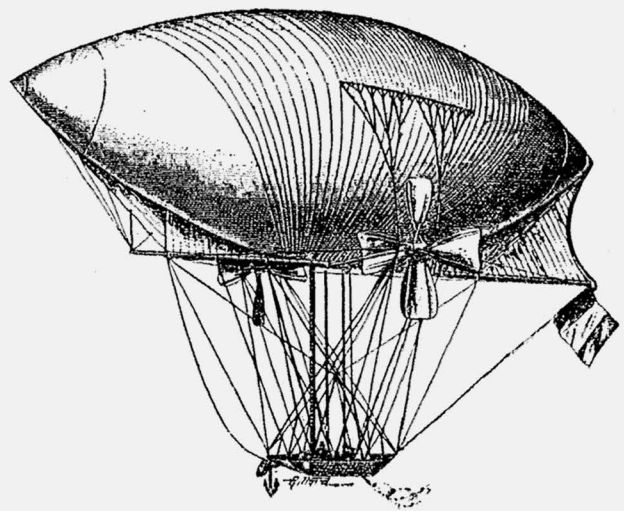
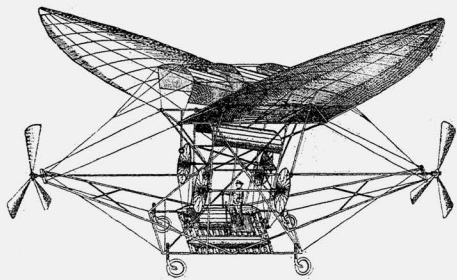




第一屆 科學史典籍與文化研讀工作坊

The First Workshop
on the Study of Historical Scientific Texts and Culture

【會議手冊與論文摘要】
Program & Book of Abstracts

主辦單位：中央研究院科學史委員會

中央研究院

中華古機械文教基金會

南臺科技大學機械工程學系

時間：2015年4月11日（週六）

地點：中央研究院人文社會科學館遠距會議室

第一屆

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南臺科技大學機械工程學系
會議時間：中華民國一〇四年四月十一日（星期六）
會議地點：中央研究院人文社會科學館遠距會議室

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學術構想與宗旨

典籍是知識的重要載體，知識通過傳鈔、印刷、出版與流傳等過程，形成了龐大的知識與社會網絡。華夏文明的特色之一，即為十分重視歷史經驗和知識的流傳。在紙張和印刷術的技術背景下，典籍成為重要文化核心。因此，對科學史典籍的勘察，實為科學史研究溯本追流的重要工作。

近二十年來，大量的科學史典籍印行，促進了科學史研究的廣度，也促進了文化史和其他專史領域中對於科學典籍的理解與利用。其中最明顯的，有西學東傳的科學典籍傳播，日常生活科技的文化史探究，以及科學社會學史等等。

無疑的，科學史研究與傳統史學研究的差異，主要在於必須有輔助學科的協助。因此科學史典籍研讀，除了能培養特殊文字內涵的校讀能力，也能培養學者的科際整合能力。誠如《夢溪筆談》和《天工開物》等代表性科學史典籍的校讀，開展了二十世紀的中國科學技術史研究的高潮一樣，本工作坊的目的即在於透過導讀科學史典籍，培養青年學者對科學典籍的興趣和解讀能力，以促進科學史的基礎研究，並透過研究典籍與其他文獻的比對分析，促進深化科學史的研究發展。

林聰益

中華民國一〇四年四月十一日

Our Intellectual Idea and Goal

Books are carriers of knowledge. Through copying, printing, publication, and distribution, these activities created an enormously large social and knowledge network. Chinese culture is known to place great emphasis on the continual distribution of knowledge and historical experiences from one generation to another. Using paper and printing press, books became the core of culture. As a result, the survey of texts has become an important root-seeking work in the study of the history of science.

The past two decades has seen the re-publication of a massive amount of historical scientific texts. The increased availability of texts resulted in the expansion of the scope of the study of history of science. It also promotes the use of historical scientific texts in many other disciplines such as cultural history and many other area-specific histories. Among them, the study of Asia's adoption of western knowledge through books, the investigation of cultural context for many everyday life technologies and the social history of scientific communities are good examples of this trend.

Needless to say, the study of the history of science demand the knowledge in assisting fields which is quite different from the traditional study of history. The study of historical scientific texts, as a result, not just cultivates a researcher's ability to decipher texts within a specialized context; it helps the researcher to integrate various academic disciplines. The study of *Mengxi Bitan* (《夢溪筆談》) and *Tiangong Kaiwu* (《天工開物》), two landmark historical scientific texts, opened 20th century's wealth of Chinese history of science discovery. The goal of this workshop is to elevate young scholars' ability and interest in deciphering historical scientific texts in order to advance fundamental studies of the history of science by showing them how to read. Through cross-analysis of various historical scientific texts and other historical sources, we hope our efforts can reach deeper understanding to the history of science.

