptional students had the opportunity to progress to the second phase as teacher trainees.

3.2 Editing acupuncture teaching materials

At the commencement of the semester, Li Chunxi and Sun Yanru were tasked with teaching acupuncture. In the textbook, Li Chunxi compiled the section on meridian points, while Cheng Dan'an suggested removing the sections on anatomy and indications. Cheng noted, "I implore you to delete the two sections on anatomy and indications as they go against the original intent. Instead of focusing on anatomy, Chinese medicine emphasizes different parts of the body. When using Chinese medicine terms, it is important to consider that others may not understand them or have limited time for interpretation. It is therefore more practical to discuss common points of use, and actual experiences in the treatment of specific diseases; otherwise, it would be laborious without any clear intention (大背原意，请之删去解剖、主治二项。中医本无解剖，只有部位；　取主治皆中医名称，他们不懂，要讲则时间不许，也不适用。只要于取法之外，将常用穴与某病有经验过之实效去谈，切合实际，否则劳而无意)". The treatment section was primarily authored by Sun Yanru, who drew heavily on classical literature. Cheng conveyed that "the available time was limited and discussing experiences in more depth would be beneficial (时间短、不切用，还是多谈经验)". The course arrangement demonstrated the interaction

between acupoint therapy and a spare acupoint demonstrator.[11] The school established a teaching material editing model of "writing, instructing, and revising (边写、边教、边改)", and compiled the versions A, B, and C of *Zhen Jiu Xue Jiang Yi*, which were utilized at various levels by Chinese and Western doctors. Among these, *Zhen Jiu Xue Jiang Yi* (Version A) adhered most closely to the draft teaching plan adopted in September 1955, which proposed that the teaching content should primarily focus on introducing the history of acupuncture and moxibustion, acupuncture science, moxibustion science, acupuncture points, and therapy, etc.[12] This essentially maintained the style and content of Cheng Dan'an's *Zhong Guo Zhen Jiu Xue Jiang Yi* (《中国针灸学讲义》*Lectures on Chinese Acupuncture and Moxibustion*, 1940). *Zhen Jiu Xue Jiang Yi* (Version C) enhanced the clarity of relevant terms and provided precise definitions, including the fundamental concepts of eight principles (八纲), four diagnoses (四诊), *Ying-Wei* (营卫), and so on. These laid a solid foundation for the development of acupuncture theory within the framework of *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation) system.[13]

In 1956, Lyu Bingkui proposed a systematic approach to the study of TCM, rooted in the principles of "systematic exploration, comprehensive assimilation, and subsequent organization and enhancement (先系统学习、全面接受，然后整理提高)". This method emphasized the review of fundamental theories, addressing its clinical deficiencies in foundational knowledge and the profession's heavy reliance on experiential practices, which hindered advancements in technical proficiency. Accordingly, Lyu advocated the prompt study of classical works through collective learning and correspondence.[14] The "Doctors of Western medicine study Chinese medicine (西学中)" course was scheduled to commence in Jiangsu province in the latter half of the year. Participants were expected to complete fundamental coursework on the "Four Classics" and acquire essential knowledge of practice within a three-year period.[15] To facilitate this, lecturers of the "Four Classics" and comrades from the school's teaching and research group were brought together to collaboratively prepare lessons.[16] Upon the completion of the second TCM training course, the students concentrated on the further study of classics, and the study of "Four Classics" lasted for 770 hours. Trainees unanimously acknowledged significant improvements in both their theoretical understanding and practical application of acupuncture by the end of the first trainee teacher class.[17] The "Four Classics" course at the school, having undergone a trial period, became a central focus of instruction across various subjects. Teaching materials for acupuncture were continuously updated and refined, drawing from both teaching experience and practical applications. In July, Li Chunxi completed *Zhen Jiu Xue Jiang Yi (Zan Bian Ben)* [《针灸学讲义 (暂编本)》, *Lectures on Acupuncture and Moxibustion (Temporary Edition*), also called Version D], which closely followed the structure of the third edition of *Zhen Jiu Xue Jiang Yi* (Version B, March 1956). This effort established a preliminary framework for the discipline of acupuncture, encompassing modules on acupuncture techniques, acupoints, and therapeutics. In contrast to the book *Xin Zhen Jiu Xue*, the temporary edition's section on the "Acupuncture Points" introduced fundamental acupuncture theories, such as meridian theory, for the first time. This inclusion marked a shift in focus away from nerves and stimulation, signaling a resurgence of traditional principles within acupuncture textbooks.

In the following year, Cheng Dan'an advocated that the study of meridian theory should be the primary focus of theoretical training within the acupuncture community. Under the auspices of "Acupuncture and Moxibustion Warm Course (针灸温课)", Cheng underscored the importance of returning to classical acupuncture knowledge as the foundation of instruction. In conjunction with this theoretical shift, the school launched a nationwide "Acupuncture and Moxibustion Tour Teaching (针灸巡回教学)" program,[18] extending its outreach beyond Jiangsu Province to disseminate acupuncture techniques more widely among the general public. The implementation of this program was accompanied by an extensive investigation into ancient acupuncture texts, which informed the creation of instructional materials that prioritized simplicity and comprehensiveness (既简便又全面). These new guidelines for prescription writing and point allocation were designed to enable students to quickly master the intricate indications of acupuncture points, thus streamlining the learning process. The resolution of pedagogical challenges through these innovations not only demonstrated the credibility and scientific validity of meridian theory, but also elevated its professional standing within the broader medical community.

Zhen Jiu Xue (1957), edited by the Acupuncture Discipline Teaching and Research Group, was published by Jiangsu People's Publishing House in October. This publication has become a foundational resource for acupuncture instructional materials, establishing itself as an essential work within the field of Chinese acupuncture and moxibustion. Compiled by Mei Jianhan (梅健寒, 1924–2004) and Li Hongkui (李鸿奎) from the inaugural trainee teachers class , the book benefited from meticulous transcription and proofreading by Xia Zhiping (夏治平, 1932–2021) and Yuan Jiuling (袁九棱). Revisions were informed by *Zhen Jiu Xue Jiang Yi* (Version A). Li Hongkui's writing proficiency significantly contributed to the project, assisting Zhao Erkang (赵尔康) in compiling *Zhong Hua Zhen Jiu Xue* (《中华针灸学》*Chinese Acupuncture and Moxibustion*). In contrast, Mei Jianhan exhibited remarkable aptitude for exploring classical literature, analyzing it through detailed charts. Most diagrams depicting the fourteen classics, along with rules regarding acupuncture points, are

attributable to his innovative insights.[19] This volume's stylistic approach differs markedly from works by Zhu Lian and Cheng Dan'an and the four textbooks (Version A, B, C and D). The authors emphasized classical principles, focusing on the organization and transmission of classical meridians and acupoints, while drawing on Japanese experiences for reference. The contemporary educational system for acupuncture is structured around four interconnected knowledge modules: meridians, acupuncture points, acupuncture and moxibustion methods, as well as therapeutics (经络、腧穴、刺灸和治疗). This incorporation of meridian theory has affirmed its pivotal role in the field. Following its release, the book received widespread acclaim from the academic community and has been integrated into subsequent compilation textbooks.

By 1957, the institution had established two cohorts of educators specializing in acupuncture (针灸师资班), comprising 113 individuals. Concurrently, three specialized courses in acupuncture (针灸专修班) were offered, enrolling 128 students. Additionally, the institution organized 32 workshops on acupuncture across 29 cities, effectively reaching a total of 2,282 participants. Numerous faculty members actively sought teaching experiences through collaborative engagements, notably illustrated by Xu Jianquan's (徐鉴泉) visit to Cheng Dan'an from Hankou. This visit facilitated discussions on a wide range of topics, including disinfection techniques, meridian understanding, tool utilization methods, and contemporary research requirements.[11] During this pivotal period, the institution trained a significant number of acupuncture instructors who not only remained at the school but also contributed to the compilation of important textbooks. Among these were the inaugural edition of *Zhen Jiu Xue Jiang Yi* and *Zhen Jiu Zhi Liao Xue* (《针灸治疗学》 *Acupuncture and Moxibustion Therapy*), both edited by Yang Changsen (杨长森), a student from the first traditional Chinese medicine training class. With support from the Jiangsu provincial government, Cheng Dan'an collaborated with the Jiangsu Provincial School of TCM to critically examine the educational trajectory of acupuncture during the Republican era, thereby providing vital resources for the organized development of teaching practices in subsequent periods.

4 Ministry of Health unified acupuncture teaching materials

In June 1954, Mao Zedong provided directives intended to help organize Western physicians in their study of Chinese medicine. The reformation of Chinese medicine policies led to a notable shift in the perception of Chinese medicine, driving Western practitioners to deepen their understanding of Chinese medicine for scientific clarification. As a result, there has been an exceptional increase in the exploration of Chinese medicine theories, aimed at nurturing the evolution of a cohesive "new medicine" that integrates both Chinese and Western approaches. By the time the first Higher Medical Education Conference convened, the reshuffling of faculty had been finalized. However, there was still a lack of a thorough set of instructional materials in the medical colleges. Although there had been some push for the direct adoption of Soviet textbooks, this method was not completely accepted due to its incompatibility with Chinese national circumstances. Shi Jinmo argued that creating a standardized textbook on TCM science is vital for promoting scientific advancement in this sector. This resource will also lay the groundwork for future educational institutions, hospitals, and clinical training programs, which were crucial for enhancing Chinese medicine through a more scientific lens. Thus, he suggested compiling and updating a unified set of educational materials for TCM.[20]

4.1 The scarcity of educators and teaching resources

The Party Committee of the Cultural Work Commission of the CPC Central Committee (中央文化工作委员会党委) highlighted the necessity for TCM education to be built upon an all-encompassing curriculum incorporating every facet of TCM，within its "Report to the Central Committee on strengthening the work of Chinese medicine (《关于改进中医工作问题给中央的报告》)", presented on October 26th, 1954. It additionally emphasized the need to establish a dedicated Research Academy of TCM (中医研究院) and to prioritize the training of educators and the development of teaching materials for medical institutions. The proposals were subsequently endorsed on November 12th.[21] The Ministry of Health's Department of TCM has been elevated, and Guo Zihua (郭子化) has been appointed as the assistant minister to manage Chinese medicine affairs. On December 19th of the subsequent year, the formation of the Research Academy of TCM was announced, initiating the first extracurricular program on TCM aimed at Western medical professionals. This initiative was part of broader efforts to improve TCM practices, assuming a significant role in training educators and developing textbooks. The Ministry of Health addressed the teacher training issue in July, tasking the Central Acupuncture Research Laboratories (中央针灸疗法实验所) with running a six-month course. Zhu Lian acted as the lead instructor, employing *Xin Zhen Jiu Xue* as the instructional material. There was a marked difference in acupuncture teaching methodologies between Beijing and Nanjing, with Beijing maintaining the traditional approach of "doctors of TCM learning Western medicine", while Nanjing has pursued an innovative strategy. Between late 1955 and early 1956, Western medicine training classes were initiated in cities like Beijing, Shanghai, Chengdu, and Tianjin, modeled after

the Research Academy of TCM, resulting in a nationwide increase.

From March to May 1956, the Ministry of Health organized a symposium, which determined that "doctors of Western medicine study Chinese medicine", the appropriate arrangement of TCM work, and the apprenticeship training of TCM doctors were key priorities.[22] As a component of this strategy, plans were formulated to create four Chinese medicine colleges in Beijing, Shanghai, Guangzhou, and Chengdu, aiming to encourage "doctors of Western medicine study Chinese medicine" across the country. To tackle the challenge of teaching materials, the Research Academy of TCM set up the Teaching Materials Editing Committee (中医教材编辑委员会), which was responsible for compiling the inaugural edition of teaching materials on TCM. This included subjects such as internal medicine, surgery, acupuncture and Chinese medical history. In June, four TCM colleges were established, followed by provinces, with explicit recommendations on the curriculum and textbooks for acupuncture courses. As a result, acupuncture education was formally integrated into the national higher education system. However, following the implementation of the policy, questions arose about how to approach learning TCM: which teaching materials to use, how to effectively conduct teaching activities, and what learning methods should be employed. It appears that a consensus has been reached in favor of reviewing classical texts in Chinese medicine.[23]

Challenges encountered in the early stages of TCM education, such as the use of ancient and complex vocabulary, and the lack of a well-defined teaching syllabus, have contributed to the disparity between the demand for and supply of qualified teachers. Additionally, the integration of Western medical practices and the establishment of new Chinese medical colleges have further exacerbated this issue. In response to a critical shortage of instructors at the Beijing College of TCM, Lyu Bingkui, the newly appointed head of the Department of TCM at the Ministry of Health, sought assistance from Nanjing. Consequently, Cheng Xinnong (程莘农, 1921–2015) and Yang Jiasan (杨甲三, 1919–2001) were transferred to lead the acupuncture teaching and research groups at the hospital and the acupuncture department of the affiliated hospital, respectively. This initiative helped establish a regular teaching routine, which has since been colloquially referred to as the "The practice of TCM originated in Nanjing". In early 1957, comprehensive and systematic research on TCM was vigorously promoted to address the issue of diverging opinions within the TCM profession. The involvement of Lyu in the Ministry of Health undoubtedly played a significant role in advancing the "doctors of Western medicine study Chinese medicine" policy alongside Guo Zihua and facilitating future efforts to compile unified textbooks. As a result, the "Jiangsu Provincial School of TCM", with its distinctive identity, emerged as a prominent center for developing acupuncture textbooks and providing teacher training.

The Teaching and Research Office of Jiangsu TCM College asserts that "The compilation of comprehensive teaching materials has emerged as the most pressing task for TCM educational institutions. We do not advocate for academic uniformity; however, establishing a set of principles, requirements, and a clearly defined purpose for demonstration textbooks would significantly enhance TCM teaching efforts by providing robust support. This initiative should be prioritized by the Research Academy of TCM as one of its foremost objectives, while also ensuring timely review and guidance for textbook authors."[24] In September 1957, the Jiangsu TCM School successfully compiled a comprehensive set of teaching materials, effectively addressing the most significant challenges in medical education nationwide. At the immediate request of the Ministry of Health, Korean medical representatives visited the Jiangsu TCM School, while Soviet and Mongolian doctors were sent to acquire knowledge of acupuncture.

4.2 *Bian Zheng Lun Zhi* (辨证论治 treatment based on pattern differentiation): core focus of textbook compilation

The standardization of TCM education in China marks a pivotal moment in the history of medical pedagogy. Prior to this initiative, the decentralized nature of TCM instruction, with individual colleges compiling their own teaching materials, resulted in educational disparities and a lack of curricular consistency. Recognizing this deficiency, Guo Zihua advocated for the implementation of unified teaching materials across Chinese medicine institutions to elevate the quality of education. Guo emphasized the imperative of adhering to the theoretical framework of TCM, with particular focus on *Bian Zheng Lun Zhi* and holistic concepts, thus ensuring that the new textbooks would strike a balance between comprehensiveness and concision. On May 27th, 1958, during the Second National Class for the Further Education of Trainee Teachers in Chinese medicine in Nanjing, Guo underscored the significance of harmonizing teaching policies, collaborative study and enhancement of pedagogical methods, and the systematic organization of instructional materials. This call to action precipitated a series of conferences dedicated to the development of standardized national teaching materials. The first of these convened in Nanjing in July 1958, followed by a meeting in Chengdu in April 1959 to delineate the plan and division of labor for compiling TCM teaching materials. These efforts culminated in the formulation of a comprehensive strategy for developing syllabi and instructional materials for TCM colleges.[25] In June, representatives from the five preeminent TCM institutions in Nanjing, Beijing, Shanghai, Guangzhou, and Chengdu convened to review the proposed outlines

and establish compilation principles. The acupuncture delegation included luminaries such as Lu Shouyan (陆瘦燕, 1909–1969) from Shanghai, Cheng Xinnong from Beijing, Qiu Maoliang, Li Chunxi, Yang Changsen, and Xia Zhiping from Nanjing. This assembly was instrumental in developing a framework for acupuncture teaching materials, drawing upon Lu Shouyan's recommendations and incorporating content from historical texts preserved in Nanjing. The textbook review meeting on March 16th, 1960, Guo Zihua and Lyu Bingkui presided over the textbook review meeting. Guo put forward that "improving the construction of textbooks is the central link of TCM education. The newly compiled textbooks should incorporate not only the essence of Chinese medicine theory but also the rich clinical experience and modern research achievements since the liberation of China. The new textbook must reflect the characteristics of *Bian Zheng Lun Zhi* and become a scientific, systematic and practical excellent textbook (搞好教材建设，是办好中医教育的中心环节，新编教材，既要囊括中医理论精华，又要包涵丰富的临床经验及解放以来近代研究成果；新教材必须反映出中医辨证论治的理法特色，成为科学性、系统性、实践性强的优秀教材)".[26]

Guo Zihua's advocacy for the principle of *Bian Zheng Lun Zhi* was evident in his public discourse, particularly in his promotion of TCM's efficacy in treating Japanese encephalitis (乙型脑炎).[27] The concept, introduced in 1955, evolved into "treatment based on differentiation of patterns (辨证施治)", a term that gained prominence following Zhu Yan's (朱颜) discourse and became well-established by 1958. Pu Fuzhou (蒲辅周, 1888–1975) worked in the Academy of TCM, proposed that "This is the valuable experience accumulated by Chinese medicine over thousands of years, which in line with the advanced scientific thought of dialectical materialism. The policy on TCM stipulates that 'systematic study and comprehensive mastery' is to master *Bian Zheng Lun Zhi*".[28] Liang Maoxin (梁茂新) observed that "*Bian Zheng Lun Zhi* were systematically summarized and abstracted in the context of establishing the first batch of TCM universities in 1956, when the TCM community drew upon ancient literature to conduct a comprehensive synthesis of fundamental theories and clinical experience to develop teaching materials".[29] The concept of *Bian Zheng Lun Zhi* served multiple purposes: it elucidated the scientific aspects of TCM, aligned with the national policy of integrating Chinese and Western medicine, and provided a compendium of fundamental diagnostic and therapeutic principles in TCM. This approach corresponded well with the prevailing emphasis on a "holistic perspective" and "systematic approach". Consequently, driven by central policy inclinations and robust promotion, the Ministry of Health incorporated *Bian Zheng Lun Zhi* into its curriculum teaching syllabus in 1959 as an exemplar discipline.

The integration of acupuncture theory with *Bian Zheng Lun Zhi* necessitated the compilation of a comprehensive acupuncture textbook. Lu Shouyan recounted his 1958 visit to Nanjing, where he observed notable advancements in acupuncture *Bian Zheng Lun Zhi* under president You Kun's (由崑) guidance. This experience informed his subsequent specialized lecture on the topic at Shanghai College of TCM, drawing from analyses in *Huang Di Nei Jing*.[30] Following the meeting, Liu Shunong (刘树农) emphasized the holistic and comprehensive nature of TCM theory, stressing the inseparability of meridian theory in *Bian Zheng Lun Zhi* from the implementation of four diagnoses and the induction of eight principles.[31]The first edition of the unified textbook *Zhen Jiu Xue Jiang Yi* was a collaborative effort, supervised by the Acupuncture Teaching and Research Group of Nanjing University of TCM and reviewed by experts from Beijing, Shanghai, Guangzhou, Chengdu, and Nanjing. Yang Changsen and Xia Zhiping were tasked with drafting the book, drawing on *Zhen Jiu Xue* as a prototype, constructing its framework and compilation style by synthesizing classical acupuncture works from previous dynasties, as well as contemporary texts such as Zhu Lian's *Xin Zhen Jiu Xue* and Cheng Dan'an's *Zhong Guo Zhen Jiu Xue* (Table 1). The treatment section, co-authored by Yang Changsen and Xia Zhiping, incorporated Chinese medicine prescriptions to enhance the *Bian Zheng Lun Zhi* approach while integrating acupuncture prescriptions. Xia recalled, "At that time, the prescriptions predominantly followed Herbal principles, which was unavoidable. For instance, TCM categorizes herbs into cold, hot, warm, cool, and neutral properties, but acupuncture points themselves do not possess such attributes. For example, Hegu (LI04) point could be prescribed for both clearing heat and dispelling cold, leading to inevitable repetition".[32] The book also incorporated the broader knowledge system of TCM, encompassing concepts such as the theory of yin-yang and five elements (阴阳五行学说), the theory of visceral manifestations (藏象学说), and the theory of qi, blood, and body fluids (气血津液学说), which exhibited correlations with the warm course policy of Chinese medicine and the acupuncture section in *Zhong Yi Xue Gai Lun* (《中医学概论》*An Introduction to Traditional Chinese Medicine*).

The publication of *Zhen Jiu Xue Jiang Yi* by Beijing People's Medical Publishing House in January 1961 marked a significant milestone in the transmission of acupuncture knowledge. This comprehensive resource addressed the pressing need for standardized teaching materials. Moreover, it disseminated a modern theoretical knowledge system of acupuncture, encompassing a holistic view and *Bian Zheng Lun Zhi*, to the broader acupuncture community. This textbook laid the foundational groundwork for establishing a theoretical system of acupuncture in the context of New China. The first edition of the textbook is widely regarded as a

Table 1 Comparison of three textbooks on acupuncture and moxibustion

	Xin Zhen Jiu Xue (《新针灸学》)	*Zhen Jiu Xue* (1957) (《针灸学》)	*Zhen Jiu Xue Jiang Yi* (《针灸学讲义》)
Knowledge system category	Acupuncture and moxibustion methods, stimulation points (孔穴), treatment (治疗)	Meridians (经络), acupuncture points (腧穴), acupuncture methods, moxibustion methods, treatment	Acupuncture points, acupuncture and moxibustion methods, treatment
Acupuncture thought	Based on neural theory	Based on the meridian theory	Based on the meridian theory
Characteristic	Standardized clinical procedures, stimulation points, disease-oriented experience accumulation, avoiding traditional acupuncture theory, and omiting the meridian sequence	Focusing on the conceptual expression of acupuncture knowledge, the pathways of the fourteen meridians, and the general indications, the names of TCM diseases are carefully selected	Focusing on *Bian Zheng Lun Zhi*, continuously incorporating the findings from integrated Chinese and Western medicine research, as well as the latest advancements in teaching and research practices

reflection of the theoretical framework of TCM, providing a unified blueprint for teaching in TCM colleges and significantly contributing to improving the quality of education.[25] While Huang Longxiang (黄龙祥) praised this textbook, he also noted that the incorporation of *Bian Zheng Lun Zhi* has resulted in a significant disconnection between the theory and practice of acupuncture diagnosis and treatment, likening its clinical application to wearing ill-fitting shoes.[33]

In sum, the development and implementation of unified acupuncture teaching materials in China represents a watershed moment in the history of TCM education. While the incorporation of *Bian Zheng Lun Zhi* into the acupuncture curriculum aimed to standardize and scientize TCM practices, its practical relevance in clinical settings remains a subject of ongoing debate. This tension between theoretical systematization and clinical applicability continues to shape the discourse surrounding TCM education and practice in contemporary China.

