

Nikolaus Smogulecki and Xue Fengzuo's *Tianbu Zhenyuan* 天步真原: Its Production, Publication, and Reception

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Compiled in 1653 by the Polish Jesuit missionary Nikolaus Smogulecki (1611–1656), or Mu Nige 穆尼閣,¹ in cooperation with his Chinese disciple Xue Fengzuo 薛鳳祚 (1600–1680),² the *Tianbu zhenyuan* 天步真原 (True Principles of the Pacing of the Heavens)³ is a book of special interest not only for its controversial role in transmitting European astrology to China, but also for the fact that it contains a system of calendrical astronomy⁴ totally different from the Tychonic system constructed between 1629 and 1644 by Johann Terrenz Schreck (1576–1630), Johann Adam Schall von Bell (1591–1666) and Giacomo Rho (1593–1638) in the *Chongzhen lishu* 崇禎曆書 (Chongzhen-reign Treatises on Calendrical Astronomy) as a result of the astronomical reform under the leadership of Xu Guangqi 徐光啓 (1562–1633).⁵ The cosmological scheme applied in the system turns out to be very difficult to understand, because from the description given in the book the scheme “not only is not heliocentric, it is

¹ For Smogulecki, see Kosibowicz (1929) and Standaert (2001a).

² For Xue Fengzuo, see Hu Tiezhu (1992b) and Standeart (2001a).

³ There two books with the same title in the *Siku quanshu* 四庫全書 (Complete Books in Four Treasuries) and the *Shoushange congshu* 守山閣叢書 (The Collectanea of the Mountain-watching Pavilion), respectively. They are very misleading because both of them are not the complete set of the original book, but only two small parts of it. While the *Siku quanshu* version was adopted from the section on the calculation of the solar eclipse, the *Shoushange congshu* version was taken from the section on astrology. The former version was republished later in the *Zhihai* 指海 (Seas of Fingers), and the both versions are included in the *Congshu jicheng chubian* 叢書集成初編 (the Preliminary Edition of the Assembled Collectanea).

⁴ In this paper, I would like to translate the ancient Chinese term *lifa* 曆法 as “calendrical astronomy” when the it is used to refer to the ancient Chinese art for calculating the civil calendar annually promulgated by the central government, which involves the computation of not only a calendar table, but also the movement of the sun, the moon and the five major planets, as well as the astrologically significant phenomena such as lunar and solar eclipses. I would, however, translate the term, or sometimes its abridgement *li* 曆, as “system of calendrical astronomy” when it is used to denote a set of concrete rules and basic constants devised for guiding the practical calculation of such a civil calendar. For the word *li* appearing in the title of a civil calendar, or an almanac more exactly, I would stay on the direct English counter-part of the word, i.e. “calendar”.

⁵ For Xu Guangqi, his astronomical reform and the *Chongzhen lishu*, see Hashimoto (1988). For the latest collective studies on Xu Guangqi, see Jami, Engelfriet and Blue (2001).

not even discernibly Tychonic”.⁶ On the one hand, in the geometrical models used in the book to represent the motions of the five major planets, the earth is located in the center of the universe. On the other hand, however, each of the models contains an independent sun-earth circle, which is a unique characteristic of the heliocentric scheme.⁷

Recent developments have revealed two important facts. While Nicolas Standaert found that the astrological part of the book is a translation from Girolamo Cardano’s (1501 - 1576) commentary on Ptolemy’s (ca.85 - ca.165) *Tetrabiblos*,⁸ I discovered that its astronomical part is actually an adaptation of the *Tabulae Motvum Coelestium Perpetuae ... Item Theoreticae Motvum Coelestium Novae et Genuinae...* (*Perpetual Tables of Celestial motions... also New and True Theories of Celestial Motions...*) of Philippe van Lansberge (1516 – 1632), a devoted Copernican and a major critic of Tychonic astronomy from Belgium,⁹ who constructed, in this series of treatises, heliocentric models for the description of the motions of the sun, the moon and the five major planets, and generated from them astronomical tables for practical calculations. These models and tables are the very basis of the astronomical part of the *Tianbu zhenyuan*, but their true Copernican face is deliberately veiled with some simple changes and omissions in the textual explanations, which make them very difficult to be comprehended.¹⁰

As we look at the book with the renewed interest, it is a little surprising to find that our knowledge about the book itself is in fact quite far from satisfaction. For example, up to now, we still have no answers to two basic questions concerning the production of the book, which are also related to our understanding of its Jesuit author’s unusual behavior in transmitting some “unorthodox” Western knowledge into China, i.e. why Smogulecki wanted to introduce to China the kind of astrology that was officially forbidden by the Catholic Church, and why, after Schall von Bell had contributed the *Chongzhen lishu* system to the newly established Qing dynasty,¹¹ he still decided to preach a different system among his Chinese disciples and openly claimed the superiority of this system to that of Schall von Bell, notwithstanding the credibility of Jesuit missionaries in China at the time was so subtly connected to the reliability of the astronomical system they recommended to the Chinese government. Besides, our knowledge about the publication history of the book in the early Qing dynasty is also very obscure. We do not even know for sure when the book was first published, whether it was once published independently or only always as a part of Xue Fengzuo’s voluminous collectanea *Lixue huitong* 曆學會通 (An Integration of Calendrical Studies), how many editions appeared in the Qing dynasty, and how they differ from each other. Moreover, in the light of the foresaid discoveries and all these new considerations, we also hope to have a better understanding of the reception of the book in the Qing dynasty. In other words, as traditional Chinese society only accepted the officially promulgated system of calendrical astronomy as orthodox, it will be interesting for us to know how widely the book was read in

⁶ Sivin (1973).

⁷ Hu Tiezhu (1992a).

⁸ Standaert (2001a).

⁹ Vermij (2002), pp. 73-99.

¹⁰ For the comparison of the models and elementary constants used in the *Tianbu zhenyuan* and Lansberge’s treatises, see Shi Yunli (2000). For the way how the true face of Lansberge’s models is concealed, see Appendix I below.

¹¹ While doing this, Schall von Bell also re-edited the book into a slightly different version titled *Xiyang xinfa lishu* 西洋新法曆書 (Treatises on Calendrical Astronomy according to the New Method from the West).

the Qing dynasty, what were the readers' responses to such a new system and the claim of its superiority, and to what degree they understood the difference of this system from the orthodox one.

This paper seeks to provide possible answers to these questions, through which I would like to discuss some interesting aspects of Smogulecki and Xue Fengzuo's work and its influence in the early and mid Qing dynasty, such as how Smogulecki's possible commitment in mathematical astronomy determined his astronomical work in China, how his work conveyed to his Chinese audience a clear voice against the Tychonic system and thus inspired Xue Fengzuo's challenge to the validity of the latter as official astronomy in China, and eventually how the dissemination of their rebelling idea and system was fatally handicapped by both the unofficial status and the bad quality of their books.

To first achieve a clear concept about the editions and the contents of the book essential for the discussion of its production and reception, I would like to begin the paper with an analysis of the publication and republication of the book. Some of my conclusions in this part are highly hypothetical due to the shortage of crucial evidence, but they can still help to shed new light the obscure lineage of the editions of the book.

1. Xue Fengzuo and His Tripartite Collectanea

As the *Tianbu zhenyuan* is now available only in the version contained in Xue Fengzuo's *Lixue huitong*,¹² the latter becomes the key to the clarification of the publication history of the former. Unfortunately, however, the history of the *Lixue huitong* itself remains very perplexing as well, and therefore has to be dealt with first.

To begin with, let me reconstruct Xue Fengzuo's career as an astronomer since he met Smogulecki, which will furnish a reference framework for our further analysis. The reconstruction is based on my recent survey of the existing copies of the *Lixue huitong* kept in the National Library of China 中國國家圖書館 (NLC, Beijing); Library of the Institute for the History of Natural Science, Chinese Academy of Sciences 中國科學院自然科學史研究所圖書館 (IHNS, Beijing); Zhejiang Library 浙江圖書館 (ZL, Hangzhou); Library of Peking University 北京大學圖書館 (LPU, Beijing); Harvard-Yenching Library (HYL, Cambridge/USA); Bodleian Library (BL, Oxford); National Science Library, Chinese Academy of Sciences 中國科學院國家科學圖書館 (NSL, Beijing); Library of Life Science 生命科學圖書館 (LLS, Shanghai); and Tohoku University Library 東北大學附屬圖書館 (TUL, Sendai) respectively (Table 1 and Appendix II). These copies are more or less incomplete and different from each other in both the contents and their order of arrangement. Putting them together, however, we can still get a good concept of Xue Fengzuo's works.

¹² Up to now, I have surveyed eighteen copies of the book existent in various libraries. In some libraries, it is registered either as *Yidu xueshi yishu* 益都薛氏遺書 (Posthumous Treatises of Mr. Xue from Yidu) or simply *Xueshi yishu* 薛氏遺書 (Posthumous Treatises of Mr. Xue), as can be seen in Table 1 below. However, neither of these two titles ever appear in any of the existing copies of the book preserved in these libraries. Instead, the title printed in all copies that I have examined is *Lixue huitong*, except for a few chapters in the book where we can see another title *Tianxue huitong* 天學會通 (An Integration of the Studies of the Heavens). We can also find a *Tianxue huitong* by Xue Fengzuo in the *Siku quanshu*, but it is merely a chapter on solar and lunar eclipses from the *Lixue huitong* or its earlier edition. For this reason, I will use *Lixue huitong* in a loose way to refer to Xue Fengzuo's tripartite collectanea except being specially clarified.

Table 1 Existing copies of the *Lixue huitong*

No.	Catalogued Title	Form	Library	Shelf Number
I	<i>Yidu xueshi yishu</i> 益都薛氏遺書	Printed	NLC	14714
II	<i>Lixue huitong · Tianbu zhenyuan</i> 曆學會通 · 天步真原	Manuscript	IHNS	522 / 795
III	<i>Yidu xueshi yishu</i> 益都薛氏遺書	Printed	NLC	A04003
IV	<i>Lixue huitong</i> 曆學會通	Printed	HYL	T 7180 4473
V	<i>Xueshi yishu</i> 薛氏遺書	Printed	LPU	8678
VI	<i>Lixue huitong</i> 曆學會通	Printed	ZL	8170/V1—3
VII	<i>Tianxue huitong</i> 天學會通	Printed	IHNS	522 / 795
VIII	<i>Lixue huitong</i> 曆學會通	Printed	BL	Sinica 34
IX	<i>Lixue huitong</i> 曆學會通	Manuscript	IHNS	522/795
X	<i>Lixue huitong zhengji bajuan</i> 曆學會通正集八卷	Printed	NSL	子 522/2677
XI	<i>Lixue huitong zhiyong jiujuan</i> 曆學會通致用九卷	Printed	NSL	叢 135/4473
XII	<i>Tianxue huitong</i> 天學會通	Printed	NSL	2952441-8
XIII	<i>Lixue huitong</i> 曆學會通	Printed	LLS	14/4473
XIV	<i>Lixue huitong</i> 曆學會通	Printed	TUL	To be checked
XV	<i>Lixue huitong</i> 曆學會通	Printed	LPU	X/7103/4473
XVI	<i>Lixue huitong</i> 曆學會通	Printed	LPU	SB/157.2/4473
XVII	<i>Lixue huitong</i> 曆學會通	Printed	LPU	X/528/4473/C2
XVIII	<i>Lixue huitong</i> 曆學會通	Printed	LPU	X/528/4473

According to Xue Fengzuo, twenty years after he studied traditional Chinese astronomy and mathematics from Wei Wenkui 魏文魁, an astronomer known for his anti-Western stance

during Xu Guangqi's astronomical reform,¹³ he arrived at Nanjing in the early spring of the ninth year of Shunzhi reign-period (9 Feb. 1652 – 28 Jan. 1653) and began to learn trigonometry, logarithm and the table of logarithmic trigonometry from Smogulecki.¹⁴ In less than two years, they co-authored a number of books and treatises, including the *Bili duishu biao* 比例對數表 (Table of the Proportional Logarithms), the *Bili sixian biao* 比例四線表 (Table of the Proportions of the Four Trigonometric Lines),¹⁵ the *Suan sanjiao fa* 算三角法 (Method of Calculating Triangles), the *Huofa* 火法 (Firearm Method), and the *Tianbu zhenyuan*.¹⁶ In late 1653, Smogulecki was summoned to Beijing by Schall von Bell as the “great mathematician”,¹⁷ but this did not bring Xue Fengzuo's “calendrical studies” (*lixue* 曆學) to end. On the contrary, he continued ambitiously to fulfill two projects proposed by Xu Guangqi during the compilation of the *Chongzhen lishu*, but which was not accomplished, in Xue Fengzuo's opinion, by his followers, i.e. (1) to realize true integration of Chinese and Western astronomy, and (2) to carry out the so-called *dushu pangtong shishi* 度數旁通十事, or the extension of mathematical studies to ten relevant fields, i.e. meteorological astrology, hydraulics, musical harmonics, fortification and gunnery, accountancy, architecture, mechanics, medical astrology and horology.¹⁸ At this time, he might have envisaged in mind a collectanea and its big structure, just as it appears finally in the *Lixue huitong*. Basically, the collectanea would include three major parts, i.e. Main Portion (*Zhengji* 正集), Portion on Test (*Kaoyan bu* 考驗部), and Portion on Applications (*Zhiyong bu* 致用部).¹⁹ The Main Portion would present a system of calendrical astronomy resulted from an integration of all systems available to him at the time, i.e. the Old Chinese Method (*Jiu zhongfa* 舊中法),²⁰ the New Chinese Method (*Xin zhongfa* 新中法),²¹ the Chinese-Islamic System from the West Areas (*Xiyu huihui li* 西域回回曆),²² the Current Western Method (*Jin xifa* 今西法),²³

¹³ For a detailed discussion of the dispute between Wei Wenkui and Xu Guangqi's Calendar Bureau (*liju* 曆局), see Shi Yunli (1996).

¹⁴ “*Zhongfa sixian yin*” 中法四綫引 (Introduction to the *Four Trigonometric Lines in Chinese Method*) in the Main Portion (*Zhengji* 正集) of the *Lixue huitong*.

¹⁵ Xue Fengzuo sometimes called logarithms proportions (*bili* 比例) or proportional numbers (*bilishu* 比例數). The four trigonometric lines here refer to sine, cosine, tangent and cotangent.

¹⁶ See “*Zhongfa sixian yin*” and “*Bili duishu biao xu*” 比例對數表敘 (Preface to the *Table of the Proportional Logarithm*) in the Main Portion, “*Kaoyan xu*” 考驗敘 (Preface to the Portion on Test) in the Portion on Test (*Kaoyan bu* 考驗部), and “*Sanjiao suanfa xu*” 三角算法敘 (Preface to the *Method of Calculating Triangles*) in the Portion on Applications (*Zhiyong bu* 致用部) of the *Lixue huitong*.

¹⁷ Kosibowicz (1929) and Vāth (1991), p. 214.

¹⁸ For Xu Guangqi's proposal of the two projects, see *Xu Guangqi ji*, chapt.7, pp. 327-328, 337-338 and 344. For Xue Fengzuo's discussion of this proposal and his aspiration to realize it, see his note in the beginning of the Portion on Applications of the *Lixue huitong*.

¹⁹ For the contents of the *Lixue huitong* as seen in its existing copies, see Appendix II.

²⁰ Xue Fengzuo's term for Guo Shoujing's 郭守敬 (1231-1316) *Shoushi li* 授時曆 (Time Granting System of Calendrical Astronomy) and its early Ming adaptation by Yuan Tong 元統, i.e. the *Datong li* 大統曆 (Great Unification System of Calendrical Astronomy). For the latest study on the *Shoushi li*, see Yabuuti and Nakayama (2006).

²¹ Xue Fengzuo's term for the system contrived by Wei Wenkui during his dispute against Xu Guangqi's astronomical reform.

²² The system compiled by Mashayihei 馬沙亦黑 and Wu Bozong 吳伯宗 in the early Ming dynasty, which Xue Fengzuo deemed an ancestor of the Western method. For the compilation and contents of the *Huihui li*, see Yabuuti (1997) and Shi Yunli (2003).