LIN Tsungyi
April 11, 2015

學術委員會

劉廣定（本會委員、國立臺灣大學化學系名譽教授）

李國偉（本會委員、中央研究院數學研究所研究員）

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黃宇暘（國立政治大學歷史學系博士生）

鮑家慶

相關資訊

研討會網址：http://www4.isu.edu.tw/sites/chsas_taipei/2015.04.11/

聯絡人：黃宇暘

E-mail: 102153505@nccu.edu.tw

議事規則

1. 論文發表時間15分鐘，單場論文全部發表結束後，進行綜合討論10分鐘。
2. 論文發表時間到達第12分鐘時，將以一短鈴提示，第15分鐘按一長鈴表示時間結束。
3. 單場全部論文發表完畢後，每位與會者請於1分鐘內提問完畢，時間到即按一長鈴表示提問時間結束，俟發表人回應後再進行下一道問題。
4. 主持人於開放討論中，如遇必要，請協助釐清問題及協調提問次序。

議程

中央研究院人文社會科學館遠距會議室 4月11日（星期六）	
09:00-09:20	報到
09:20-09:40	開幕、致歡迎詞
專題演講	
09:40-10:20	傅大為：我研究《夢溪筆談》的幾個階段經驗與感想
10:20-10:40	茶敘
第一場 主持人：劉廣定	
10:40-11:10	張之傑：六十七兩采風圖之關聯試探 [8] 陳德勤：西方科技資訊進入中國——研讀《中西聞見錄》心得 [10]
11:10-11:20	綜合討論
第二場 主持人：洪萬生	
11:20-11:50	孫顯斌：談「中國科技典籍選刊」的整理實踐與思考——以《王禎農書》為例 [12] 徐丁丁：「中國古代重要科技發明創造」的整理與介紹 [14]
11:50-12:00	綜合討論
12:00-13:30	午宴
第三場 主持人：陳東和	
13:30-14:00	林聰益、林昶峯：《自鳴鐘表圖法》的圖畫重構與校註 [16] 蕭國鴻：探討古中國典籍之機構插圖 [18]
14:00-14:10	綜合討論
14:10-14:20	休息
第四場 主持人：孫顯斌	
14:20-14:50	周維強：有志自強：吳鶚及其《製造火藥圖說》 [20] 張 濤：化學初階實驗教學部分之考證 [22]
14:50-15:00	綜合討論
15:00-15:20	茶敘
第五場 主持人：英家銘	
15:20-16:05	陳思宇：范景文《戰守全書》火器知識傳承初探 [24] 黃宇暘：魚形雷力：黎晉賢與其《魚雷圖說問答》 [26] 吳彥儒：日逐雲霄：高魯與《空中航行術》 [28]
16:05-16:20	綜合討論
16:20-16:35	閉幕致詞
16:35	賦歸

Agenda

Media Conference Room, Humanities and Social Science, Academia Sinica. 4/11(Saturday)	
09:00-09:20	Check in
09:20-09:40	Opening and Welcome Speech
Keynote Speech	
09:40-10:20	FU Dawei: The Several Stages of Experiences and Reflections Regarding My Study of <i>Mengxi Bitan</i>
10:20-10:40	Tea Break
Session 1. Host: LIU Kwangting	
10:40-11:10	ZHANG Zhijie: The Relation between Liu Shi Qi's Two Panorama Prints [9] Richard T.C. CHEN: Open Doors for Western Technology and Information into China Review on The study of <i>The Beijing Magazine</i> [11]
11:10-11:20	Discussion
Session 2. Host: HUNG Wansheng	
11:20-11:50	SUN Xianbin: A Review on Editing <i>the Series of Chinese Classics of Sciences and Technologies</i> [13] XU Dingding: The Great Inventions of Technology and Science in Ancient China [15]
11:50-12:00	Discussion
12:00-13:30	Lunch
Session 3. Host: CHEN Tunghe	
13:30-14:00	LIN Tsungyi, LIN Wenfeng: Picture reconstruction and annotation of <i>Illustrated Description of Chime Clocks and Watches</i> [17] HSIAO Kuohung: On the Study of Mechanism Illustrations in Ancient Chinese Books [19]
14:00-14:10	Discussion
14:10-14:20	Rest Time
Session 4. Host: SUN Xianbin	
14:20-14:50	ZHOU Weiqiang: The Ambitions to Make Ammunitions: A Story about WU E and His <i>The Making of Gunpowder with Illustrations</i> [21] CHANG Hao: The Original Version of the Part of Laboratory Teaching in <i>Huaxue Chujie</i> [23]
14:50-15:00	Discussion
15:00-15:20	Tea Break
Session 5. Host: YING Jiaming	
15:20-16:05	CHEN Szuyu: Firearm and Knowledge Inheritance: The story of FAN Jingwen and His <i>Zhan Shou Quanshu</i> [25] HUANG Yuyang: The Fish that Kills: A Story about LI Jinxian and His <i>Torpedo Question and Answer with Illustrations</i> [27] WU Yanru: Triumph in the Skies: Kao Lu's <i>Air navigation technique</i> [29]
16:05-16:20	Discussion
16:20-16:35	Closing Remarks
16:35	Farewell

論文摘要

六十七兩采風圖之關聯試探

張之傑*

摘 要

六十七，字居魯，滿州鑲紅旗人。乾隆九年至十二年，任巡臺御史三年。在臺期間倩工繪製《臺海采風圖》、《番社采風圖》，另著《臺海采風圖考》、《番社采風圖考》。《番社采風圖》及《臺海采風圖》臺灣皆有藏本，但皆非完本。島內學者對《番社采風圖考》皆不陌生，至於《臺海采風圖考》，從日據至今沒有一位島內學者看過！本文作者有緣自中科院自然科學史研究所取得一份抄本掃描件，經繕打、註釋、校勘，此書始引進臺灣。現存《臺海采風圖》僅9幅，內容皆為動植物。《臺海采風圖》還有哪些內容？學者每每以《重修臺灣府志》引述《臺海采風圖》番俗21條，認為《臺海采風圖》應該也包含番俗。《臺海采風圖考》引進後，始知此書並無番俗。本文考察兩采風圖之分合，得出《臺海采風圖》曾經包含番俗，其後將番俗部份析出，歸入《番社采風圖》的結論。