5 Conclusion: distinguishing science from classics in TCM

The conventional framework for official acupuncture knowledge has historically been established through teaching materials, which have undergone internal modifications and transformations along their natural progression prior to the advent of Western education. However, with the introduction of Western learning, numerous scientific efforts emerged to merge Eastern and Western medical paradigms within these educational resources. In 1928 and 1929, two significant conferences focused on reforming Chinese medicine teaching materials aimed at deconstructing and creating a cohesive system for acupuncture knowledge. This initiative sought to develop systematic teaching resources through deliberate integration and the establishment of structured disciplines. Unfortunately, due to differing opinions, these scientific teaching materials ultimately faded away. Private acupuncture institutions typically embraced two primary approaches for their "scientific" teaching resources: one following the Japanese model advocated by Cheng Dan'an, and the other adopting a "simple and practical" methodology as demonstrated by Lu Zhijun and Zhu Lian.

In the early days following the establishment of PRC, the "scientification of Chinese medicine" emerged as an imperative, aiming to transform the fragmented practice of TCM into a cohesive "new Chinese medicine" that aligned with the needs of modern China. Consequently, Zhu Lian's *Xin Zhen Jiu Xue* was embraced for its adherence to scientific principles. In response to changes in TCM policy, Jiangsu province undertook the exploration and review of classical texts. With some modifications, they compiled 57 editions of *Zhen Jiu Xue*, addressing the scarcity of teaching materials during a surge in "doctors of Western medicine study Chinese medicine". This initiative also facilitated the training of a significant number of acupuncture instructors while allowing sufficient time for the development of standardized teaching materials. These two phases can be viewed as evolution and enhancement within the modern framework of scientific teaching materials for acupuncture. However, there has been a fundamental shift in scientific thinking. Unlike the singular scientific approach of Western medicine in interpreting Chinese medicine during the Republic era, this modern approach emphasizes social scientific epistemology to explain and validate acupuncture based on its clinical efficacy, presenting an alternative form of scientific expression within the socialist system.

The establishment of the TCM colleges in 1956 marked a significant milestone in the systematic development of modern TCM. The Ministry of Health has made concerted efforts to acknowledge the distinctive nature of TCM theory and its extensive clinical experience, integrate TCM classics with Western medical science, and identify dialectical materialism and practical theory as the most scientifically rigorous discourse in medicine. By adopting a holistic approach and placing *Bian Zheng Lun Zhi* as its core, TCM facilitates the mutual transformation between acupuncture theory and practice through the integration of Chinese and Western medical paradigms. Guo Zihua's advocacy for the inclusion of *Bian Zheng Lun Zhi* in educational textbooks solidified its widespread acceptance as a fundamental principle. Consequently, the first edition of the

acupuncture textbook was published. Despite numerous rewrites and revisions, there have been no revolutionary changes to the underlying concepts, terminology, or core content; meanwhile, *Bian Zheng Lun Zhi* has accompanied the establishment of a modern theoretical framework for acupuncture. However, in the process of unifying TCM knowledge, both scientific exploration and classical review maintain compatibility with each approach while making adaptive adjustments. Ultimately, underpinned by dialectical materialist thinking, this framework presents a unique synthesis that embodies Chinese characteristics—a blend that, supported by educational materials, has endured to this day.

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Adaptation and Continuity: Chinese Medicine's Reception of the First-ever Synthetic Chemical Agent

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Abstract

The paper examines the response of Chinese medicine and the general public to the introduction of the first-ever synthetic chemical agent of Salvarsan (洒尔佛散) to the Chinese market. Since the new medicine was first introduced in 1910, the feedback has been predominantly positive. The rapid efficacy of Salvarsan was also recognised by Chinese medicine practitioners, who integrated it into the Chinese traditional herbal classification system and redefined its pharmacological properties in Chinese medicine theories. Nevertheless, Chinese medicine's perspective on Salvarsan goes beyond mere acceptance. The discourse surrounding Salvarsan encompasses its therapeutic effectiveness and delves deeper into broader themes concerning the fundamental principles of the medication as well as the dispute between Chinese and Western medicine that transcends medical theory. To maintain the validity of Chinese medicine theory in the discussion that went beyond simple medical theory, Chinese medicine used Salvarsan as evidence against the notion that bacteriological theory was the sole reliable theory of disease.

Keywords: Salvarsan; Chinese medicine; Metals & Stones category (金石类); Bacteriological theory

1 Introduction

Antibiotics, sometimes known as "Magic Bullet (魔弹)", are currently the most common and important therapeutic drugs used in Western medicine to treat infectious illnesses. However, the term "Magic Bullet" was first used to refer to a specific medicine for syphilis, developed in Germany in 1910 by German scientist Paul Ehrlich (1854–1915) and Japanese scientist Sahachirō Hata (秦佐八郎, 1873–1938). The medicine was marketed under the trade name "Salvarsan (洒尔佛散)" or known as "Preparation 606" (Note 1).

The birth of Salvarsan is recognised as a watershed point in medical history as the first synthetic drug to effectively target the causative agent of syphilis, ushering in the era of modern chemotherapy. Prior to this, most treatments focused on symptom relief or were discovered empirically, with few medicines capable of addressing the root causes of infectious diseases (Note 2).

Meanwhile, Salvarsan also had a particular existence in the history of medicine in modern China. On the one hand, Salvarsan was introduced in China simultaneously in 1910, about 70 years after Protestant missionaries initially introduced Western medicine to the country. A major part of what laid the foundation for Salvarsan's subsequent rise in popularity was the early introduction of Western medicines in China. Still, it's worthwhile to investigate whether Salvarsan's dissemination differed in any way from that of the earlier Western medications, and if so, in what ways. On the other hand, as the first synthetic chemical agent to debut in the Chinese pharmaceutical landscape, Salvarsan's widespread adoption blazed a trail for the acceptance of subsequent antibacterial agents, including Sulphonamides and Penicillin.

Given the profound differences in their theoretical foundations, the bacteriological paradigm that forms the foundation of Salvarsan is fundamentally distinct from the yin-yang (阴阳) cosmology and five element theory (五行理论) that underpin Chinese medicine. This fundamental divergence raises a critical question: what was the perspective of *Zhong Yi* (中医 traditional Chinese medicine) on this revolutionary medication that signifies a major turning point in Western pharmacological therapy? Nonetheless, the implications of this pharmaceutical development extended beyond the professional sphere to include laypeople who had depended on these traditional healing systems for generations. Like Chinese

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medical practitioners, these individuals also encountered an enormous surge of Western knowledge. Briefly, this newly developed drug not only constituted a substantial breakthrough in the progression of Western medicine but also showed the intricate and dynamic exchange between Western and Chinese medicinal practices during the transforming era.

Hence, this paper will initially examine the launch of Salvarsan (606) (Note 3) and its reception among the Chinese population. Subsequently, based on that, it also investigates the views of Chinese medicine practitioners on the new medicine Salvarsan, explores the nuanced response of Chinese medicine to the emergence of this influential new medicine, and seeks to unravel the intricate interaction and integration of Western and Chinese medicine during this period of transformation.

2 Previous anti-syphilis therapy: symptom-relieving medication

Even though the article's main focus is on the novel medicine Salvarsan, it is essential to briefly review the history of previous syphilis treatments in order to gain a better understanding of the different interpretations and responses of traditional Chinese physicians to Salvarsan since it was introduced to the market.

Syphilis was widely regarded as one of the most serious venereal diseases before the 20th century. Modern medical historians believe that syphilis first appeared among soldiers during the Italian Wars in 1494, and then quickly spread across Europe as the mercenaries returned to their home countries. In the late 15th and early 16th centuries, the new disease, also called *Yang Mei Chuang* (杨梅疮) in China, began to spread from Guangzhou. Doctors initially lacked information about its cause, progression, and treatment, making it their top priority to figure out how to handle it. Interestingly, despite the diverse medical practices in the East and West, there exists an intriguing similarity in the usage of medicinal remedies for syphilis.

Mercury was their unanimous medicine of choice. Regarding the treatment of syphilis, there is a proverb in Europe that goes, "Two minutes with Venus, two years with mercury". In China, mercury, referred to as *Qing Fen* (轻粉 Calomelas) was used either externally or internally. Given its extensive historical utilisation in treating various dermatological conditions, its selection appears logical, considering that the primary symptom of syphilis manifests as a rash resulting in cutaneous and mucous membrane damage.

Mercury treatment has significant drawbacks despite its effectiveness. Prolonged and excessive use can result in mercury toxicity, which has led to much controversy over the years regarding its use in treating syphilis. To tackle these problems, traditional Chinese doctors explored alternative therapies and came across *Tu Fu Ling* (土茯苓 Rhizoma Smilacis Glabrae), a herb that is thought to provide a milder and side-effect-free alternative. Following the 17th century, it gained widespread recognition as a syphilis cure in Chinese medicine. *Tu Fu Ling*'s extensive utilisation in large quantities became emblematic of Chinese medicine's approach to treating syphilis.[1] In addition, *Tu Fu Ling* was present in the link of the trading network of the Dutch East India Company, which was well recognised as the "China root" in European medicine.[2–4]

Despite the ongoing disagreement, the efficacy of mercury in swiftly alleviating symptoms associated with syphilis still established its position as a crucial medication in treating the condition, leading to its continued usage throughout the centuries (Note 4). During the Ming and Qing dynasties, mercury was a key ingredient in Chinese medical treatises for treating syphilis. For instance, the 18th-century surgical compendium *Yang Yi Da Quan* (《疡医大全》*The Complete Book of Medical Knowledge on Sores and Ulcers*) contained a large number of mercury-containing prescriptions for treating syphilis.[5] Indeed, even after the introduction of the powerful medicine Salvarsan in the 20th century, mercury continued to be employed as an additional treatment.

In brief, the treatments accessible for syphilis before the early 1900s were unable to completely eradicate the spirochetes, the genuine causative agent of syphilis, albeit they did demonstrate a capacity to alleviate the associated symptoms. The year 1910 marked the commencement of a new phase in the treatment of syphilis with the advent of Salvarsan. This synthetic chemical agent selectively targeted the etiological agent of syphilis and provided a more efficient and precise strategy for treating the condition.

3 The introduction of Salvarsan and acceptance by the Chinese public

In 1835, medical missionary Peter Parker (1804–1888) established an ophthalmological hospital in Guangzhou, one of China's earliest Western medical clinics. Salvarsan was launched more than 70 years after Western medicine entered the Chinese market. Western medicine's prior introduction and dissemination undeniably paved the path for the commercialisation and extensive adoption of the novel pharmaceutical in China in the early 20th century.

Through the utilisation of pharmaceutical advertising in the flourishing press of the time, the China Export-Import & Bank Co. Ltd (谦信洋行) originally introduced the new medication to the Chinese people via the German *Xie He Bao* (《协和报》*Xiehe Newspaper*) prior to its formal release.[6] Subsequently, the newspaper provided in-depth coverage of the underlying concept and the development process of the new anti-syphilis drug in two consecutive editions so as to generate momentum for its debut. The first step was to elucidate the significance of the medicine's appellation, "606", which

symbolised that the arsenic-containing medicine had undergone refinement and extraction six hundred and six times. The article continued to praise the outstanding results of 606, noting that no cases of illness recurrence had been reported, that it offered a full cure in a matter of days.[7,8] This was the first time that Salvarsan and the notion of chemotherapy linked with it were introduced in Chinese. Shortly after, the China Export-Import & Bank Co. Ltd also advertised the new medication in newspapers owned by Chinese people.[9] Simultaneously, advertisements promoting medical services offering patients Salvarsan injections appeared in newspapers.[10] To put it another way, the public could be apprised of newly introduced pharmaceuticals through newspaper advertisements as soon as they become available on the market.

On the other hand, unlike the earlier bottom-up diffusion of Western medicine in China, Salvarsan's promotion path followed a top-down form of dissemination, with initial adoption concentrated among the upper strata of society.[11] Shortly after its introduction, Dr. Wills, practicing in Kuling (now as Guling, 牯岭, located in Jiujiang city, Jiangxi province), administered Salvarsan to a wealthy Chinese patient diagnosed with syphilis. Impressed by the results, the patient recommended the treatment to his sister.[12] The early adoption of Salvarsan by the elites not only reflected their recognition of the medicine's therapeutic promise but also symbolized a broader embrace of scientific modernity. An intriguing detail is that the word "606" was favoured in the Chinese setting over the commercial name "Salvarsan". If "Salvarsan" denoted a specific remedy for syphilis, which referred to as "I save",[13] "606" conveyed a more scientific image, alluding to the arduous process that led to its development: 605 unsuccessful trials preceding the 606th one,[9] demonstrating the ability of experienced physicians to employ scientific methodologies to combat the problems posed by syphilis successfully.

After the 1920s, the dissemination of Salvarsan in China was shaped by a confluence of socio-medical factors. The reduction in cost made the drug more accessible, while the increasing emphasis on scientific development prompted medical professionals and educated elites to show greater support for scientifically produced pharmaceuticals. At the same time, injection-based therapies became more widely accepted among both physicians and patients. Media coverage also played a key role in shaping public perception of the medicine's efficacy. Together, these developments contributed to the growing consensus that Salvarsan represented the most effective treatment for syphilis available at the time.[9]

As Salvarsan gained broader recognition and acceptance, its influence extended beyond clinical practice. No longer regarded merely as a pharmaceutical, it came to embody the promise of modern experimental science. During the first half of the 20th century, Salvarsan not only represented a potent symbol of Western biomedicine but also served as a compelling testament to its perceived legitimacy and effectiveness. This perception made it increasingly difficult for Chinese medicine practitioners to ignore the medicine, particularly as it was being acknowledged by the public as a hallmark of modern medical progress. Indeed, upon closer inspection, it becomes clear that a significant number of Chinese medicine treatises on Salvarsan were published precisely during this period.

4 Repositioning Salvarsan: analogical integration into the Metals & Stones category of materia medica

4.1 Chinese medicine's embrace of new therapeutics in the early 20th century

The incorporation of foreign substances into the framework of Chinese medicine was not unprecedented. Throughout history, the materia medica showed great flexibility in absorbing exotic medicines introduced through trade, diplomacy, and cultural exchange.[14] *Fan Hong Hua* (番红花 Stigma Croci), *Hu Jiao* (胡椒 Fructus Piperis), and *Ru Xiang* (乳香 Olibanum), imported from regions such as Persia, India, or Arabia, were gradually integrated through analogical classification based on perceived similarities in flavor, nature, therapeutic function, and bodily correspondence. *Fan Hong Hua* was used to invigorate blood and relieve depression. *Hu Jiao* was used to warm the middle burner and dispel cold. *Ru Xiang* was employed to activate qi and alleviate pain. In each case, foreignness did not preclude medical legitimacy. Rather, empirical observation and theoretical analogy served as mediating tools, enabling foreign substances to be absorbed into the epistemological and therapeutic frameworks of Chinese medicine.

In this sense, the incorporation of Salvarsan, a chemically synthesized compound, exemplified a continuation of Chinese medicine's adaptive tradition. An interesting fact is that *Zhong Xi Yi Xue Bao* (《中西医学报》*The International Medical Journal*), which was established by Ding Fubao (丁福保, 1874–1952) , a Chinese medical practitioner, was the first Chinese journal to entirely reprint the introductory article on Salvarsan that was first published in *Xie He Bao*.[15]

Syphilis was a widespread infectious disease in early twentieth-century China, carrying a heavy social stigma and often associated with national decline and moral decay, which intensified public fear and social exclusion of affected individuals. The high prevalence and serious consequences of syphilis generated an urgent demand for reliable therapeutic solutions. This urgency compelled Chinese physicians to closely follow emerging biomedical treatments. As Salvarsan gained international acclaim as a groundbreaking therapy, many Chinese medicine practitioners began incorporating it into their clinical practices. Realising the potential of this newly developed medicine, Ding Fubao astutely

capitalised on the opportunity by promptly featuring pharmaceutical advertisements in *Shi Bao* (《时报》*The Eastern Times*), providing injections of Salvarsan at his facility.[16] Notable Chinese medicine physicians such as Yun Tieqiao (恽铁樵, 1887–1935) and Chen Bangxian (陈邦贤, 1889–1976) actively recommended the integration of Salvarsan therapy injections into their patients' treatment regimens.[17,18] Generally speaking, Chinese medicine adopted a broadly receptive stance toward Salvarsan.

4.2 Bridging traditional and Western pharmacology: Salvarsan and Metals & Stones category

However, an important question that remains to be addressed is how Chinese medicine recognised or elaborated on the effectiveness of Salvarsan. Alternatively, what steps have Chinese medicine practitioners taken to reassemble the pharmacological facts about Salvarsan within the context of Chinese medicine?

In general, the interpretation of Chinese medicine on Salvarsan was predominantly based on traditional medicine's comprehension of *Qing Fen*. With its classification as a mercury preparation, *Qing Fen* is placed in the Metals & Stones category (金石类), which is a traditional herbal categorisation system (also called medicinal minerals) under the materia medica classification system. Similarly, Salvarsan, a chemically synthesised arsenic compound, was deemed by Chinese medicine to be analogous to *Qing Fen* to a substantial degree and, thus, ought to also be categorised as belonging to the Metals & Stones category (Note 5).

One of the illustrative examples of this conceptual integration can be found in the work of Ran Xuefeng (冉雪峰, 1879–1963), a renowned Chinese medical practitioner. In his *Da Tong Yao Wu Xue* (《大同药物学》*Datong Pharmacology*), also referred to as *Ben Cao Jiang Yi* (《本草讲义》*Lectures on Materia Medica*), Ran advocated for a systematic synthesis of Chinese and Western pharmacological knowledge. The term "*Da Tong* (大同)" encapsulates the purpose behind this Chinese medicine practitioner's compilation of the book: to harmonise the strengths of both Chinese and Western medicine. Ran's intention went beyond merely applying scientific principles to Chinese medicine; it also involved integrating Chinese traditional herbal theory into Western medicinal practices, culminating in a comprehension of the fundamental nature of pharmaceuticals. As the book mentions, "Western medicine has recently shown a preference for using Metals & Stones category medicines. however, the so-called 'chemical medicine' they utilise really falls within the Metals & Stones category, or rather, its drug properties are even more potent than Metals & Stones category medicines".[19]

While Ran did not specifically mention Salvarsan, his statements about chemical medicine were consistent with the prevailing views held by Chinese medicine practitioners at that time regarding Salvarsan's therapeutic properties. Drawing upon their prior understanding of Metals & Stones category medicines, Chinese medicine could incorporate this new medicine, derived from bacteriology, into their knowledge of materia medica. Salvarsan was understood to possess properties analogous to *Qing Fen*, though not without potential adverse effects. Excessive or incorrect consumption of *Qing Fen* may cause tendon contracture, bone pain, carbuncles, and swellings.

In a similar vein, Salvarsan was reported to produce comparable reactions (Note 6), which, according to some practitioners, justified the continued use of *Tu Fu Ling* as an alternative remedy for syphilis. Drawing from his over ten years of clinical experience, Zhang Shanlei (张山雷) said in his textbook *Ben Cao Zheng Yi* (《本草正义》*The Proper Meaning of Materia Medica*), high doses of *Tu Fu Ling* have proved to be a viable treatment for severe syphilis.

4.3 Clinical limitations and adverse effects of Salvarsan

While it may not the immediate efficacy of Salvarsan, it surpasses it in terms of safety, given its minimal side effects.[20] Interestingly, this comparison closely mirrors earlier debates in Ming and Qing dynasties medical texts concerning the relative merits of *Qing Fen* and *Tu Fu Ling*. This raises two key questions, did Chinese medicine practitioners' assertions of Salvarsan's side effects hold merit? Conversely, from a biomedical standpoint, was Salvarsan truly as safe and effective as initially claimed?

In reality, Salvarsan was not able to eliminate the causing the syphilitic organisms entirely from the body, so a prolonged course of treatment was required instead of success with a single injection. Upon its original release, the Western medical community carefully deliberated the efficacy and safety of the medicine. Concerns quickly emerged regarding the adverse effects associated with repeated injections, including localized tissue necrosis, renal failure, and severe hepatitis. Some clinicians also expressed worries about the potentially fatal nature of administering large doses of Salvarsan.

To address increasing scepticism, Ehrlich modified Salvarsan and subsequently introduced a revised version, referred to as "new-Salvarsan" or "914", although it continued to be commonly referred to as "Salvarsan" or "606".[21] Additionally, Ehrlich recommended using small doses of Salvarsan, in combination with mercury, to prevent death from a cerebral haemorrhage. While initially hailed as "this drug we have by far the most active anti-spirochaetal remedy yet discovered",[22] Salvarsan soon came to be viewed not as a stand-alone cure but rather as part of a broader treatment strategy. Effective therapy for syphilis increasingly relied on combination regimens that included mercury, iodine, and

bismuth—commonly referred to as "mixed therapy" or "syphilis nettling therapy".[23]

Another serious concern was the potential for resistance to repeated Salvarsan administration. Yun Tieqiao once mentioned recommending Salvarsan injections to a patient. At first, the treatment led to improvement, but when the syphilis reappeared, Salvarsan proved to be ineffective. The patient suffered from significant cranial oedema and was left paralysed.[24] Indeed, such a circumstance did exist. The medical missionary E.H. Hume (1876–1957), who was a great advocate of Salvarsan, reluctantly admitted that any doctor treating syphilis would ultimately come across instances of resistance to the medicine.[24] In this light, the insights offered by Chinese medicine regarding Salvarsan's limitations should not be dismissed outright.

5 The focus of the Chinese-Western debate: Salvarsan and the feasibility of bacteriological theory

5.1 Critiques and debates on bacteriological theory within Chinese medicine

Although from the point of view of clinical application, Chinese medicine practitioners have included Salvarsan in the traditional herbal system to better understand its therapeutic benefits. Notably, they support the effectiveness of Salvarsan's specific effects in the treatment of syphilis. However, the complexity of the topic of Salvarsan stems from the fact that it had a purpose beyond being a mere remedy for syphilis since it emerged from the flourishing bacteriological theory of that era. The causes of infectious illnesses have been better understood since the late 19th century when Koch's postulates established a causal link between certain germs and particular diseases. The cognitive changes induced by illness encourage the development of therapeutic strategies, enabling medical practitioners to shift from the previous method of symptomatic treatment, which focuses mainly on symptom relief, to a more precise treatment that targets the root cause of the disease.

In simple terms, pharmacological research targeted at eradicating disease-causing microbes has been shaped by germ theory, and the outstanding example of applying bacteriological theory in clinical treatments is Salvarsan. This raises an important question: how should Chinese medicine interpret the bacteriological theory behind Salvarsan?

An example that might be cited here is Yun Tieqiao. Yun authored two articles on the topics of syphilis and Salvarsan at separate points in time. What is particularly intriguing is Yun's presentation, which differed greatly between the two publications, both before and after, and was an example that provide insight into how Chinese medicine responds to Salvarsan.

The first is a 1920 publication titled *Mei Chuang Jian Yuan Lu* (《梅疮见垣录》*Perspectives on Syphilis*). Yun was clearly aware that "bacteriological theory was the basis for the creation of Salvarsan". However, he elaborated on this point with a more critical perspective. While recognizing the medicine's efficacy, Yun emphasized that Salvarsan and Neo-Salvarsan could not completely cure syphilis and, in some cases, might even worsen the condition. He noted that while the medicine initially inhibited the growth of microorganisms and improved symptoms, it did not fully eliminate the infection. To illustrate, Yun offered a hypothetical: the medicine kills 95% of the germs in the body, but a small percentage of those bacteria evolve and develop resistance. However, if the medication is too potent, it may harm the body's vital energy, while if it's too mild, it may not effectively eliminate the infection. Yun concluded by saying that this was the specific challenge that modern medicine is confronted with, and it was not limited to syphilis treatment. He likened the situation to a race between doctor and pathogen, in which the latter often gained the upper hand.[25] Yun's perspectives remain insightful, particularly when considering the rapid development of antibiotics in the late 20th century and the subsequent challenges posed by antibiotic resistance in Western medicine.