²³ Xue Fengzuo's term for the system contained in the *Chongzhen lishu*. For a thorough analysis of this system, see Hashimoto (1988), pp.74-163.

and the New Western Method (*Xin xifa* 新西法),²⁴ while the Portion on Test would provide a collection of the digests of all these systems. In addition, the Portion on Applications would deal with the application of mathematical studies to a variety of fields such as astrology, musical harmonics, medicine, hydraulics, mechanics, strategics, fortification and gunnery.

Apparently, the Main Portion of the *Lixue huitong* was completed in the first year of Kangxi reign-period (18 Feb. 1662 – 7 Feb. 1663), because Xue Fengzuo’s preface to the whole portion is dated to this year.²⁵ Since the Portion on Test should have been both a basis and a byproduct of the integration contained in the Main Portion, Xue Fengzuo might have been working on it simultaneously, but the whole portion was probably not completed until the third year of Kangxi reign-period (28 Jan. 1664 – 14 Feb. 1665) when he wrote the preface to the *Jiu zhongfa xuanyao* 舊中法選要 (Digest of the Old Chinese Method),²⁶ the first digest in that portion. We can also deduce the completion time of the Portion on Applications from the following fact. In the table of contents of this whole portion, there are ten titles, i.e. *Sanjiao suanfa* 三角算法 (Triangle Calculations),²⁷ *Yuelü* 樂律 (Musical Harmonics), *Yiyao* 醫藥 (Medicine), *Zhanyan* 占驗 (Astrology), *Xuanze* 選擇 (Date Selection), *Mingli* 命理 (Fortune Telling), *Shuifa* 水法 (Hydraulic Method), *Huofa* 火法 (Firearms Method), *Zhongxue* 重學 (Mechanics Studies) and *Shixue* 師學 (Strategics Studies), where the last four titles are noted as *que* 闕 (lack). But these four treatises actually occur in the existing copies of the *Lixue huitong* and their prefaces are all dated to the third year of Kangxi reign-period. This seems to suggest that, while the last four parts were added in the third year of Kangxi reign-period, other parts of this portion, including the table of contents, had been completed before this year. Apparently, Xue Fengzuo forgot to correct the old table of contents when he delivered the complete manuscript of the portion to the carver’s workshop.

The block-carving of the whole collectanea started probably at Nanjing²⁸ or Wujing 武進²⁹ in about the same year or shortly after, when its three major portions were basically completed. The title of the first edition was arguably *Tianxue huitong* 天學會通 (An Integration of the Studies of the Heavens), because several chapters in both the Main Portion and the Portion on Test in the existing copies of the *Lixue huitong* still bear this as the general

²⁴ Xue Fengzuo’s term for the system contained in the *Tianbu zhenyuan*.

²⁵ “*Zhengji xu*” 正集敘 (Preface to the Main Portion) in the Main Portion of the *Lixue huitong*.

²⁶ “*Jiu zhongfa xuanyao xu*” 舊中法選要敘 (Preface to the *Digest of the Old Chinese Method*) in the Portion on Test of the *Lixue huitong*.

²⁷ This title refers actually to the *Suan sanjiao fa*, the first treatise in this portion.

²⁸ When commenting on Xue Fengzuo’s works, the famous early Qing astronomer and mathematician Mei Wending 梅文鼎 (1633–1721) recalled that while Xue Fengzuo was having his books carved in Nandu 南都 (the Southern Capital, i.e. Nanjing) he himself was still staying in his poor mountainous homeland, and they therefore did not know each other. Obviously, here Mei Wending was not talking about Xue Fengzuo’s activity in 1652 and 1653, because at that time Mei Wending himself was just around twenty years old and did not begin his study of astronomy and mathematics until six years later. For Mei Wending’s comments on Xue Fengzuo, see *Wu’an lisuan shuji* 勿庵曆算書記 (A Record of the Works by Wu’an), pp.37b-38a (Wu’an is the alias, or *hao* 號, of Mei Wending). For the time of his first study of astronomy and mathematics, see Li Yan (1998), p.518. For a detailed biography of him, see Li Di (2006).

²⁹ Wujing is about 120 kilometers east of Nanjing downstream on the Yangtze River. Xue Fengzuo’s signature to the “*Zhongfa sixian yin*” in the Main Portion reads, “towards the end of the twelfth month of the first year of the Kangxi reign [29 Jan. - 7 Feb. 1663], the year being *renyin*, Xue Fengzuo writes in the guest house in Piling 毘陵”, where Piling is the elegant name of Wujin. This means Xue Fengzuo had moved to Wujin by this date, and therefore might also be possible to have the *Lixue huitong* carved there.

title, which are obviously the remnants from the *Tianxue huitong* edition, as I will show below. In addition, Mei Wending also mentioned this very title in his discussion of Xue Fengzuo and Smogulecki's works, though by it he only meant Xue Fengzuo's own system in the Main Portion.³⁰

The *Tianxue huitong* underwent at least one revision between 1668 and Xue Fengzuo's death in 1780, because in two exemplifying calculations attached to the *Jiu zhongfa xuanyao*, Xue Fengzuo cited some data from the *Shixian li* 時憲曆 (Calendar of Time Modeling), the officially promulgated civil calendar of the Qing dynasty, of the sixth year of Kangxi reign-period (24 Jan. 1667–12 Feb. 1668).³¹ Moreover, in some of the extant copies of the *Lixue huitong*, we can find two prefaces to the *Jin xifa xuanyao* 今西法選要 (Digest of the Current Western Method), both entitled “*Jin xifa xuanyao xu*” 今西法選要敘 (Preface to the Digest of the Current Western Method), but one of which is obviously a slightly abridged version of the other and is therefore another sign of Xue Fengzuo's later revision.

In most of the existing copies of the *Lixue huitong*, we can see a series of treatises bearing the general title *Qihua qianliu* 氣化遷流 (The Change, Displacement and Current of Qi) in addition to their specific sub-titles. They appear to be another book incorporated in the collectanea, which consists in at least twenty-one chapters, although only less than ten of them still exist.³² Since the prefaces to three chapters of the book are dated to the fourteenth year of Kangxi reign-period (26 Jan. 1675 – 13 Feb. 1676),³³ it is unreasonable to think that the book as a whole was completed before this year. Talking about the publication of Xue Fengzuo's works, Mei Wending told us:

“The two books above [i.e. *Tianxue huitong* and *Tianbu zhenyuan*] were copied from a version borrowed from my friend Liu Zhao 劉昭 in Jinling 金陵 [i.e. Nanjing]³⁴ ... Later I met Mr. Liu Shuyin 劉淑因 from Yingzhou 潁州,³⁵ who generously planned to emend and publish the remained works of Xue Fengzuo, and invited me for a critical reading [of the manuscript]. But the plan was delayed by other affairs. Recently Mr. Liang Shixun 梁世勳 from Dongfan 東蕃 kindly sent me the complete works of Mr. Xue, wherein all chapters of the *Qihua qianliu* are printed in continuation.”³⁶

These words also suggest that the *Qihua qianliu* as a whole book is really a later addition to

³⁰ *Wu'an lisuan shuji*, pp.37b-38a.

³¹ *Jiu zhongfa xuanyao*, chapt. 6, pp.36a-37b in the Portion on Test of the *Lixue huitong*.

³² Copy V in Table 1 contains chapt. 21 of the book, which is the highest chapter number of the book appearing in the existing copies of the *Lixue huitong* I have so far checked.

³³ The prefaces to chapters “Tumu xianghui” 土木相會 (Conjunction of Jupiter and Saturn), “Yuzhou dayun” 宇宙大運 (Grand Cycle of the Cosmos), and “Taiyang ji wuxing gaoxing guojie” 太陽及五星高行過節 (Transits of the Apogees of the Sun and the Five Planets) in the Portion on Applications of the *Lixue huitong*. See also Standaert (2001a).

³⁴ This might have been take place in 1675 to 1676 when Mei Wending first heard about Xue Fengzuo and his work from his friends during an eight-month's sojourn in Nanjing. Another possibility is the nineteenth year of Kangxi's reign-period (31 Jan. 1680 – 17 Feb. 1681) when Mei Wending stayed at least four months in Nanjing and wrote his first and last letter to Xue Fengzuo. For Mei Wending's knowledge of Xue Fengzuo, his stays in Nanjing and his letter to Xue Fengzuo, see *Wu'an lisuan shuji*, pp.37b-38a and Li Yan (1998), pp. 522-525.

³⁵ Liu Shuyin is the co-author of chapt. 10 of *Qihua qianliu*, which is now existent only in copy No.V in Table 1.

³⁶ *Wu'an lisuan shuji*, pp.37b-38a.

the original edition of the *Lixue huitong* and that the major difference between the “complete works of Mr. Xue” and the original *Lixue huitong* is the inclusion of this book in the former. In fact, as another piece of evidence for my argument, we have not found the general title *Tianxue huitong* or *Lixue huitong* in all existing chapters of the *Qihua qianliu*, nor does the title of the latter show up in the tables of contents of the three major portions of the *Lixue huitong*.

The addition of the *Qihua qianliu* actually turned the collectanea into a new series, which must have been the source of the titles such as *Xueshi yishu* and *Yidu xueshi yishu*, as shown in Table 1. Since the *Wu'an lisuan shuji* was completed by 1702,³⁷ this expanded edition should have been printed not long before that on account of Mei Wending's referring of his acquisition of the “complete works of Mr. Xue” as a recent event.

At least one more re-edition appeared later in the Qing dynasty, since my survey shows that the eighteen copies of the *Lixue huitong* listed in Table 1 fall actually into two distinguishable groups. Group one, including copies III-XVIII, is arranged explicitly in three major portions, which is made clear by the following two features:

- (a) In front of each portion, there is a preface to and a table of contents of the entire portion;
- (b) On the first page of each chapter of the Main Portion, we can see at the bottom of the title line such words as “Zhengji sanjuan” 正集三卷 (Main Portion, chapter three) and so on, indicating the portion title and the chapter number in the portion.

Copy I is the only representative of another group I have found so far. This copy contains all the titles occurring in group one, except the *Qihua qianliu*. However, we can find neither the two features above, nor any other clues, indicating that the contents of the book are actually arranged in the three-fold divisions. The only exception is that we can still see the words *Zhengji erjuan* 正集二卷 (Main Portion, the second chapter) in small fonts on top-right corner of the title page of the *Bili sixian xinbiao*, apparently a small detail overlooked by the re-editor, which also indicates that the edition in question really came after the edition of the three-fold divisions.

Figure 1: Imprints of the same page in two different editions of the *Lixue huitong*

³⁷ Li Yan (1998), p.538.

曆學會題	目錄	舊中法歲實	七卷
求歲實	時憲法歲實	天步真原歲實	
舊中法冬至	今曆法冬至	前後兩乙未六十年冬至	
天步真原冬至	測遠年冬至	太陽平行	
前後兩庚寅六十年冬至	太陽黃赤道交度	積年立成	
積年立成	太陽黃赤道交度	積度過官立成	
黃赤道交度立成	黃赤道交差立成	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陰天正經朔及閏餘分	前後兩乙未六十年經朔	遠年經朔	
遠年經朔	月距日	月策及距日立成	
月策及距日立成	太陰心差	月轉遲疾曆	
月轉遲疾曆	前後兩乙未年月轉	遠年月轉遲疾	
遠年月轉遲疾	月轉終及度	太陰平實行均數加移	
太陰平實行均數加移	月交	前後兩乙未月交	
前後兩乙未月交	遠年月交		

(a) (From copy No.X)

曆學會題	目錄	舊中法歲實	
求歲實	時憲法歲實	天步真原歲實	
舊中法冬至	今曆法冬至	前後兩乙未六十年冬至	
天步真原冬至	測遠年冬至	太陽平行	
前後兩庚寅六十年冬至	太陽黃赤道交度	積年立成	
積年立成	太陽黃赤道交度	積度過官立成	
黃赤道交度立成	黃赤道交差立成	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陽盈縮心行度	太陽盈縮心行度	太陽盈縮心行度	
太陰天正經朔及閏餘分	前後兩乙未六十年經朔	遠年經朔	
遠年經朔	月距日	月策及距日立成	
月策及距日立成	太陰心差	月轉遲疾曆	
月轉遲疾曆	前後兩乙未年月轉	遠年月轉遲疾	
遠年月轉遲疾	月轉終及度	太陰平實行均數加移	
太陰平實行均數加移	月交	前後兩乙未月交	
前後兩乙未月交	遠年月交		

(b) (From copy No. I)

Moverover, the two groups were actually printed with the same set of printing blocks, with only very small changes. Fig. 1 shows the imprints of the table-of-content page of an identical chapter from groups one (a) and two (b) respectively. Not only are they with the same size and layout, but they also bear identical defects resulted from damages on the printing block, especially the long crack running through the whole block and the damage at the left-bottom corner. The only difference is that imprint (a) has two characters *qijuan* 七卷 (chapter seven) at the bottom of the title line on the right, while it is absent from imprint (b). This is not strange at all, because, as a widespread practice in traditional Chinese book-printing business, a publisher used to keep the printing blocks of a book after the first press, so that they could be reused or even shared among publishers who wanted to republish the book or to include it in a larger collection, so as to reduce the cost of publication.³⁸ Small

³⁸ For the popularity of this practice in traditional Chinese printing industry, see Chia (2002), pp. 31-32, 188-189, and 213-214. A very good example of this kind of block reusing is Schall von Bell's printing the *Xiyang xinfa lishu* with the *Chongzhen lishu* blocks in the beginning of the Qing dynasty, as can be verified from a comparison of the existing copies of the two books.

alterations, if needed, could also be made to the blocks during later impressions,³⁹ while larger-scale revisions could be done by replacing or adding a few printing blocks.⁴⁰ In fact, as my survey shows, the original printing-blocks of the first edition of the *Lixue huitong* have actually been reused exactly in this way in all later editions, if more than one, I have hitherto seen.

There is also evidence that the title of the whole collectanea was first changed from “*Tianxue huitong*” into “*Lixue huitong*”, probably on account of the connection between the term *tianxue* 天學 (studies of the heavens) and Christianity, in either the 1668-1680 edition or in the first posthumous edition printed not long before 1702.

In 1683, the famous early Qing scholar Huang Zongxi 黃宗羲 (1610-1695), who had a good knowledge of both Chinese and Western astronomy of the time,⁴¹ completed a book entitled *Lixue jiaru* 曆學假如 (Exemplars of Calendrical Studies). While demonstrating how to calculate lunar and solar eclipses with the procedures contained in the *Chongzhen lishu*, he applied, besides the *Chongzhen lishu* version itself, “Xue Fengzuo’s version”,⁴² i.e. the *Jin xifa xuanyao* in Xue Fengzuo’s tripartite collectanea. This means that Huang Zongxi probably had a copy of the collectanea in his library. Since his son Huang Baijia 黃百家 (1643-1709) was very keen on astronomy as well, we have reason to believe that he read his father’s collections on astronomy, including this book.⁴³ In his “*Tianxuan pian*” 天旋篇 (Essay on the Revolution of the Heavens), Huang Baijia mentioned Smogulecki’s astronomical work as follows:

“Up to the Shunzhi reign-period, there was also Mu Rude Nige 穆如德尼閣 [i.e. Smogulecki],⁴⁴ a man from Boluoniya 博樂尼亞 [i.e. Poland], who composed *Lixue huitong* [and] *Tianbu zhenyuan*, and [who] also privately took the *Xinfa shu* 新法書 (Treatises on New Method),⁴⁵ emended and condensed it. [Astronomy] thus became more accurate than before.”⁴⁶

If what Huang Baijia read was Huang Zongxi’s copy, we can easily conclude that the

³⁹ To change a few words on a printing block was not difficult for a block-carver in the Ming and Qing periods. He could simply dig out the characters needed to be changed and wedged in the newly carved characters. Examples of this kind of “block revisions” can be found in a number of old books, including Schall von Bell’s *Xiyang xinfa lishu*. The most interesting changes of this type can be seen in the *Zhili yuanqi* 治曆緣起 (the Origin of the Calendrical Reform) of the latter book, where all words such as *Huangshang* 皇上 (Your/His Majesty the Emperor) and *Shengshang* 聖上 (Your/His Majesty the Sovereign) in the *Chongzhen lishu* version are changed in this way into small circles “○”, obviously to avoid mentioning the Ming emperor.