關鍵詞：六十七，《臺海采風圖》，《臺海采風圖考》，《番社采風圖》，《番社采風圖考》，《重修臺灣府志》

* 業餘科學史研究者

The Relation between Liu Shi Qi's Two Panorama Prints

ZHANG Zhijie^{*}

Abstract

Liu Shi Qi, a mandarin, assumed office as Taiwan Inspective Censor in 1744-1777. During his tenure of office, he hired artisan-painters to draw two series of paintings: *Aborigine Tribal Panorama Prints* and *Taiwan Panorama Prints*. In addition, he also completed two books to explain those prints: *Aborigine Tribal Panorama Prints Commentary* and *Taiwan Panorama Prints Commentary*. From the Japanese colonial period till now, no Taiwanese scholars read *Taiwan Panorama Prints Commentary*. As a matter of fact, all the extant drawings of *Taiwan Panorama Prints* are animals and plants. But *Revised Annals of Taiwan Prefecture* cited 21 aboriginal customs from *Taiwan Panorama Prints*, so some scholars believe that *Taiwan Panorama Prints* should also contain aboriginal customs. The author got a manuscript of *Taiwan Panorama Prints Commentary* fortunately from The Institute of History of Natural Science in 2011, and found no aboriginal customs. We can arrive at a conclusion that *Taiwan Panorama Prints* contained original aboriginal customs for a time. But later, Liu Shi Qi classified those aboriginal customs paintings into *Aborigine Tribal Panorama Prints*.

Keywords: Liu Shi Qi(六十七), *Aborigine Tribal Panorama Prints* (番社采風圖), *Taiwan Panorama Prints* (臺海采風圖), *Aborigine Tribal Panorama Prints Commentary* (番社采風圖考), *Taiwan Panorama Prints Commentary* (臺海采風圖考), *Revised Annals of Taiwan Prefecture* (重修臺灣府志)

^{*} Amateur science history researcher.

西方科技資訊進入中國——研讀《中西聞見錄》心得

陳德勤*

摘 要

《中西聞見錄》是洋務運動期間由傳教士丁韋良等人在 1872 年創辦於北京的一份近代期刊，對洋務運動有推波助瀾功效，促進了中國近代科學觀念的產生和發展而成為西學東漸的一座橋樑。《中西聞見錄》共計 36 冊，共載 361 篇文章，其中科技文章有 166 篇，它所報導科技資訊範圍很廣，包含天文學、地理學、地質學、物理學、礦物學和有關製造玻璃、煉鋼煉鐵、機械製造、物理學、醫學、動植物學、科技人物傳、及其他技術的基本常識性知識，筆者在近兩年閱讀此雜誌過程，使我體會到要把這些科技新聞資訊找出來是容易，但如何求證這些資料正確性，是需要花一些時間，茲就筆者研讀心得供閱者參考：

1. 文章報導需再加以查證，有時作者會把時間、地點弄混，導致在閱讀過程遇到阻礙，此時需把作者原書找出，仔細閱讀，才能還原真相。
2. 文章裡面有許多時間是用國曆表達，需換算成西元日期或互換，中央研究院計算機中心，兩千年中西曆轉換網頁 <http://sinocal.sinica.edu.tw/>，是一個很好用工具，解決了日期換算問題。
3. 筆者試著用紐西蘭(Trove)、澳大利亞(Paper Past)、英國(Welsh Newspapers On Line)及美國國會圖書館(Library of Congress)網頁提供免費全文早期新聞，在那裏找尋資料消息真實性，並補充原有報導不足，使該新聞事件更具體呈現。
4. 資料需做整理：因該雜誌有 36 冊，頁數近千頁，數量不少，筆者做成 EXCEL 檔，依期刊號、西元、中國年號、頁數、題目、國籍、分類、內容、作者加以整理記錄，越詳細越好，以利快速找到資料時。
5. 因時代變化，所用詞彙會有不一樣意義，有同名異物，及當時新的外來物取的名，但後來已不用，如當時稱博物館為積骨樓，故每個字句需加以仔細推敲、考證，否則會被誤導。

關鍵詞：洋務運動、《中西聞見錄》

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Open Doors for Western Technology and Information into China Review on The study of *The Beijing Magazine*

Richard T.C. CHEN*

Abstract

The Beijing Magazine is a modern periodical. It was established by a western missionary William Alexander Parsons Martin in 1872 during the period of Westernization Movement. The Magazine indeed encouraged and increased the momentum of Westernization Movement. It also boosted the generation and development of concept of modern science in China. The Beijing Magazine includes 36 volumes which contains 361 articles. Most of the articles covered informations on science and technology ranging from astronomy, geography, geology, physics, mineralogy to glass-making, steel-making, iron-smelting, machinery manufacturing, medicine, zoology, phytology and other useful basic general knowledge. In the course of studying these works, I realized the fact that it was easy to dig out the information but difficult to verify the correctness of the information. I'd like to share a few thoughts on my study.

1. The authors sometimes confused with time and location. I had to read carefully from the original copy to restore the truth.
2. The articles were dated by using Chinese calendar. A task of transferring these dates into Christian era was necessary. [Http://sinocal.sinoca.edu.tw/](http://sinocal.sinoca.edu.tw/) is a very useful website to settle the problem.
3. I utilized the free web pages from Trove, Paper Past, Welsh Newspapers on Line and Library of Congress to verify the authenticity of these articles. In order to embody the truthfulness, I also made up some informations wherever having been under coverages.
4. These informations need to be sorted. The volume of this periodical is fairly large. I made an EXCEL file according to their issue numbers, dates, number of pages, subjects, nationalities, categories, contents and authors etc. "The more detailed the better" will facilitate the speed of searching the information needed.
5. The words used contained different meanings due to change of times. One must carefully elaborate and research each word or will be misled.