Paradoxically, Yun Tieqiao's viewpoint underwent a transformation when he revisited the topic of the efficacy of Salvarsan after a span of seven years while lecturing at the correspondence school of Chinese medicine that he had created. Salvarsan's failure, according to Yun, demonstrated the limitations of utilising bacteriological theories to explicate illnesses, which is because pathogenic bacteria may not cause disease but rather that sickness occurs first, and bacteria may develop as a result of the infection.[24] The opinions expressed in the article titled *606* from 1927 could seem somewhat unconventional compared to the article seven years ago. Surprisingly, Yun's disciple, Lu Yuanlei (陆渊雷, 1894–1955), also articulated similar beliefs.[26] This contrast prompts the question of why such disparate perspectives have arisen. What accounts for the significant disparity between the two articles, and is it feasible that neither Yun nor Lu has a thorough understanding of bacteriological theory?

5.2 Chinese medicine's engagement with Salvarsan and bacteriological theory

As previously noted, most articles on Salvarsan in Chinese medicine dated from the 1920s. The occurrence of this situation may be attributed not only to the escalating popularity and prevalence of Salvarsan in the treatment of syphilis but also to the growing dispute between Western and Chinese medicine. During the 1920s, there was a transition away from the previously dominant idea of "merging Chinese and Western medicine" towards a novel notion by Yu Yan (余岩,

1879–1954), which included a complete restructuring of the Chinese and Western medicine connection.[27]

Ling Su Shang Dui (《灵素商兑》 *Critique of the "Spiritual Pivot" and "Basic Questions"*), published by Yu Yan in 1917, is a comprehensive critique of the core concepts of Chinese medicine, such as yin-yang, the five elements, the five organs and six bowels (五脏六腑), and the twelve meridians (十二经脉).[27] In the early 1920s, Yu's critique was met with resistance from traditional practitioners, most notably Yun Tieqiao. It is usually assumed that Yun's positive reaction to Yu Yan's comments was especially evident in the book published in 1922, *Qun Jing Jian Zhi Lu* (《群经见智录》 *On Insights into the Theory of Yellow Emperor's Inner Classic*), which emphasised the significance of *Nei Jing* (《内经》 *The Inner Classic*) in the traditional medical system and clinical evidence. Nevertheless, Yun implicitly highlighted the value of researching *Nei Jing* in his earlier book *Mei Chuang Jian Yuan Lu*.

Yun's 1920 article can be divided into three main parts. To begin with, Yun provided an explanation of the transmission of syphilis, shedding light on the causative agent of the disease, and meticulously analysed the effectiveness as well as the limitations of Salvarsan. His comprehensive knowledge of syphilis in Western medicine suggests that he is familiar with the subject. Furthermore, he presented his classification of the treatment course for syphilis and shared his clinical experience. Remarkably, Yun concluded his essay by exploring preventive strategies for venereal diseases, drawing on the ideas in *Su Wen* (《素问》 *Basic Questions*).[25] In other words, the article's main objective was not only to expound upon the understanding of syphilis but also to utilise it as an exemplar to underscore the practicality and significance of *Su Wen* in clinical practice. Even with Salvarsan, the disease cannot be completely eradicated, which is why the principles outlined in *Su Wen* are crucial for effectively controlling the disease at its core.

Upon closer inspection, it is clear that the two aricles authored by Yun Tieqiao share certain commonalities. Specifically, both articles delve into his comprehension of the medical principles underlying pharmaceuticals by examining Salvarsan. The former concluded by promoting *Su Wen* as a means of legitimizing traditional medical thought, while the latter was more strongly worded. Despite being titled *606*, Yun's composition's primary objective is to critique the bacteriological theory by pointing out its insufficient effectiveness to inherent flaws in the theory. Clearly, Yun's engagement with Salvarsan became a vehicle for engaging in the broader epistemological debate between Chinese and Western medical traditions. In this regard, the writings of Lu Yuanlei offer valuable additional insight.

Lu's article was published in 1929 and coincided with a pivotal year in the history of modern Chinese medicine. In that year, Yu Yan proposed the complete elimination of Chinese medicine during a meeting of the Central Health Commission. One of the critical reasons Yu Yan gave was that the lack of bacteriological theory in Chinese medicine has made it appear ineffectual in topics about national health management and clinical diagnosis and treatment.[28] The theory of bacteriology, which arose in the late 19th and early 20th century as a Western medical explanation for the origin of infectious diseases, also became a major topic of disagreement in the dispute between Chinese and Western medicine.

Lu's article, titled *Bo Zeng Yu Ying Jun* (《驳曾毓英君》 Rebuttal of Zeng Yuying's views), was written in response to Zeng's criticisms of his previously published article *Shang Hai Jin Shi* (《伤寒今释》 *Typhoid Fever: Current Interpretation*). Zeng chastised Lu for his poor understanding of bacteriology theory and inappropriate interpretation of typhoid fever, which resulted from a lack of knowledge of the topic. In response, Lu laid forth against using bacteriology as the only parading for determining the aetiology of disease and cited Salvarsan's failure as proof of bacteriological theory's limitations in clinical practice, echoing Yun's claim in *606*.[26] Indeed, Lu's article was not intended merely to respond to Zeng's questioning but also served as a comprehensive defence of Chinese medicine on a broader scope.

Salvarsan was selected by both Yun and Lu as a key example because, in addition to being a successful syphilis treatment, it was also one of the few medications that effectively used bacteriology in clinical treatment prior to the 1930s, signifying the development as well as the rigour of Western scientific practice. Simultaneously and consequently, it also served as an illustration of Chinese medicine challenging the validity of bacteriology since even this symbol of scientific understanding cannot achieve a perfect success rate in treatment.

The discourse surrounding Salvarsan represented one of the entry points and breakthroughs in Chinese medicine practitioners' endeavours to substantiate Chinese medicine's therapeutic efficacy. Even when Salvarsan became a specific medication for syphilis, Chinese medicine continued to be used in treatment. In 1937, Zhang Tiejun (张铁军), the quartermaster general of the Second Regiment of the Cavalry of the Sui-Yuan Army, corresponded with Zhang Zanchen (张赞臣, 1904–1993), a distinguished Chinese medicine practitioner, seeking knowledge on Chinese medicine prescriptions for the treatment of syphilis. The impetus for this letter stemmed from the fact that, regardless of the existence of Salvarsan as a standard remedy for syphilis, Zhang Tiejun observed the condition persisted as untreatable, and there also were numerous patients in the army who were seeking help from charlatans.[29]

Remarkably, the medical records of many well-known Chinese medicine practitioners still contain the clinical records of their treatment of syphilis.[30–31] Even with the availability of penicillin after 1943, Chinese medicinal therapy continued to be utilised in the treatment of syphilis. In the 1960s, Beijing College of Chinese

Medicine Affiliated Hospital and the Institute of Dermatology and Venereology Chinese Academy of Medical Sciences collaborated to establish a research group focused on treating advanced neurosyphilis and tabetic neurosyphilis. The team employed a blend of Chinese and Western medical approaches. Chinese medicine practitioner Qin Bowei (秦伯未, 1901–1970) supervised this collaborative endeavour, which effectively treated tabetic neurosyphilis by integrating *Di Huang Yin Zi* (地黄饮子 Rehmannia Drink) in the therapeutic regimen, yielding positive practical outcomes.[32]

6 Conclusion

In early twentieth-century China, syphilis was widely perceived not only as a public health crisis but also as a sign of national degeneration and moral decay. It became emblematic of both biological contamination and cultural decline, generating widespread anxiety in medical, political, and moral discourse. Against this backdrop, as the first synthetic chemical agent to enter the Chinese market, Salvarsan occupied a complex position in modern Chinese medical discourse. Introduced as a potent cure, it was quickly embraced by the affluent and soon became an iconic treatment after the 1920s.

For practitioners of Chinese medicine, the arrival of Salvarsan presented both a challenge and an opportunity. Although its bacteriological basis differed markedly from Chinese medicine, its clinical effectiveness, especially in treating a culturally and morally charged disease like syphilis, was difficult to dismiss. Rather than rejecting this foreign drug, many Chinese medicine practitioners sought to incorporate it into their own diagnostic and therapeutic systems. Figures such as Ding Fubao promoted Salvarsan in advertisements, while Yun Tieqiao recognized its efficacy in medical writings. These efforts reflected a broader trend among Chinese medicine practitioners, who did not merely adopt Western pharmacology passively, but actively engaged with it, integrating new biomedical agents into existing herbal paradigms, reinterpreting their functions, and critically evaluating their limitations. In doing so, they helped reshape the contours of Chinese medical knowledge in an era of epistemological encounter and transformation.

While Chinese medicine practitioners actively incorporated Salvarsan and engaged with bacteriological theory, this engagement was far from unreserved acceptance. Undeniably, no pharmaceutical can be regarded as perfect from a medical theoretical standpoint, and Chinese medicine practitioners were not ignorant. Nevertheless, when Salvarsan became entangled in the dispute between Chinese and Western medicine, it transcended its primary classification as a mere pharmaceutical agent due to the broader cultural, ideological, and epistemological connotations it acquired. Salvarsan was not only seen as a therapeutic breakthrough but also symbolized the perceived superiority of Western scientific rationality and modernity. This symbolic status made it a focal point in the contestation between different medical paradigms. In the debate beyond mere medical theory, Chinese medicine used Salvarsan's limitations in treating syphilis as evidence to challenge the uncritical reverence of bacteriological theory, emphasizing the continued relevance of holistic, systemic approaches intrinsic to their medical doctrine. This stance underscored the complexity of illness and defended traditional concepts amid the rise of biomedical science.

Notes

1. Salvarsan, a yellowish arsenical compound (dioxydiamino-arseno-benzene), must be dissolved in an alkaline solution before injection. Historians differ on its origin, with some dating it to 1907 and others to 1910. To be precise, it was synthesized in 1907, but it was not introduced as a medicine until 1910, after its efficacy had been confirmed.
2. Before the 20th century, only a few pharmaceuticals targeted the underlying causes of infectious diseases, most discovered empirically, such as Quinine (Chloroquine) for malaria. Late 19th-century synthetics like Aspirin mainly relieved symptoms, while chemical disinfectants like carbolic acid were too toxic for internal use.[33] Salvarsan's debut in 1910 marked a new era in chemotherapy, offering targeted treatment with reduced patient risk. Today, modern medicine relies heavily on synthetic chemistry. The standard practice of medicine today is heavily reliant on synthetic chemistry products.[34]
3. Salvarsan, introduced in 1910, faced formulation and toxicity challenges. In 1911, Ehrlich developed an improved version, "Neo-Salvarsan" or "Preparation 914", which soon replaced "606" as the preferred treatment for syphilis in the early 20th century. However, Chinese sources continued to use "Salvarsan" or "606" to refer to the medicine, and for consistency, this paper also uses "606". Terminology for sexually transmitted infections has also changed. While "STDs" is common today, "venereal diseases" was the prevailing term in the mid-twentieth century. To reflect the historical context, this paper adopts "venereal diseases".
4. Mercury faced a similar situation in Western medicine. A mid-18th-century London brochure on syphilis treatment stated that it "has for years past been the greatest bane to mankind of any one medicine in the whole materia medica. Nevertheless, I would not have it imagined that I mean to expunge it out of practice".[35]
5. Rather than reformulating classical prescriptions, Chinese medicine practitioners incorporated Salvarsan by analogical classification, placing it within the established Metals & Stones category, alongside mercury-based medicines such as *Qing Fen*.
6. For example, Yun Tieqiao recorded a syphilis patient treated with Salvarsan. When the disease recurred, the medicine proved ineffective. Worse still, the injection

caused severe head swelling, leaving the patient permanently disabled and unable to walk.[20] Zhang Zelin likewise observed that Salvarsan (606) could "drive toxins deep into the bones," a harm comparable to that of traditional remedies like *Qing Fen* or *Fan Shi* (矾石, alum minerals).[36]

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Ethical approval

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Author contributions

PANG Jingyi drafted and revised the paper.

Conflicts of interest

The author declares no financial or other conflicts of interest.

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Original Article

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Chinese Medicine in Hong Kong, 1842–1941

Patrick Chiu[1,✉]

Abstract

This article examines the complex interplay between Chinese medical and pharmaceutical practices and the introduction of Western medicine and pharmacy in China, with a particular focus on the British administration's efforts to marginalizing Chinese medicine in Hong Kong from 1842 to 1941. Soon after the British occupation of Hong Kong in 1841, the Hong Kong government promulgated laws and regulations governing the sale, supply, distribution, and manufacture of opium and potent medicines (aka "poisons"). These laws, based on parliamentary acts passed in Westminster, marginalized Chinese medicine and pharmacy and empowered Western medical doctors, chemists, and druggists as the sole providers of these services. Despite this, Chinese medicine and pharmacy remained the preferred therapeutic system of the local Chinese population. However, minimal resources were allocated to the sector or support for practitioners of Chinese medicine and pharmacy, even though they served most of the population. The British Hong Kong administration seized two key opportunities which shifted the balance in favor of Western medicine and pharmacy. The first was during the 1894 bubonic plague, when the British Hong Kong administration funded a Western medicine clinic at the Tung Wah Hospital in Sheung Wan, with a short-lived effect. The second, with lasting impact, was the mass influx of refugees fleeing Kwangtung (now Guangdong) to Hong Kong in 1938, which led to the three independently managed Tung Wah hospitals (the Hospitals) merging into one Hospital Group at the urging of the British Hong Kong administration, due to funding issues by local philanthropists. Western medicine thus became the mainstream therapeutic system for in-patients at the Hospital Group.

Keywords: Chinese medicine; Hong Kong; Chemists; Apothecaries; Tung Wah Hospital; Western medicine; History of medicine

1 Introduction

In 1841, Hong Kong Island was a modest fishing port comprising around twenty villages and a few thousand residents, falling under the jurisdiction of Xin'an (新安, also known as Baoan/宝安) County in Kwangtung (now Guangdong) province (Fig. 1).[1] On January 26th, 1841, Captain Charles Elliot, Chief Superintendent of British Trade in China, declared British occupation of Hong Kong Island upon landing near Sheung Wan (上环), at what is now called Possession Point (水坑口). Following the conclusion of the First Opium War (1839–1842), Hong Kong Island was ceded to the United Kingdom under the Treaty of Nanking on August 29th, 1842, with *Ratifications* exchanged at Hong Kong on June 26th, 1843.[2]

In the first century of British Hong Kong administration, most residents attended the privately owned apothecaries with resident Chinese medicine practitioners providing clinical consultations and druggists compounding and dispensing herbal remedies on-site. Those under-privileged would attend the free outpatient clinics operated by the Tung Wah Hospital (东华医院, TWH), Hong Kong's main charitable Chinese medicine provider, under the Tung Wah Hospital Incorporation Ordinance, 1870.[3]

In 1938, soon after the merger of three TWH medical institutions merged into one, Western medicine became the mainstream treatment modality. With funding by the British Hong Kong administration, two-thirds of

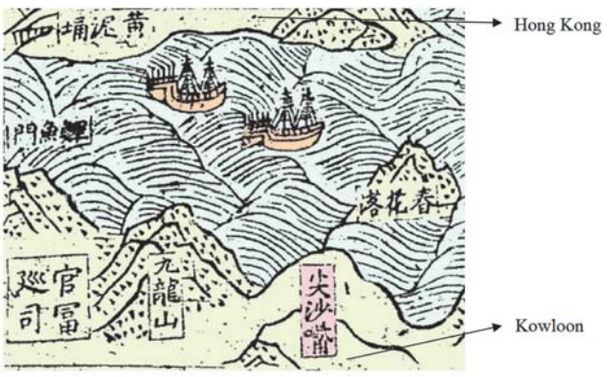

Figure 1 Map of Hong Kong by Gei Fei (郭棐), *Yue Da Ji* (《粤大记》 *History of Kwangtung*) (source with permission from: edition by author)

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in-patient received Western medicine while out-patients for Chinese medicine remained at 1.8 times of those attended by Western medicine practitioners.[4] This was partly due to the restricted movement of individuals, including practitioners of Chinese medicine and operators of apothecaries, across the border between Hong Kong and Shenzhen when Canton fell to the Japanese Imperial Forces in October 1938, during the War of Resistance against Japanese Aggression in China.

Although Chinese medicine and pharmacy co-existed with its Western counterparts under British Hong Kong administration after WWII, Chinese medicine and druggist practice were not operated in government or missionary hospitals and clinics.

2 Chinese medicine, 1842–1941

The period from 1842 to 1941 in China marked a tumultuous transition from the late Qing Imperial dynasty to the nascent Republican Government. This era also presented significant challenges for the newly established Hong Kong administration. The population of Hong Kong Island grew dramatically from 5,650 in 1841 to 1.8 million (including 24,145 British and foreign residents, or 2% of the total population) by 1940, reflecting an almost two-hundred-fold increase over the century across the expanded territory, which included the Island, Kowloon, and the New Territories (Table 1).

The expansion of Hong Kong's territory, from the acquisition of Hong Kong Island in 1841 to the addition of Kowloon in 1860 and the New Territories in 1898, coupled with an open border, provided Hong Kong with a readily available labor force from China. Three significant waves of migration from southern provinces, particularly Kwangtung, can be identified. The first wave occurred from 1841 to 1864, shortly after the two Opium Wars (the first from 1839 to 1842 and the second from 1856 to 1860) and the Taiping Rebellion in southern China from 1850 to 1864. By 1864, Hong Kong's population peaked at 125,504, including 4,007 British and foreign residents. The second wave, occurring from 1901 to 1911, was driven by instability in China due to popular uprisings, the eventual fall of the Qing dynasty, and the establishment of the Republic of China in 1911. During this period, the population grew from 206,162 in 1901 to 450,739 (including 11,225 British and foreign residents) by 1911. The third wave was triggered by the intermittent outbreak of the War of Resistance against Japanese Aggression in the 1930s, which led to a significant exodus. The population surged from 849,750 in 1931 to 1.82 million (including 24,125 British and foreign residents and an estimated 750,000 refugees) by 1940. However, the Japanese occupation of Hong Kong on Christmas Day of 1945 upon the surrender of the British miliary led to more than a million and a quarter refugees fled to the safe places in South and Southwestern China.

From its inception in 1841, the Hong Kong administration aimed for a breakeven fiscal budget. The laissez-faire policies adopted by the Hong Kong administration, characterized by free-market enterprise, minimal regulations, and limited support for the business community, effectively positioned Hong Kong as a free trade hub for re-exporting opium and supplying bonded labor to Southeast Asia and the Americas. Today, the Hong Kong SAR Government's estimated health expenditure for the 2025–2026 fiscal year is projected to reach 24% of total recurrent government expenditure, a significant increase from the 11.9% recorded in the 1997 fiscal year, reflecting the growing healthcare needs of the entire population.[7] This increase was primarily due to better health care services to the rapidly aging baby boomer generation, those above the age of 65.[8] Back in the period from 1880 to 1940, medical expenditures averaged 4.5% of total public expenditures, ranging from 2.2% to 6.8% (Fig. 2).

While this level of funding was adequate to support the mostly British expatriate population and civil servants, it was however insufficient to support a young population with a majority composed of babies and children, who required frequent pediatric outpatient clinic services, vaccinations, and other care. Hence, the majority—

Table 1 Population growth of Hong Kong, 1841–1940 (excluding military personnel)[5,6]

Year	Whites (Mostly British)	Chinese Including Other Nationalities	Total	Remarks
1841	n/a	5,650	5,650	First year of British occupation
1864	2,986	116,335	119,321	End of Second Opium War (1856–1860) and Taiping Rebellion (1850–1864)
1871	4,181	117, 804	121,985	Hong Kong emerged as a trading hub for opium and bonded labor attracting a steady inflow of migrant workers from the Southern province of Kwangtung
1881	9,721	150,690	160,402	
1891	10,446	210,995	221,441	
1901	9,432	274,543	283,975	Boxers Incident (1900–1901)
1906	13,200	408,249	421,449	1906 census figures
1911	11,225	438,873	450,098	Republican Revolution (1911)
1931	19,540	830,210	849,750	Intermittent outbreaks of the War of Resistance against Japanese Aggression with full scale military conflicts in 1937 and occupation of Canton in October 1938
1940	24,125	1,797,766	1,821891	

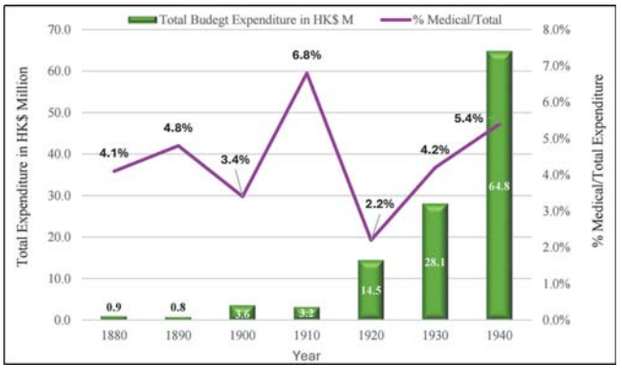


Figure 2 Medical expenditure as % of total expenditure in HK$, 1880–1940 (source with permission from: Hong Kong Blue Book, 1880–1940[9])

95%—of the local Chinese population relied on private expenditure on medical consultations and medicine expenditure on Chinese herbal medicine as well as charitable Chinese medicine services provided by organizations like the TWH from 1870 to 1940. The British Hong Kong administration was also "fortunate" that local residents preferred Chinese medicine practitioners over Western medical doctors as part of their cultural identity and familiar with the Chinese medicine concoctions than small amount of potent oral liquids often with intense chloroform aroma, painful hypodermic injections, inconvenient dosage forms of suppositories etc.

According to the Hong Kong Almanack of 1848, there were eighteen herbal apothecaries and six Western apothecaries practicing in the region. The herbal apothecaries served as Chinese medicine practitioners, addressing the health needs of residents.

In the 1840s, most Chinese apothecaries functioned as independent health care providers, often utilizing the front room of their residences for medical consultations with the back room compounding and mixing concoctions and herbal remedies. Traditional apothecaries with on-site Chinese medicine practitioners opened in Hong Kong Island. Three models of Chinese medicine practice took form:

- an in-house physician based in *Yao Cai Pu* (药材铺 apothecary) treating gynecological, pediatric and internal medicine cases such as Deshou Apothecary (德寿堂) (Fig.3);
- solo practitioners running their own medical halls and focusing on bone-setting (骨伤铁打), wound care and minor surgery; and later;
- upstairs clinicians providing consultations, compounding medications, and home delivery of herbal remedies.

Some Chinese medicine practitioners specialized as acupuncture and musculoskeletal (针灸推拿) practitioners who focused on pain management and rheumatic disorders. Slow progress of Chinese medicine was observed as clinically effective herbal remedy

Figure 3 Deshou Apothecary (德寿堂) , Kowloon, Hong Kong, 1900. (source with permission from: edition by the author).

formulations were sold as proprietary medicines and not openly circulated or shared.