⁴⁰ We can find this kind of additions in the *Xiyang xifa lishu* as well. Usually, new contents are added to the end of either a section or a chapter, which is obviously easier for block-carvers to handle. When there is still empty place on the last block of the section or chapter to be changed, the whole block will be replaced. If one block is not enough for new additions, more will be inserted. For example, compared to the *Chongzhen lishu* version, leaves 10, 23 and 26 of the *Richan lizhi* 日躔曆指 (Gist of the Calendar of the Solar Motion) in the *Xiyang xifa lishu* belong to the imprints of replaced blocks, while leaves *you erwu* 又二五 (twenty-five again) and *you erliu* 又二六 (twenty-six again) in the same part belong to the imprints of continued new blocks.

⁴¹ For Huang Zongxi and his works in astronomy, see Yang Xiaoming (1997).

⁴² *Lixue jiaru*, chapt.1, p.323. Also see Yang Xiaoming (1997).

⁴³ For Huang Baijia and his astronomical work, see Yang Xiaoming (1998).

⁴⁴ Smogulecki is styled Rude 如德 in Chinese.

⁴⁵ This refers obviously to the whole *Xiyang xifa lishu*.

⁴⁶ Quoted from Yang Xiaoming (1998).

title of the copy, which was in Huang Zongxi's possession by 1683, is "*Lixue huitong*" rather than "*Tianxue huitong*", although Huang Baijia seemed to attribute the whole collectanea to Smogulecki. In addition, since the first posthumous edition of Xue Fengzuo's collectanea was printed not long before 1702, it is reasonable to believe that Huang Zongxi's version belongs to the revised edition printed before 1680. However, since Huang Baijia's "*Tianxuan pian*" is believed to be written between 1697 and 1700,⁴⁷ we cannot exclude the possibility that he also had an opportunity to see the first posthumous edition. In this case, we have to accept the plausibility that the title *Lixue huitong* was probably not used until the first posthumous edition. But this title-alteration was not perfectly conducted whenever it actually happened, because the block-carver apparently overlooked the old title still remaining in the few chapters of the existing copies of the *Lixue huitong*, as I am going to show below.

2. Editions of the *Tianbu zhenyuan*

Up to now, we have not found any independent copy of the *Tianbu zhenyuan*. The only version available is the *Xin xifa xuanyao* 新西法選要 (Digest of the New Western Method) and some other chapters contained in the Portion on Test and Portion on Applications of the *Lixue huitong*. However, this version is apparent not the original edition of the book, because Xue Fengzuo clearly indicated in his preface to the version:

“I have formerly had the book carved in Jiangning 江寧 [i.e. Nanjing] as the *Tianbu zhenyuan*. By deleting the superfluous and complicated parts of it, I compiled the *Xin xifa xuanyao*.”⁴⁸

This means that the book had been carved on blocks independently before the completion of the *Lixue huitong*. When recollecting his first meeting with Smogulecki, Fang Zhongtong 方中通 (1635-1698),⁴⁹ another Chinese disciple of the latter, also mentioned the carving of the *Tianbu zhenyuan*:

“Later [I] visited Mr. Mu [Nige] in his residence with Mr. Xue [Fengzuo]. At the time [he] just finished the carving of his *Tianbu zhenyuan*, and talked it with me. [I] liked it and associated myself with him.”⁵⁰

In fact, it is not unreasonable to believe that all works completed in 1652 and 1653 by Xue Fengzuo and Smogulecki had been carved on printing blocks before Xue Fengzuo began to compile the *Lixue huitong*. For example, in his preface to the *Zhengxian bu* 正弦部

⁴⁷ Yang Xiaoming (1998).

⁴⁸ See “*Xin xifa xuanyao xu*” 新西法選要敘 (Preface to the *Digest of the New Western Method*) in the Portion on Test of the *Lixue huitong*.

⁴⁹ For Fang Zhongtong and his work in mathematics, see Yan Dunjie (1960) and Guo Shirong (2002)..

⁵⁰ “*Zhongxi shuxue tong xu*” 中西數學通序 (Preface to the *Integration of Chinese and Western Mathematics*) in *Peigu*, chpat.1, p.16a. Fang Zhongtong also wrote a poem to mark his meeting with Xue Fengzuo and their common apprenticeship to Smogulencki. See *Peishi*, j.1, p.6a.

(Section on Sine) in the Main Portion,⁵¹ Xue Fengzuo told us that this work had first been carved on printing blocks, and then, during the project of integration, he revised it by converting the numerical system in the book from the Western system (sexagesimal system) into Chinese system (a combination of decimal and centesimal systems).⁵² The same revision can also be seen in the existing copies of the *Suan sanjiao fa* and the *Bili sixian biao*.⁵³ This means that, during his compilation and publication of the *Lixue huitong*, Xue Fengzuo actually revised and re-carved some of the works he and Smogulecki completed in 1652 and 1653. Therefore, it is justifiable to ask what are his revisions and changes to the original edition of the *Tianbu zhenyuan*.

Since all chapters in the existing copies of the *Lixue huitong* bearing the general title *Tianbu zhenyuan*, or in a few cases the *Xin xifa xuanyao*, are obviously adapted from the *Tianbu zhenyuan*, we can reconstruct a table of contents of the book (Table 2, the chapter numbers in the first column are my additions).

Table 2 Reconstructed Table of Contents of the *Tianbu zhengyuan*

No.	Title of the volume	English translation
1	Linian jiazi 曆年甲子	Sexagesimal names of calendar years
2	Taiyang taiyin bu 太陽太陰部	Section on the sun and the moon
3	Riyueshi yuanli 日月食原理	Principles of lunar and solar eclipses
4	Wuxing jingwei bu 五星經緯部	Section on the longitudes and latitudes of the five planets
5	Biaoshang mengqiu 表上蒙求	Explanation of the tables one
6	Biaozhong mengqiu 表中蒙求	Explanation of the tables two
7	Biaoxia mengqiu 表下蒙求	Explanation of the tables three
8	Biaoshang 表上	Tables one
9	Biaozhong 表中	Tables two
10	Biaoxia 表下	Tables three
11	Jingxing bu	Section on the fixed stars

⁵¹ The actually content of this treatise is the *Sanjiao baxian biao* 三角八線表 (Table of the Eight Trigonometric Lines), dealing with the calculation of the table of sine. The *Lixue huitong* contains two versions of the same treatise, one in the Main Portion and the other in the *Xin xifa xuanyao*. The former version contains a lot of notes by Xue Fengzuo which is absent from the latter. In addition, their prefaces also differ from each other.

⁵² “Zhengxian bu xu” 正弦部叙 (Preface to *Section on Sine*) in the Main Portion of the *Lixue huitong*. For Xue Fengzuo’s conversion of the numerical system, see Appendix III below.

⁵³ For a detail discussion of these revisions, see Appendix III below.

	經星部	
12	Lifa bu 曆法部	Section on calendrical methods
13	Weixing xingqing bu 緯星性情部	Section on the properties of the planets
14	Shijie bu 世界部	Section on the world (on meteorological astrology)
15	Xuanze bu 選擇部	Section on selection (on selection of auspicious dates)
16	Renmin bu 人命部上卷	Section on human fate, chapter one (on natal astrology)
17	Renmin bu 人命部中卷	Section on human fate, chapter two
18	Renmin bu 人命部下卷	Section on human fate, chapter three
19	Lülü 律呂	Music harmonics
20	Zhengxian bu 正弦部	Section on sine

At this moment, we still do not know whether the original version contains more contents than this, but it is highly possible that both the *Bili duishu biao* and *Bili sixian biao* were originally published as a part of the *Tianbu zhenyuan*, because when the famous late Ming and early Qing scholar Fang Yizhi 方以智 (1611-1671)⁵⁴ talked about trigonometric logarithms, he referred his readers to the *Tianbu zhenyuan*.⁵⁵

From an examination of the imprints of the chapters listed in Table 2, we can find a very important fact, i.e. most of the chapters of the *Xin xifa xuanyao* (Nos. 4-5, and 8-18) in the existing copies of the *Lixue huitong* were obviously printed with the same set of printing blocks of an independent edition of the *Tianbu zhenyuan*. The evidence includes:

- (1) As far as the printing style is concerned, they are all printed in *fangsong ti* 仿宋體 (quasi-Song script) and the page frame is 20.6cm × 12.3cm without vertical grids, while other texts in the *Lixue huitong* are printed in *songti* 宋體 (Song script), and the page frame is 19.6cm × 12.3cm with vertical grids.
- (2) The general title “*Tianbu zhenyuan*” still occurs on the first page of every chapter. The same title also remains in the title line in the tables of contents before each chapter of Nos. 2, 4 and 8-15. On the first page of each of the major chapters such as chapters Nos. 2, 3, 12, 14, 15 and 18, we can still find the bylines bearing the names of both Smogulecki and Xue Fengzuo, such as *Daxi Mu Nige zhuan*, *Haidai Xue Fengzuo ji* 大西穆尼閣撰, 海岱薛鳳祚輯 (composed by Mu Nige from the Great West, compiled by Xue Fengzuo from the Grand Mountain by the Sea) as in the astronomical part, and *Daxi Mu Nige kouyi*, *Haidai Xue Fengzuo Yifu bianji* 大西穆

⁵⁴ For Fang Yizhi, see Peterson (1975) and (1979), Ren Daobin (1983), Zhang Yongtang (1986), Fung Kam-wing (1989) and Luo Chi (1998).

⁵⁵ *Tongya*, chapt.11, p.39a.

尼閣口譯，海岱薛鳳祚儀甫輯 (orally translated by Mu Nige from the Great West, compiled by Xue Fengzuo Yifu⁵⁶ from the Grand Mountain by the Sea) as in the astrological part.

- (3) Most importantly, in a copy of the *Lixue huitong* (No.VII in Table 1), there is even a title page that is definitely a remnant from the printing blocks of an independent edition of the *Tianbu zhenyuan* (Fig. 3).

The title page in Fig. 3 not only indicates that the complete title of the independent edition is actually *Tianbu zhenyuan congshu* 天步真原叢書 (Collectanea of the True Principal of the Pacing of the Heavens) rather than *Tianbu zhenyuan*, but also reveals the date of the independent edition, i.e. the third year of Kangxi reign-period (28 Jan. 1664 - 14 Feb. 1665), which should have been the second independent edition of the book. However, according to the common practice with regard to printing blocks in ancient China, it is reasonable to think that Xue Fengzuo did not have the whole book re-carved now that it had been carved on blocks not long before. In other words, the printing blocks of these parts of the *Tianbu zhenyuan* came directly from the original edition of the book, and therefore reflect the state of that edition. This point is also supported by the fact that the original title *Tianbu zhenyuan*, rather than *Tianbu zhenyuan congshu*, still remains in the most of the *Tianbu zhenyuan* related chapters in the existing copies of the *Lixue huitong*.

Figure 3: The cover page of the *Tianbu zhenyuan*



(From copy No.VII in Table 1)

Nos.4, 6, 7 and 13, as well as the table of contents before No.3, are also in the same printing style as Nos.2, 4-5, and 8-18, but they bear a different general title, i.e. *Tianxue huitong · Xin xifa xuan(yao)* 天學會通 · 新西法選 (要) (Integration of the Studies of the Heavens · Digest of the New Western Method). Obviously, the printing blocks of these chapters came from the *Tianxue huitong*. There are other chapters in the existing copies of the *Lixue huitong* which bear the same general title, but their printing style is similar to other parts of the *Lixue huitong*, i.e. in *Songti*, and with bigger page frame and vertical grids. These chapters include the *Rishi zhufa yitong* 日食諸法異同 (Similarities and Dissimilarities of

⁵⁶ Xue Fengzuo is styled Yifu 儀甫.

Various Calculating Methods of the Solar Eclipse)⁵⁷ in the Main Portion, the five chapters of the *Jin xifa xuanyao* in the Portion on Test, and the *Xifa yiyao* 西法醫藥部 (Section on Western Medicine) in the Portion on Applications. Their printing blocks are arguably the remnants from the *Tianxue huitong* as well.

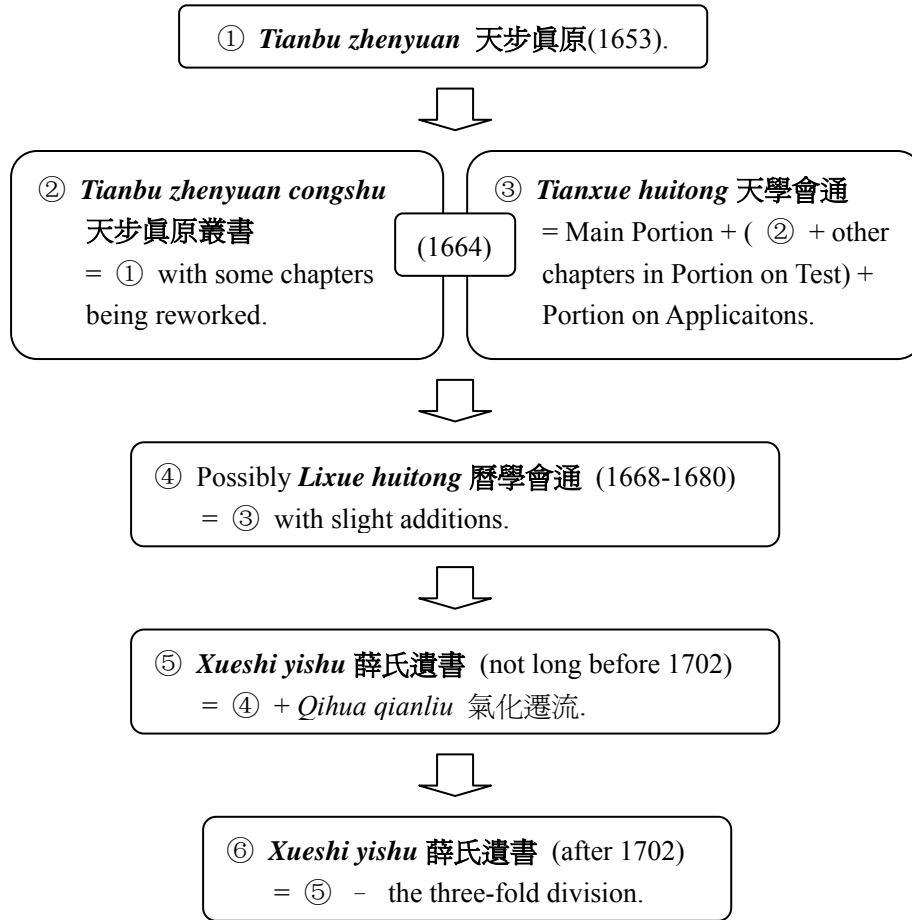
Apparently, by “deleting the superfluous and complicated parts” of the *Tianbu zhenyuan*, Xue Fengzuo did not mean that he rewrote the whole book. What he actually did was presumably to rewrite only a few chapters of the book. In other words, it is very likely that the chapters bearing the title “*Tianxue huitong · Xinxifa xuanyao*” belong to his rework, while the chapters bearing the general title “*Tianbu zhenyuan*” are imprints of the original blocks of the book. If this is true, then two new questions follow up, i.e. why Xue Fengzuo decided to rewrite these parts and to what degree these reworked texts differ from their original versions. These questions are of interest particularly because, as one of these possible reworks, chapter No.4 is devoted to the theory of the five planets where heliocentric models are adopted in Lansberge’s original work.