Keywords: Westernization Movement, *The Beijing Magazine*

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談「中國科技典籍選刊」的整理實踐與思考 ——以《王禎農書》為例

孫顯斌*

摘 要

選刊由中國科學院自然科學史研究所策劃組織，是科技史、古典文獻、圖書館與出版界的通力合作，採取圖文對照的版式，將書影與錄文、校釋文字對照排版，同時附帶學術導言，說明作者、學術成就、版本源流及整理情況等內容。

《王禎農書》的版本系統並不複雜，且早有整理本問世，研究者多所憑藉。但這次圖文對照重新整理，發現原整理本限於當時條件所根據的版本情況與聲稱不符，產生了誤導。圖文對照的方式則最大限度的保留了典籍原貌，又提供了點校整理成果，方便研究和閱讀使用和檢驗。另外，異文的判斷取捨一直是校勘最大的理論挑戰，「義理之是非」與「底本之是非」殊難分辨，細緻考察刊刻流程，由此入手或可以解決一部分問題，從而不斷推進完善校勘學的理論和實踐。

關鍵詞：古籍整理、王禎農書、版本、校勘

* 中國科學院自然科學史研究所助理研究員

A Review on Editing the Series of Chinese Classics of Sciences and Technologies

SUN Xianbin^{*}

Abstract

The Series are schemed by the Institute for the History of Natural Sciences, CAS, and are the results of concerted efforts by historians, classical literature researchers, librarians and publishers. The Series provide facsimiles and corresponding texts with punctuations, annotations and notes of collation. Also attached is an academic preamble including the introduction of the author and academic achievements thereof, the origin and development of editions, and the explanation of editing, etc.

The editions of Agricultural Treatise of Wang Zhen are not complicated, and edited version that many researchers rely on was published a few years ago, but we found that the editions that the last editor claimed to use differed from the real text, which caused much confusion. Editions with both facsimiles and corresponding texts could keep the original look while being easy to read or examine. Furthermore, how to determine the text variants is always a big challenge in textual criticism. Being truth or not? Or being original text or not? That is a question. Maybe we can overcome part of the difficulties by examining the procedure of printing so that we could perfect the theory and practice of textual criticism.

Keywords: Classics editing, Agricultural Treatise of Wang Zhen, edition; Textual Criticism

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「中國古代重要科技發明創造」的整理與介紹

徐丁丁^{*}

摘 要

中華民族創造了燦爛的古代文明，眾多科技成就同樣熠熠生輝。然而在很長的一段時間裡，「四大發明」的概念一直主導著大多數人對中國古代科技的認知。有鑒於此，中國科學院自然科學史研究所於2013年8月啟動「中國古代重要科技發明創造評選」項目。經由條目推選、意見諮詢、調研審核、海外評議等環節，歷時一年半，至2015年1月，提出「中國古代重要科技發明創造評選」85項清單，並分為科學發現與創造、技術發明、工程成就三類。希望藉此給學者大眾提供有價值的參考。

由於古代科學與技術門類發展不均、參比因素複雜，遴選工作并非易事。本次評選之標準大體有三：一為突出原創性；二為反映古代科技發展的先進水準；三為對世界文明有重要影響。史料不足、爭議較大者，未予選入，普及文本撰寫等工作正在進行。

關鍵詞：中國古代科技史、發明創造、整理評選

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The Great Inventions of Technology and Science in Ancient China

XU Dingding*

Abstract

China, as one of the oldest civilization, created splendid culture and brilliant scientific and technological achievements in the world. For a long time, the term of Si Da Fa Ming (the four great inventions), as a dominant and concentrated concept, used to be delegated the great creations of science and technology in ancient China. The Great Inventions of Technology and Science in Ancient China is a program promoted by the Institute for the History of Natural Sciences, CAS, started in August 2013. Through systemic procedure of recommending, consulting, investigating and discussion, the group made a result of the list of The Great Inventions of Technology and Science in Ancient China, including 85 entries, consisted three parts of scientific discovery and creations, technological inventions, and engineering achievements. The list, published in January 2015, hope to appraise those Great Inventions and provide a reference for scholars and the public.

Aware of the complexity of this selection, the program based three general standards: originality, advancement, and the influence in the world. An entry will be dismissed if it is lacked of historical data, or still controversial in academia. An popular reader is writing in progress.

Keywords: History of Science and Technology in Ancient China, Discovery and Invention, Arrangement and Selection

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《自鳴鐘表圖法》的圖畫重構與校註

林聰益^{*}、林玚峯^{**}

摘 要

《自鳴鐘表圖法》為清代徐朝俊所著，收入於清嘉慶十四年（1809 年）出版的《高厚蒙求》中，是中國第一部專門為自鳴鐘的所撰寫的科學史典籍，亦是研究明清時期機械鐘製造與發展的重要參考資料，其內容包含機械鐘錶的製作、構造、維修與問題排除。本文主要針對《自鳴鐘表圖法》上所提到的機芯內部構造圖畫，利用 Solidworks 軟體重新建構 3D 模型，同時對照近代歐洲機械鐘的資料，重新分類與註解其構造與名稱，並加入現在的科學知識的基礎理論進行構造分析與研究，以利中國機械鐘發展史的研究。