Traditionally, Chinese medicine practitioners learned clinical and people skills either from their family elders or served under a master for an average of fifteen years of pupillage before they completed their training, then they could open their own Chinese medicine apothecaries or dispensaries. The larger dispensaries carried both retail and wholesale herbal and precious food and medicine business and usually without an in-house Chinese medicine practitioner.

3 I-Tsz and Tung Wah Hospital

A charity hospice cum funeral home, *Guang Fu Yi Ci* (广福义祠 Kwong Fook I-tsz), was opened by Tam Choy (谭才) and thirteen trade representatives after receiving a piece of land granted by the Hong Kong administration in Pound Lane, Sheung Wan in 1851. At the back of the funeral home, there were 6 to 8 rooms used as a hospice for terminal patients. In 1869, Alfred Lister, acting Registrar General, made a visit to the I-Tsz, which found the conditions deplorable and filed a detailed official report to Sir MacDonnel, who took affirmative action to take remedial action to change the lassie-faire policy on Chinese affairs. A hospital for Chinese became an urgent matter. In response to the Hong Kong administration's request, a group of local of philanthropists formed the TWH which was governed by the Chinese Hospital Incorporation Ordinance, passed in the Legislative Council on April 13, 1870:

> "Whereas it has been proposed by the said Governor His Excellency Sir Richard Graves MacDonnell to found a Chinese Hospital for the Care and Treatment of the indigent Sick to be supported by the Voluntary Contributions; And Whereas Her Majesty Queen Victoria has been graciously pleased by Way of Endowment of the said Hospital to grant a piece of Crown Land."[3]

The TWH was incorporated as a non-profit organization whose board of directors consisted of dignitaries as founding directors who formed the hospital committee for 1870 and 1871. TWH relied on donations from the directors, local companies, Chinese residents, and transiting ship captains. In 1872, the TWH opened with much publicity of having its patron saint, Shennong (神农), a mythological figure in ancient China who was considered the "father of Chinese medicine", as the focus of its inaugural ceremony. All directors and employees, including medical doctors, had to pledge their loyalty and made a sacred oath to be pure, upright, and honest to the cause of the hospital.

The hospital was staffed with three Chinese medicine practitioners initially and later increased to eight, of whom one was a vaccinator. Administration of smallpox vaccinations by TWH was provided since 1881, and over the years, local Chinese residents had accepted TWH as a reputable medical institution (Fig. 4). This could be reflected by the number of smallpox vaccinations performed in an epidemic as reported in the minutes of the Sanitary Board meeting in 1888 (Table 2).[10]

4 The beginnings of Western apothecary and medical practice

British or Western medical doctors practiced alone or formed partnerships with other physicians or surgeons, opening dispensaries to serve both Western patients and corporate clients in Hong Kong since the early 1840s. Hong Kong Dispensary, Victoria Dispensary, the Medical Hall and a couple of others served the mainly expatriate community and western sailors. Dr. Peter Young, who practiced at the Canton Dispensary in the late 1830s, moved to Hong Kong and set up a private practice in 1841. He subsequently became a senior partner of the Hong Kong Dispensary and Young was succeeded by Dr. Thomas Boswell Watson in 1856. Watson transferred the business to his nephew, Alexander Skirving Watson, in 1858 when the Dispensary was operated by A. S. Watson since then. It changed hands a few times until it was owned by John David Humphreys (JDH) in 1879. Henry Humphreys, elder son of JDH, was born in 1867 in Hong Kong, and was sent to study at St. Helen's College in Southsea, England. Henry Humphreys passed the Major Examination in Pharmacy in London and was registered as a Pharmaceutical Chemist in 1889. He returned to Hong Kong the same year and joined his father at A.S. Watson. He subsequently had a diverse career in brokerage, retail, and property as well as pharmacy.[11]

Figure 4 Tung Wah Smallpox Hospital, erected in 1910 (source with permission from: taken by the author)

Other dispensaries such as the Victoria Dispensary, established by Thomas Hunter in Macao, then branched into Hong Kong with its first retail outlet in Pottinger Street in 1846 and later moved to Queen's Road, Central in 1848. George K. Barton was responsible for the Hong Kong branch of Victoria Dispensary with three Macanese assistants, of whom Joao Braga became the manager in 1849. He was assisted by Alberto Bothelo who learned apothecary skills at the Hong Kong Dispensary before joining the Government Civil Hospital in 1856 as Apothecary. Joao Braga's connection with Victoria Dispensary came to an end on August 24th, 1857 when he re-opened the Medical Hall Dispensary. Ownership of Medical Hall Dispensary changed hands later to E. Niedhardt, a German national who eventually also changed its name to the German Dispensary (Table 3).

Many other Western dispensaries were opened and then closed throughout the second half of the nineteenth century until the 1920s, with consolidation under a handful of pharmacy groups continuing until the Japanese occupation in 1941. During the transition process, Western dispensaries became wholesalers and retailers of "opium cures" (Note 1), prescription medicines, photographic materials, liquor and soda water and health and beauty products, whereas qualified physicians and surgeons operated their own clinics or formed partnerships.

Table 2 The number of vaccinations already performed as of 1888

Location	Date	Number	Total
Government Civil Hospital	/	180	1,666
Alice Memorial Hospital	/	206	
Tung Wah Hospital	October 23rd, 1887 to January 21st, 1888	1,055	
Villages (by Tung Wah Doctors)	From October 23rd, 1887, to January 9th, 1888	255	

Table 3 List of Hong Kong Dispensaries 1848, Hong Kong Almanack 1848

Serial Number	Name of Dispensary	Location	Apothecary/Surgeon	Remarks
1	Hong Kong Dispensary	Queen's Road	Dr. Alexander Anderson, Dr. James Young	Originated from Canton in 1828
2	Victoria Dispensary	Pottinger Road	Thomas Hunter, Geroge Barton	Originated from Macao
3	Medical Hall	Queen's Road	Alexander Taylor	All locally formed by British expatriate entrepreneurs with some of medical and pharmaceutical background
4	Stocker & Co.		Charles Stocker	
5	Farriers	Queen's Road East	George Frazar	
6	Castles & Co.	Stanley Street	Not known	

With a growing population of both expatriates and locals, the Hong Kong administration opened the Civil Hospital in 1850. Initially, the facility served only civil servants and police officers. Later, it expanded its services to include the general public for in-patient care, charging fees ranging from $0.50 to $1.00 in local currency (equivalent to approximately USD 120 to $240 in 2024). These fees were often unaffordable for many local Chinese, particularly low-paid laborers working at the piers or as rickshaw pullers, which created a significant barrier to access for those in need of medical care.

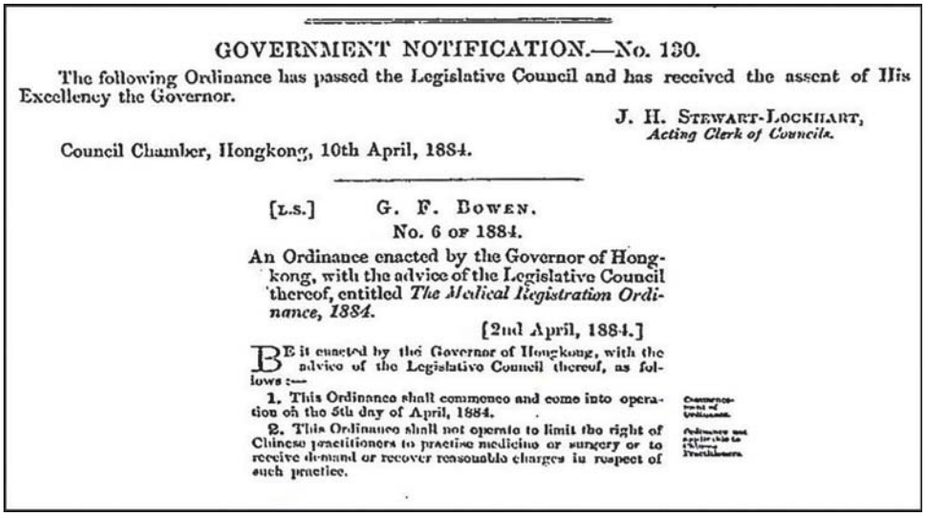
The Hong Kong administration recruited British medical practitioners via the office in London for postings in Hong Kong, who received Crown Exemption for registration as a medical practitioner under the Medical Registration Ordinance of 1884 (Fig. 5). In 1888, there were two qualified medical practitioners working for the Hong Kong administration where there were twelve medical practitioners registered under the ordinance and they were in private practice, serving about 10,000-strong expatriate population (Fig. 6).

5 Western medical education

Almost all laws in Hong Kong were local adaptations of the original English Acts to ensure that the same system of governance was in place in its Colonies. It was not surprising that one of the first known pieces of legislation was the licensing of sale of opium, in 1844. The first section of which stated the sale of opium in addition to other items required a licence.

> "That no person shall within the said Island of Hong Kong or its Dependencies or the waters thereof carryon the trade or occupation of a freighter or broker of Salt, or sell or retail any Opium, Bhaang, Ganja, Paun, Betel, and Betel-leaf in a smaller quantity than one chest for consumption , without having previously obtained a licence for that purpose from the Governor for the time being in Council." (Note 2)

In 1858, the Medical Act of the UK established a framework for the regulation of medical practitioners was promulgated in the United Kingdom. Prior to its enactment, both apothecaries and physicians provide medical advice and medications to patients. The Act empowered the General Medical Council (GMC) to regulate the qualifications of practitioners in medicine and surgery. Key features of the act included: creation of the GMC to oversee the registration of medical practitioners and maintain standards in the profession with the kind of qualifications and a system of medical education necessary for registration and the disciplinary powers of the GMC, including removal from the register.[12]



GOVERNMENT NOTIFICATION.—No. 130.

The following Ordinance has passed the Legislative Council and has received the assent of His Excellency the Governor.

J. H. STEWART-LOCKHART,
Acting Clerk of Councils.

Council Chamber, Hongkong, 10th April, 1884.

[L.S.] G. F. BOWEN.

No. 6 OF 1884.

An Ordinance enacted by the Governor of Hongkong, with the advice of the Legislative Council thereof, entitled *The Medical Registration Ordinance, 1884.*

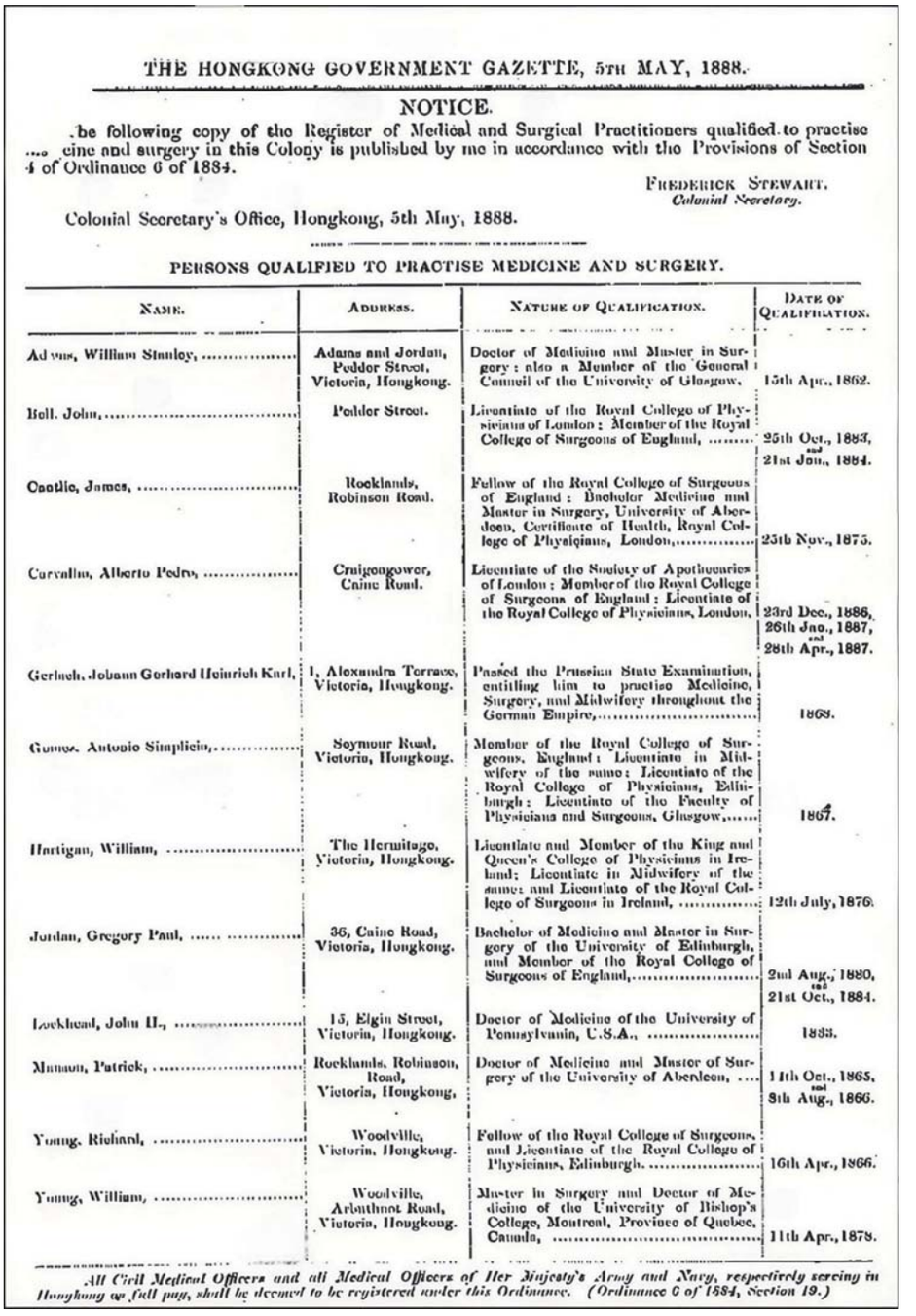
[2nd April, 1884.]

BE it enacted by the Governor of Hongkong, with the advice of the Legislative Council thereof, as follows:—

1. This Ordinance shall commence and come into operation on the 5th day of April, 1884.

2. This Ordinance shall not operate to limit the right of Chinese practitioners to practise medicine or surgery or to receive demand or recover reasonable charges in respect of such practice.

Figure 5 The Medical Registration Ordinance of 1884, Government Notification 130. *Hong Kong Government Gazette*. April 12, 1884 (source with permission from: https://sunzi.lib.hku.hk/hkgro/browseGa.jsp?the_year=1884)



THE HONGKONG GOVERNMENT GAZETTE, 5TH MAY, 1888.

NOTICE.

...be following copy of the Register of Medical and Surgical Practitioners qualified to practise ...cine and surgery in this Colony is published by me in accordance with the Provisions of Section 4 of Ordinance 6 of 1884.

FREDERICK STEWART,
Colonial Secretary.

Colonial Secretary's Office, Hongkong, 5th May, 1888.

PERSONS QUALIFIED TO PRACTISE MEDICINE AND SURGERY.

NAME.	ADDRESS.	NATURE OF QUALIFICATION.	DATE OF QUALIFICATION.
Adams, William Stanley,	Adams and Jordan, Peddar Street, Victoria, Hongkong.	Doctor of Medicine and Master in Surgery: also a Member of the General Council of the University of Glasgow.	15th Apr., 1862.
Bell, John,	Peddar Street.	Licentiate of the Royal College of Physicians of London: Member of the Royal College of Surgeons of England,	25th Oct., 1883, and 21st Jan., 1884.
Cantlie, James,	Rocklands, Robinson Road.	Fellow of the Royal College of Surgeons of England: Bachelor Medicine and Master in Surgery, University of Aberdeen, Certificate of Health, Royal College of Physicians, London,	25th Nov., 1875.
Carvalho, Alberto Pedro,	Craigengower, Caine Road.	Licentiate of the Society of Apothecaries of London: Member of the Royal College of Surgeons of England: Licentiate of the Royal College of Physicians, London.	23rd Dec., 1886, 26th Jan., 1887, and 28th Apr., 1887.
Gerlach, Johann Gerhard Heinrich Karl,	1, Alexandra Terrace, Victoria, Hongkong.	Passed the Prussian State Examination, entitling him to practise Medicine, Surgery, and Midwifery throughout the German Empire,	1868.
Gomes, Antonio Simplicio,	Seymour Road, Victoria, Hongkong.	Member of the Royal College of Surgeons, England: Licentiate in Midwifery of the same: Licentiate of the Royal College of Physicians, Edinburgh: Licentiate of the Faculty of Physicians and Surgeons, Glasgow,	1867.
Hartigan, William,	The Hermitage, Victoria, Hongkong.	Licentiate and Member of the King and Queen's College of Physicians in Ireland: Licentiate in Midwifery of the same: and Licentiate of the Royal College of Surgeons in Ireland,	12th July, 1876.
Jordan, Gregory Paul,	36, Caine Road, Victoria, Hongkong.	Bachelor of Medicine and Master in Surgery of the University of Edinburgh, and Member of the Royal College of Surgeons of England,	2nd Aug., 1880, and 21st Oct., 1884.
Lockhead, John H.,	15, Elgin Street, Victoria, Hongkong.	Doctor of Medicine of the University of Pennsylvania, U.S.A.,	1883.
Manson, Patrick,	Rocklands, Robinson, Road, Victoria, Hongkong.	Doctor of Medicine and Master of Surgery of the University of Aberdeen,	11th Oct., 1865, and 8th Aug., 1866.
Young, Richard,	Woodville, Victoria, Hongkong.	Fellow of the Royal College of Surgeons, and Licentiate of the Royal College of Physicians, Edinburgh.	16th Apr., 1866.
Young, William,	Woodville, Arbuthnot Road, Victoria, Hongkong.	Master in Surgery and Doctor of Medicine of the University of Bishop's College, Montreal, Province of Quebec, Canada,	11th Apr., 1878.

All Civil Medical Officers and all Medical Officers of Her Majesty's Army and Navy, respectively serving in Hongkong or full pay, shall be deemed to be registered under this Ordinance. (Ordinance 6 of 1884, Section 19.)

Figure 6 The 1888 Register of Medical and Surgical Practitioners, Government Notification 197. *Hong Kong Government Gazette*. May 5, 1888 (source with permission from: https://sunzi.lib.hku.hk/hkgro/view/g1885/670297.pdf)

In Britain's colonies, the separation of apothecary and physician came much later. Modelled after the Medical Act 1858, the British Hong Kong administration of Hong Kong promulgated the Medical Registration Ordinance in 1884. Section 12 (c) further stipulated that:

> "Any person holds a medical diploma, degree, fellowship, membership, licence, authority to practise, letters testimonial, certificate, or other status or document granted by any university, corpo-ration, college, or other body, or by the Hongkong College of Medicine for Chinese... qualifying or entitling him to practise medicine, surgery, and midwifery in the country or place where it is granted, shall be entitled to be registered..."[13]

The College was founded in 1887. It was housed at the Alice Memorial Hospital on Hollywood Road, with Dr. Patrick Manson as its first dean. The College offered a 5-year curriculum, and the first batch with two graduates in 1892 including Dr Sun Yat-sen (孙中山).[11] The qualifications of the college were not recognized by the GMC in the initial years and graduate students could not practice in Hong Kong. Most went aboard to practice in Singapore until jobs opened up by the British Hong Kong administration after the plaque in 1894 (Note 3).

6 Marginalization of Chinese medicine

TWH had a philanthropy mission and would accept poor and fee-paying patients. For room and board, the range was HK$ 0.075 to HK$ 1.8 depending on if they chose the upstairs or downstairs. It was far lower priced than the Government Civil Hospital which was HK$ 1.0 per day. TWH's rooms were airy, beds clean and free of odor, which was common for wards with patients having open-wounds in most Western hospitals at the time, as dry earth was used as deodorizer and sandalwood was burned to disperse any bad odor. However, surgery and medicine were of the most "antiquated and barbaric description, untouched by European science".[14]

From 1875 to 1893, TWH recorded high mortality rates in annual reports of Dr. B.C. Ayres, who was the longest serving as well as the last Colonial Surgeon of Hong Kong. He came to Hong Kong from India in 1873 to take up the post of Colonial Surgeon and stayed in the post for 24 years.[15] He reported "the percentage of deaths to admissions, 51% for Chinese patients admitted in the TWH versus 3.7% for those (mostly Europeans) admitted in the Government Civil Hospital in 1875, an astonishing 13.8 multiples".[16]

At the height of bacteriology's "golden age" after the pioneering developments in the field, by Louis Pasteur and Robert Koch in the 1880s, the sudden outbreak of bubonic plague in 1894, transmitted through infected fleas with bacillus that lived on rats in Hong Kong was the biggest challenge to Chinese medicine. The epidemic started in Canton (now Guangzhou), a capital city of Kwangtung province and 75 miles or 120 kilometres away from Hong Kong, with high transmission and fatalities in February which the administration in Hong Kong ignored. Upon the urge of Liu Weichuan (刘渭川，Cantonese as Lau Waichuen), chairman of the TWH, the young Dr. James Lowson (1866–1935) who was the acting medical superintendent of the Government Civil Hospital visited Canton on May 2nd to observe the latest development of bubonic plague transmission there, which was at the height of the epidemic. Dr. Lowson returned to Hong Kong on May 8th, and the first case was reported the next day with Hong Kong declared a quarantine port on May 10th.

For three months from early May to late July in 1894 the contagious disease infected 2,679 people and killed 2,485, with a mortality rate of 93.4%.[17] The delay in treatment of Chinese patients at the TWH and its conservative approach of using Chinese medicine as the only therapeutic modality was open to debate. The deadly contagious disease devastated Hong Kong society for three decades, from 1894 to 1923, infecting 21,867 people and killing 20,489, with a mortality rate of 93.7%.[18] Dr. Moira Chan-Yeung, a distinguished Hong Kong born Canadian physician remarked that the high mortality rates of the bubonic plagues:

> "While it was true that Chinese people did not go to hospital until they were very close to death, it is also true that the failure to use antiseptics and the use of non-sterilized materials such as lard, musk, and ambergris to teat open wounds (by Chinese medicine practitioners at the TWH) ,must have also encouraged infection, septicaemia, and in many cases, even death. Moreover, housing the patients with infectious diseases and open infected wounds with other patients was conducive to the spread of infections."[19]

Dr. James Lowson, the acting medical officer in charge of the Epidemic Hospital and superintendent of the Government Civil Hospital and Lunatic Asylums, levied a pointed critique against the Hong Kong administration and Tung Wah Hospital's management of the plague epidemic, which resulted in precipitously high mortality rates.