Imaginably, after the manuscript of the *Tianxue huitong*, including the rewritten part of the *Tianbu zhenyuan*, was basically ready, Xue Fengzuo picked out the printing blocks to be replaced, and delivered the rest blocks together with the new manuscript to the carver’s workshop, so that the remained blocks could be reused in printing. Soon, however, he decided that the *Tianbu zhenyuan* should also be reprinted in a new edition, therefore he asked the carvers to prepare a new title page and not to change the original title on those reusable blocks so that they could be used simultaneously for the new independent edition of the book. All these blocks were obviously kept and used without substantial change in all later editions of the *Lixue huitong*.

In conclusion, the first edition of the *Tianbu zhenyuan* was carved on blocks in about 1653, and the second edition followed ten years later both as a part in the Portion on Test of the *Tianxue huitong* and as an independent book, of which only a few chapters were probably reworked by Xue Fengzuo. This new edition kept without substantial change in all later editions of Xue Fengzuo’s tripartite collectanea. The early history of the book together with the Xue Fengzuo’s collectanea can be summarized graphically as in Chart 1.

Chart 1 The editions of the *Tianbu zhenyuan* and *Lixue huitong*

⁵⁷ The methods under comparison include Xue Fengzuo’s own method as suggested in the Main Portion and the methods of the four systems of calendrical astronomy contained in the Portion on Test.



3. The Context and Production

From Table 2 it is clear that, except the two treatises on musical harmonics (律呂, *Lǜlǜ*)⁵⁸ and trigonometry (*Zhengxian bu*), the contents of the *Tianbu zhenyuan* falls basically in two categories. The first category (Nos.1-12) is on calendrical astronomy, which is an adaptation of Lansberge’s works, dealing with the positional calculation of the sun, the moon and the five major planets, as well as the prediction of both solar and lunar eclipses.⁵⁹ The second category (Nos. 13-16), on the other hand, is about astrology, including meteorological, natal and selectional astrology, which is adapted primarily from Girolamo Cardano’s *in Cl. Pelusiensi IIII de Astrorum Iudicijs, ... Pretera Geniturarum XII ...*.⁶⁰ Since astronomy was both a field interesting to Smogulecki from his adolescence⁶¹ and a concern of many Chinese

⁵⁸ In fact, these two treatises belong to traditional Chinese knowledge and have nothing to do with Western learning at all, although they are co-authored by Smogulecki and Xue Fengzuo. In traditional China, musical harmonics was deemed to be related to the calendrical studies.

⁵⁹ See Appendix I.

⁶⁰ Standaert (2001a).

⁶¹ At the age of sixteen, Smogulecki co-authored with Georg Schönberge a book on astronomy entitled *Sol Illustratus ac Propunhatus* (Freiburg, 1626). Although the book was written for religious purpose, it still shows

scholars such as Xue Fengzuo in late Ming and Early Qing period, it is quite easy to understand why he taught Western astronomy to his Chinese disciples. But why did he also introduce Western astrology so systematically to them?

Among Chinese literati in the early Qing period, Smogulecki was known as a “sincere gentleman” who “is willing to discuss mathematics with scholars but does not make them join in his church”.⁶² For Xue Fengzuo, whose former master Wei Wenkui was one of the most stubborn adversaries against Western astronomy, this might have been a very important reason for his choosing of Smogulecki as his new mentor. But there was one more powerful motive behind this decision, i.e. his ambitious plan to fulfill the two projects proposed by Xu Guangqi, as we mentioned earlier in this paper. Needless to say, the first step was to study Western knowledge necessary for the projects but impossible to acquire from Wei Wenkui.

Undoubtedly, calendrical astronomy and related mathematical knowledge was the main concern of Xue Fengzuo when he decided to turn to a missionary from Europe, but his goal was apparently not limited to that. Among a variety of other subjects such as musical harmonics and firearms, astrology was also a major topic he hoped to learn, because he looked upon *zhanhou* 占候 (astrology) as a very important branch of the so-called *lixue* 曆學 (calendrical studies) and believed:

“The Xi and He families (羲和氏) investigated the Seven Governors (*qizheng* 七政)⁶³ through calendrical phenomena (*lixiang* 曆象) and made prognostications with them. Therefore, it is an old tradition that the calendrical studies include astrology (*zhanhou* 占候).”⁶⁴

It seems that Xue Fengzuo already began his study of astrology when he was a student of Wei Wenkui. In the Portion on Applications of the *Lixue huitong*, we can find a work on astrology by Wei Wenkui entitled *Xianxiang tongzhan* 賢相通占 (General Astrology of the Virtuous Premier),⁶⁵ which is probably what Xue Fengzuo learnt from his Chinese master. Talking about his cooperation with Smogulecki in translating Western astrology, Xue Fengzuo recalled:

“The old [astrological] method of the five planets originated from Qincha 欽察,⁶⁶ but its contents handed down is very brief ... I studied various books [on it] but eventually was not able to gain a certainty in heart. Thinking to myself that the method was transmitted from the Western areas, I [therefore] began to read the Western astrological method translated by the scholar-official Wu Bozong 吳伯宗 in the year *guihai* of the Hongwu reign-period [3 Feb. 1383 – 22 Jan. 1384]. The book seems to be a little

the good familiarity of the authors with the contemporaneous developments in mathematical astronomy. See Standaert (2001a)

⁶² *Wu'an lisuan shuji*, pp.44b-46a.

⁶³ The sun, the moon, Mercury, Venus, Mars, Jupiter and Saturn.

⁶⁴ “Zhongfa zhanyan xu” 中法占驗敘 (Preface to Chinese Methods of Astrology) in the Portion on Applications of the *Lixue huitong*.

⁶⁵ The work is signed as being compiled (*ji* 輯) by Wei Wenkui and redacted (*ding* 訂) by Xue Fengzuo.

⁶⁶ The Mongolian Kingdom founded by the eldest son of Genghis khan in 1219.

more complete, but the divisions of the twelve zodiac signs [in it] are irregularly unequal, for which the reason is not disclosed yet. I have long sought for its explanation without realizing that the subtle essence lies right on this point. The year *renchen* [9 Feb. 1652 – 28 Jan. 1653], I came to Baixia 白下 [i.e. Nanjing]. While staying in leisure with the Western Confucian Mr. Mu [Nige], we discoursed, translated and thoroughly investigated [Western astrology], and I finally understood its principles with my dull mind.”⁶⁷

This means that Xue Fengzuo’s study of Western astrology was not a passive behavior after his meeting with Smogulecki at all, but a continuation of his long pursuit and a part of his original plan for the apprenticeship with Smogulencki. Moreover, it seems that after the completion of the *Lixue huitong*, Xue Fengzuo’s main focus in “calendrical studies” turned entirely onto astrology, and most of the existing texts on astrology contained in his *Qihua qianliu*, such as the “Tumu xianghui”, “Yuzhou dayun” and “Taiyang ji wuxing gaoxing guojie” etc., were composed in this later period, as the dates of their prefaces indicate.⁶⁸ In the spring of the twelfth year of Kangxi reign-period (17 Feb.– 15 May 1673), he was invited to compile the “Tianwen fengye” 天文分野 (astrological field allocation) part of the *Sangdong tongzhi* 山東通志 (General Annals of Shangdong).⁶⁹

Besides Xue Fengzuo, another major disciple of Smogulecki in Nanjing Fang Zhongtong turned out to be an enthusiastic student of astrology as well. Talking about the reason of his apprenticeship with Smogulecki, Fang Zhongtong told us:

“I have been liking the works of the masters of the three cosmic boards (*sanshi* 三式)⁷⁰ ever since my childhood, and my father [i.e. Fang Yizhi] thus asked me to expert on Diagrams and Numbers (*xiangshu* 象數). Therefore, I began to stay with Mr. Mu [Nige] to study multiply, division and calendrical calculations, and roughly understand the general idea.”⁷¹

Bearing these in mind, we can understand why Smogulecki ever taught and translated Western astrology in China: as a “sincere gentleman”, what else could he do when his Chinese disciples had so great interest in the subject? However, he might have another intention in doing this as well. Probably, by the teach and translation of Western astrology he was trying to prepare a complete version of the “studies of the heavens” for the needs of the entire Bureau of Astronomy in their conventional duties, i.e. (1) a system of calendrical astronomy which could be used both in the compilation of the annually issued civil calendars and in the prediction of the portentous phenomena such as the luni-solar eclipses, and (2) a system of astrology which could be used in various prognostications.

In fact, Smogulecki was not the first one who tried to introduce Western astrology into China. As I just mentioned above, in the beginning of the compilation of the *Chongzhen lishi*,

⁶⁷ “*Renming xu*” 人命敘 (Introduction to the Natal Astrology) in the Portion on Test of the *Lixue huitong*.

⁶⁸ See footnote 33 above.

⁶⁹ Zhang Huasong (2004).

⁷⁰ For a discussion of this kind of astrology, see Ho Pengyok (2003), 5-8.

⁷¹ *Peigu*, chapt. 2, p.15a-19a.

Xu Guangqi already included meteorological and medical astrology in his project of “the extension of the mathematical studies to ten relevant fields”. Eight years later in November 1637, when Li Tianjing 李天經 (1579-1659),⁷² the successor of Xu Guangqi as the director of the astronomical reform and the compilation of the *Chongzhen lishu*, contributed a newly constructed globe of stars to the throne, the emperor showed very high interest in the new constellations in the southern hemisphere and inquired about their astrological meanings. In the wake of this, Li Tianjing reported a few days later that he was “leading the two far-coming subjects Luo Yagu 羅雅谷 [i.e. Rho] and Tang Ruowang 湯若望 [i.e. Schall von Bell] to compile in detail the astrological portents and effects of each constellation into a book called *Tianwen shiyong* 天文實用 (Pragmatic Use of Celestial Patterns) and will submit it progressively for the imperial inspection.”⁷³ Then shortly after the Western system of celandrical astronomy contained in the *Chongzhen lishu* was officially adopted by the Qing dynasty, Schall von Bell also began his attempt to reform not only the astrological notes in the civil calendars,⁷⁴ but also the routine astrological interpretations of the daily observed omens, because the Chinese astrological knowledge used in both activities were deemed superstitions by most of Catholic missionaries in China. Therefore, he memorialized the throne on 2 December 1645 that “there is in Europe a book on astrology entitled *Tianwen shiyong*, of which the first chapter has been translated into Chinese, but which your subjects have not got time to discuss and study.” He then asked for permission “to continue the translation so that the civil calendars could be noted with the new method of the [*Tianwen*] *shiyong*” on the one hand, while the daily observed omens “would be interpreted with the book and reported humbly [to the throne] for the sagely judgement”⁷⁵ on the other. Considering the controversy among the Catholic missionaries on China mission regarding Schall von Bell’s involvement in astrological activities at the Bureau of Astronomy⁷⁶ and the alleged close relationship between Smogulecki and Schall von Bell,⁷⁷ it is reasonable to think that Smogulecki knew well of the possible need of Western astrology at the court, and his own work in this direction was inspired by the foresaid moves of the Jesuit astronomers and their Chinese followers.

We do not know whether and to what degree, if any, Smogulecki was directly involved in Schall von Bell’s effort in astrological reform at the court, but very interestingly, some early Qing scholars did connect him to the *Tianwen shiyong*.⁷⁸ For example, while

⁷² For Li Tianjing, see Huang Yinong (2005), pp.97-98.

⁷³ *Xiyang xinfa lishu*, yuanqi, chapt. 6, p.34a.

⁷⁴ Huang Yinong (1996).

⁷⁵ *Xiyang xinfa xuanshu*, “zhoushu” 奏疏 (memorials), pp.48b-49a.

⁷⁶ Huang Yilong (1996).

⁷⁷ Vāth (1991), p.167.

⁷⁸ In fact, the *Tianwen shiyong* was published and became quite well known in the early Qing period. For example, the famous early Qing astronomer Wang Xichan 王錫闡 (1628-1682) knew the book and once asked his friend to buy a copy from Beijing (*Xiao’an xiansheng wenji*, chapt.2, p. 29a). Mei Wending was a critic of astrology in general, but he cited the *Tianwen shiyong* in his discussion of the epoch and the division of constellations in his *Lisuan quanshu* (chapt.1, pp.25b-26a and chapt.19, pp.45a-46a). He even discovered the similarity between the book and the *Xiyu tianwenshu* 西域天文書 (Book on Celestial Patterns from Western Areas), an astrological book translated from Islamic sources in the early Ming dynasty (*Wu’an lisuan shuji*, p.13b). Another famous scholar of the early Qing period, Liu Xianting 劉獻庭 (1648-1695), mentioned that one of his friends had a pseudograph on astrology entitled *Xingwu* 星悟 (Astral Consciousness), which combined the astrological knowledge from the *Tianwen shiyong* with the doctrine of *Wuxing* 五行 and Islamic astrology (*Guangyang zaji*, chapt. 2, pp. 27ab). For the *Xiyu tianwenshu*, see Appendix 1 of Yano (1997).

commenting on the verse “*yuezhi congxing, ze yi fengyu*” 月之從星，則以風雨 (when the moon follows the stars, there will be wind and rain) from chapter “Hongfan” 洪範 (Great Plan) of the *Shangshu* 尚書 (Books on the Documents), the famous early Qing Confucian exegete Yan Ruoju 閻若璩 (1636-1704) cited the *Tianwen shiyong* and attributed it to Smogulecki:

“In recent years the Westerner Mu Nige composed the treatise *Tianwen shiyong*, which concentrates on forecasting wind and rain in every direction. His method takes the moon as the dominant factor. When the five planets are opposite or close to it, wind and rain will arise. This means that the moon also follows the five planets, not just getting close to the fixed stars. This point has been verified one time after another without any exception. The supreme principle does not have discordance between the Chinese and foreigners, while the abstruse meanings only gradually become explicit after thousands of years.”⁷⁹

This comments was entirely quoted by Hu Wei 胡渭 (1633-1714) in his commentaries on chapter “Hongfan”, where he suggested that Smogulecki’s method was originated in China:

“The divination method of Mu Nige comes probably from what Confucius said in antiquity, i.e. ‘after the Son of the Heaven lost its organs, the learning spread into four barbarians’ (*tianzi shiguan, xue zai siyi* 天子失官，學在四夷), and therefore we can not treat it as the alien only because it is Western learning.”⁸⁰

As far as astronomy is concerned, Smogulecki could have chosen to teach both Xue Fengzuo and Fang Zhongtong the Tyconic system as contained in the *Chongzhen lishu*, but he did not. Apparently, he intended to preach something different among his Chinese disciples, which reveals the existence of a disagreement between him and Schall von Bell in astronomy, although they are said to be good friends.⁸¹ While Schall von Bell was an exponent and introducer of Tyconic astronomy in China, Smogulecki was in fact more influenced by the Copernican astronomer Philippe van Lansberge, not only by his mathematical astronomy and his confidence in this astronomy, but also by his criticism of Tyconic astronomy. As a devoted Copernican astronomer, Lansberge not only defended the heliocentricity of the universe, but also assumed the exactitude of all the ancient observations and claimed that his own theories and tables fitted them all. For this reason, he called his theories *novae et genuinae* (new and true) and his tables *perpetuae* (perpetual), or *ex omnium temporum observationibus constructae, temporumque omnium observationibus consentientes* (constructed from the observations of all times, and conforming to the observations of all times). This, together with a variety of other issues, including his defense of the heliocentrism, involved him and his student inevitably in the polemic against the so-called

⁷⁹ *Shangshu guwen shuzheng*, Chapt.6a, p.28b.

⁸⁰ *Hongfan zhenglun*, chapt.5, pp.44ab.

⁸¹ Vāth (1991), p.167.

“Tychonici”, i.e. Tycho and his followers, even including Kepler, which in turn gave rise to a long-lasting controversy among astronomers in Europe.⁸² In one decade or so immediately after the publication of his theories and tables in 1732, Lansberge became an influential astronomer in Europe and his tables were the most serious rival of Kepler’s *Rudolphine Tables*, although they were gradually proved to be inferior to the latter afterwards.