關鍵詞：徐朝俊、自鳴鐘、機械鐘錶

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Picture reconstruction and annotation of *Illustrated Description of Chime Clocks and Watches*

LIN Tsungyi*, LIN Wenfeng**

Abstract

Written by Xu Chaojun, *Illustrated Description of Chime Clocks and Watches*, collected in *Gao Hou Meng Qiu* in 1809, was the first ancient record about the history of science specifically for chime clocks as well as an important reference for the manufacturing and development of mechanical clocks in Ming and Qing Dynasty. It contains the production, structure, maintenance, and problem-solving of mechanical clocks and watches. Aiming at the structural picture of the mechanism mentioned in *Illustrated Description of Chime Clocks and Watches*, the Solidworks software is utilized for reconstructing the 3D model. Meanwhile, the data of modern European mechanical clocks are compared for reclassifying and annotating the structure and its names. Furthermore, the basic theory of current scientific knowledge is included for the structural analysis and study so as to benefit the research on the development of Chinese mechanical clocks.

Keywords: XU Chaojun, chime clock, mechanical clock and watch

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探討古中國典籍之機構插圖

蕭國鴻^{*}

摘 要

歷史悠久的古中國，流傳許多記載各種產業之生產知識、經驗、及技術的專書，說明各種機械裝置的功能、構造、及使用方法，為了清楚說明這些器械的作動情形，通常需要以文字搭配插圖來表達。這些技術類的代表性專書如出版於元朝 1313 年的王禎《農書》、明朝 1621 年的茅元儀《武備志》、明朝 1637 年的宋應星《天工開物》、明朝 1639 年的徐光啟《農政全書》、以及清朝 1742 年的《欽定授時通考》等。這五本專書不僅詳細收集古中國機械裝置的使用情形，更記載各種機件的製造及其組裝方法，對於了解當時工藝與技術的發展，有很高的研究與參考價值。然而，有些插圖繪製不明確或錯誤，難以清楚了解實際機械的傳動關係。本文根據插圖功能，將古代器械分為農田整地裝置、收穫與運輸裝置、穀物加工裝置、戰爭武器、手工業裝置、礦業裝置、提水裝置、鼓風冶金裝置、及紡織裝置等九類，並就當中不明確、謬誤、或疏漏的部分進行研究與探討。

關鍵詞：古機械、機構插圖、復原研究、機構學、機械史

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On the Study of Mechanism Illustrations in Ancient Chinese Books

HSIAO Kuohung*

Abstract

In the long history of Chinese, there are many books that recorded production knowledge, experiences, and technologies in a variety of primitive industries. They also describe functions, structures, and operations of various mechanical devices. In order to explain how the production devices work, it is necessary to use illustrations with texts to show the processes of production. Five typical books describe the technical development of ancient China, including *Nong Shu* 《農書》 by WANG Zhen (王禎) in AD.1313, *Wu Bei Zhi* 《武備志》 by MAO Yuanyi (茅元儀) in AD 1621, *Tian Gong Kai Wu* 《天工開物》 by SONG Yingxing (宋應星) in AD 1637, *Nong Zheng Quan Shu* 《農政全書》 by XU Guangqi (徐光啟) in AD 1639, and *Qin Ding Shou Shi Tong Kao* 《欽定授時通考》 by Ortai et al. in AD 1742. These books not only collected in detail the uses of mechanical devices in ancient China, but also documented the methods of how to produce the members and to assemble those members into devices. They provide important research and reference value in order to realize the development of technology in the subject's time period. However, some illustrations are depicted vaguely or incorrectly. It is hard to realize the actual transmission processes. Sorted by functions, these mechanism illustrations can be divided into 9 types: soil preparation devices, harvest and transportation devices, grain processing devices, war weapons, handiwork devices, mining devices, water lifting devices, blast metallurgy devices, and textile devices. And, the illustrations are studied and investigated for their uncertain, incorrect, and lost members.

Keywords: Ancient Machinery, mechanism illustration, reconstruction research, history of machinery

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有志自強：吳鶚及其《製造火藥圖說》

周維強*

摘 要

十九世紀下半，中國因外患和內亂頻仍，且武備落後，開始向列強大量購買軍火。採購的對象除了昂貴的槍枝砲械外，也包括了彈藥，憑藉較佳的品質和威力，西方彈藥在中國也佔據了龐大的市場。為了不讓軍力受制於外人，同治三年，淮軍採用洋槍後，即於上海設立機器局，製造洋槍、洋砲和炸彈。光緒初年，安徽清軍使用銅帽擊發的前膛槍為基本武裝，作為步槍推進藥的黑火藥和擊發藥的白藥的需求甚大。光緒二年，安徽巡撫裕祿因皖軍洋鎗隊的火藥依賴外購，為不假外求，故於安慶設立火藥局，自行製造加工火藥，先委任萬賢書，不久改命吳鶚負責此事。吳鶚一方面負責生產，一方面詳細地記載自力製造火藥的過程。最後完成製藥圖說十六篇，並附上造田雞礮各法等內容，成為《製造火藥圖說》一書。此書詳細的記載了當時製造黑火藥和白藥（雷汞）的工藝技術，分為提硝、提磺、製炭、磨篩硝黃、碾壓硝黃、碾炭篩磺、拌合藥料、碾藥、炸藥成餅、壓藥成餅、做子、光藥、試藥、用料和用人主題，說明製造黑火藥的工序和管理，並附有製造田雞砲和白藥的方法。以往學者並未提及安徽設立火藥局史事，對於光緒初年製造火藥相關史實亦較少關注。本文即透過探析吳鶚《製造火藥圖說》的內容，考察清末地方火藥製造技術水平，並反映清末官方力圖擺脫依賴西方軍事技術的努力。