> "I have written strongly – as I feel strongly – concerning the existence and condition of the Tung Wah Hospital, but you will understand that my objections to that institution are based entirely upon professional grounds. In addition to this, I believe that it constitutes a serious menace to the health of local community. I should, however, be sorry to have it supposed that I do not recognize that the fact that where a large native population is concerned, some deference has to be paid to the inclinations, and even to the prejudices of the majority."[18]

The appalling conditions at TWH during the 1894 bubonic plague outbreak prompted Governor William Robinson to convene a commission in February 1896, with Colonial Secretary James Lockhart as chairman and four appointed members, to investigate the organization's operations. The December 7th, 1896 edition of *The Hong Kong Telegraph* featured notes and comments on the Government's TWH Commission Report. The editorial included commentary on the report from T.H. Whitehead, a director of Standard Chartered Bank who served as one of the four appointed members of the commission:

> "Mr. Whitehead's recommendation in his very able report on the Tung Wah, that the Chinese should be required within a reasonable time to pass all their medical (Chinese medicine) men through a course of Western scientific study; no interference with their practice, no foreign doctors or foreign methods of treatment forced upon them; but only that they should take the necessary measures to become acquainted with modern medical school is established in Hongkong that programme can easily be carried out. If not, then the community and the Government are solely to blame for the daily murders in the Tung Wah and throughout Hong Kong."[20]

After consultation with the TWH board, the leadership reluctantly accepted the Hong Kong administration's request to appoint a Chinese Western-trained physician, Dr Zhong Benchu (钟本初, Cantonese as Chung Boonchor), a graduate of the College, as "Chief" of the hospital in 1896. While his salary was covered by the Hong Kong administration, all other expenses were

assumed by TWH. This represented the second milestone in Hong Kong's medical history, with the recognition of Western medicine gaining acceptance among Chinese elites who had previously upheld Chinese medicine as the sole healing modality for the natives in Hong Kong.

7 Taking over the Chinese hospital group

As medical science and pharmaceutical technology advanced in Western nations through discoveries like the isolation of active compounds from medicinal plants—including morphine (1804), caffeine (1829), quinine (1820), codeine (1832), and cocaine (1860)—for pain relief, fever reduction, and anesthesia, Western medicine progressed beyond the conservative approaches of traditional practitioners. In the second half of the 19th century, advances in the research of "germ theory" and sterilization, and the routine use of antiseptics to prevent hospital-acquired infections, the use of ether and chloroform as anesthetics in surgical operations, and the discovery of vaccines for cholera, and widespread vaccination of smallpox improved infant mortality. The installation of the first diagnostic X-ray system in Alice Memorial Hospital in the early 20th century further distinguished Western clinical practice from Chinese medicine.

The high infant mortality rates in Hong Kong in the early 1890s became worsened at the turn of the century, due to the expanding population of Chinese migrants and their young families from Kwangtung, was a result of the expanded geography of the New Territories leased by the British in 1898. The Hong Kong administration discussed with the TWH and recruited the graduates of the College to staff the first two clinics sponsored by the TWH in 1905. Once the two were in full operations, they became detached from the TWH and called themselves Chinese Public Dispensaries (CPDs). The primary responsibility is to issue death certificates, and their secondary responsibility is to provide Western medical treatments. The funding of CPDs came from two sources: the local committee comprising Chinese elites responsible for the operating costs such as purchase of medicines and the Registrar General, not the Medical Department, paid the Doctors and other dispensary staff.

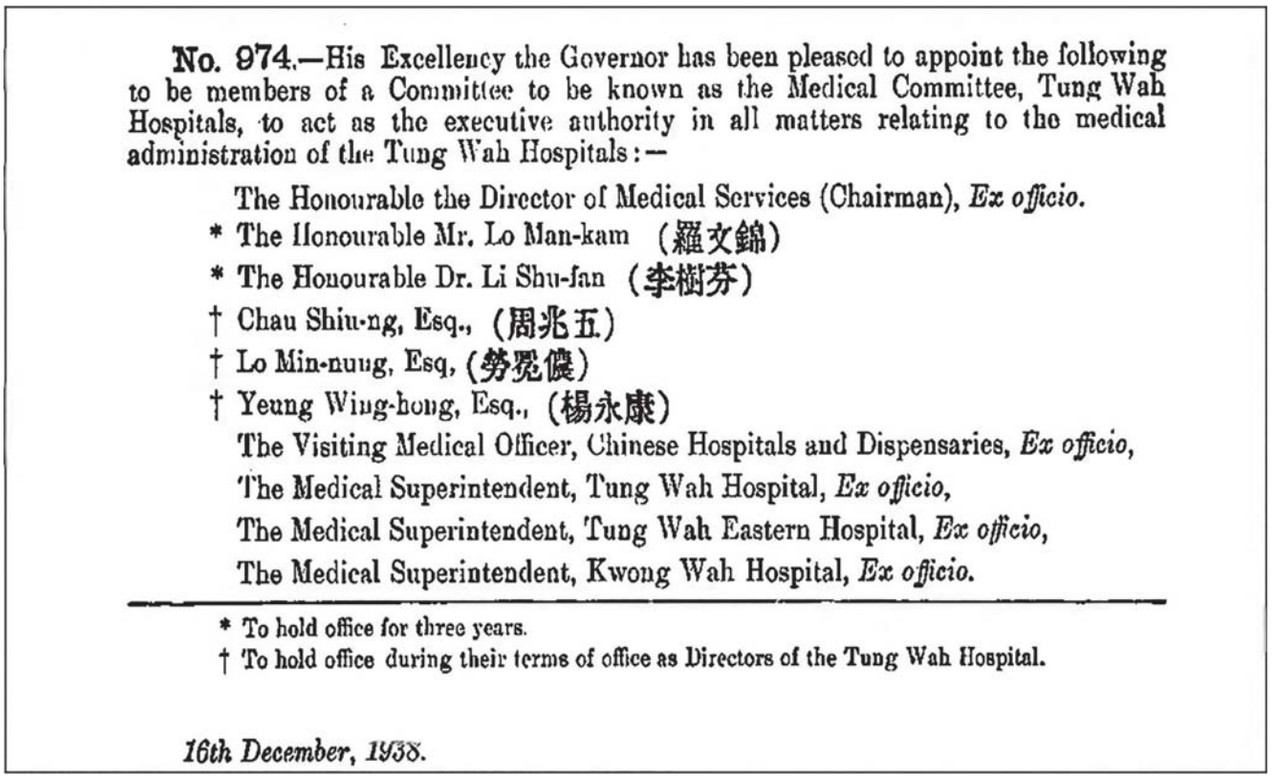
By 1906, the Chinese population residing in Kowloon and the New Territories comprised 158,461 out of Hong Kong's total population of 421,499. With medical services for both Chinese medicine and Western practices now crucial, the CPD initiative proved highly effective—establishing more clinics close to newly arrived migrant communities in outlying areas. Graduates from the College reached out to the poor through affordable outpatient services, filling needs not met by costly private traditional practitioners or distant government hospitals. The dispensaries also provided health education and maternal/child clinics, helping reduce infant mortality. By 1938, there were 6 CPDs in Hong Kong Island, 3 in Kowloon and 7 government dispensaries in the New Territories. The CPDs delivered 474,827 Western medicine out-patient consultations out of 760,018 or 62% of all government sponsored or owned hospitals including the TWH and clinics in 1838.

Slow progress was made in Chinese medicine until 1929, when debates in the Nationalist government's National Health Assembly in Shanghai regarding the "abolition of Chinese medicine" led to the formation of the Central Medical Hospital for Chinese Medicine (CMHCM) in Nanjing in March 1930. Six months ago, the Wall Street crash on October 24th, 1929 had a substantial impact on the global economy and Hong Kong's re-export of commodities was hard-hit with port activities and large number of dock workers were laid off. TWH faced unprecedented financial setbacks as wealthy philanthropists became far and few. For cost saving purposes, the three hospitals of the TWH group; Tung Wah (东华), Kwong Wah (广华), and Tung Wah Eastern (东华东) hospitals built in 1872, 1911 and 1929, respectively, amalgamated under one consolidated board of directors in 1932.

By 1938, the TWH group comprised 1,096 of Hong Kong's 2,538 total hospital beds (43%). The remaining 868, 322 and 252 beds (34%, 13%, 10%) belonged to government, missionary and private, and /military hospitals. As the single largest Chinese medicine provider, TWH's decision carried consequences—Chinese medicine inpatient services were abolished with only symbolic outpatient care for the poor, after 65 years. This milestone established Western medicine as the mainstream therapeutic system until 1997.

The inflection point came with the War of Resistance against Japanese Aggression. When Canton fell on October 21st, 1938, Hong Kong faced a massive influx of refugees fleeing wartime atrocities, swelling the population from 1.05 million to 1.8 million by mid-1939, with 750,000 needing medical care. By then, the TWH board agreed to relinquish its authority over medical services, transferring control to the Hong Kong administration. Only three of the ten medical committee members concurrently served as TWH directors; the chairman and six others were appointed by the Hong Kong administration (Fig. 7). This represented the first time TWH sought financial support from the government.

From 1930 to 1938, the Hong Kong administration completely ignored the renaissance of the Chinese medicine, as it fell outside the purview of the TWH group. This presented a golden opportunity for the Hong Kong administration to tap into the large pool of Chinese medicine practitioners in Hong Kong, by upgrading their clinical skills and techniques with minimal investments, in order to better serve the community-at-large. This represented the first time TWH sought financial support from the government.



No. 974.—His Excellency the Governor has been pleased to appoint the following to be members of a Committee to be known as the Medical Committee, Tung Wah Hospitals, to act as the executive authority in all matters relating to the medical administration of the Tung Wah Hospitals:—

The Honourable the Director of Medical Services (Chairman), *Ex officio.*
* The Honourable Mr. Lo Man-kam (羅文錦)
* The Honourable Dr. Li Shu-fan (李樹芬)
† Chau Shiu-ng, Esq., (周兆五)
† Lo Min-nung, Esq, (勞冕儂)
† Yeung Wing-hong, Esq., (楊永康)
The Visiting Medical Officer, Chinese Hospitals and Dispensaries, *Ex officio,*
The Medical Superintendent, Tung Wah Hospital, *Ex officio,*
The Medical Superintendent, Tung Wah Eastern Hospital, *Ex officio,*
The Medical Superintendent, Kwong Wah Hospital, *Ex officio.*

* To hold office for three years.
† To hold office during their terms of office as Directors of the Tung Wah Hospital.

16th December, 1938.

Figure 7 Medical Committee of Tung Wah Hospital Group (source with permission from: https://sunzi.lib.hku.hk/hkgro/view/g1938/477990.pdf)

In addition to those Western medicine practitioners in private practice, with most received their education at the Medical School of the University of Hong Kong since 1887, the government had 54 Western medical practitioners including the director and deputy director of medical services under its payroll in 1939, 9 more than the previous year, to cope with additional workload, though never was enough with the influx.

By 1941, Hong Kong had 310 medical practitioners registered to practice Western medicine. Of these, 198 (64%) were educated and trained locally, with the remainder from the UK, and the British Commonwealth countries. After a century under British Hong Kong administration, Hong Kong had evolved with its own hybrid East-West approach to medical services for its population. Dr. Moria Chan-Yueng observed:

> "It appears that the Chinese chose the option that seemed most fitting for them. In the Chinese hospitals (referred to the TWH), they frequently chose Western medicine, with its significantly lower mortality rates than Chinese medicine for inpatient care, but for milder health problems requiring only outpatient care, more sought Chinese medicine treatment. These findings suggest that from milder ailments and outpatient care, Chinese medicine would not likely be displaced by Western medicine."[20]

With a population of around 1.8 million residents, including 750,000 refugees, by mid-1939, Hong Kong's medical system was strained to meet the growing demand. Most Chinese residents still preferred traditional Chinese medicine as their primary form of healthcare. However, the largest provider of Chinese medicine services had withdrawn from serving the communities from which the directors of the TWH Group of Hospitals had originated a few decades earlier. The structure of medical services in Hong Kong at the time can be represented by the division of labor (Fig. 8). Ironically, the Chinese hospitals and dispensaries was a sub-division of the Health Division despite more than 95% of Hong Kong population preferred Chinese medicine and pharmacy as their first choice of therapy.

8 Conclusion

In the first one hundred years of British Hong Kong administration in Hong Kong, Western medicine evolved from a handful of lay apothecaries serving a couple of hundred British and European expatriates in the 1840s into 310 Western medical practitioners serving the medical needs of 20,000 expatriates and a measurable proportion of the 1.8 million Chinese community in 1940. Likewise, hundreds of Chinese medicine practitioners and apothecaries providing their medical and dispensary service to their fellow residents who formed the majority of the patient base.

The early years of Western medicine in Hong Kong Hong Kong went through a process and followed a path aptly described by Stuart Anderson regarding the Straits Settlements:

> "The person responsible for medicines initially was usually a ship's surgeon. This generally transferred to

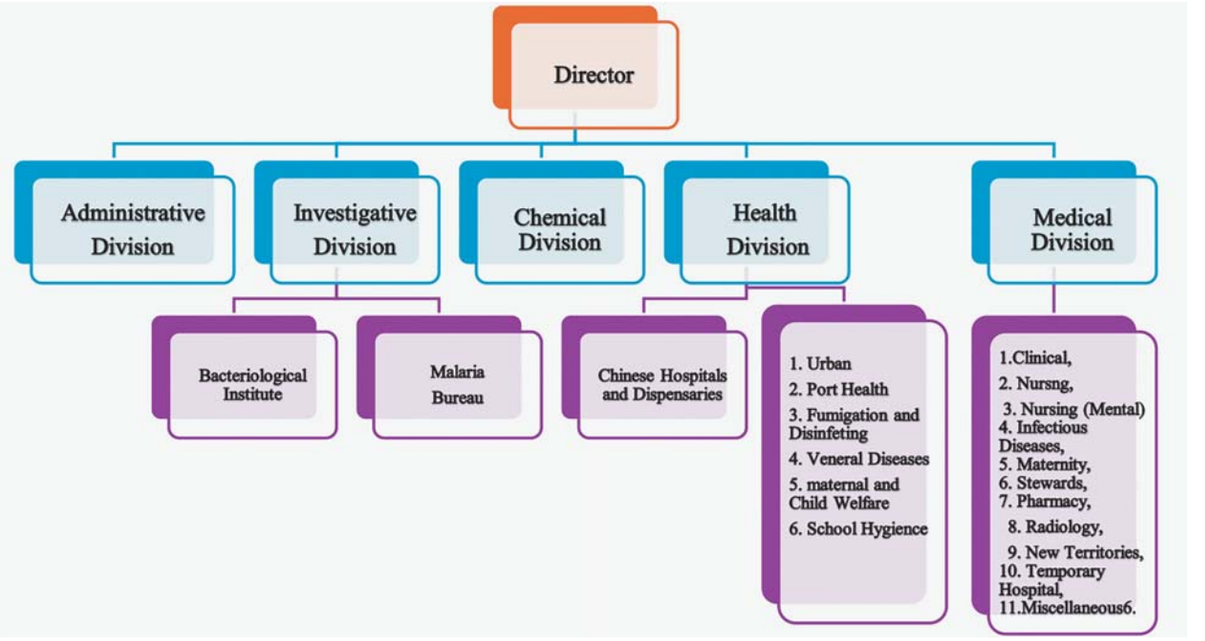


Figure 8 Organization Structure of Medical and Sanitary Department, Medical and Sanitary Department Report for 1938 (source with premission from: adaptation by the author)

> military surgeons on land, and the role was soon delegated to subordinates, often apothecaries or apothecary's assistants. As the apothecaries took on increasingly medical roles, responsibility for medicines passed first to chemists and apothecaries and later to pharmacists."[21]

Since Hong Kong fell under the British occupation in 1841, the Hong Kong administration followed the laissez-faire policy of Great Britain closely until health disasters such as the bubonic plaque forced changes to be made towards the end of the 19th century. Mark Harrison summarized the British policy:

> "Each individual was expected to take care of his or her own health, and high mortality was tolerated as part of the natural order."[22]

The 1894 bubonic plague outbreak revealed the shortcomings of British Hong Kong administration that both Western and Chinese forms of medical care and pharmaceutical provision proved woefully inadequate to meet the needs of impoverished migrants from Kwangtung living in overcrowded squatter settlements lacking sewage infrastructure. Swarming mosquitos and rats abetted the plague's spread. The pandemic caused over 2,500 deaths within a six-month period in 1894. Mortality rates among the Chinese population significantly exceeded those of Europeans for a variety of reasons, including crowded dwellings, broken sanitation systems, and cultural factors influencing late seeking of medical care only as a last resort in terminal cases.

The bubonic plague outbreak and its ongoing threats served as an impetus for change in the Hong Kong administration's approach to public health governance in Hong Kong. It underscored the necessity of cooperative leadership with Chinese elites to deliver free medical and social initiatives to the rapidly growing Chinese populace nearing the turn of the 20th century, constrained as resources were by the Hong Kong administration's limited budget.

The Hong Kong College of Medicine for Chinese was established in 1887 and Dr. Sun Yet-san was one of the two graduates who completed the medical course in 1892. More local students were recruited in subsequent years, and the Hong Kong administration seized the opportunity to introduce Western medicine to the community by appointing Dr. Zhong Benchu, the first Chinese Western medicine practitioner, in the Tung Wah Hospital in 1897.[23] A reasonable interpretation of the anomaly of this situation is perhaps better articulated by Pratik Chakrabarti:

> "The expansion of European commercial and cultural dominance led to the pre-eminence of European traditions and practices were part of establishments. As Europeans collected specimens in the tropics in the seventeenth century, they often extracted the materials used in the local drugs for their own medicines, but discouraged among the Europeans and the locals the use of their own medicines. Along with that, European authorities controlled medical universities, degrees and licensing. These often linked to the marginalization of traditional forms of medicine."[24]

A strategic move by the British Hong Kong administration to consolidate its position as a de facto cultural hegemony was to advance Western medicine and pharmacy as the mainstream therapeutic system. This was shown by the Secretary Department notification that the new edition (1914) of the British Pharmacopoeia became "Official" as from 1st January 1915, in Hong Kong.[25] Stuart Anderson, an authority in imperial

pharmacy history, summarized on the disregard of indigenous medicine:

> "It has illustrated the (fact that the) function of the British Pharmacopoeia in the early part of the twentieth century went far beyond specifying standards and rationalizing formulas. It played a part in regulating trade in drugs and medicines, by promoting western medicines at the same time as suppressing the use of indigenous education and practice. The issues encountered in India were repeated in many other provinces and settlements across the empire, with diverse climates, cultures, and religions. For imperial powers such as Britain, pharmacopoeias became instruments of imperialism."[26]

Traditional Chinese medicine remained as the first choice with 519,459 out of 597,225 or 87% of local patients than those who opted for western medicine in the TWH Group in 1938.[27] The situation changed in 1938 when the philanthropists were not financially sound enough to provide subsidized Chinese medicine and pharmacy to the public. The Hong Kong administration bailed out the TWH Group in late 1938 with one condition that the Medical Committee of the TWHs appointed by the Hong Kong Governor functioned as executive committee of the hospital in 1939.[28]

Despite the Hong Kong administration's systematic promotion of Western medicine as the dominant therapeutic system, Chinese medicine persisted as the preferred choice for the majority of Hong Kong's population. The 1938 statistics from the Tung Wah Hospital Group revealed that 87% of patients still relied on traditional treatments, underscoring its deep cultural roots and enduring efficacy. However, the financial instability of philanthropic support for Chinese medicine and the Hong Kong government's eventual intervention—tying aid to Western medical oversight—marked a pivotal moment in its marginalization.

The arduous journey of Chinese medicine in Hong Kong Hong Kong reflects both resilience and coercion. While it thrived as a grassroots practice, Hong Kong policies deliberately suppressed its institutional legitimacy. The British imposition of the British Pharmacopoeia, the control of medical licensing, and the strategic appointment of Western-trained Chinese doctors like Chung Boon Chau exemplify efforts to dismantle indigenous therapeutic traditional systems in favor of imperial hegemony. Its survival, despite systemic marginalization, speaks to its irreplaceable role in the community—a testament to the tension between Hong Kong modernity and the tenacity of traditional knowledge.

Notes

1. "Opium Cures" sold by Western dispensaries in 19th-century China's treaty ports referred to a range of products and treatments that claimed to help individuals overcome opium addiction. These remedies often contained varying amounts of opium or other narcotics, which worsened addiction despite their purported purpose of curing addiction.
2. An Ordinance for licensing the sale of Salt, Opium, Bhaang, Ganja, Paun, Betel, and Betel-leaf, within the Colony of Hong Kong, and for the licensing of Pawnbrokers and Auctioneers, with a Table of Fees on Official Licences and Signatures, No. 21 of 1844, Anno Octavo Victorae Regime (in the Eight Year of Victoria Region), Hong Kong. *The Friend of China and Hong Kong Gazette*. Dec 28 1844; Sect: 624.
3. The Hongkong College of Medicine for Chinese became part of the University of Hong Kong, when founded by Hormusjee Mody, a local Parsee merchant broker in 1908.

Funding

None.

Ethical approval

This article does not contain any studies with human or animal subjects performed by the author.

Author contributions

Patrick Chiu drafted and revised the paper.

Conflicts of interest

The author declares no financial or other conflicts of interest.

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A Coincidence of Purpose: The Prelude of the Chinese Materia Medica Research at the Peking Union Medical College in 1920

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Abstract

This paper reconstructs in detail the course leading to the inception of the Chinese material medica (CMM) research at the Peking Union Medical College (PUMC) in 1920. By analyzing the primary materials from several archives, it provides, for the first time, a historiographical account of the major events and key figures in the process. These include the China Medical Board (CMB) Commission to East Asia in 1915 that shaped the attitudes of Drs. William H. Welch and Simon Flexner, the PUMC's chief scientific architects, toward CMM and its scientific investigation; the influence of medical missionaries and Japanese scientists on these attitudes; the medical leaders' decisive roles in recruiting Ralph G. Mills and Bernard E. Read, two of medical missionaries with strong interests in and actual studies on CMM, to the PUMC, which serendipitously made them central figures associated with the CMM research at the College; and finally the critical role of Mills and other medical missionaries in introducing CMM research, both concept and material, to the CMB executives and in their reconciliating the research subject with the institutional aims. The findings of the study contextualize the inception of CMM research at PUMC from the perspective of broader narrative of transnational circulation and recognition of medical knowledge and highlight the intermediatory roles played by medical missionaries that were critical in the intersection between traditional Chinese medicine (TCM) and scientific medicine. The study also reveals multiple serendipitous occurrences associated with the eventual inception of the program, thus offers a fresh interpretation of the beginning of the most impactful research program of scientizing TCM in the first half of the 20th century.

Keywords: Chinese materia medica; Peking Union Medical College (PUMC); China Medical Board (CMB); William H. Welch; Simon Flexner; Ralph G. Mills; Bernard E. Read

1 Introduction

On February 11th, 1924, just days into the Chinese lunar Year of the Rat, the Peking Branch of the American Society of Experimental Biology and Medicine held its first regular meeting of the year on the Peking Union Medical College (PUMC) campus. Following the first presentation by Professor Ralph G. Mills, the head of the Department of Pathology, Drs. Ko-Kuei Chen (陈克恢) and Carl F. Schmidt shared with the attendees—a dozen or so PUMC faculties and students, their findings of the sympathomimetic activities of ephedrine, an alkaloid they had just isolated from Chinese herb *Ma Huang* (麻黄 Herba Ephedrae).[1] Both Schmidt, an American pharmacologist and the senior of the duo, and Chen, an American-trained Chinese pharmacist and physiological chemist, were members of the PUMC's small Pharmacology Division. Their *Ma Huang* study was part of the Chinese materia medica (CMM) research program initiated and led by Bernard E. Read (伊博恩), the head of the Division since its establishment in early 1921.