During this period, Smogulecki was still in Europe because he did not embark to China until 1644. From his astronomical work in China, it is clear that he obviously had a good knowledge of and thus became a sympathizer of Lansbergian astronomy, though at the same time he was also responsible for the first importation of Kepler’s *Tabulae Rudolphinae*, a product of the Tyconic school in the eyes of Lansberge and his followers, into inland China.⁸³ As a remote echo to Lansberge’s self-confidence and his polemic against Tyconic astronomy, Smogulecki not only adapted Lansberge’s astronomy into Chinese, but also entitled the Chinese version as *zhenyuan* (真原, true principles), though he did not disclose the name of its real author.⁸⁴ He even did not hide his criticism of Tycho and the Chinese version of Tyconic astronomy contained in the *Chongzhen lishu*, although he still kept some respectful words on Schall von Bell and Rho, the “Tychonici” in China. This is clear from Xue Fengzuo’s comments:

“At the time when the Current Western Method *Shixian* 時憲⁸⁵ was just completed, the superintendents of the project claimed that its measurements and calculations conformed to the observed celestial motions up there, and that its discourses and written theories exhausted human intelligence down here. Yet the insightful Western Confucian (*xiru* 西儒) still points out a variety of its shortcomings. Generally, to initiate something new is really difficult. When they established the methods and prepared the instruments from where there was no method, how could they achieve perfection in every aspect? Just like climbing the Grand Mountain (*Taishan* 泰山), who can reach the peak with one stride without accumulating small steps? The New Western Method is taught by the Western Confucian Mu Nige, who changes into new models and applies his wise thinking. His tables of the Seven Governors are freshly clear and succinctly profound, free of the complexity and the overloaded details of the old tables [in the *Shixian*]. The logarithms of the eight [trigonometric] lines are subtle and wonderful, easy and simple, being free of the pain of multiplication and division. These are not special creations, but only concern the selection between easiness and simplicity, fineness and clumsiness, which might be done slowly. As to the additive and reductive

⁸² For Lansberge’s defense of heliocentrism against Tycho Brahe, see Vermij (2002), p.86-87. For the controversy in mathematical astronomy aroused by Lansberge’s polemic against Tycho Brahe, see Wilson (1989).

⁸³ Szczesniak (1943) and (1949).

⁸⁴ To Xue Fengzuo, the author of the New Western Method was Smogulecki, as he believed that the “New Western Method comes from the Western Confucian Mu Nige” and sometimes calls it “Nige’s new procedures” (*nige xinshu* 尼閣新術). See “*Xin xifa xuanyao xu*” and “*Jin xifa xuanyao xu*” in the Portion on Test of the *Lixue huitong*.

⁸⁵ The *Shixian* (Time modeling) here obviously denotes the Tyconic system contained in the *Chongzheng lishu*, rather than the civil calendar of the Qing dynasty.

corrections of the vernal equinox and the adding corrections of the sun within each zodiac sign, they have never been mentioned previously in any book and literature. In addition, the old tables of the moon and Mars are irregularly incoherence, [the theory of] Mars lacks the [consideration of] the southern latitudes and the additive correction with respect to the sun, [the theory of] Venus lacks the [calculation of the] orbital node but just takes the apogee plus sixteen degrees as a substitution, [the calculation of] the appearance and disappearance of Mercury does not conform [to the Heaven], and the apogee of Mercury is directly taken as its orbital node. All of these are serious defects. Therefore, the Western Confucian comments that the Current Western Method is introduced from Tycho, who was actually a second-rate astronomer and whose method has not been imported to China in a complete version. How deeply correct this comment is!”⁸⁶

Needless to say, Xue Fengzuo’s “Western Confucian” here refers to Smogulecki, who was understandably the actual source of Xue Fengzuo’s comments on the “Current Western Method” as well as his knowledge of its “serious defects”. Undoubtedly, these “defects” were judged with the criteria of Lansberge’s astronomy. For example, “the additive and reductive corrections of the vernal equinox” (*chunfen jiajian* 春分加減) was actually a major issue that opposed Lansberge to the “Tychonici”.⁸⁷

In addition to his criticism of Tycho and Tychonic astronomy, Smogulecki even could not help himself in teaching, though in a very ambiguous way, that “the earth also has displacement (*diyi youyou* 地亦有遊)”.⁸⁸ Sometimes, he even could not restrain himself from giving negative comments on Schall von Bell’s capability in astronomy, as can be seen from Fang Yizhi’s report:

“As to the doctrine regarding the Mercury’s circling the sun, the Revered Mister Mu [i.e. Smogulecki] says: ‘Daowei 道未 [i.e. Schall von Bell]⁸⁹ has not been versed in it. A scholar in my country spent his whole life on understanding Mercury. Venus and Mercury adhere to the sun, just like circlets haloing the sun.’”⁹⁰

In short, all that Smogulecki did actually formed a Chinese version of Lansberge’s campaign against Tychonic astronomy, although he did not expose his cosmological commitment more explicitly in a written form. His real attitude toward heliocentrism keeps hazy, but his stance in mathematical astronomy is quite clear, i.e. he belonged to the Copernican school represented by Lansberge and actually exposed the divergence between Tychonic and Copernican astronomy to a Chinese audience. In this sense, we can say that he was a

⁸⁶ “*Xin xifa xuanyao xu*” in the Portion on Test of the *Lixue huitong*.

⁸⁷ Curtis (1989), pp. 164-165.

⁸⁸ *Wuli xiaozhi*, chapt.1, p.36b. In a note to the same book (chapt. 2, p.32a), Fang Zhongtong also mentioned that “Mr. Mu also has the doctrine of the displacement of the earth” (*Mu Xiansheng yiyou diyong zhishuo*, 穆先生亦有地遊之說).

⁸⁹ Schall von Bell is styled Daowei 道未 in Chinese.

⁹⁰ *Wuli xiaozhi* (1983), chapt.1, p.31a.

Copernican in China.

If there was anything else in late Ming and early Qing dynasties which could have strengthened Smogulecki's adherence to Lansberge's astronomy, that might have been the Jesuit awareness of the inexactitude of Tyconic astronomy in some cases. In fact, even before the beginning of the compilation of the *Chongzhen lishu*, Jesuit astronomers in China already knew that Tyconic system was not a perfect selection for them. That was why Schreck wrote in 1621 from China to his friend in Europe that "Tycho has something good, but at times he errs by a quarter of an hour", and tried to seek help from Galileo and Kepler in order to obtain better methods for the possible use in the prospective astronomical reform in China.⁹¹ Although the *Chongzhen lishu* was eventually based on Tyconic astronomy, the worry on the problem was still lingering among the Jesuit missionaries in China up to 1669 and 1670, as can be seen in the letters of Adrien Greslon (1618-1696) and Christian W. Herdtrich (1625-1684), where similar anxiety is expressed.⁹² As a Jesuit missionary in China expert in astronomy, Smogulecki understandably had a very clear concept on this issue. Maybe that was the reason why he selected to teach his Chinese disciples a different system that he deemed better than the one contained in the *Chongzhen lishu*. Maybe he believed that this new system could become a remedial substitute for the latter.

No matter what Smogulecki's real intention was, Xue Fengzuo became totally convinced by his comments on Tycho and his astronomy, and believed that the system taught by Smogulecki was more advanced than what Schall von Bell contributed to the Qing government. He not only called Smogulecki's system the "New Western Method", but also relied almost solely on it in his ambitious project intended to establish a system of calendrical astronomy which integrated, and thus naturally excelled in his opinion, all the existing systems, both Western and Chinese, old and new. Although he claimed that eight or nine tenths of the essential contents in his integrated system "are taken from the *Shoushi[li]* and the *Tianbu zhenyuan*, whereas both Chinese-Islamic [*Huihuili*] and European [*Chongzhen lishu*] systems are occasionally drawn on as supplements",⁹³ a quick scan of the system betrays that it is actually a whole-scale transplantation of the system contained in the *Tianbu zhenyuan*, whereas the other three systems are only cited from time to time for reference interest. Only one thing in his integrated system does not belong to the *Tianbu zhenyuan*, i.e. the adoption of the decimal system for the expression of ordinary amounts and the centesimal system for the expression of the magnitude of angles less than one degree, which in his opinion belongs to Chinese method.⁹⁴

Most importantly, armed with Smogulecki's New Western Method and his low opinion on Tycho's astronomy, Xue Fengzuo began to launch a more explicit criticism against the system in the *Chongzhen lishu*, or the Current Western Method in his own words, although he still admitted that it was once a good system. In the beginning of the Main Portion of the *Lixue huitong*, he pointed out:

"As to the Current Western Method, the far-Westerners Tang 湯 [i.e. Schall von

⁹¹ D'Elia (1960), pp. 28-33.

⁹² Golvers (1993), pp. 221 and 245-246.

⁹³ "Zhengji xu" 正集叙 (Preface to Main Portion) in the Main Portion of the *Lixue huitong*.

⁹⁴ For Xue Fengzuo's adoption of these numeral systems see Appendix III.

Bell] and Luo 羅 [i.e. Rho] have enunciated its abstruse spirits. Its principles are very subtle and its numbers very delicate, but it still contains open problems. The method was created by the Western Confucian Tycho, whom Western scholars called a famous expert only in the study of the fixed stars, but whose work in other subjects such as the eclipses was not held in esteem in Western calendrical astronomy. Moreover, he lived fifty or sixty years ago, and his method still contains defects. Recently comes [Mu] Nige's 尼閣 method, which I have already translated as the *Tianbu zhenyuan*, where a variety of Tycho's shortcomings have been discussed.”⁹⁵

He went even further as to challenge the position of the Current Western Method as official calendrical astronomy by openly claiming:

“Now the New Western Method comes in addition and the New Western Method from the Great West has been integrated with Chinese methods. This method [i.e. the Current Western Method] has reached the time of having accomplished its functions and being ready to retire.”⁹⁶

In other words, the Tychonic system should be removed from official system of calendrical astronomy, and the New Western Method, or more preferably his integrated system, should be adopted in place of it.

It is noteworthy that the *Tianxue huitong* was carved on printing blocks right in the same year when Yang Guanxian 楊光先 stirred up the “calendar lawsuit”.⁹⁷ In the meantime, Xue Fengzuo also had the *Tianbu zhenyuan* reprinted and added to it a new cover page. It seems that the concurrence of all these events was not just a simple coincidence. Maybe, Xue Fengzuo was trying to express his response to the lawsuit with the two sets of books, which in his opinion contains two systems of calendrical astronomy better than the Current Western Method that was then under attack and was abolished from the official institution.

4. Responses and Reception⁹⁸

Xue Fengzuo's role in the transmission and reception of the *Tianbu zhenyuan* is a little complicated. On the one hand, as a student of Smogulecki and a scholar who wanted to integrate Chinese and Western calendrical studies, he was a receiver of the book and therefore his opinion and treatment of the book reflects Chinese reception of the book. On the other hand, however, he was also a co-producer and a transmitter of the book. Through the

⁹⁵ “Xifa huitong canding shiyi ze” 西法會通參訂十一則 (Eleven Items Concerning the Integration of the Western Method) in the outset of the Main Portion of the *Lixue huitong*.

⁹⁶ The revised version of the same preface reads, “Now the *Tianbu zhenyuan* comes in addition, and the ‘true principle’ method from the Great West has been integrated with Chinese methods. This method [i.e. the Current Western Method] has accomplished its functions and will retire indeed.” See “*Jin xifa xuanyao xu*” in the Portion on Test of the *Lixue huitong*.

⁹⁷ For Yang Guangxian and the law suite see Chu Ping-Yi (1997) and Zhang Dawei (1998).

⁹⁸ Since the reception of the astrological part of the *Tianbu zhenyuan* has been well treated by Standaert (2001a), this part will focus exclusively on astronomical side.

compilation and publication of the *Tianbu zhenyuan* and its integration with Chinese methods, he actually formed a joint force with Smogulecki challenging the officially adopted Tyconic system in China. Therefore, it will be of interest to see how their effort in this respect was received by other Chinese scholars in the Qing dynasty.

It is now very hard to tell how widely the book, either the book itself or in Xue Fengzuo's integrated version, was disseminated and read in the early Qing dynasty. We can take for sure that Yang Guanxian would not turn his ear to Xue Fengzuo had he really read his works, because Xue Fengzuo was still deemed, in spite all his efforts in integrating Chinese and Western astronomy, a student of Western astronomy,⁹⁹ which Yang Guanxian attempted to thoroughly eradicate from China. But except him, a number of influential intellectuals in this period did know or read the book.

Earlier in this article, I have mentioned Huang Zongxi and Huang Baijia's connection with the *Lixue huitong*.¹⁰⁰ Besides them, another pair of father and son, i.e. Fang Yizhi and his son Fang Zhongtong also deserves our special attention.

As a disciple of Smogulecki, Fang Zhongtong certainly read the book and had a good knowledge about the divergence between Smogulecki and Schall von Bell in astronomy, at least in technical issues. Sometime between 1653 and 1663, he visited the latter in Beijing and discussed astronomy with him. The meeting seems so important to Fang Zhongtong that he even wrote a poem “Yu xiyang Tang Daowei xiansheng lun lifa” 與西洋湯道未先生論曆法 (For Discussing Calendrical Astronomy with Mr. [Johann Adam Schall von Bell](#) from the West Oceans) to mark the event. In the note to the verse “yin'gan xiansheng yi, zhonghuai rixi qing” 因感先生意，中懷日夕傾 (Appreciating the Mister's generosity, day and night I pour out my thinking) in the poem, he explained:

“The Mister [i.e. Schall von Bell] had entered China by the Chongzhen reign-period, and he therefore entitled his system of calendrical astronomy *Chongzhen lishu* 崇禎曆書... The method of Mars I learnt from Mr. Mu [Nige] is the most concise and precise, and we therefore had a checking discussion with each other (*gu xiang zhilun* 故相質論).¹⁰¹

This means that Fang Zhongtong discussed with Schall von Bell the theory of Mars, and from the diction “*rixu*” 日夕 (day and night), it seems that the discussion was not short. Keeping in mind Smogulecki and Xue Fengzuo's criticism of the Martian theory in the Current Western Method,¹⁰² we can see this in a sense as a face to face conversation between a Copernican and a “Tyconicus” in China on this topic, although the conversation apparently had nothing to do with cosmology.

From Fang Zhongtong's preface to Jie Xuan's 揭暄 (1613-1795) *Xuanji yishu* 璇璣遺述 (Remained Discourses on the Heavens), however, Smogulecki's teaching did arouse his interest in some cosmological issues:

⁹⁹ For example, Mei Wending divided Western astronomy into eight schools, and made Smogulecki and Xue Fengzuo representatives of one school. See *Wu'an lisuan shuji*, pp.3a-4b.

¹⁰⁰ Footnotes 42 to 47 above.

¹⁰¹ *Peishi*, j. 2, p.4a. Also see Zhang Yongtang (1987), p.249.

¹⁰² See footnote 86 above.

“Then I visited Mr. Mu Nige’s residence with Xue Yifu and heard his talk that there was someone in his country who spent nearly fifty years on the study of Mercury and was more precise as compared with previous researchers. I therefore had the suspicions on that the Heavens might not be in nine layers, provided that the Venus and Mercury are on circlets haloing the sun; and that Mars, Jupiter and Saturn might retrograde only when they are in opposition to the sun; as well as on why the earth is not so hot now that the sun is said to be one hundred and sixty-five times greater than the earth.”¹⁰³

While discussing astronomy with Jie Xuan, Fang Zhongtong raised these questions to the latter and they eventually co-authored, on the basis of their discussion, a treatise titled *Jie Fang wenda* 揭方問答 (Catechism between Jie Xuan and Fang Yizhi). The treatise itself was lost later, but Jie Xuan apparently incorporated its contents into his *Xuanji yishu*,¹⁰⁴ whence we know that, except the discussion of the foresaid suspicions, they touched upon neither the astronomical divergence among Jesuit astronomers in China nor any sensitive issue in cosmology such as the geo-kinetic doctrine Fang Zhongtong learnt from Smogulecki and mentioned in a note to Fang Yizhi’s *Wuli xiaozhi*.¹⁰⁵

Our previous knowledge about Fang Yizhi’s relationship with Smogulecki and Xue Fengzuo is limited to his quotations of Smogulecki’s geo-kinetic doctrine and his comment on Schall von Bell’s knowledge on Mercury.¹⁰⁶ Recently, however, I have found that he is actually the author of the only preface to the *Tianbu zhenyuan*.¹⁰⁷ In addition, he also spent a common period of time in Nanjing with Smogulecki, Xue Fengzuo and Fang Zhongtong between the spring of 1653 and the autumn of 1655, during which Fang Yizhi, now a Buddhist convert, claimed himself to be in “seclusive cultivation” (*biguan* 閉關) in a temple to avoid the pursuit of the Qing government, but he was actually quite busy in meeting old and new friends.¹⁰⁸ His social circle at the time should understandably include Smogulecki and Xue Fengzuo, who were then the teacher and a fellow-disciple of Fang Zhongtong respectively. Except Mr. Mu (i.e. Smogulecki), Fang Yizhi also mentioned Xue Fengzuo in his works, as can be seen from his quotations of the latter’s opinion on using the conjunction and apogees of Jupiter and Saturn in fate-calculation (*tuiming* 推命),¹⁰⁹ and of his long comments on the shortcomings of Chinese astronomy as compared with Western astronomy.¹¹⁰

Despite being a famous advocator of the “Chinese origin of Western learning” (*Xixue zhongyuan* 西學中源),¹¹¹ Fang Yizhi recognized the superiority of Western astronomy in exact observations and calculations, as can be seen from his preface to the *Tianbu zhenyuan*.