關鍵詞：吳鶚，《製造火藥圖說》，黑火藥，雷汞，裕祿，安徽火藥局，田雞砲

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The Ambitions to Make Ammunitions: A Story about WU E and His *The Making of Gunpowder with Illustrations*

ZHOU Weiqiang*

Abstract

The second half of the 19th century witnessed China's failure to defend itself against internal and outside enemies. The country's defenseless was partly caused by its insufficient military power. China began to purchase firearms from European and American powers. Not just firearms, China also purchased much ammunition. Imported ammunition took China's market by storm. To create an army not under foreign control, the Shanghai Armory was established in 1864 to create firearms and bombs of western design in order to supply the Huai Army (淮軍). In the early days of the Guangxu reign(1875-1910), troops stationed in Anhui (安徽) were equipped with percussion cap muzzleloaders. They needed a sizable supply of black powder as gun propellant and mercury fulminate ("white powder") as the firing agent. In 1876, in order to supply the Foreign Arms Corps of the Wan Army (皖軍洋鎗隊), Yulu (裕祿), the Governor of Anhui, established the Gunpowder Office (火藥局) to manufacture their own gunpowder. The head of the office was WAN Xianshu(萬賢書) at first, not for long, he was replaced by WU E(吳鶚). WU took the job of gunpowder manufacturing. He also registered the gunpowder manufacturing process in detail. He created 16 illustrated articles of gunpowder production and side articles on the making of test equipments such as a gunpowder test cannon. The articles are collected in the book *The Making of Gunpowder with Illustrations*. This book registered the techniques of the making of black powder and mercury fulminate of its days in detail. The steps of black powder production include the refinement of saltpeter, the refinement of sulfur, the production of charcoal, sifting of saltpeter and sulfur, grinding of saltpeter and sulfur, making of fine charcoal powder, mixing ingredients, grinding the mix, shaping by static weight compression, shaping by hydraulic compression, making grains, polishing grains, quality control and human resources. This book also included the making of a black powder test cannon and the preparation of mercury fulminate. There was no study on the Anhui Gunpowder Office. Very few have studied the history of gunpowder making during the early Guangxu Reign. We studied WU E's *The Making of Gunpowder with Illustrations* to reveal Late Qing's local production of gunpowder and their efforts to establish an indigenous national defense industry.

Keywords: WU E, *The Making of Gunpowder with Illustrations*, black powder, mercury fulminate, YU Lu, Anhui Gunpowder Office, black powder test cannon.

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《化學初階》實驗教學部分之考證

張 濤^{*}

摘 要

《化學初階》是西方傳教士傳播上帝福音的代表作品之一，作者是來自美國的嘉約翰(John Kerr)，這本被稱為近現代中國的第一本中文化學書籍，它在1870年出版了第一、二卷，然後又在1874年出版了第三、四卷。前一二卷是化學無機部分，但是後面二卷則是實驗教學內容。這兩部分幾乎沒有任何直接的關連。前部分是屬於普通化學，然而後部分卻是完全是實驗教學內容。

本論文將探討本書三、四卷的原本，分析本部分翻譯的動機及目的，以及研究它與當時滿清政府引進西方科技的關係。

關鍵詞：化學初階、嘉約翰、化學實驗、分析化學

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The Original Version of the Part of Laboratory Teaching in *Huaxue Chujie*

CHANG Hao^{*}

Abstract

Huaxue Chujie, considered by many as the first chemistry textbook in nineteenth century China, also stands as a representative of the type of texts used in the spreading of the Christian gospel at that time. This book, translated over a four-year period (1870-1874) by John Kerr and He Liaoran, consisted of four volumes: The first two volumes, dealing with inorganic chemistry, were published in 1870. Volumes three and four, published later in 1874, discussed a range of chemistry experiments.

The main purpose of this paper is to study the original version of *Huaxue Chujie* and the motivation(s) that lay behind the translation of the various chemistry experiments.

Keywords: *Huaxue Chujie*, John Kerr, chemistry experiments, analytical chemistry

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范景文《戰守全書》火器知識傳承初探

陳思宇*

摘 要

崇禎年間，流寇問題日益嚴重，威脅到江南地區。時任南京兵部尚書的范景文，為使江南的明軍能夠有效的運用武器和戰術，來抵抗流寇的入侵，他整合了重要的兵書內容，編輯成《戰守全書》一書，發給將士們參閱。《戰守全書》共十八卷，分為戰部八卷和守部十卷。其以軍祭作為開頭，並以軍事占驗作為結束，內容包括多個領域的兵學知識，不但是一部反應當代兵學知識整理和發展的軍事百科全書，更是研究明廷對抗流寇策略與明代兵書發展的重要史料。

明代軍隊使用的火器，隨著戰爭的需要和歐洲技術的輸入，不斷的在技術上翻新。《戰守全書》所編纂的火器知識內容十分豐富，除了收錄自宋代以來便長期使用的烟球、引火球等燃燒爆裂物，尚有明軍已使用的各種火器，同時也刊載由歐洲傳教士引入的西洋守銃、西洋飛彪銃等新式火器。本文擬分析這些火器知識之來源，和引用著作之代表性，以了解明季軍隊運用火器的概況，並探究其火器知識傳承的歷史脈絡。