At the time when Chen and Schmidt presented their results, Read was carrying out research on the pharmacological and toxic effects of chaulmoogra oil (大枫子油) for his Ph.D. dissertation at the Yale University. In October, 1924, the newly minted Doctor Read prepared an introductory article of his group, which had just been elevated in the past July to the full department status. Under the section header "Chinese materia medica", Read articulated the merit and aims of his CMM research and outlined the portfolio of this single theme, three-pronged program. The first was a spectrum of bibliographical work, ranging from literal translation and interpretation of classic CMM texts to a comprehensive collation of the existing literature of relevant

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scientific investigations. The second line of research focused on the botanical and pharmacognostic studies of CMM, including an experimental herbal garden on the College campus, with a goal of clarifying their taxonomic identifications and standardizing their preparation process. The last direction of active investigation entailed chemical and pharmacological analyses of selected CMM, including those already in clinical application by the Westerners, like *Dang Gui* (当归 Radix Angelicae Sinensis) and chaulmoogra oil, as well as a few novel candidates, such *Ma Huang*.[2]

Merely two years after the presentation of Chen and Schmidt, ephedrine was ushered onto the American market for treating common conditions, such as asthma and hay fever, as well as rare diseases like Addison's. This instant success was, in part, based on their laboratory studies at the PUMC, but more critically, on the impressive outcome of the clinical studies, chiefly by several American physicians.[3] Although Schmidt and Chen left the PUMC in the Junes of 1924 and 1925, respectively, Read's CMM program was able to ride the wave to become a major player of the global ephedrine research sensation by engaging in a wide range of projects from *Ma Huang* pharmacognosy to ephedrine chemistry, pharmacology, and pharmaceutical manufactory. In fact, the success of ephedrine not only sustained the CMM program at the PUMC, but also enabled Read to justify his researches on bibliography and pharmacognosy until he left the College to become the director of the Physiological Division at the Lester Institute of Medical Research in Shanghai in 1932.

By and large, the key results of Chen and Schmidt on the pharmacological characterization of ephedrine are the same as those of Hajime Amatsu (天津创) and Seiko Kubota (久保田晴光) published in 1910s, while working at the Kyoto Imperial University Faculty of Medicine under the pharmacology professor Kurata Morishima (森岛库太),[3,4] they nevertheless have been widely recognized as one of the most celebrated scientific achievements with world acclaim from China during the Republican Era (1912–1949). The historical significance of this rediscovery is far beyond chemical and pharmacological analyses of a Chinese herb. As the first modern medicine developed from CMM, the PUMC team's *Ma Huang*/ephedrine work has long been regarded as a major milestone and poster child of CMM scientization, arguably the most important component of now century-long and still contentiously debated TCM modernization. It is almost always in the spotlight and frequently cited in the discourse by different sides to support their arguments. In spite of its insurmountable impact upon the concept and research strategy of CMM scientization over the past century, the history of this scientific event per se has only been explored preliminarily thus far and never been examined in the broad context of the CMM research program which first enabled its inception, then expanded and deepened its scope.[4] Moreover, the history of the PUMC's CMM program, whose impact was far beyond enabling and expanding the ephedrine research, also warrants a close examination for its critical role in the history of TCM modernization in China.

Read offered very little history of the CMM program in his introductory article. The only relevant content was his highly appreciative acknowledgement of Dr. Ralph Mills' work in Korea as the knowledge and material foundation of the first two research areas of the program, "Dr. Ralph G. Mills supervised the establishment of a collection of CMM at the Severance Union Medical College, Seoul, Korea. This included extensive bibliographical work which forms the basis of our present research", and "the Severance Collection of materia medica has made a good nucleus for the pharmacognostic studies upon Chinese drugs".[2] He also, time and again, credited Mills for transferring the collected research material to him in 1920 and referenced Mills' results in his bibliographical series on CMM, published over the next two decades and broadly regarded as a hallmark of global proliferation of CMM knowledge.[5] But Read had never revealed his relationship with Mills, nor the reasons behind the transfer of the material. Interestingly, Mills also had some minor associations with ephedrine pharmacology research, trivia that few of his contemporaries or historians probably had ever noticed. He was the first American who became aware of the work of Amatsu and Kubota, and himself had also made a direct contribution to the Chen-Schmidt project.[5,6]

Only a few general descriptions of the PUMC's CMM program and brief biographical sketches of its key scientists, often based on secondary sources with factual inaccuracies, exist in the current literature of relevance. The origin of the program is seldomly mentioned in the accounts and only touched upon occasionally from a whiggish perspective in the context of the ephedrine success, which, as before mentioned, came three years after the inception of the program.[7,8,9] Therefore, the following questions of historiographical interest remain to be addressed:

First, why did PUMC, a medical college established by the Rockefeller Foundation (RF) as its flagship institution in China to promote modern medical education on par with the best of the West, devote its entire Department of Pharmacology to study CMM, an integral part of an indigenous medical faction which had been deemed as entirely inadequate by the American medical pundits, such as Dr. William Welch, the most senior RF medical advisor (Fig. 1)?[10] Historian Sean Lei (雷祥麟) reasoned the rationale behind PUMC's "unusual decision to support what was commonly seen as a dying science is to demonstrate its good intentions in recognizing and developing appreciation for the value of traditional Chinese culture" by referencing a small part of an informal communication from Henry Houghton

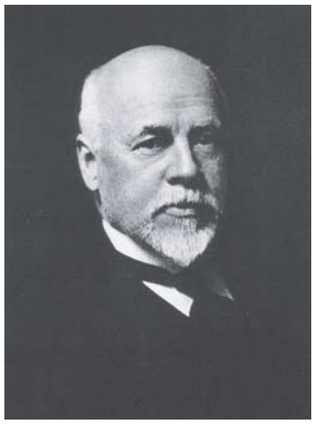


Figure 1 William H. Welch (source with permission from: The United States National Library of Medicine)

(胡恒德), the PUMC acting director, in May 1920, to Edwin Embree, the secretory of RF and PUMC Board of Trustees.[9] But is it a convincing or sufficient explanation for this bizarre or logically paradoxical association?

Second, Ma Qiusha (马秋莎), a historian specialized in the history of RF philanthropic enterprise in China, has attributed the RF advisors' very low opinion of Chinese medicine to the influence of the missionaries in China without providing substantive evidence.[11] The statement thus begs for a clarification of Drs. Welch and Simon Flexner's standings on CMM, as they were not only the most prominent American medical leaders and the most trusted RF medical advisors, but also the chief academic architects of the PUMC. It also asks to examine the influence from missionaries, if any, on their views, as well as the roles played by Mills and Read, both missionary medical school instructors prior to their association with the PUMC, in the initiation of the CMM research program.

Third, it was only until very recently that the research effort of Mills on CMM in Korea has been investigated and the relationship between his work and Read's in Beijing and later in Shanghai revealed.[5] However, his role in initiating the PUMC's CMM research program, and the reason that his research material ended up in PUMC's possession, is yet to be explained.

Based mostly on the materials from several archives, this paper is set to specifically address these questions, with the hope to accurately reconstruct the process leading to the conceptual inception of the CMM program at the PUMC, thus better understand its significance in the history of CMM scientization and the rediscovery of ephedrine borne out of this program.

2 The American medical leaders' encounter with Chinese materia medica

2.1 A medical and cultural commission to China

On November 30th, 1914, the RF created the China Medical Board (CMB), a subordinate division dedicated solely to manage the Foundation's upcoming medical philanthropical activities in China. At the first CMB meeting on December 11th, Wallace Buttrick, then executive secretary of the General Education Board, was named CMB's director, and Roger S. Greene (顾临), formerly American Council General in Hankou, was appointed CMB's resident director in China (Note 1). Besides granting fellowships to Chinese doctors and Anglo-American medical missionaries and allocating funds to missionary hospitals across China, the CMB also completed, on July 1st, 1915, the purchasing of the Union Medical College (UMC) in Beijing, with a goal to transform the small school, created in 1906 by the London Missionary Society (LMS) and jointly managed by six British and American missions, into an institution of modern medical education.[12]

Buttrick was a layman in medicine and medical education, but had a long association with the Rockefeller philanthropy. Moreover, a former Baptist minister, he was well connected with the Christian missions, which had dominated the Western medical education and practice in China for decades through their hospitals and medical colleges. The first step Buttrick took, after the UMC acquisition, was to organize a China Medical Commission (Fig. 2) and convince two of his fellow CMB members, Drs. Welch and Simon Flexner (Fig. 3), the director of the Rockefeller Institute for Medical Research (RIMR) in New York City, to join the venture, hoping the advice of the medical leaders, the first hand observation in China and the direct interaction with the medical missionaries and the Chinese would enable his agency to develop its policies and formulate a concrete plan for the new school.[13]

Figure 2 CMB China Medical Commission Group Photo. From left: Wallace Buttrick, Frederick L. Gates, Simon Flexner, Roger S. Greene, William H. Welch (source with permission from: Rockefeller Archive Center)

Figure 3 Simon Flexner (source with permission from: The United States National Library of Medicine)

During the PUMC's gestation and formative years from 1914 to 1922, RF and/or CMB had commissioned no fewer than six broad surveys of medical education and practice in China. Besides Buttrick's CMB Commission in 1915, often referred as the Second China Medical Commission in the literature, others included those of Harry P. Judson, the president of the University of Chicago, in 1914; Frankline C. McLean (马克林), the founding director of PUMC, in 1916; George E. Vincent, the president of RF, in 1919; Richard M. Pearce, the director of RF's Division of Medical Education, in 1921; and Edwin R. Embree, the secretary of RF, CMB and the PUMC Board of Trustees, in 1922. Largely due to the participation of Welch and Flexner, the Buttrick/CMB Commission undoubtedly was the most influential in shaping the specific and long-lasting policies for the development of PUMC, and, more broadly, in promoting modern medical education and research in China, just as the CMB chairman J. D. Rockefeller, Jr. had hoped in his bon voyage note to the medical leaders, "not only will you going to China indicate, as nothing else could, the high ideals upon which the work of the CMB is founded, but it will win for the enterprise the confidence and respect of the leading medical men, officials and citizens".[14]

The CMB China Medical Commission left San Francisco on August 7th, 1915, and returned to the same seaport on December 27th. The journey included two months in China (September 16th to November 21st), two stopovers in Japan of a total of 38 days, and a brief visit each to Korea and Hong Kong. Its itinerary and activities in China, recommendations to the CMB, and their impact on the PUMC ideal and policies have been reviewed and discussed.[8,12,15,16] This section, therefore, will only focus on those directly pertinent to the current subject, but absent in the literature, namely, Welch and Flexner's exposure to TCM and CMM in the context of their general experience and understanding of Chinese culture and history during the journey and its influence on their attitude toward CMM research.

All the Commission members were consciously aware that experiencing the Asian culture was an important purpose of their trip, thus everyone was fully immersed in the cultural appreciations, evidenced by photographs and numerous entries in Welch and Flexner's travel diaries on sightseeing, shopping, dining, entertainment, social gatherings and other activities alike. Paul Reinsch, the American minister to China at the time, hosted the Commission on multiple occasions during its time in Beijing. His memoir, published only a few years afterwards, also includes some vivid witness of the Commission's cultural exposure, "in their hours of leisure from the scientific tasks of their mission, the members of the Rockefeller board saw much of Chinese life on the lighter as well as its more serious side".[17] Welch, at the age of 65, was the oldest and apparently the most cultural inclined and adventurous member of the group. His genuine enjoyment of exotic Chinese food and curiosity about Chinese life, people and history impressed Flexner, who described their East Asia trip almost entirely about these cultural activities in his biography of Welch a quarter of a century later.[18]

Flexner was the only Commission member who had previously been in Asia. In early 1899, while an associate professor in Welch's Pathology Department at the Johns Hopkins University School of Medical (JHUSOM), he was appointed the chairman of the Johns Hopkins Special Commission to study tropical disease endemic in the Philippines. During the trip, he stayed in Japan for ten days. Besides the excitement of meeting famous Japanese scientific figures like bacteriologist Kitasato Shibasaburō (北里柴三郎), he was fascinated by the Japanese culture.[19] Much less adventurous than Welch, Flexner nevertheless had his own way of appreciate the sophistication of Chinese culture. For example, he developed a particular liking of Chinese jade pendants and, in the ensuring years, repeatedly asked those traveling between Beijing and New York to buy the crafts for him.

Interestingly, the members of the RIMR also considered that their leaders were taking a cultural rather than a pure medical or educational mission in China. On October 18th, 1915, those at the first staff meeting of the Institute's new academic year decided to send a greeting card to express their "kind regard and best wishes for the success in their cultural mission to Doctor William H. Welch and Doctor Simon Flexner" (Fig. 4).[20] One of the card signers was Franklin C. McLean, a 27-year-old assistant physician of the RIMR Hospital, who would become PUMC's first director ten months later, per Flexner's recommendation.

While admiring the Chinese history and ancient civilization, and enjoying its sophisticated arts and crafts in daily life, the medical leaders also shared a very low opinion on the Chinese tradition, for its lacking scientific spirit and enlightenment, which, for centuries, stalled the country's intellectual and technical development, including medicine. Welch bluntly admitted to the Chinese students and faculty of Yale College in

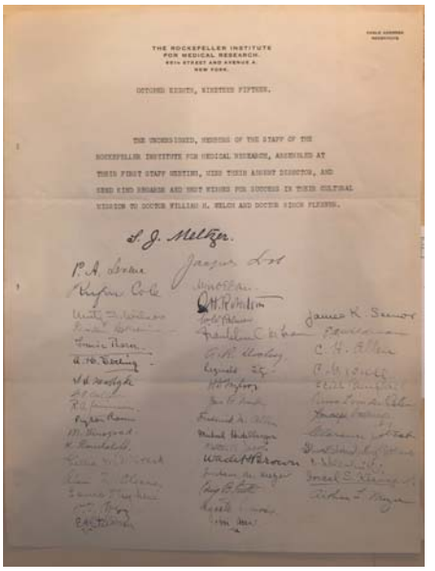


Figure 4 Greeting card from RIMR staff to Drs. William H. Welch and Simon Flexner (source with permission from: American Philosophical Society Library)

Changsha his disappointment, "I confess I have been shocked at the lack of appreciation of this method of science".[21] With this conviction, the Commission seemed to have no plan or interest to explore Chinese medicine, an integral part of the Chinese culture that arguably concerned the members the most. However, Welch did describe one instance of direct, though superficial, encounter with CMM, "we were much interested in the shops and booths of the Chinese doctors in the public squares of Nanking, where we had gone to see the Confucian temple. There were dried roots, stems and leaves, snake skins, toad skins and bones of animals—particularly tiger bones, which are ground up and used as a tonic".[10] Besides these native materia medica samples, he also "saw interesting street scenes—teeth pullers, medicines and medicine men" while strolling in the Nanking market place on the same day, probably accompanied by Dr. Philip S. Evans (易文士), professor of Physiology at the Department of Medicine of the Nanking University.[22,23] Nevertheless, it should be fair to say that most of the American medical leaders' contact with Chinese medicine was inadvertent and indirect through their interactions with the Westerners residing in China, who functioned as a unique group of intermediaries in their exposure to the Chinese culture. The most frequent contacts among them were medical missionaries like Dr. Evans, with whom Welch and Flexner personally acquainted and trusted, but also included a few such as Dr. Mills, with whom the medical leaders formed instant personal bond on their trip.

2.2 A pleasant meeting with Mills in Seoul

The CMB Commission traveled to China by way of Japan and then Korea. They spent part of the September 15th visiting the Severance Medical College and its hospital in Seoul, the only missionary medical school in Korea, and met Dr. Oliver R. Avison (鱼丕信), the president of the College, and Drs. Ralph Mills and Jesse Hurst, two American professors. Welch and Flexner were "particular impressed with Dr. Mills, an enthusiastic bacteriologist and pathologist .... He is a most attractive young man", and immediately committed to provide Mills research and teaching materials, such as "preserved pathological specimens for teaching, also mounted blocks for sections".[24] "Help Mills", as Welch vowed in his diary, while Flexner was so impressed by Mills that he later even sent a letter to Mills' father, a prominent lawyer in Illinois, telling him the visit with his son "proved a very delightful one".[25]

Illinoian Ralph G. Mills (Fig. 5) was a graduate of University of Illinois and Northwestern University Medical School. He came to Korea in 1908 as a medical missionary, first served at a remote mission station near the Korea—China border, then, for 5 years, as the professor of Pathology and Bacteriology at the Severance Medical College.[5] In November 1914, he established a research department at the college, the first and only unit dedicated to medical research at any Asian medical schools outside Japan.[5] It was in this capacity that Mills developed a diverse research portfolio and engaged in projects ranging from parasitology, disease epidemiology, to native materia medica and botany, a reflection of his own broad academic interests.[26] Although the research facility was still in a very primitive state at the time of the Commission's visit, its scientific spirit and objectives, even its preliminary results, were highly appreciated by Welch and Flexner.[5] The medical leaders were especially intrigued by Mills' tentative identification of a land snail as the intermediate host of Paragonimus, a lung parasite prevalent in Korea, for its originality and alignment with their own keen interest in infectious agents and pathological cause of diseases. Both of them noted this work in detail in their diaries, which was clearly resulted from their extensive exchanges with Mills.[24,27] Although Welch

Figure 5 Ralph G. Mills (source with permission from: the Presbyterian Historical Society)

did notice Mills' interest in botany, even called him a naturalist, there seemed no discussion on other projects on the list Mills provided to the Commission, including two related to CMM.[26,28] Mills' ongoing CMM works at the time, including a partial translation of *Ben Cao Gang Mu* (《本草纲目》 *The Grand Compendium of Materia Medica*) into English and collection of native medicine specimens, were only preparatory steps toward those specified by the department's aims. Since the preliminary results were either bibliographical in nature or inseparable from his botanical collection, there might not be any tangible results either presentable to the medical leaders or could elicit their interest.[5]

One CMM related fact, however, did draw Welch's attention while at the Severance Hospital. According to Avison and his staff, the Koreans generally held a dichotomized attitude toward Western surgery and medicine, with a much higher acceptance of former than the latter, as Welch noted, "we found the great preponderance of surgical over medical cases in Avison's hospital".[29] In fact, Mills had reported this observation with a more disconcerting twist the year before in *China Medical Journal* (《博医会报》), "it is evident that every Oriental believes implicitly in the efficacy of these remedies, namely native drugs and acupuncture, and this faith is not all banished when some of them graduate from the schools of Western medicine. Whether rightly or wrongly this faith exists".[30] Although the first Rockefeller Foundation China Medical Commission had already captured part of this sentiment in 1914, "the old Chinese practitioners claim to know about medicines and their effect upon the body, but admit that they know practically nothing about surgery",[31] this was probably the first time when Welch realized that the superiority of modern medicine was not uniformly accepted in East Asia as he had assumed. He would soon hear the same rhetoric about the Chinese attitude from Dr. Dugald Christie (司督阁), the principal of the Mukden Medical College and Dr. Charles Young (杨怀德), the professor of Pathology and Bacteriology and dean of UMC.

2.3 The influence of medical missionaries on the RF medical leaders

The CMB Commission arrived in the Northeast Chinese city of Shenyang on September 16th, where they were greeted by Roger Greene, who would accompany them throughout the entire journey, and Charles Young, who had traveled up from Beijing to be the first in China to greet the Commission, with whom he would interact extensively during the coming weeks.

Both Welch and Flexner had broad personal connections with the Americans in China, most noticeable among them were a dozen or so JHUSOM graduates. They were also personally closer to some of these former students than a simple teacher-student relationship, which gave them a distinctive advantage to gain in-depth knowledge about China and Chinese medicine. For example, Evans (M.D. 1899) was a distant relative of Welch and a fellow Yale alumnus;[22] Edward Hume (胡美) (M.D. 1901), dean of Yale-Hunan Medical College in Changsha, was a Welch protégé, in part due to the friendship between his father and Welch since their student days at Yale;[32] Charles Young (M.D. 1903) named his son, born a few months after the Commission's visit to Beijing, after Welch to show admiration to his teacher; Henry Houghton (M.D. 1905), dean of Shanghai Harvard Medical School, was one of Flexner's first assistants at the RIMR, per Welch's recommendation, prior to his coming to China as a medical missionary in 1906.[33] These veteran medical missionaries, like Mills in Korea, followed a very similar career path in China, starting at field mission hospitals and then becoming medical educators in central cities, thus exposed broadly to the practice of both Western and Chinese medicine. It is only rational to assume that they shared their personal experience and views on TCM and CMM with their teachers while escorting the Commission during its visit to their respective cities.

Many, if not most, American medical missionaries held a dichotomized opinion on TCM in 1910s (Note 2). On the one hand, they viewed TCM as an obsolete ancient medical faction of unintelligible doctrines and bizarre diagnosis methods that could not be interpreted by or reconciled with modern sciences. Charles Young, although open-minded and clearly against Western cultural prejudice, nevertheless explicitly analogized TCM in 1910s to Western medicine from the times of Hippocratic and Galen to the Dark Ages, "in our glance at Chinese medicine, it is to be remembered that Chinese civilization is in the stage occupied by the European nations in the Middle Ages. It has been in much the same condition of suspended animation for two millennia".[34] On the other hand, many medical missionaries also believe that CMM, one of TCM's chief therapeutic modalities, had some genuine clinical utilities, especially those of botanic or mineral origins.