¹⁰³ *Xuanji yishu*, front matters, pp.9b-11a. Also see Zhang Yongtang (1987), pp.246-247.

¹⁰⁴ For Jie Xuan’s cooperation with Fang Zhongtong and the contents of his *Xuanji yishu*, see Shi Yunli (2004).

¹⁰⁵ See footnote 88 above.

¹⁰⁶ See footnotes 88 and 90 above.

¹⁰⁷ See Appendix IV below and Shi Yunli (2006).

¹⁰⁸ Ren Daobin (1983), pp. 182-194 and Luo Chi (1998), p.72.

¹⁰⁹ *Wuli xiaozhi*, chapt.2, p. 49b.

¹¹⁰ *Tongya*, chapt. 11, pp.37b-38b. These comments were quoted by his second son Fang Zhonglü 方中履 in the *Gujin shiyi* 古今釋疑 (Disabusing of Doubts from Ancient to Present Times), chapt.12, pp.13a-14b. For Fang Zhonglü and the *Gujin shiyi*, see Yu Yingshi (1986), pp. 137-166.

¹¹¹ There are vast discussions on this conception. For a historical review of it, see Wang Yangzong (1995).

He even celebrated the achievements of Western astronomers as “a great complementary to the founding of civilization which ancient sages such as Rong Cheng 容成 and Da Nao 大撓 did not accomplish”, and suggested that the Confucian goal of “adopting the sun and stars as the recorders [of the seasons], the moon as the measurer [of months]” was really reached because of the arrival of Western astronomy.¹¹² Fang Yizhi had good relationship with Schall von Bell,¹¹³ and knew the *Chongzhen lishu*.¹¹⁴ But he obviously believed that Smogulecki introduced something more advanced, as can be seen from his quotation of the latter’s negative comments on Schall von Bell’s knowledge of Mercury. In addition, he also saw Smogulecki’s introduction of logarithm as an important improvement in astronomy:

“Then why Western calendar can calculate the planetary longitudes and latitudes more precisely than those of the sun and moon? Their method sets up [trigonometric] lines such as sine, cosine, tangent, cotangent, secant and cosecant, and it also begins to adopt the method of trigonometric logarithms as new means of measurement. See the *Tianbu zhenyuan* for detail.”¹¹⁵

Unfortunately, Fang Yizhi did not leave us more concrete comments on the astronomical system contained in the book.

While Xue Fengzuo was engaged in the compilation and publication of the *Tianbu zhenyuan* and *Lixue huitong* in Nanjing from 1652 to at least 1663, Wang Xiaochan 王錫闡 (1628-1682) was establishing himself into one of the most famous Chinese astronomers of the time.¹¹⁶ In 1668, Wang Xichan first learnt Xue Fengzuo’s name and thus wrote a letter to him, wherein Wang Xichan not only expressed his respect for Xue Fengzuo’s reputation in astronomy and raised some questions for the latter’s opinion, but also expressed a wish to have a copy of his works. Unfortunately, Wang Xichan did not receive any response from Xue Fengzuo in four years, and there is no evidence that he ever acquired any of the latter’s works in the rest of his life.¹¹⁷

Mei Wending was luckier than Wang Xichan in this respect. Although he did not know Xue Fengzuo until 1675 and had no personal contact with him either, he was able to borrow a copy of Xue Fengzuo’s tripartite collection from a friend in Nanjing, copied from it both the Main Portion and the *Tianbu zhenyuan*, and wrote two treatises on them respectively, i.e. the *Tianxue huitong dingzhu* 天學會通訂注 (Emendations and Annotations of the *Tianxue huitong*) and the *Tianbu zhenyuan dingzhu* 天步真原訂注 (Emendations and Annotations of

¹¹² For details of Fang Yizhi’s opinion, see Appendix IV below.

¹¹³ Fang Zhongtong mentioned in the note to his Poem “Yu xiyang Tang Daowei xiansheng lun lifa” that Schall von Bell had “the best relationship with my father” (*yu jiajun jiao zuishan* 與家君交最善). See *Peishi*, chapt.2, p.4a.

¹¹⁴ Fangzhong cited the book in his *Wuli xiaozhi* (chapt.1, pp.29b and 47b). Besides, Fang Yizhi’s father Fang Kongzhao 方孔炤 also read the book and wrote the *Chongzhen lishu yue* 崇禎曆書約 (An Synopsis of the *Chongzhen Reign Treatises on Calendrical Astronomy*), although the treatise turns out not to be a real “synopsis” of the *Chongzhen lishu*. For the content of the *Chongzhen lishu yue*, see the *Tuxiang jibiao* 圖象幾表 (Graphs, Diagrams and Charts), j. 7, pp.1a-30a in the *Zhouyi shilun hebian* 周易時論合編 (An Assembled Compilation of the Current Discourses on the *Zhouyi*).

¹¹⁵ *Tongya*, chapt.11, p.39a.

¹¹⁶ For Wang Xichan and his astronomical works, see Sivin (1976) and Chen Meidong (2000).

¹¹⁷ See *Xiao’an xiansheng wenji*, chapt.2, pp.1a-3a and 28a, as well as Xue Bin (1997).

the *Tianbu zhenyuan*). These two works have long been lost, but Mei Wending's summaries of them still exist:

“The Western Confucian Mu Nige wrote the *Tianbu zhenyuan*, which has both similarities and dissimilarities to the [*Chongzheng*] *lishu*. What appear to be different but actually similar are the diagrams illustrating the procedures of calculation. [The calculating method with] the logarithm table is distinctly different from that in the [*Chongzheng*] *lishu*, but they do not yield different results in calculation, which is what looks different but is actually similar. The root numbers for the corrections of the vernal equinox and the obliquity of the ecliptic are totally different. They are real differences, but their correctness or wrongness cannot be determined without the truth from observations. There are too many errors in the block-carving of the original book so that it is almost unreadable. Therefore, I simply make some emendation and annotation, expecting them to be discussed and determined by future talents...Mr. Xue Fengzuo constructs an integrated system on the basis of the *Tianbu zhenyuan*. He converts the sixty minutes [of arc] into one hundred minutes, following the method of the *Shoushi*[*li*], which is really convenient to use. However, he conducts calculation with logarithm, which in my opinion is not as a proper method as the direct use of multiplication and division.¹¹⁸

It is clear from these comments that Mei Wending noticed the difference between the geometrical models of the planetary motions, or the “diagrams illustrating the procedures of calculation” in his own words, applied in the *Tianbu zhenyuan* and the *Chongzhen lishu*. It seems, however, that he did not really understand the real significance of the difference, but just saw the difference as something superficial, which is obviously a result of his general opinion on the role of geometrical models in astronomy.

According to Mei Wending, “mathematical astronomers use both reality-representative diagrams (*shizhi zhitu* 實指之圖) and suppositional diagrams (*jiexiang zhitu* 借象之圖)” in the description of the heavenly motions. While the former represent the real arrangement of the heavenly bodies, the latter are pure mathematical models facilitating calculations.¹¹⁹ This conclusion was drawn by him from the contradiction in the “Tychoic” models of the five major planets in the *Chongzhen lishu*, where the deferents of Mercury, Venus, Jupiter and Saturn were uniformly centered on the earth, whereas that of Mars was centered on the sun. Mei Wending proved that the two types of model were equivalent to each other, and concluded that Tycho's Martian model was just a “suppositional configuration” (*jiexiang* 借象) which was not different mathematically from the reality-representative diagrams wherein the deferent was centered on the earth.¹²⁰

Apparently, Mei Wending applied the same philosophy to the geometrical models in the *Tianbu zhenyuan*, saw them just as suppositional diagrams, and therefore did not believe that

¹¹⁸ *Wu'an lisuan shuji*, pp.37b-38a.

¹¹⁹ *Lisuan quanshu*, chpat.1, pp.1ab.

¹²⁰ *Lisuan quanshu*, chpat.17, pp.1a-12a, and Appendix 2 of Martzloff (1993-1994).

they had substantial differences from the models in the *Chongzhen lishu*. In fact, he mentioned the *Tianbu zhenyuan* in his discussion of the distinction between the two kinds of diagrams and the “real meaning” of Tycho’s model of Mars, where he actually treated the book as a support for his own argument.¹²¹ In his mind, what made the theories in two books different were neither geometrical models nor mathematical techniques like the use of logarithms, but the elementary constants (“root numbers”) and other corrections. Moreover, as a competent astronomer, Mei Wending did not willing to simply judge the reliability of these new constants and corrections without any “solid” evidence. Rather, he selected to treat their correctness and wrongness as an issue pending to the test of practical observations. In a sense, this can be seen as his response to the superiority of the *Tianbu zhenyuan* claimed by Xue Fengzuo.

Mei Wending wrote quite extensively on Western astronomy, but they are based overwhelmingly on knowledge from the *Chongzhen lishu*. Except the Emendations and Annotations of both the *Tianbu zhenyuan* and Xue Fengzuo’s integrated system, he did nothing more than a couple of brief quotations from these two works. One reason for this unbalanced treatment could be that, while the *Tianbu zhenyuan* and Xue Fengzuo’s integrated system were out of the hands of unofficial astronomers, the system from the *Chongzhen lishu* was the officially promulgated system. But a more fatal reason should be the poor quality of both the *Tianbu zhenyuan* and *Lixue huitong*.

In fact, the two books are not in a good and clear writing-style on the one hand, and are full of printing errors on the other, needless to say that all words that may reveal the true face of Lansberge’s heliocentric and geo-kinetic models are either simply deleted or changed.¹²² Apparently, Mei Wending’s reading of the books was heavily hindered by these defects. Unaware of the distorted interpretation of Lansberge’s models, he attributed all obscurities in the book to the carving errors. The same problem seems to have happened to Huang Zongxi as well, because we can find the following words in his *Lixue jiaru*, where Xue Fengzuo’s Digest of the Current Western Method is adopted for an ememplifying calculation:

“The above is based on the version of Xue Fengzuo from the Grand Mountain by the Sea. I have noticed the errors in both its table-checking-instructions and numbers, and corrected them, so that everybody can understand, [because I] do not have the habit of exposing the tail but hiding the head (*wu cangtou luwei zhixian* 無藏頭露尾之習).”¹²³

This is actually a not so implicit accusation, blaming the errors directly on Xue Fengzuo who had, in Huang Zongxi’s eyes, the bad habit of secreting important techniques through intentionally made mistakes.¹²⁴

¹²¹ *Lisuan quanshu*, chpat.1, p.1b.

¹²² See Appendix I.

¹²³ *Lixue jiaru*, chpat.1, p.323.

¹²⁴ Similar accusation can be found against Muslim astronomers in China as well. For example, many Chinese scholars in early and mid Qing dynasty, including Mei Wending and Ruan Yuan 阮元 (1764—1849), the famous mathematical and astronomical biographer and Confucian exegete of the Qing dynasty, both charged Muslim astronomers with “trickily hiding the root numbers” of the Chinese-Islimic System of Calendrical Astronomy (*Huihui lifa* 回回曆法) in order to “fool the eyes and ears” of their rivals. See Shi Yunli (2003).

Mei Wending complimented Xue Fengzuo's adoption of the centesimal system in place of sexagesimal, but he did not ever use it himself.¹²⁵ However, his low opinion over logarithm did not last long, because later he wrote a treatise on logarithm titled *Bilishu jie* 比例數解 (Explanation of Proportional Numbers), where he praised this calculative technique as “a wonder of arts”, marveling particularly at the fact that with logarithm one could finish some sophisticate calculations, such as root extracting of over the third order, even in almost an eyewink, which otherwise would not be able to be complete in hours with Chinese techniques.¹²⁶

It seems that the influence of the *Tianbu zhenyuan* and *Lixue huitong* in the official circles was quite limited. During the grand project of compiling the *Siku quanshu* 四庫全書 (Complete Books in Four Treasuries) between 1772 and 1778, when local officials across the country were encouraged to collect and provide books for the project,¹²⁷ only two small treatises from the *Tianbu zhenyuan* and *Lixue huitong*, i.e. the chapter *Rishi zhufa yitong* 日食諸法異同 (Similarities and Dissimilarities of Various Methods for [the Calculation of] the Solar Eclipse) from the Main Portion of the *Lixue huitong* and the chapter *Rishi yueshi yuanli* 日食月食原理 (Principles of the Solar and Lunar Eclipses) from the *Tianbu zhenyuan*, were collected from Zhejiang 浙江¹²⁸ and eventually incorporated in the *Siku quanshu* under the misleading titles *Tianxue huitong* and *Tianbu zhenyuan* respectively. More astonishingly, in the editorial summaries of these two treatises, it is not made clear that both of them belong to some bigger collection(s), as if they are originally two books devoted exclusively to the calculation of luni-solar eclipses.¹²⁹ Apparently, these editors had no knowledge about the scope of the two authors' work. Moreover, their interest in the two treatises was obviously concentrated on the technical aspects, particularly some special techniques and treatments in calculation. They quoted Mei Wending's comments on both Xue Fengzuo's integration and the similarities and dissimilarities between the *Tianbu zhenyuan* and the *Chongzhen lishu*, but they did not mention Mei Wending's changed view on logarithm. Following Mei Wending, they also commented on the obscurity of the *Tianbu zhenyuan*, but attributed it to that “as Xue Fengzuo began to translate this book, the new method [i.e. the *Chongzhen lishu*] was just promulgated, and therefore the translation between Western and Chinese languages did not become fluent yet.”¹³⁰ In other words, Xue Fengzuo's bad translation was due to his insufficient acquaintance with the officially accepted Chinese version of Western astronomy, i.e. the *Chongzhen lishu*.

In the bibliographical sections in all officially compiled histories of the current dynasty by the mid Qing period, the knowledge about Smogulecki and Xue Fengzuo's work is nothing more than these two treatises.¹³¹

¹²⁵ In the *Lixue yiwen* 曆學疑問 (Inquiries in Calendrical Astronomy), Mei Wending again claimed that Xue Fengzuo's adoption of centesimal system in place of sexagesimal system was “insightful”. See *Lisuan quanshu*, chapt.1, p.28b. But Jiang Yong 江永 (1681-1762), the famous exegete and mathematician of mid Qing period, criticized Xue Fengzuo's work in this respect as “changing the convention and looking for troubles” (*gengzhang duoshi* 更張多事). See *Shuxue*, chapt.1, p.33b.

¹²⁶ *Wu'an lisuan shuji*, pp.44b-46a.

¹²⁷ For the compilation of the *Siku quanshu*, see Wu Zhefu (1990).

¹²⁸ *Siku caijin shumu*, p.103 and 271.

¹²⁹ *Siku quanshu zongmu tiyao*, chapt. 106, pp. 2718-2719.