關鍵詞：戰守全書、范景文、火器、兵書、流寇

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A First Look at Ming Dynasty's Firearm Knowledge: The Story of FAN Jing-wen and His *Zhan Shou Quanshu*

CHEN Szuyu*

Abstract

During the Chongzhen Reign (1628-1644), insurrections became increasingly serious. Areas south of the Yangtze River were especially threatened. In order to enhance Ming army's effectiveness in using weapons and tactics to fight rebels, FAN Jingwen (范景文), Nanjing's Minister of War (南京兵部尚書, Nanjing bingbu shangshu), compiled a book *Zhan Shou Quanshu* (戰守全書) which is 18 volumes in length and consists of 8 volumes for offense and 10 volumes for defense. It contains a wide range of tactical knowledge. This book is not just a crystallization of military knowledge of its days; it is a valuable source for the study of Ming's wars against rebels and the evolution of Ming's military manuals.

The firearms used by Ming's forces were constantly under innovation, as demanded by the wars and also thanks to inputs from Europe. *Zhan Shou Quanshu* has much information about firearms. It introduced traditional incendiary bombs, Ming army's firearms and several new firearms brought to China by the missionaries. Here we investigate the sources of this book's military knowledge and the values of this book's sources. We hope this work may provide an overview to Ming's use of firearm and reveal the lineage of Ming's knowledge of firearm.

Keywords: *Zhan Shou Quanshu* (戰守全書, *The Book of Offense and Defense*), FAN Jing-wen, firearm, military manuals, rebels

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魚形雷力：黎晉賢與其《魚雷圖說問答》

黃宇暘*

摘 要

魚雷是近代海軍史上革命性的發明，具有低成本、高隱密性、高本益比的特點，是小型海軍對抗海軍強權的重要利器。魚雷於晚清傳入中國，隨即引起李鴻章等主持海軍事務官員的注意。李鴻章於光緒五年訂購超勇級撞擊巡洋艦時，即要求配載魚雷艇，光緒十年中法戰爭後，更於奏議中指出法軍摧毀福建水師，實為魚雷之功。福建船政學堂出身的黎晉賢，曾充福星兵船管輪，並由福建船政大臣黎兆棠選派到德國監造北洋海軍定遠、鎮遠鐵甲艦，後赴德國魚雷廠學習製造。光緒十年中法戰爭爆發，黎氏受李鴻章電飭回國，總管新創辦的旅順魚雷營，統理各魚雷船，以及旅順東西南北四岸炮臺機器事務。與此同時，黎氏在其任內撰《魚雷圖說問答》，對魚雷的戰雷頭、深淺機、浮力艙與動力部等分別以剖面圖逐一描繪，該書實為中國近代海軍軍官對西方海軍技術考察並翻譯引介的重要典籍。因此本文擬對作者與該書作一探析，並運用晚清官方檔案與主持海軍事務者的信函、奏議等釐清黎晉賢對西方魚雷的考察，與西方魚雷在中國近代海軍史上所扮演的角色。

關鍵詞：魚雷、黎晉賢、李鴻章、旅順、北洋海軍

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The Fish that Kills: A Story about LI Jinxian and His *Torpedo Question and Answer with Illustrations*

HUANG Yuyang^{*}

Abstract

The torpedo is a revolutionary invention in modern naval history. It is cost effective, difficult to detect and the rewards can be high. It helps a small navy to against a great navy. Torpedoes entered China in the late Qing dynasty. Naval decision-makers such as LI Hongzhang (李鴻章) soon noticed torpedo's potential. In 1879, LI ordered torpedo boats with the purchase of Chaoyong Class (超勇級) cruisers. After the success of the Sino-French War of 1884, he filed a memorial to the Emperor stating that the destruction of the Fujian fleet by the French Navy was caused by their use of torpedoes. LI Jinxian (黎晉賢), a Fujian Maritime School alumnus, began his naval career as an engineer officer on the warship Fuxing (福星). Later he was chosen to supervise the construction of ironclads Zhenyuan (定遠) and Dingyuan (鎮遠) for the Beiyang Fleet in Germany by the Fujian Minister of Naval Affairs LI Zhaotang (黎兆棠). He also received torpedo production trainings in a German torpedo factory. In 1884, he was called to return to China by LI Hongzhang to take charge of the Lushun torpedo fighting group to command torpedo boats and the harbor's coastal guns. During this period, LI authored a book *Torpedo Question and Answer with Illustrations* which explained the warhead, depth adjustment mechanism, buoyancy compartments and power compartments using a series of cutaway drawings. This book was one of the most important western naval science books authored by Chinese naval officers in modern history. This article try to investigate into the life of the author, his book and use Late Qing government archive and naval decision-makers' letters and memorials to reveal the story about LI's study of western torpedo warfare and the torpedo's roles in China's modern naval history.