There were multitude reasons for their acknowledgement of CMM. The most common logic behind was the similarities between CMM and other kindreds of the global materia medica tradition, especially those of European. John Kerr, an American medical missionary pioneer and the first president of the China Medical Missionary Association (CMMA), pointed out in 1887 that a small group of Chinese herbal medicines were identical to those used traditionally by the Europeans, and many others were conceptually the same.[35] Dr. Victor G. Heiser, who had interacted extensively with those of CMB and PUMC in his capacity as the director of the Far East of the RF's International Health Division, also wrote, "... of well recognized medicinal value is many of their drugs line the shelves of our own drug stores. The plantain, the spurge, the saxifrage, and the mugwort serve in our folk medicine".[36] Houghton listed

a few drugs shared by Chinese and West as examples to show Embree that, "the materia medica of both countries (America and China) hold so much in common".[37] Young not only pointed out that "the Chinese have a very extensive materia medica. Many of their drugs are also used in the West", but also drew a parallel of CMM knowledge to that in the first edition of London Pharmacopoeia complied in 1618, thus provided a more concrete reference point for comparison.[34] Mills, Young's acquaintance and fellow University of Illinois alumnus, elaborated his understanding of Young's argument that, if the medical missionaries could not reject their own pharmaceutical tradition entirely, then they must accept at least some CMM, "not long since, a doctor now practicing in China called my attention to the similarity between the pharmacopoeia of England a couple of hundred years ago and that of China today. It is perfectly evident that much of what we now know of medicinal treatment dates back for a long time and no one would say that it was all useless. It seems, therefore, rather premature for us to condemn the whole of the Oriental practice as useless and bosh".[30]

In addition to the similarity, the medical missionaries also recognized the value of those native drugs unknown to the West, predicated on the extensive empirical experience behind them. "Emperor Shen-Nung (神农)", a mythical ancestral figure of five thousand years, was often quoted to suggest the long history of the CMM tradition. Moreover, some missionaries believed that even by sheer luck or probability, the large variety of CMM novel to the West must contained a few genuinely valid therapeutics, as Dr. G. Duncan Whyte (怀敦干), a Scottish physician in south China, reasoned, "Chinese, a race of educated intelligent people, inhabiting so large an empire, cannot have failed in the course of a few thousand years to discover some, at least, of the medical properties of the flora that are found varying throughout its tropical, semi-tropical, and more temperate areas".[38] Since the 18th century, the Europeans and then Americans gradually realized that *Ben Cao Gang Mu*, the great Chinese pharmacopeia compiled and published by Li Shizhen (李时珍) in the late 16th century, was the comprehensive encyclopedia of extensive and intricate CMM knowledge and an authoritative reference for their understanding of the Chinese drugs. Hume believed "no medical reference book in the Western world begins to wield such influence in its field as this work on materia medica does in China".[39] Dr. Newton H. Bowman, a TCM enthusiast and Mills' colleague at Severance Medical College, singled out Li's masterpiece as the "standard for Chinese medicine" and introduced it in details in his long article on the history of Korean medicine.[5,40] Dr. George A. Stuart (师图尔), an American medical missionary in China for twenty-five years and once CMMA president, spent a decade to complete the revision of the CMM of botanic origins first compiled by the British medical missionary Porter Smith (施维善) in 1870, with heavy consultation of Li's classics. Stuart's book, published shortly after his death in 1911, instantly became a popular reference of CMM among the Westerners in China and even captured the attention of the first RF China Medical Commission, "there is a very elaborate Chinese materia medica ... One work on the pharmacopoeia, the Pen-tsao, contains several copious volumes. The subject matter has been treated in more concise form in a volume entitled *Chinese Materia Medica* by G. A. Stuart, M.D., Shanghai, 1911".[31]

Besides the logic of similarity and experience over centuries, some medical missionaries also witnessed CMM's clinical efficacies personally. Dr. Avison, a pioneer medical missionary in Korea, had long fascinated the therapeutic efficacy of native materia medica, "native drugs are numerous and many of them unknown to us and untried by us, though the people who use them think much of them and sometimes, after we have failed to cure a case, it is treated by a native doctor with native drugs and cured, much to our chagrin".[41] Hume noted a pernicious anemia patient who had failed the treatment prescribed by the famous Scottish tropical medicine expert Dr. Patrick Manson (万巴德) in south China, but subsequently cured by a Chinese medicine practitioner using crow's liver.[42] The above-mentioned Dr. Whyte, in his rebuff of the claim made by fellow mission doctors that "Chinese medicines are worthless", remained them that "surely most of us have seen incurable cases who have subsequently received native treatment, and whose life has been prolonged considerably beyond the period we had anticipated".[38]

The medical missionaries' experience with CMM efficacy was also corroborated by the differential attitude of Chinese toward Western medicine and surgery. It was a common knowledge among the Western practitioners in China and Korea that, while readily accepting the Western surgery, the Chinese, even the educated elite, demonstrated an unwavering belief of their native medicine. Young had noted "an interesting fact, namely, that while the Chinese realize that Western surgery is so infinitely superior to their own, that there is no comparison, many of them, I believe it may be said most of them, as yet prefer the old Chinese school of internal diseases".[34] Hume recalled the Chinese in Changsha often told him that "you are making a great reputation as an external disease doctor. However, we do not believe that the medicines prescribed by the Western doctors for internal diseases will prove as effective as those of our Chinese doctors", which he translated as "we trust your surgery, but have greater confidence in Chinese medicine" and wondered "how long it would be before people trusted us as much as they did these herbalists".[42] In another word, through their decades long extensive and often clashing cultural encounters with the Chinese, many medical missionaries had come to share a common belief as Chinese populace on CMM, although to different degrees and for different reasons, but distinctive

from the total dismissal of TCM by their compatriots at home, the medical leaders included.

During his tour in China, Welch had heard, on multiple occasions, anecdotes about the Chinese medical practitioners' magic art or CMM's superior healing power, as well as the dichotomized Chinese view on Western medicine and surgery. One of such claimed that the severe dropsy of a Bright's disease patient was cured by a Chinese remedy after his English doctor claimed the condition helpless. Using the case as an example, the English doctor shared his opinion with Welch "that the Chinese have some very valuable therapeutic procedures that are well worth investigating".[10] Welch also heard similar rhetorics from Minister Reinsch, who recorded in his memoir, "I so expressed to Doctors Welch and Flexner during their visit—that much of value might be found in the Chinese materia medica. In my own experience there had been so many instances where relief had been afforded in apparently hopeless cases that I thought it worthy of special study".[17]

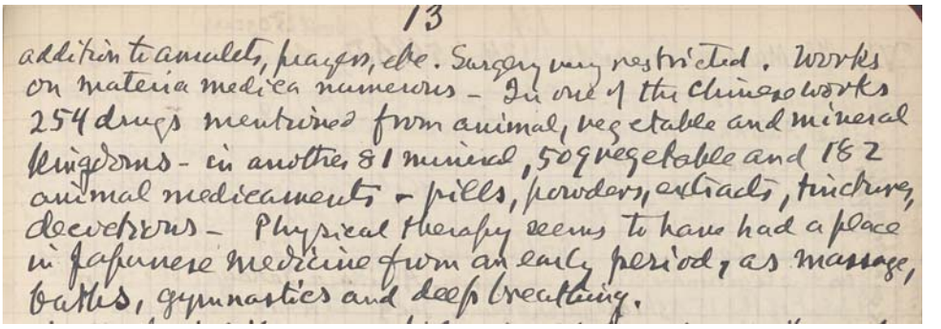
The Commission paid its first visit to the newly acquired UMC on September 22nd, 1915, the day after they arrived in Beijing. During the brief inspection, they heard yet again the account of differential trust and acceptance of the Western surgery and medicine among the Chinese, the same as those they had just learned in Seoul and Shenyang. "The Chinese appreciate Western surgery but do not seem to consider Western drugs superior to their own", was noted by Welch.[29] It is unclear whether Welch had learned from Mills in Seoul that the modern medical education would not necessarily eradicate this wholesale trust of CMM among the elite Asians, but when he directly witnessed the same reality three times within a week, the medical leader apparently became alerted, as this dismissal attitude toward Western medicines was an obvious obstacle to the effective promotion of modern medical education and practice in China. He could not help to ponder, "has western medicine, in contrast to surgery, been in position or so represented as to demonstrate its superiority to Chinese medicine?" and thought of putting "the first-class internists in the mission hospitals" as a way of changing the Chinese perception.[29] The issue of Chinese resistance to Western medicines apparently still troubled him after he returned to America, evidenced by his speech on March 22nd, 1916, "we are told that the Chinese are not greatly impressed with the superiority of our treatment of internal disease over that obtained by their own drugs", which he attributed to the drugs' much less drastic effect in curing internal diseases than surgical operation on patients, after offered the fact that CMM was broadly embraced by the natives.[10]

It is suffice to say that Welch went back to America with a similar dichotomized view on TCM as the medical missionaries. His description of and remarks on TCM's knowledge system and clinical practice in the above-mentioned speech were mostly mockery and derogatory. But in the meantime, his praise of CMM tradition seemed also genuine, "the general impression of the practice of native Chinese medicine is very unfavorable. But on the other hand, we have a great deal of evidence that they possess some remarkable remedies and cure some of their patients—though I cannot say how many". He singled out CMM as one of such remedies, "a great, distinctive feature of Chinese medicine is its materia medica. Their anatomy, physiology and methods of diagnosis all seem to us highly fantastic, but the Chinese surpass the rest of the world in their empirical materia medica". His awareness of the similarity between Chinese and Western materia medica traditions, and probably *Ben Cao Gang Mu*, was also apparent, "the leading Chinese work on pharmacology contains something like 200 drugs, from all three kingdoms, though principally from the animal kingdom, many of which are in use in Western medicine today .... the Chinese have a voluminous medical literature on materia medica—the single works in many volumes, nearly fifty volumes from one author—which is very valuable, though it cannot be said that they have made any progress since their early days".[10] These comments on CMM clearly showed imprints of the medical missionaries, as well as his own learning of Chinese medicine from the history books by Japanese scholars.

The exposure to TCM in China undoubtedly aroused interest in Welch, an aficionado of medical history, in learning more about the history of the Asian medical tradition. On the journey back to America, he studied thoroughly *History of Medicine in Japan*, an introductory text in German by Japanese medical historian Fujikawa Yu (富士川游), "from whose works I obtained most of my information about Japanese medicine",[10] although the award-winning book was often referred as "the Chinese-Japanese medicine" with extensive referencing of TCM. He abstracted in details essentially the entire book, which included many specifics about compendiums of CMM reflected in his speech, "Works on materia medica numerous". In one of the Chinese works 254 medicines mentioned from animal, vegetable and mineral kingdoms. In another 81 mineral, 509 vegetable and 182 animal medicaments–pills, powders, extracts, tinctures, decoctions" (Fig. 6),[43] a clear testimony of the medical leader's attention to the native remedies.

2.4 The inspiration in Japan

Fujikawa's book was a gift given by Professor Miura Kinnosuke (三浦谨之助) to Flexner, probably a token indicator of his connection with the Japanese medical community. Dr. Miura, at the time professor of Medicine at Tokyo Imperial University and physician of Emperor Taisho (大正天皇), studied pharmacology of ephedrine in 1887, the year when the alkaloid was first isolated by the pharmaceutical professor Nagai Nagayoshi (长井长义) of the same University.[3] Miura was also familiar with the seminal research of Noguchi Hideyo (野口英士), a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addition to amulets, prayers, etc. Surgery very restricted. Works on materia medica numerous - In one of the Chinese works 254 drugs mentioned from animal, vegetable and mineral kingdoms - in another, 81 mineral, 50 vegetable and 182 animal medicaments - pills, powders, extracts, tinctures, decoctions - Physical therapy seems to have had a place in Japanese medicine from an early period, as massage, baths, gymnastics and deep breathing.

Figure 6 Welch notes on the history of Chinese medicine and materia medica (source with permission from: the Johns Hopkins Chesney Archives)

full member at Flexner's RIMR, and nominated him for the 1915 Imperial Prize of the Japan Academy, the highest academic honor awarded to Japanese scholars.[44] Flexner had a long and close association with Noguchi Hideyo since 1899, a relationship few American medical scientists had opportunity to enjoy. Moreover, he and Welch and many first-generation Japanese scientists and physicians, such as Miura, were disciples of the same European medical science doctrine, in particular of the German-Austria school. They admired the achievements of Japanese scientists, such as bacteriologists Kitasato Shibasaburō and Hata Sahachirō (秦佐八郎) who had made remarkable contributions to modern medicine and been recognized globally, including nominations for Nobel Prize. They viewed these senior Japanese medical scientists as academic equals. "Japan today is abreast with America and Europe in medical science and practice", as Welch said in his before-mentioned speech in March 1916, a sharp contrast to their often critical and condescending treatments to the Anglo-American medical missionaries and their indifference toward Chinese institutions and doctors.[10]

The Commission was back to Japan on November 24th. Before boarding the trans-Pacific liner Tenyo Maru on December 11th, they once again visited several Japanese medical schools and interacted with the faculties at those fully modernized educational and research institutions. On December 3rd, Welch and Flexner visited the Imperial University of Kyoto Medical Faculty and had exchanges with faculty members of essentially all disciplines.[45] The attention was naturally on their own field of pathology, but Flexner was also intrigued by Professor Kurata Morishima's experimental pharmacology research on CMM. The inspiration was clearly expressed a year later in his communication with Dr. Harry B. Taylor (戴世璜), an American medical missionary in charge of the St. James Hospital in Anqing. Taylor met Flexner and Welch on October 23rd, 1915, when the Commission was passing Anqing on its way from Hankou to Nanjing. He later asked Flexner to facilitate his intended collaboration with American pharmacologists to investigate CMM, "I am now writing to ask if you will be good enough to put me in touch with a laboratory of experimental pharmacology. Ever since I have been in China, I have hoped that something could be done in investigating Chinese meteria medica... I feel sure that Chinese meteria medica includes many potent drugs will worth investigating".[46]

As early as the first CMMA national conference in Shanghai in 1890, Dr. Kerr and some senior members had already advocated for the studies of CMM.[5] By mid-1910s, the interest in scientific investigation of CMM was widely shared among medical missionaries, including those with whom Welch and Flexner interacted extensively during their East Asia trip. The motivations behind their interests varied, but generally along two lines. The first was to replace those imported drugs with more cost-effective native materials at resource constrained missionary hospitals. For example, Houghton was an ardent proponent of comparative analyses to enable such substitutions.[37] The second, and probably a more common objective, was to understand the taxonomy, chemistry, pharmacy and pharmacology of the native drugs unknown to the West, so their claimed therapeutic efficacies in Chinese pharmacopeia or personal anecdotes could be determined and applied accordingly in clinics. For example, Hume urged earnestly for CMM research in his address at the highly publicized grand dedication ceremony of the PUMC new campus on September 19th, 1921, with Dr. Welch as one of the honored guests, "hardly a day passes without our hearing of some Chinese remedy of unusual potency. For the trained pharmacologist, associated with the biological chemist and botanist, the field is infinitely large",[47] and again at a conference later in New York city, "it is more than probable that pharmacological studies, based on suggestions from this and similar Chinese works, will enrich the world's knowledge of potent pharmacals".[39] For a few more ambitious and scientific minded individuals like Read, "discovering new compounds of medical value with benefits to mankind" also seemed an achievable goal.[48]

The medical missionaries' will of studying CMM, however, clearly disconnected with their ability of executing actual research project, thus only nominal progress was made in the quarter of a century between the first CMMA congress and the visit of the CMB Commission.[5] Taylor's request to Flexner was a good case in point to show a medical missionary's interest in

CMM research and their inadequate scientific training and scanty resource. His letter prompted an immediate and encouraging response from Flexner, "I quite share your interest in the Chinese meteria medica. When we were in Japan, we learned that quite a number of the drugs were being studied in the pharmacological laboratory there, and there were a number of publications from that laboratory dealing with Chinese drugs. When the new schools become established with all the new laboratory equipment, I trust that the pharmacologists will go to Peking and Shanghai and will become interested in Chinese meteria medica".[49] Clearly, Flexner felt that the experimental pharmacological research on CMM was aligned with his inspiration by the Japanese pharmacologists, and agreeable with the type of scientific medicine research he envisioned for PUMC.

It should be pointed out, though, that Flexner's support for pharmacological investigation of CMM was probably only to those in China, whereas his own interest and expectation in such approach was rather limited. His ideal type of medicines in 1910s was chemotherapeutic agents exemplified by Salvarsan, the "magic bullet" developed by his German friend Paul Ehrlich in 1909 for treating syphilis. Michael Heidelberger, at the time a junior chemist at the RIMR and later of world fame in antibody biochemistry, recalled when he was assigned by Flexner to develop chemotherapy for polio, "Dr. Flexner always felt with Paul Ehrlich that chemotherapy was one of the great hopes of mankind for medical progress. He was very anxious to get that chemotherapy study started".[50] At one time in 1916 when the results of his experiments were mostly negative, Heidelberger suggested an alternative approach to Flexner, "I thought that the chemistry of some of the Chinese drugs that had been used for centuries in the treatment of various conditions over there and were known to have active principles, wasn't understood at that time. I thought that Dr. Flexner might let me have a laboratory at the Institute to study some of these Chinese drugs .... I made this proposal about Chinese drugs to Dr. Flexner, and he didn't like it a bit".[50] Although Flexner's reason to dismiss Heidelberger's idea seemed mostly for the job perspective of his young associate, it nevertheless also made clear that he did not consider CMM research a complementary approach or an alternative source of effectively finding new cures for infectious diseases.

3 Bernard Read, a British pharmacist in love with Chinese materia medica

The first action CMB took, after the China Medical Commission returned to America, was to appoint a leader for the Beijing school. Flexner assumed the leading role in the recruiting effort with full force. In late June 1916, after a five-month intense pursuit with false hopes and real frustrations, he finally secured Franklin C. McLean (Fig. 7) of his institute as the head of PUMC and professor and chair of the Department of Medicine.

One of McLean's chief mandates was to design the new College's organizational structure and build a faculty body with the academic credential and scientific inspiration in line with the vision and objectives set by the medical leaders. According to his plan, the College would have six "major" teaching departments, including, on the preclinical side, the departments of anatomy, physiology and pathology. The Department of Physiology would consist of divisions of physiology, pharmacology and physiological chemistry, three kindred disciplines often referred together as physiological sciences.[51] In December, 1917, with the approval of the PUMC Board of Trustees, McLean appointed Bernard Read associate professor and head of the Physiological Chemistry Division, making him one of the earliest appointees of the new PUMC and the first member of the Department of Physiology.[52]

Bernard E. Read was born in 1887 in Brighton, a seaport city south of London (Fig. 8). After graduated from secondary school in 1903, he entered the South of England College of Pharmacy, one of the vocational schools emerged in late 19th century England. After a year of full-time schooling and five-and-a-half-year apprentice in three dispensaries while studying part time

Figure 7 Franklin C. McLean (source with permission from: the University of Chicago Library)

Figure 8 Bernard E. Read (source with permission from: Rockefeller Archive Center)

in the same school, he became a registered pharmacist and a member of the Pharmaceutical Society (M.P.S.) in 1908 and qualified as Pharmaceutical Chemist (Ph. C.) in 1909.[53] In September 1909, Read was appointed by the LMS to teach materia medica, practical pharmacy, dispensing, and chemistry, as well as charge the hospital dispensary at the UMC in Beijing.[54]

In the ensuing years, Read learned Chinese and became familiar the local culture. One of his favorite pastimes was to visit "the drug shops with medicines that the Chinese had used for centuries: tiger bones for renewed strength; ginseng which would cure almost anything ... he felt that he could spend days in any of these old time drug shops, listening to the prescriptions given by the druggists in response to a request by a buyer, watching the compounding of the medicine with the use of old style mortar and pestle, and scales of the same vintage ... he could have prolonged these visits indefinitely as the vendor described where the drugs came from, how they were refined and prepared for the markets and for what illnesses each one was used".[55] Read had no exposure to scientific research during his service at the UMC, because the College, like all missionary medical schools in China at the time, was barely equipped and marginally interested in anything beyond providing student instruction and rudimentary patient care. His only publication was a booklet titled *Materia Medica, Tables and Notes*, a handbook for his pharmacy work.[54]

With essentially no academic record to speak of, Read was uncertain about his professional outlook after the CMB took control the UMC, which prompted him to seek consultation from the CMB Commission members when they were in Beijing. Although the date of his appointment, October 9th, turned out to be a heavily engaged day for the Commission, including a meeting with President Yuan Shih-kai (袁世凯) in the mid-afternoon, Welch still managed to receive Read at the breakfast table.[56]

Read expressed his desire to continue in pharmacy, and even tried to convince Welch that CMB should establish a pharmacy school in China to rectify the Chinese students' deficiency in the pharmaceutical knowledge about their native drugs, a major concern of Read for his students going into drug trade without proper training.[56] A few years later in 1919, when the new PUMC had just admitted its first medical class, Read again elaborated this same rationale of strengthen pharmacology, a term he used loosely to refer materia medica, pharmacy, and, on occasions, pharmaceuticals, "there is felt locally a great need for an able pharmacologist. Our graduates taking up work in any place are faced with a total absence of any kind of person acquainted with a knowledge of modern pharmacy".[57] Apparently, the severe shortage of professional pharmacist in China was nothing but a fact, as confirmed by Roger Greene, "there are so few such helpers as foreign pharmacists, business managers, etc., that we may practically disregard them entirely".[58]

Welch found Read's articulation of the importance of pharmacy in promoting Western medicine in China convincing. He also realized during their meeting that Read "is not a graduate in medicine, his training had been in pharmacy and to some extent in chemistry", thus considered to grant this "clean, bright, capable-appearing young man" his wish, "in the present conditions in China the students should have more pharmaceutical training and knowledge of the materia medica than is customary in the medical schools at home, and perhaps we could continue Read in this capacity".[56] Flexner, however, strongly preferred an alternative to develop Read that the young pharmacist should use his upcoming furlough to study biochemist at JHUSOM, "so that he should fit himself to teach physiological chemistry... and there will be opportunity for us to form a judgment of his qualifications and ability. He seems to be of the age and general type which we desire for the medical school".[56] It may be worthwhile to note that Flexner himself also had a long association with pharmacy, including apprentice at pharmacies and graduation from the Louisville School of Pharmacy, although this once passion had evolved over time into a favor for experimental pharmacology.[19,59] Perhaps because of his own humble educational beginning, Flexner, who often demonstrated academic snobbish toward medical missionaries, had little prejudice toward Read's vocational school pedigree and supported the young British to study in America.

Flexner's proposal was agreed upon by the Commission on the next day. Buttrick decided to sponsor Read with the small fund in his discretion.[56,60] In fact, Buttrick already had Read on his mind for future PUMC faculty appointment during his negotiation with the LMS in the UMC transaction. Francis H. Hawkins, the LMS' secretary for China, pleaded to Buttrick on April 15th, 1915, that "we earnestly recommend the reappointment of our present staff. In particular, we would urge upon the favorable consideration of the new Board the claims of Mr. Wilson, our business manager, and Mr. Read, the senior chemist; unlike the others, they could not easily be transferred, and, in view of the circumstances under which they were and their faithful and efficient work, they would not be receiving considerate treatment if they were not reappointed".[61] The LMS' proposition to CMB was mostly based on the concern that neither Read nor Wilson had medical degree, hence would have a slim chance of working in other mission hospitals.

In early February 1916, Read joined the laboratory of Professor Walter Jones, a Ph. D. biochemist who headed the three-member Department of Physiological Chemistry at JHUSOM. Jones was one of the few world experts in nucleotide chemistry. His interest was of little clinical relevance, despite a long association with the medical school. Read had his first taste of bona fide scientific research at a reputable academic institution and

excelled by publishing six articles on original research during his eighteen-month association with Professor Jones.[62]

While working under Dr. Jones, Read also signed up the pharmacology course offered by Dr. John Abel's Pharmacology Department, the largest and strongest experimental pharmacology faculty in any American medical schools at the time. He apparently enjoyed the subject and retook the course in the second year to make up the missing lectures due to late registration in the first time.[63] He also maintained a close association with the Chinese students in Baltimore, attending their meetings and helping CMB to care three Chinese pharmacy students studying in the same city.[64] China and pharmacy seemed never very far from him.

When Buttrick visited Baltimore in mid-October, 1916, Jones gave him nothing less than the highest praise of Read, "he is the best student I have ever had work with me. He is making certain very important discoveries, some of which will soon be published. He has the keenest sense for 'leads' of anyone I have known. He is a very valuable man, and I would be very glad to keep him with me as a member of my staff. His heart, however, is in China and he is going back there".[65] Based upon his remarkable performance and Dr. Jones "speaks in the very highest terms of his ability", the CMB granted Read another year of fellowship, starting in mid-1917, to train him in the more medically relevant field of physiological chemistry.[66]

Read registered as a Master's degree student at the Yale University for his second fellowship, under the guidance of Dr. Lafayette B. Mendel, a prominent biochemist famed for his seminal achievements of identifying the essential amino acids for dietary need and the discovery of vitamin A. In the Mendel laboratory, Read studied the tissue absorption and urinary excretion of Sudan III (a fat-soluble dye) and the toxicity caused by the dye's impurity in experimental animals. The project, an expansion of a previous work in Mendel's laboratory, served as his thesis.[67] In parallel, Read also carried out a mini-series of laboratory analyses on Litchi (荔枝), a fleshy fruit from south China which had been known to the Europeans since late 16th century. He examined the fruit's chemical constituents to evaluate its nutritional value and therapeutic claims cited in Dr. George Stuart's *Chinese Materia Medica, Vegetable Kingdom*, and investigated its glycogenic activity in rabbits in a small-scale feeding experiment.[68] Unlike his Sudan III paper, Read did not acknowledge Dr. Mendel in the publication of his first project on CMM, suggesting it was likely an initiative of his own inspired by Stuart's treatise on Chinese medicinal plants.