¹³⁰ *Siku quanshu zongmu tiyao*, chapt.106, pp. 2718-2719.

¹³¹ See e.g. *Qinding huangchao wenxian tongkao*, chapt.229, pp.5b-6a; and *Qinding huangchao tongzhi*,

Compared with the editors of the *Siku quanshu* and those official historians, Ruan Yuan¹³² obviously had much clearer knowledge about of both the *Tianxue huitong* and *Tianbu zhenyuan*, and provided a quite detailed description of their contents in his famous *Chouren zhuan* 疇人傳 (Biographies of Mathematicians and Astronomers).¹³³ Different from Mei Wending and others, he did not believe that the differences between the systems from the *Tianbu zhenyuan* and *Chongzheng lishu* were just something superficial, but admitted that *Tianbu zhenyuan* contained new knowledge that had not been introduced to China previously by Westerners. He also pointed out the fact that “very few people understand the system [in the book] since it was not officially promulgated at the time and Xue Fengzuo’s translation did not provide a clear explanation”. Therefore, he hoped to “find someone enthusiastic who can retranslate the book, so that those talking about Western studies would know the existence of this system besides the two [other] systems constructed with epicycles and ellipse respectively.”¹³⁴ As far as Xue Fengzuo’s own system is concerned, Ruan Yuan’s stance was quite critical, remarking that Xue Fengzuo “clung too much to the established method of Mu Nige, only derived [the integrated system] according to the latter’s constants and danced to his pipe, and therefore did not reach a deeper comprehension.”¹³⁵

Ruan Yuan was responsible for the polishing and publication of the *Diqiu tushuo* 地球圖說 (Explication of the World Map), wherein the French Jesuit Micheal Benoist (1715-1774), or Jiang Youren 蔣友人 in Chinese, first introduced the heliocentric system positively to both the court and, through Ruan Yuan’s publication, the wider public in China.¹³⁶ That might have been the reason why he understood clearly that the system in the *Tianbu zhenyuan* is different from those in both the *Chongzhen lishu* and the *Lixiang kaocheng houbian*. Nevertheless, Ruan Yuan never published any clear description of either the true cosmology of the *Tianbu zhenyuan* or the internal connection between this cosmology and the heliocentric system that he made popular in China through the *Diqiu tushuo*.

6. Concluding Remarks

It is very clear that Smogulecki’s behavior in preaching astronomy in China was not in full lockstep with his Jesuit colleagues. By claiming that Tycho “was actually a second-rate astronomer and his method has not been imported into China in a complete version” and that Schall von Bell “is not expert” in some respect of astronomy, he was hinting not only that the system of calendrical astronomy in the *Tianbu zhenyuan* was better than the Tychonic system adopted by the Qing dynasty, but also that the Jesuit astronomers did not do their best in helping Chinese government in constructing the most reliable system of calendrical

chapt.102, pp.1ab.

¹³² For Ruan Yuan, see Wu (2006). For his biographies of Mathematicians and Astronomers, see Fu Zuohua (1990).

¹³³ *Chouren zhuan*, chapt.36, pp.1a-2a and chapt.45, pp. 21b-22a.

¹³⁴ *Chouren zhuan*, chapt.45, pp. 21b-22a. Obviously, by the two systems he meant the systems in the *Chongzhen lishu* and the *Lixiang kaocheng houbian* 曆象考成後編 (Later Volumes of the Thorough Investigation of Calendrical Astronomy) where deferent-epicycle and elliptic models are adopted respectively. For recent study of the second book, see Han Qi (2001), and Shi Yunli and Xing Gang (2006).

¹³⁵ *Chouren zhuan*, chapt.36, pp.1a-2a.

¹³⁶ Sivin (1973).

astronomy. In doing this, he already became a “dissident” both within and without the circles of the Society of Jesus in China, given the sensitive role of calendrical astronomy in both the Chinese society and the Jesuit missions to China, no matter whether he introduced Lansberge’s heliocentrism faithfully or not.

We do not know to what degree Smogulecki’s Jesuit colleagues in China knew all he did with his Chinese disciples, and how they would respond had they know. In Philippe de Couplet’s (ca.1623-1693) *Catalogus Patrum Societatis Jesu, qui post obitum S. Francisci Xaverii ab Anno 1581 usque ad annum 1681 in Imperio Sinarum JESU Christi Fidem Propugnerunt* (a Catalogue of the Fathers of the Society of Jesus who Guarded the Faith of Jesus Christ in Chinese Empire since the Death of S. Francisco Xavier in 1581 up to 1681), we can find a brief report of Smogulecki’s career in China, where he is said to have compiled an *Elliptic Map of the World (Mappa mundi ellipticae)*, but there is no a single word about his *Tianbu zhenyuan*.¹³⁷ In late 1653, Schall von Bell summoned Smogulecki to Beijing under the name of “great mathematician”.¹³⁸ Very strangely, however, after his arrival in Beijing, Smogulencki was not installed, as supposed, in any position deserving this name, but was first appointed to the missionary position in Beijing and then dispatched to the mission in Hainan 海南,¹³⁹ a place far away not only from central China geographically but also from the Bureau of Astronomy, a post most suitable for a “great mathematician”, academically.

It must be admitted that Smogulecki did not cause any cosmological shock to early Qing scholars. On the other hand, however, he did bring to China Lansberge’s polemic against Tyconic astronomy, which led, though from a pure technical angle, to Xue Fengzuo’s challenge to the Tyconic system that had been officially promulgated in China. The only problem is that Smogulecki and Xue Fengzuo’s voice was mostly ignored by Qing scholars, even by those who actually read either the *Tianbu zhenyuan* or Xue Fengzuo’s tripartite collectanea. The reason for this ignorance could be multifold, but the most important cause must have been the worst lack of a reader-friendliness in their works, resulted directly from the poor writing, shabby printing and intentional distortions.

The same reason can also be applied to the explanation of the Qing readers’ indifference of the cosmological basis of the *Tianbu zhenyuan* and the significance of its difference from that of the *Chongzhen lishu*. What can we expect if nobody was able to read and understand the book without any obstruction? But in addition to this, we can find another equally important reason from Xue Fengzuo’s own orientation in astronomy. In fact, nowhere in the entire *Lixue huitong* did Xue Fengzuo ever try to draw a reader’s attention to any theoretical issue. For instance, when discussing how and where the New Western Method was superior to the Current Western Method, he always fixated exclusively on technical issues, such as the application of logarithmic trigonometric functions in place of pure trigonometric functions, the secular correction of the vernal equinox, and other secondary corrections that should be

¹³⁷ Couplet (1687), pp.118-119. This catalogue was translated from Chinese (*e Sinico latinè redditus*), which means that it came from the Jesuits in China, probably before 1681 when Couplet first went back from China to Europe. The catalogue registers quite completely the Chinese astronomical works by other Jesuit authors such as Matteo Ricci (1552-1610), Sabatino de Ursis (1675-1620), Manuel Diaz (1574-1659), Giulio Aleni (1582-1649), Johann Terrenz Schreck, Giacomo Rho, Johann Adam Schall von Bell, and Ferdinand Verbiest (1623-1688).

¹³⁸ Kosibowicz (1929) and Vāth (1991), p. 214.

¹³⁹ Kosibowicz (1929).

added to the moon, Mars, Venus and Mercury. At least from the existing versions of both the *Tianbu zhenyuan* and *Lixue huitong*, one can feel nothing more than a pure instrumentalist approach in mathematical astronomy, which was very typical of almost all mathematical astronomers in the Qing period.¹⁴⁰

Appendix I

Lansberge's Copernican Astronomy in the *Tianbu zhenyuan*

Lansberge's objective as an astronomer was the recovery of astronomy, which in his opinion had not been fulfilled by any other astronomer up to his time, not even by Copernicus and Tycho. The result of his effort was published in 1632 as three treatises in one bound volume, i.e. *Tabulae Motuum Coelestium Perpetuae Item Theoreticae Motuum Coelestium Novae et Genuinae et Astronomicarum Observationum Thesaurus* (*Perpetual Tables of Celestial motions..... also New and True Theories of Celestial Motions, and Treasury of Astronomical Observations*). Whereas the *Theoreticae* treats "theoretical astronomy" that provides geometrical models for the explanation of the motions of the heavenly bodies, and the *Tabulae* treats "practical astronomy" that provides necessary tables derived from the models in the *Theoreticae* for practical calculations, the *Thesaurus* is a collection of astronomical observations of over two thousand years, which Lansberge draws on to prove the exactitude of his theories and tables.

According to my survey, the *Tianbu zhenyuan* was compiled on the basis of this set of treatises. While the chapters on theories, i.e. Nos.2-4 in Table 2, are based on the *Theoreticae*, the chapters of tables, i.e. Nos.8-10, are adapted from his *Tabulae*. Moreover, Smogulecki might have consulted the usage instructions in the *Tabulae* as well when he composed both the explanations of the tables, i.e. Nos.5-7, and the instruction for practical calculation of the Chinese almanac, i.e. No.12. Interestingly, however, the table of the fixed stars in the *Tianbu zhenyuan*, i.e. No.11, is not a translation from the Lansberge's table in the *Tabulae*, but an excerpt from the table of the fixed stars in the *Chongzhen lishu*. Since this chapter is a rework by Xue Fengzuo as we see above, we do not know if the original table is a direct rendering of Lansberge's work.

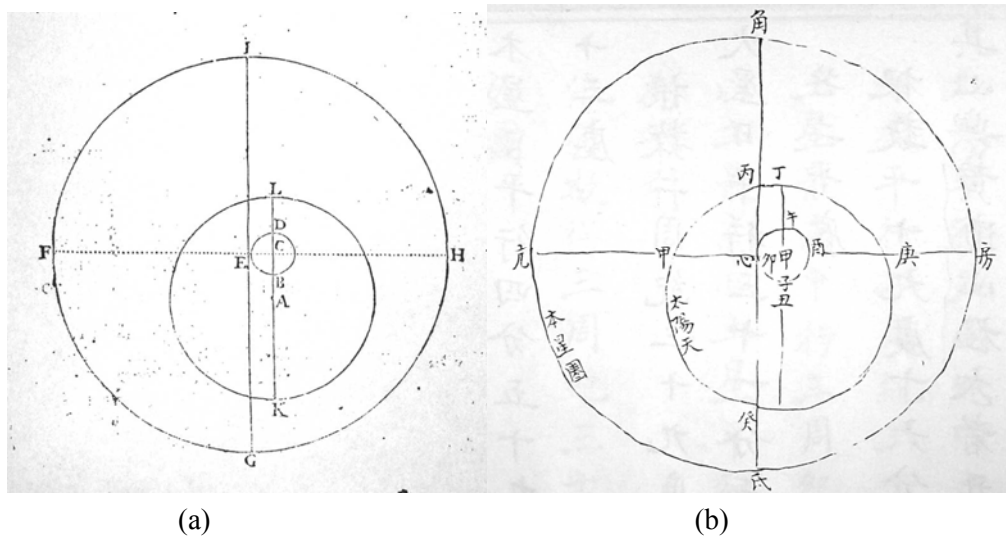
As a devoted Copernican, Lansberge treats Copernican system as reality,¹⁴¹ and adopted heliocentric models in describing the motions of the five major planets, though in practical calculations he always puts an imaginary mean sun on the orbit of the earth to indicate the mean position of the earth. His model for the motion of the earth is a geocentric one, but its hypothetical feature is made clear by the preceding words: "under the command of noble God I now attempt to conduct this demonstration, and begin from the theory of the motion of the sun, or the earth."¹⁴²

¹⁴⁰ For Xue Fengzuo's indifference to cosmology in the *Lixue huitong*, see Sivin (1973). For Qing astronomers' general attitude to the cosmological issues, see Gernet (1993-94) and Martzloff (1993-94).

¹⁴¹ Vermij (2002), p. 86.

¹⁴² Lansberge (1632), (I) p.1.

Figure 4: Geometrical model representing the motion of the superior planets



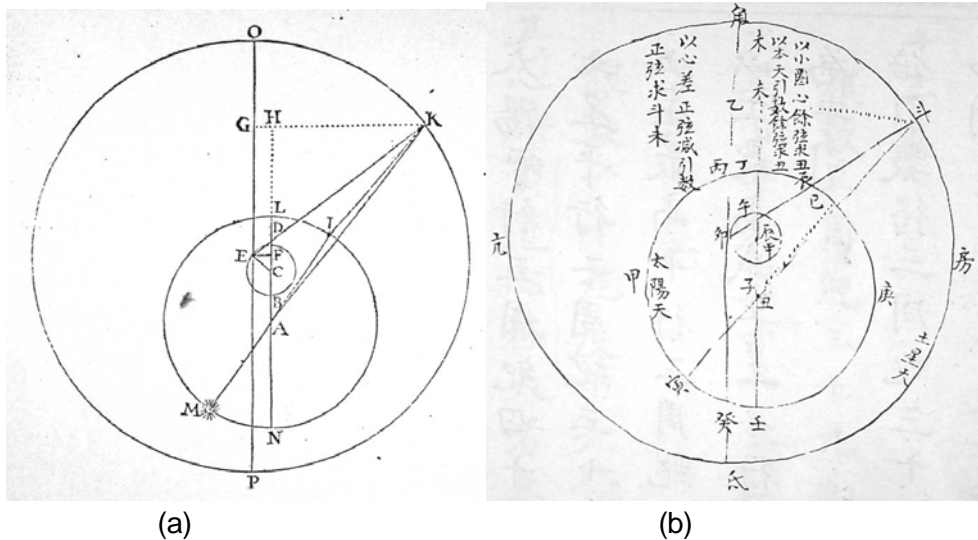
SOURCE: (a) is from Lansberge (1632) (II), while (b) is from copy No. II in Table 1.

Unfortunately, however, in the existing version of the *Tianbu zhenyuan*, i.e. the Digest of the New Western Method in the *Lixue huitong*, the true face of Lansberge’s cosmology is thoroughly veiled, and the interpretation of Lansberge’s theories of the five planets becomes very problematic. On the one hand, any words in the original texts revealing the actual position of the earth are changed. For example, when Lansberge describes his general model for the three superior planets (Fig.4a), he makes it clear that IFGH is the eccentric of Saturn, Jupiter or Mars, and LKL is the *magnus orbis terrae* (big circle of the earth), while E is the center of the eccentric IFGH, which moves on circlet BDE.¹⁴³ In the Digest of the New Western Method, however, E becomes “the earth at *xin* 心”, while Lansberge’s “big circle of the earth” is interpreted into *taiyangquan* 太陽圈 (the circle of the sun) or even *huangdao* 黃道 (the ecliptic), and circle LKL in the diagram (*ding-jia-kui-geng* 丁甲癸庚 in Fig.4b) is also labeled *rixingtian* 日行天 (the heaven of the sun), giving the illusion that the observer in this model is located on point E.¹⁴⁴

Figure 5: The geometrical model illustrating the calculation of the longitude of Saturn.

¹⁴³ Lansberge (1632), (I) pp.13-14.

¹⁴⁴ Chapter on Wuxing 五星 (Five Planets) in the Digest of the New Western Method of *Lixue huitong*, pp.1ab.



SOURCE: (a) is from Lansberge (1632) (II), while (b) is from copy No. IX in Tab.1.