Keywords: torpedo, LI Jinxian, LI Hongzhang, Lushun, the Beiyang Fleet

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日逐雲霄：高魯與《空中航行術》

吳彥儒*

摘 要

十九至二十世紀初，航空氣球與飛機的研發，讓人類不僅實現凌空的夢想，更能成就翱翔天際的挑戰。世界各國日逐雲霄，航空機具性能日益進步，除本於科學的進步與挑戰，更著重於軍事和商業的發展潛力價值。因此，世界各國競相發展航空相關的科學知識與技術，如化學、材料科學、流體力學、機械學等。而中國當時的科學技術與人才遠遜於外國，清廷深知不能只依賴翻譯書籍或聘請外國教師來閉門造車，故派遣眾多留學生出洋，藉此培養科學人才，並帶回最新的一手資訊。高魯(1877-1947)是中國近代最知名的天文學家與外交官，歷任中央觀象臺長、中央研究院天文研究所所長、中華民國駐法公使等職。然而，高魯在天文學與外交工作的耀眼成果，使世人忽略他在近代中國航空史上的重要貢獻。1905-1909年，他留學比利時布魯塞爾大學，以飛機翼的力學計算為題獲得工科博士學位，並參訪歐洲各國的飛行展示，將其見聞著錄為《空中航行術》。是書文說圖隨，共一百七十頁，著重解說各式氣球、飛機的發展歷史與技術知識，並附上完整的中西文對譯表。高魯及《空中航行術》為中國帶來最新的西方航空知識，如氣球、飛機的造型演變緣由，因應氣流飛行的力學計算程式等，是培育中國航空人才的重要根基。因此，本文擬運用清代檔案、民初航空書籍與《申報》、《述報》、《大公報》等報刊，考述作者的生平、交遊網絡與航空知識淵源，以呈現清末民初之際中國知識分子對西方航空科技的追求。

關鍵詞：高魯、飛車、飛機、空中航行術、航空史

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Triumph in the Skies: Kao Lu's *Air navigation technique*

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Abstract

In 19-20 century, development of air balloons and aircraft, a symbol of commitment to human challenges of flight, as well as the temptation of military and commercial value highly. Therefore, the world competes for the development of aviation-related scientific knowledge and technology, such as organic chemistry, materials science, fluid mechanics, mechanics and so on. At that time, China's aviation knowledge sources in addition to the translation of books, but also need overseas students observe new information. Kao Lu (1877-1947) is modern China's most famous astronomer and diplomat, served as the central observatory, Institute of Astronomy, Academia Sinica, ROC Ambassador in France and other staff. 1905-1909, he study at Catholic University of Brussels, Belgium, and received his PhD in Engineering, with the latest scientific knowledge. At that period, he write a book of *Air navigation technique* (*Kong zhong hang xing shu* 空中航行術), recorded the latest technology of aviation knowledge. Kao Lu dazzling performance in the astronomical community, leading to the results of introducing aviation technology rarely concern. This article will use the archival documents of the Qing dynasty and the press, probe Kao Lu's life with development of aviation technology at early Republic of China.

Keywords: Kao Lu、Blimp、Aircraft、*Air navigation technique*(*Kong zhong hang xing shu* 空中航行術)、Aviation history

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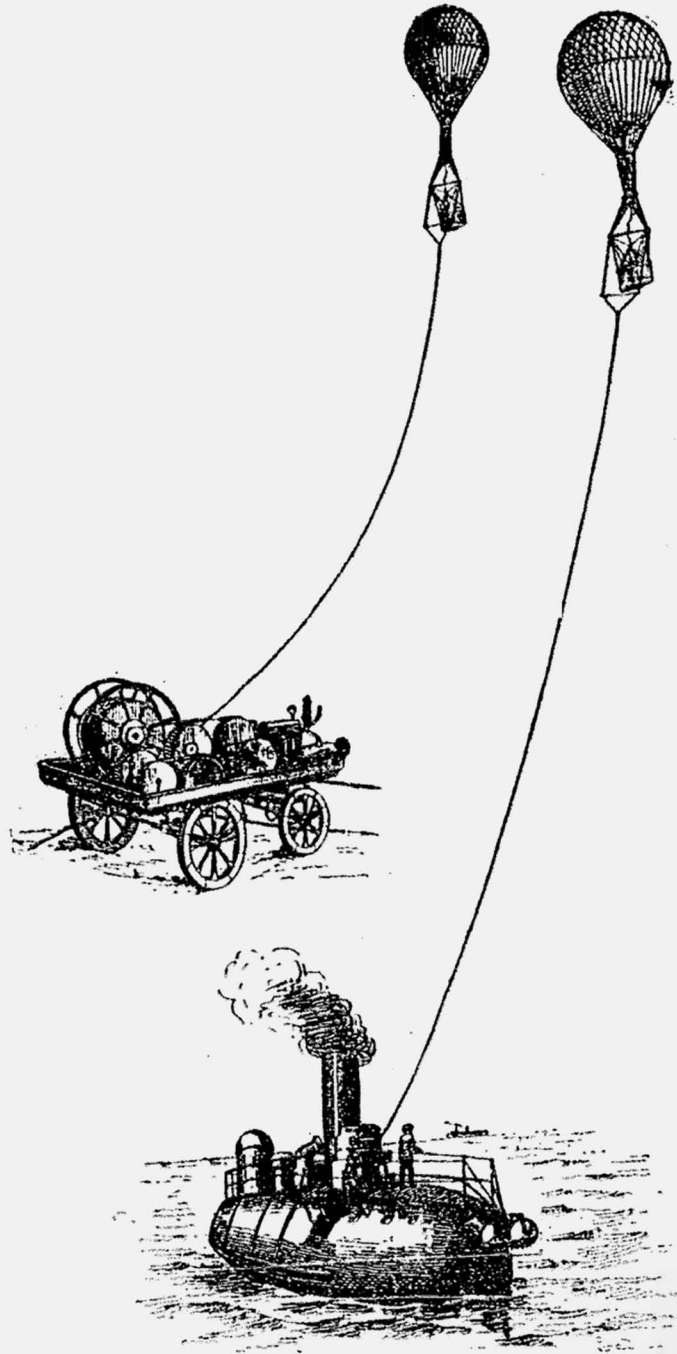
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