The appointment of Read to the senior PUMC position was made only a few months after he began the second fellowship and two years prior to the commencement of his scheduled teaching in Beijing. This greatly eased Read's anxiety on job perspective, and more importantly, fundamentally changed his career trajectory. Flexner apparently supported this appointment, even though it not only was an apparent deviation of the "top down" hiring norm he enforced and McLean routinely followed,[69] but also a defiance of conventional credential requirement for the position, typically a biochemist with a Ph.D. degree and independent research experience. Doubtlessly, no one could have predicted the significant impact of this somewhat unconventional hiring on the execution of the CMM program at PUMC in three short years.

Toward the end of April, 1918, 21 faculty members had been appointed to the medical faculty in Beijing.[70] On June 6th, 1918, at the newly completed Yale Clubhouse in midtown Manhattan, the CMB executives and the members of the PUMC's Board of Trustees hosted a dinner party for twelve of these new hires who were in America at the time. McLean, Read and all other CMB and PUMC key figures featured in this article, except Ralph Mills, were at the gathering. Buttrick served as the toastmaster, Vincent, Welch, Flexner, and McLean all spoke.[71] Mills had been appointed de facto the professor and head of the PUMC's Department of Pathology in April and arrived in America in early May. His absence from the dinner was mostly due to the administrative processes, such as formal transfer from the Presbyterian Mission in Korea to China and the PUMC Board's rubber stamping of the appointment. But he would soon engage many of these CMB and PUMC personalities in the discourse on CMM research.

4 The saga of Mills collection

Mills and Flexner had formed a mentee-mentor like relationship, soon after the CMB Commission returned to America. In his first letter to Flexner in early 1916, Mills expressed his gratitude for Flexner's encouragement to him in the previous autumn, as well as his frustration with the academic isolation in Korea, "you probably do not realize how that feeling of loneliness in the work oppresses one out here and how much we yearn for the intimate contact with the best that there is in medical research .... I shall never forget the stimulus I got during your visit here, for it came just when I needed it the most". Mills also described in great detail his initiative of translating and abstracting newly published Japanese medical literature with the aim of keeping the English-speaking medical professionals better informed about the works by the Japanese medical researchers.[72]

McLean's appointment in June 1916 became a turning point for Mills' career prospective. The news came to him, almost simultaneously, via Flexner and also directly from McLean, his boyhood acquaintance (Note 3). He and McLean immediately began to correspond and even managed to meet in person twice, in October, 1916 and September, 1917, respectively. McLean, like Welch and Flexner, was also impressed by his friend's research

and exuberance energy in pursuing scientific knowledge, as noted in his diary, "the medical school saw evidence of a great deal of original work, mostly that of Dr. Mills .... and a year or more of intensive training in the best atmosphere, he should develop most rapidly, and should be an extremely valuable man".[73] He even expressed his interest, as early as September 1916, in having Mills working at his new Beijing school, "I should like to have him at Peking in the Department of Pathology, the capacity to be determined later".[73] The feeling was apparently mutual. Mills admired the grand mission of PUMC and consulted McLean for his future career path. He also updated McLean, often in details, his situation at Severance Medical College, including his various projects and their progress.[5]

There was, however, one noticeable difference between the communications Mills had with Flexner and McLean. He had never been mentioned the CMM project or related subject to Flexner even once in their correspondences.[74] In contrast, he had already described in his first letter to McLean the effort of translating and annotating *Ben Cao Gang Mu*, "your pharmacological training will doubtless cause you to appreciate another thing we are doing. The old materia medica of the Oriental practitioner is now undergoing a sifting and a translation into English at least that part of it which is apparently worth keeping. The book work is more than half done".[75] Mills obviously had no reservation of showcasing his translation of the Great Chinese Pharmacopoeia to other Americans and Europeans as well, nor did he have any concern with Flexner about the bibliographical nature of his other work, since he had presented the Japanese medical literature abstracting project repeatedly to Flexner, including sending the reprints to the RIMR.[5,72,74] One possible explanation could be that Mills had sensed, in their first interaction, that Flexner was indifference in or even disapproval of his works on the translation of Chinese Pharmacopoeia, thus evaded the subject entirely in the subsequent communication.

In September, 1917, Mills wrote to Flexner, inquiring the possibility of studying at the RIMR for his upcoming furlough in spring 1918.[76] Flexner immediately extended a warm invitation in his reply, "we should welcome you at the Rockefeller Institute and do all we can to promote your studies and assist you in obtaining the opportunities you desire".[77] In a long follow-up letter, Mills explained his difficulty in determining a particular field of specialization, due to the medical college's limited resource and often unexpected teaching staff shortfalls. Throughout his letter, Mills repeatedly pleaded for Flexner's advice, "I am therefore banking a great deal upon the advice you shall give as to which course to follow" and expressed a genuine longing for becoming a true medical researcher, "I am really more anxious to get the personal touch with men who are high up in research work, for I have ample opportunity in the Orient for individual investigation, I have never had the good fortune to be intimately associated with anyone in the development of any problem".[78]

After received the letter in mid-April, 1918, Flexner directly sent a note to Buttrick to make a case for Mills' situation in Korea and recommended him for a position at PUMC, "I think it might be very well for Dr. McLean to consider him for the Peking school. There is no doubt that Mills would go much further there than he ever can at Seoul. Indeed, he is largely a wasted spirit there".[79] A dominant force in hiring the academic staff during PUMC's formative phase and a pathologist himself, Flexner's "recommendation" effectively dictated the Mills appointment, even though it was an obvious deviation from the process of appointing former medical missionaries that he and McLean had been following, namely, the decisions were predicated upon favorable evaluations of their retraining performance under respectable American specialties, like the case of Bernard Read. As expected, Flexner's recommendation was well received and carried through by Buttrick and McLean soon after Mills had arrived in America and met Flexner briefly in Chicago. By the end of July, Mills was released by the Korea Mission and appointed the professor and head of the Department of Pathology at the PUMC. Thrilled by this career advancement and in preparation for the job in Beijing, Mills immediately began training in histopathology under Dr. William G. MacCallum, who succeeded Welch in 1917 to chair the Pathology Department at the Johns Hopkins Hospital.[80]

The retraining arrangement, however, was inevitably in conflict with what Mills had planned in Korea to complete his CMM work during the furlough by possibly collaborating with two University of Michigan scientists. Determined to preserve at least part of his cherished project, Mills proposed to Buttrick to support him finishing the portion of the translation and annotation concerning the Chinese drugs used in Korea and publish the results.[81] Buttrick and George Vincent (Fig. 9), the RF president who would soon also assume the CMB leadership from Buttrick, discussed the proposal with Mills on several occasions throughout the autumn.[82] A long time sociologist professor and university administrator, Vincent was uncertain about the scientific value of Mills' work, hence also duly followed Mills'

Figure 9 George R. Vincent (source with permission from: Rockefeller Archive Center)

suggestion by forwarding his sample manuscript to Dr. Henry Kraemer, a University of Michigan pharmacognosy expert and one of Mills' potential collaborators, for advice.[83,84] After receiving a rather unfavorable feedback from Kreamer, which raised doubt about the value of the project, Vincent decided to post the Mills proposal to the CMB members for discussion, instead of taking any definitive and immediate action or making any commitment.[83,85,86,87]

Few of the key CMB members seemed to be enthusiastic about the Mills proposal, but they did have a clear consensus that, if the CMM research was to continue, it should be handled by someone with proper scientific expertise, and Mills, instead, should not be on the project. There were probably two reasons behind this opinion. First, the work was unrelated to Mills' new responsibilities at PUMC, thus any additional effort related to the CMM would be a distraction to his pathology training at Hopkins. Flexner had voiced his strong belief, when the CMB Commission was in Beijing, that the pathologist was the most important position of a medical school, "pathology must be a live wire. We must get a living pathologist for each of these schools (Note 4). Such a man comes in contact with all the other departments, and is very stimulating to everyone. If we fail in pathology, we are done for. If we succeed, the rest is easier".[88] Since Flexner had essentially relied on his faith in Mills, rather than a post hoc evaluation of his retraining performance, to make the recommendation, he could only hope that Mills would live up to the high expectation for the critical position. It is quite evident that he regarded any projects unrelated to pathology as distractions of Mills' development to a competent pathologist for the Beijing enterprise.[74] Even Buttrick, an ardent supporter of CMM research mostly on his own intuition, echoed the same position while discussing the subject with Embree, "from the beginning I have felt that if Dr. Mills was to be our professor of pathology, he ought not to do this work or to be in any possible way responsible for it".[89] Second, there were reservations on the approaches taken by Mills in his CMM research. A proponent of pharmacological analysis and a hardcore experimentalist, Flexner had little appetite in research on classical pharmacopeia, materia medica, or pharmacognosy, all obsolete for modern medical research in his view, as he elaborated to his younger brother Abe (Abraham) in their discussion about pharmacology, "the connection of pharmacology with materia medica is historical only, and has no more significance than the connection of internal medicine with pharmacy. They are both stages which go back to the beginnings of medicine".[59] His interest in works of bibliographical nature was also minimal, which was clearly reflected in his response to Mills when he was sought for advice to salvage the Japanese medical literature abstracting project, "I should like to feel that each member of the faculty of the Peking School is thinking of the work—teaching and research—which the school is founded to do, and as little as may be of mere bibliographical things for some time to come".[90] Buttrick also concerned Mills' technical expertise in this specific area, "for some years I have been interested in the material on CMM collected by Dr. Mills. It has always seemed to me that it ought to be studied by experts".[89]

A few of Mills' fellow PUMC faculties, however, felt strongly about his CMM research and lobbied Vincent and Buttrick for its continuation on their own initiatives. Albert Dunlap, a medical missionary formerly associated with Houghton in Shanghai before being appointed the associate professor of otolaryngology, campaigned the project for CMB's support, "purely because he felt the work should be done".[81,84,91] Bernard Read too was enthusiastic about the Mills work. When he stopped by at the CMB headquarters in New York City one day in September, 1918, and skimmed through the pages of a manuscript that Mills had brought over from Korea and left in the office for Buttrick to assess his CMM work, Read realized the material was the translation and annotation of *Ben Cao Gang Mu*, and immediately made a specific proposition to Buttrick, "I hope that its continuance and final completion along chemical and botanical line may be conducted by PUMC. Might I suggest that a committee be formed to take up this matter? We need especially one or more men to direct the investigations which will naturally be men in the various scientific departments of our school and other schools in China".[92] This was probably the first time anyone had suggested to engage the PUMC in CMM related research. In the context of medical missionaries' broad support for CMM research and Mills' exceptional and enviable position in Korea which had enabled him to execute such a project, it is understandable his colleagues of missionary background genuinely wished the results of his effort were not lost by the personnel change, and in the case of Read, even hoped an opportunity to partake in the project.

The question then facing Vincent and other CMB members was whether to preserve the Mills material and his unfinished project, and if so, how to dispose them? According to Buttrick, few CMB members were interested in making a generic investment in the Mills collection, "I know that I was not in accord with most of the members of our Board when I say that I have from the beginning felt that the CMB might properly make an appropriation in order that the material may become available for science".[89] The Board members' indecisive attitude clearly indicates that, in their mind, CMM was not a research subject of high priority or strategic importance for PUMC, unlike those such as the nutritional analysis of Chinese food earmarked by McLean for a very concrete purpose.[93] Vincent once tentatively proposed to assign the unfinished CMM work to PUMC's Pharmacology Division, as paraphrased by Mills, "if the work was carried on at all, it should be as a function of the Department of Pharmacology

of the Peking school".[85] Since that group only existed on the organizational chart at the time, the Board felt unadvisable to preemptively commit resource to a potential future project.

Vincent remained noncommittal to the Mills material and proposal during most of 1919, until an accidental external force urged him to take an action. In October, 1919, he received a letter from Dr. Edward Kremers (Fig. 10), a renowned pharmacy professor at the University of Wisconsin School of Pharmacy. In this unsolicited letter, Kremers shared with Vincent his interest in studying Chinese herbal plants, the ongoing research in his laboratory by two Chinese students (Note 5), and the assistance he had received for these projects from Minister Paul Reinsch, his friend and former colleague.[94] The only phytochemistry expert interested in East Asian medicinal plants in America, Kremers believed that CMM research was a field, "so large and so promising, if attacked from the point of view of modern science, more particularly plant chemistry".[94] He reached out to Vincent, hoping "the Rockefeller Foundation, which has already entered the medical field in China, will not neglect to do something for Chinese pharmacy so closely affiliated with Chinese medicine".[94] Intrigued by the proposition, Vincent, after some initial exchanges with Kremers, asked McLean to follow the matter up with the professor.[85]

McLean had been supportive of Mills' CMM work before their professional association at the PUMC. Sympathetic to his friend's desire of finishing the work, he assured Mills that, "I am sure that the work should be done in Peking, in one way or another, and it would be a great lose to sacrifice the material you already have".[95] He even suggested ways for Mills to continue the project ad hoc in America, such as providing him names of two American biologists working in China, so Mills could seek their assistance in expanding his collection of animal drug specimens.[5,85] In his communications with Kremers, McLean inadvertently mentioned Mills' research on CMM and his collection. This aroused Kremers' interest greatly and prompted a quick invitation to Mills to the University of Wisconsin to discuss their shared interest in person.[95,96,97]

Figure 10 Edward Kremers (source with permission from: https://wellcomecollection.org/works/s82zfewj/items)

By early 1920, Mills had come to term with the reality of giving up his beloved CMM work, although he was still hoping an informal association with the project, as he confessed to McLean, "I have no thoughts of continuing the materia medica work as a definite line of research other than as a consultant and then only as a minor hobby".[85] However, he had no clear direction as how to dispose the work and seemed ambivalence about the idea of engaging PUMC. He did not know about Kremers, either by reputation or research interest, a reflection of his isolation from the pharmaceutical and pharmacy communities in America. However, after his extensive exchange with Kremers in mid-April in Madison, Mills was firmly convinced that he had finally identified a perfect successor for his in-limbo project. Kremers clearly possessed admirable expertise, envious facilities and unique manpower that PUMC could hardly be possible to match any time soon, as he excitedly reported to McLean, "Kremers is attracting graduate students to his laboratory and several of these are Chinese who are anxious to study the Oriental forms which are more or less familiar to them. He has the facilities to do the work and it would necessitate the development of our department to a degree far in advance of anything now contemplated and the selection of particular men for this special job that does not ordinarily constitute a part of a faculty in a medical school such as ours".[91,97] To Mills, the most encouraging and tangible outcome of his meeting with Kremers was that the professor had enthusiastically committed to a well thought through collaboration. Hoping to secure the collaborative deal with financial support from the CMB before his slated voyage to China in early June, Mills immediately brokered a meeting for Kremers and Embree at the CMB headquarters in New York City on May 8th, 1920.[97]

Kremers presented to Embree the research proposal and associated funding request that he and Mills had jointly developed, which included purchasing some material from the Mills collection and studying selected drugs based on the knowledge in Mills' translation and research notes of *Ben Cao Gang Mu*. For the CMB decision makers, Kremers' expert opinion convincingly validated the importance of the Mills collection and the merit for the continuation of his CMM project, thus changed their perceptions on the issue. After learning the assessment from Kremers, Buttrick felt that "the proposal of Dr. Kremers looks to me like a possible way of utilizing this material for the benefit of medical education in China".[89] Soon after, Vincent started to refer the Mills collection, whose value he was unable to fully appreciate in the past two years, as "a good deal of valuable material on Chinese materia medica", and used the correspondence concerning materia medica with Dr. Mills and Dr. Kremers to substantiate this statement.[98]

The Kremers proposal, however, was obviously incompatible with the idea of engaging PUMC in handling the Mills material and potentially continuing the associated research in Beijing. The situation thus prompted the CMB to make a definitive choice. Buttrick, during his discussion with Embree on the Kremers' proposition, independently entertained the idea in line with the opinion to eventually complete the Mills project by PUMC, "it occurred to me to ask why could not the Department of Pharmacology at Peking do this work when that department shall be established?".[89] Within a week after the Kremer—Embree meeting, the CMB declined the proposal, not insomuch as its scientific merit, but on a logistically indisputable ground that its funding request was incompatible with the Board's appropriation principle of exclusively supporting institutions and individuals in China. While declining the Kremers' proposal, the CMB also made its first ever decision on CMM research by recommending the PUMC to purchase the Mills material and its Pharmacology Division to handle the associated investigation.[99]

Embree shared these recommendations and their rationales with Mills. Although his curtesy note appeared in tone of seeking Mills' feedback on the Board's proposition, in essence, it was simply a post hoc dissemination of the decision.[99] Mills was deeply disappointed by the news. In a lengthy reply to Embree, he argued vigorously that enlisting Kremers would be the most economic and expeditious way of accomplishing the objectives of his CMM project. Although he was willing to include the PUMC to facilitate the work, citing support from Read, but strongly opposed, even with a threat, the idea of deploying the entire work to the Beijing school, "I must say that I am determined to scheme and endeavor in this way or that until the thing is done in a satisfactory manner no matter how long it takes to accomplish that end".[91] The protest apparently went in vain. In mid-May, 1920, after nearly two years of on again, off again, exchanges between Mills and CMB decision makers, the fate of his CMM research material and unfinished work was finally settled. CMM, as a subject of scientific investigation, was conceptually accepted by and materially in part ready for the PUMC.

It should be noted though that the CMB recommendation was rather informal and still pending the approval from the PUMC's Administrative Board in Beijing.[99] No personnel was appointed to the Pharmacology Division, nor any budget appropriated for the initiative. The only estimation of the associated cost was a fuzzy price tag of $1,500 for the acquisition of the Mills material from the Severance Medical College, its official owner.[89] Therefore, the recommendation, although clearly marked the beginning of CMM research at the PUMC, should be seen more of a conceptual endorsement, rather than a concrete commitment.

The recommendation should also be viewed in the broader context of the research direction sanctioned by the PUMC's creators and overseers. On April 14th, 1920, the PUMC Trustees approved the College's mission statement at its annual meeting. This official document unequivocally expressed the Board's endorsement of an ethno- and regional-centric research focus in the College's aims, "to afford opportunities for research, especially with reference to problems peculiar to the Far East".[12] The wording clearly reflected Flexner's vision on PUMC's research direction, as he had highlighted in his portion of the CMB Commission report a few years prior, "the country abounds in diseases, the nature of which is either unknown or the manner of conveyance undetermined. Hence the conditions are remarkably favorable for the scientific observation and experiment in the laboratory and clinical branches".[100] It is unclear whether the Trustees' endorsement of the above-mentioned research direction carried any cloud on the recommendation of acquiring the Mills collection a month later. Flexner's initial appreciation of the unique research opportunities in China was mostly from the standpoint of the country's disease spectrum and underlying etiology, but conceptually, the investigation of CMM also fit well with Flexner's guiding principle, since it would be a meaningful China (or East Asia)-centric subject for pharmacologists at the PUMC, while only an exotic or eccentric academic interest for American scientists.

In late December, 1920, the Severance Medical College generously agreed to transfer the Mills collection with no cost to PUMC. The agreement between the two Colleges stipulated that the material would be under the custodian of Bernard Read, the acting head of the Department of Physiology, and, during a course of several years, satisfactorily investigated by the lead pharmacologist when that position was filled.[101] As a result of coincidental intersection of multitude factors, including a series of disappointments in recruiting a seasoned experimental pharmacologist that McLean and Flexner had hoped, the lead pharmacologist became the last vacant senior faculty position at the PUMC. On February 20th, 1921, the Trustees formally appointed Read associate professor and head of the Pharmacology Division, for which he had been actively pursuing since September 1920.[102,103] The appointment officially staffed the Pharmacology Division and effectively empowered Read to execute the CMM research program.

5 Conclusion

This paper has, for the first time, reconstructed the course of events leading to the inception of CMM research at the PUMC in 1920. It describes William Welch and Simon Flexner's first exposure to CMM in their 1915 East Asia trip through interactions with medical missionaries and Japanese pharmacologists, two local groups of intermediaries in a unique cultural encounter borderland, and demonstrates the influence of this unique experience on their awareness of CMM's cultural impact on the

introduction of modern medicine in China, accepting attitude toward the merit of CMM research and its compatibility with scientific medicine research paradigm. The paper also recounts these medical leaders' critical roles in the unconventional recruitments of Ralph Mills and Bernard Read, two medical and pharmacy missionaries and CMM enthusiasts, to the PUMC senior academic positions unrelated to and unintended for CMM research. In addition, the paper traces the interests and research efforts of Mills and Read on CMM long before their associations with the PUMC, and highlights their ideological, logistical and material contributions to the CMB's decision in engaging PUMC in CMM research, as well as the struggle of the CMB executives in reacting to the disposition of the Mills' CMM project and collection for fitting their institutional building aims.

In conclusion, the events associated with the CMB Commission were critical prelude for the commencement of PUMC's in house CMM research in 1920. They brought together three groups of key actors, the American medical leaders, the senior Foundation executives and the veteran medical missionaries into an unexpected discourse that ultimately led to the engagement of the PUMC in CMM research. This outcome, however, was mostly a reactive act to Mills' persistence and external competing interest, rather than a proactively planned academic initiative with clear objectives and concrete resource commitment. The CMM research program, in essence, is the continuation of Mills' unfinished efforts in Korea, and both Mills and Read's eventual associations with the inception of the CMM research at the PUMC is, by and large, personal and serendipitous.

The appointment of Read to lead the Pharmacology Division, the recruitment of Carl Schmidt and Ko-Kuei Chen, and the selection of the CMM candidates for chemical and pharmacological investigations, are all important and highly pertinent events to the historical narrative of the formative phase of PUMC's CMM program and the successful development of ephedrine into a modern medicine, hence should also be reconstructed and interpreted based on primary archival materials and original scientific publications.

Notes:

1. General Education Board is another Rockefeller philanthropic organization unrelated to RF.
2. For a general survey of missionaries' views on TCM, in particular those expressed in the *China (Missionary) Medical Journal*, see: Tao FY. The change of Western missionaries' perception of traditional Chinese medicine (传教士中医观的变迁). *Historical Research*. 2010;(5):60–78, Chinese. Li YR, Yan N. Traditional Chinese medicine recorded by missionaries (1887–1932): a study centered on the *China Medical Missionary Journal*. *Chinese Medicine and Culture*. 2025;8(1):78–85.
3. McLean and Mills were from professional families in Decatur, Illinois, and their families were affiliated with the same Presbyterian church.
4. Referred to the planned Rockefeller Medical Schools in Beijing and Shanghai.
5. The two Chinese students are Ming-Heng Chou (周明衡), a Master degree student, and Ko-Kuei Chen, an undergraduate pharmacy student.

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David Chen drafted and revised the paper.

Conflicts of interest

The author declares no financial or other conflicts of interest.

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Chinese Medicine and Culture
中医药文化（英文版）

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