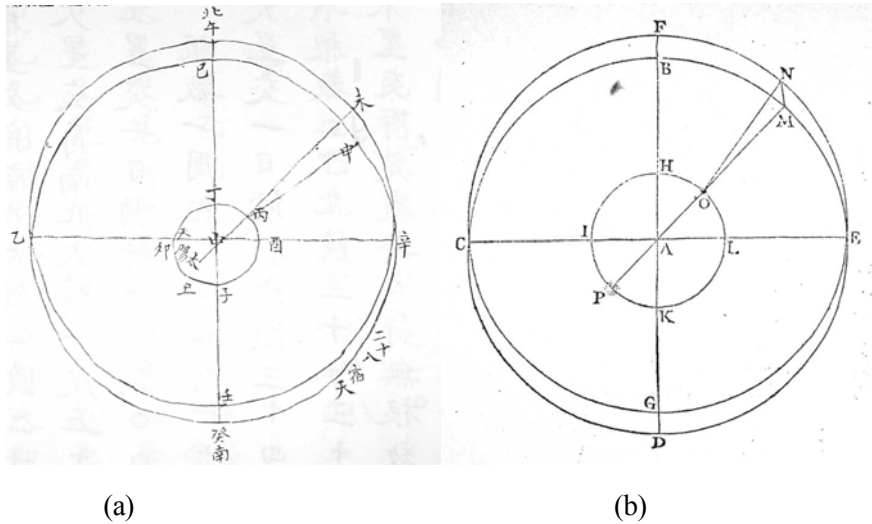
On the other hand, any words in Lansberge’s original texts indicating the motion of the earth are simply left out. For example, in Lansberge’s introduction of the model used in calculating the longitude of Saturn (Fig.5a), I is the earth, M is the imagined mean sun, OPK is the circle of Saturn, ILMN is *magnus orbis terrae*, and DEB the circle described by the center of Saturn’s circle.¹⁴⁵ In the Digest of the New Western Method (Fig.5b), however, ILMN (*ren-geng-bin-yin* 壬庚丙寅 in Fig. 5b) is noted as the ecliptic or the heaven of the sun as done in the model for the superior planets above, and you can not find a single word about the true meaning of point I (*si* 巳 in Fig.5b), neither a word concerning the where-about of the earth in the model. Points A and I (*zi* 子 and *si* 巳 in Fig.5b) are jointed with a dotted line, as if the earth I is merely an auxiliary point in the geometric operations. The same is true with the models used in the longitudinal computations of the other four planets.¹⁴⁶

At this moment, it is not clear whether these changes were made by Smogulecki in the original edition of the *Tianbu zhenyuan*, or they were out of Xue Fengzuo’s hand during his reworking, since the very chapter on the motion of the five major planets belongs to those rewritten, as shown in the second part of this article above.

Figure 6: The geometrical model illustrating the calculation of the latitude of the superior planets.

¹⁴⁵ Lansberge (1632), (I) p.15

¹⁴⁶ Chapter on Wuxing 五星 (Five Planets) in the Digest of the New Western Method of *Lixue huitong*, p.3b.



SOURCE: (a) is from Lansberge (1632) (II), while (b) is from copy No. IX in Tab.1.

The representation of the models for the latitudinal calculation of the five planets has the same problem. Fig.6a is the model for calculating the latitude of the superior planets as used in the Digest of the New Western Method, corresponding to Lansberge’s model in Fig.6b. According to Lansberge, HIKL is the orbit of the earth, BCDE is the orbit of the planet, and FCEF is the ecliptic in the same plane with HIKL. The earth is at O, the planet at M, and the imagined mean sun at P, while OM is “the distance from the orbit of the planet to the center of the earth”.¹⁴⁷ Again, several of these denotations are changed in the Digest of the New Western Method. While HIKL (*ding-mao-zi-you* 丁卯子酉 in Fig.6a) becomes again the circle of the sun or the ecliptic, OM (*bin-shen* 丙申 in Fig.6a) the “distance from the circle of the planet to the ecliptic” and FCEF (*wu-yi-ren-xin* 午乙壬辛 in Fig.6a) the “heaven of the fixed stars”, points O (*bin* 丙 in Fig.6a) becomes no identification at all.¹⁴⁸

¹⁴⁷ Lansberge (1632), (I) p. 26

¹⁴⁸ Chapter on Wuxing 五星 (Five Planets) in the Digest of the New Western Method of the *Lixue huitong*, p.21b.

Appendix II

Contents in the Surveyed Copies of the *Lixue huitong*

No.	Libraries	Shelf numbers																	
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
		NLC	HNNS	NLC	HVTL	LPU	ZL	HNNS	BL	HNNS	NSL	NSL	NSL	LIS	TUL	LPU	LPU	LPU	LPU
		14714	522/795	A04003	T7180-4473	SB 8678	8170/V1-3	522/795-2595493	Sinica 34	522/795-2594617	子 522/2677	總 135/4473	2952441-8	14/4473	總 3287	X/7103/4473	SB/157.2/4473	X/528/4473/C2	X/528/4473
正集	三角八線表	✓		✓	✓	✓	✓		✓	✓	✓			✓	✓	✓			✓
	中法四線	✓		✓	✓	✓			✓	✓	✓			✓	✓	✓			✓
	太陽太陽部	✓		✓	✓	✓					✓			✓	✓	✓			✓
	五星經緯部	✓		✓	✓	✓					✓			✓	✓	✓			✓
	交食法原	✓		✓	✓	✓					✓			✓	✓	✓			✓
	中曆	✓		✓	✓	✓					✓			✓	✓	✓			✓
	太陽太陽	✓		✓	✓	✓					✓			✓	✓	✓			✓
	五星立成	✓		✓	✓	✓					✓			✓	✓	✓			✓
	交食表	✓		✓	✓	✓					✓			✓	✓	✓			✓
	經星部	✓		✓	✓	✓					✓			✓	✓	✓			✓
	日食諸法異同	✓		✓	✓	✓	✓				✓			✓	✓	✓			✓
比例對數表	✓		✓	✓	✓					✓			✓	✓	✓			✓	
考索部	舊中法選要	✓		✓	✓	✓				✓			✓	✓	✓			✓	
	太陽, 太陽曆原	✓		✓	✓	✓				✓			✓	✓	✓			✓	
	五星, 交食曆原	✓		✓	✓	✓				✓			✓	✓	✓			✓	
	太陽, 太陽曆法	✓		✓	✓	✓				✓			✓	✓	✓			✓	

中外重法部	√		√	√	√										√										
中外火法部	√		√	√	√							√													
中外御學部卷一	√		√	√	√							√													
中外御學部卷二	√		√	√	√							√													
氣化運流卷之七			√						√																
氣化運流卷之八			√		√							√													
氣化運流卷之九															√										
氣化運流卷之十																					√				
氣化運流卷之十一																									
氣化運流卷之十二										√															

Appendix III

Xue Fengzuo's Adoption of Decimal and Centesimal Systems

In the *Tianbu zhenyuan*, sexagesimal system is adopted for all amounts. In this system, a value like 584400 has to be expressed as “the 3rd sexagesimal cycle 02, the 2nd sexagesimal cycle 42, the 1st sexagesimal cycle 20” 第三旬周〇第二旬週四第一旬週〇 in Chinese, which “leaves no residues in rounding-up but is difficult and clumsy in practical operations” in Xue Fengzuo's opinion.¹⁴⁹ Therefore he gave up this system, and adopted the decimal system for ordinary amounts and centesimal system for the magnitude of angles less than one degree, which belonged, in his opinion, to Chinese method. Concordantly, he also converted the old table of logarithms of the trigonometric lines, supposedly titled *Bili sixian biao* 比例四線表 (Table of the Proportions of the Four [Trigonometric] Lines), into the new system and renamed it as *Bili sixian xinbiao* 比例四線新表 (Table of the Proportions of the Four [Trigonometric] Lines) or *Zhongfa sixian* 中法四綫 (Four Trigonometric Lines in Chinese Method). This is another, but maybe the most unique, work Xue Fengzuo finished in his project of integration. In the preface to the new table,¹⁵⁰ he tells us:

“I came to Nanjing in the Spring Day of the year *renchen* 壬辰 (11 Jan. 1652) and learnt trigonometry from Mr. Mu [Nige]. In addition, I also learnt from him logarithm and the table of logarithms of the four trigonometric lines. ... However, when I was engaged in the project of emendation and integration recently, I found that, whereas the Chinese method was too scattered and simple, the old [trigonometric] method was in sexagesimal system, both being incompatible with each other. Therefore, I integrated them by converting the sexagesimal system in both the eight trigonometric lines and the related books into centesimal system, so that the old and new, Chinese and Western can be unified into one system, which might become a ladder for this study [i.e. astronomy].¹⁵¹

He repeats the similar story as well in his preface to the *Zhengxian bu* in the Main Portion.¹⁵² As we can easily find, the angles smaller than one degree in the existing versions of the *Bili sixian xinbiao*, *Suan sanjiao fa* and the two versions of the *Sanjiao baxian biao* (or *Zhengxian bu*) in both the Main Portion and the Digest of the New Western Method are all expressed in the centesimal system. This means that Xue Fengzuo really revised these works in accordance with the centesimal system, and the *Bili sixian xinbiao* is actually an independent work by himself, rather than by Smogulecki and him together as was believed before.¹⁵³ Mei Wending

¹⁴⁹ See “Xifa huitong canding shiyi ze” 西法會通參訂十一則 in the Main Portion of the *Lixue huitong*.

¹⁵⁰ The preface to the table was written in the late twelfth month of the first year of Kangxi (29 Jan. - 7 Feb. 1663).

¹⁵¹ See “*Zhongfa sixian yin*” 中法四綫引 (Preface to the *Four Trigonometric Lines in Chinese Method*) in the Main Portion of the *Lixue huitong*.

¹⁵² See “*Zhengxian xu*” in the Main Portion of the *Lixue huitong*.

¹⁵³ Li Yan (1998), pp.139-140.

also observed that “the *Bili sixian* 比例四線 (Proportions of the Four Trigonometric Lines) was taught by Mr. Mu [Nige]”, while “Yifu [i.e. Xue Fengzuo] compiled again the *Sixian xinbili* 四線新比例 (New Proportions of the Four Trigonometric Lines), which gives the values of the four trigonometric lines. He uses ‘degree’ in the same way [as Mu Nige does], but divides one degree into one hundred minutes.”¹⁵⁴

Appendix IV

The Preface to the *Tianbu zhenyuan* and its Mysterious Author

In front of the Digest of the New Western Method in the *Lixue huitong*, there is a preface entitled “*Tianbu zhenyuan yin*” 天步真原引 (An Introduction to the *True Principles of the Pacing of the Heavens*) by a pseudonymous author, which reads,

“Ancient people knew that the Existence not falling in the Existence-Nonexistence dichotomy is actually the Nonexistence. Those experiencing the Way and reserving the arts in themselves tend to be like this. All the visible between the Heaven and Earth are the invisible. The Diagrams and Numbers are actually the empty space, just like a whole tree’s being a whole kernel. Sages express the Cosmos according to its appearance, which is called imitation. Therefore, the imitated expression of the Chaos is the Cosmos, the Eight Trigrams and the *yin* and *yang* Strokes are the imitated expression of the Grand Ultimacy, and the imitated expression of the Seven Luminaries and the Five Phrases is the ‘endlessly solemn’ Heaven. The shape of the Way has no shape and no no-shape, which subtly shows that the Way and the Instruments are inseparable.

“Revered Mr. Yi [儀公, i.e. Xue Fengzuo]¹⁵⁵ studies the insurmountable Way and explores the instrumental matters of calendrical astronomy. To accomplish the undertakings as a provision for the use of people,¹⁵⁶ this was the sincere hope of ancient sages. Later individuals like [Zu] Gengzhi 祖塈之 and [Seng] Yixing [僧]一行 who conducted the real study of the profound meanings have been rare in each generation, because only a genius can carry on the great cause.

Calendrical astronomy has now become more and more accurate. Only

¹⁵⁴ *Wuan lisuan shuji*, pp.44b-46a.

¹⁵⁵ This polite address of Xue Fengzuo comes from Xue Fengzuo’s styled name Yifu (儀甫).

¹⁵⁶ A literary quotation from section one of the *Yi jici* 易系辭 (The Great Appendix of the *Book on Change*), meaning that sages set up the principle of the Yi and thus instituted the divination method so that ordinary people were able to use. The original text reads (underlines added by myself): “The Master said: ‘What is it that the Yi does? The Yi opens up [the knowledge of the issues of] things, accomplishes the undertakings [of men], and embraces under it [the way of] all things under the sky’ ... Therefore the virtue of the stalks is versatile and spirit-like ... Therefore [those sages], fully understanding the way of Heaven, and having clearly ascertained the experience of the people, instituted [the employment of] these spirit-like things, as a provision for the use of the people.”

by consulting Tan (鄒)¹⁵⁷ can one realize that [their] studies are so diverse, from the asterisms named Islands and Golden Fish, to the rectification of the latitudinal lines and longitudinal degrees; from the measurement of the apogees and quadrants, to the computation of trigonometric proportions. The muddy pellet with big oceans¹⁵⁸ has been investigated with a pea floating in the middle of a blown-up bladder.¹⁵⁹ [They] extensively survey the blue sky just as counting [grains of] rice and salt. Isn't it a great complementary to the founding of civilization which ancient sages such as Rong Cheng 容成¹⁶⁰ and Da Nao 大撓¹⁶¹ did not accomplish? I would use these [events] further to prove the restlessness of the [four seasons in their] alternating progress, and the [sun and moon in their] successive shining,¹⁶² the everyday novation of 'the premonitions in advance',¹⁶³ and the realization and clarification of 'adopting the sun and stars as the recorders [of the seasons], the moon as the measurer [of months]'.¹⁶⁴

As to the *Tianbu zhenyuan*, how can we say that only astronomers have to rely on it? Those talking about Nature and the heavenly Way can also know from it what can be added to their studies."¹⁶⁵

The signature at the end of the preface is a very strange one, i.e. *Bituo sanhan Zhi ti* 苾馱散漢知題 (inscribed by Zhi 知, a free man of *Bituo* 苾馱). Presumably, the "Zhi" here is the name of the author, while the *Bituo sanhan* (a free man of *Bituo*) is his alias (*hao* 號). Coming from the Buddhist Classics, *Bituo* is actually a transliteration of the Sanskrit term *Vidya*, which means Ming 明 (bright).¹⁶⁶ Therefore, the author is actually calling himself "a free man of the Ming", probably trying to indicate in this enigmatic way that he is a loyalist to the fallen Ming dynasty. I venture that this author is Fang Yizhi, the famous thinker of the late Ming and early Qing dynasties, for the following reasons:¹⁶⁷

¹⁵⁷ Here the author of the preface is using the story how Confucius consults the Master Tan (鄒子) from a periphery tribe on the lost rites of the Middle-kingdom to refer metaphorically to the learning of astronomy from the Jesuit astronomers.

¹⁵⁸ The earth surrounded by the oceans.

¹⁵⁹ An experiment believed to be able to demonstrate the geocentric configuration of the Cosmos. According to my study, the experiment was originated in China but was attributed to Jesuit missionaries by some late Ming and early Qing scholars. See footnotes 48 in Shi Yunli (2004).

¹⁶⁰ The sage in ancient Chinese myth who created musical harmonics and calendrical astronomy.

¹⁶¹ The sage in ancient Chinese myth who invented the system of Heavenly Stems and Earthly Branches and applied it to calendarical purpose.

¹⁶² A literary quotation from chapt.30 of the *Zhongyong* 中庸 (Doctrine of the Mean). The original text reads: "He [i.e. Confucius] maybe compared to the four seasons in their alternating progress, and to the sun and moon in their successive shining."

¹⁶³ A quotation from chapter "Kongzi xianju" 孔子閒居 (Confucius Is at Home in Leisure) of the *Liji* 禮記 (Records of Ritual Matters), meaning that premonitions appear before important events.

¹⁶⁴ A quotation from chapter "Liyun" 禮運 (The Conveyance of the Rites) of the *Liji*, meaning a sage king should set up rules for his people in harmony with the rhythm of Heaven and Earth, including setting up calendar rules according to the motion of the sun, the moon and stars. Obviously, the author of the preface believed that such a Confucian goal was reached with the arrival of Western astronomy.

¹⁶⁵ "*Tianbu zhenyuan yin*" in the Portion on Test of the *Lixue huiton*. The paragraphs are divided by myself.

¹⁶⁶ Wang Bangwei (1995), p.188.

¹⁶⁷ For a more detailed discussion of this problem, see Shi Yunli (2006). This preface was not included in Fang

- (1) The idea expressed in the first part of the preface is obviously Fang Yizhi's thought, especially such propositions as "a whole tree is a whole kernel" (*quanshu zhi wei quanren*, 全樹之爲全仁), "the Existence not falling in the Existence-Nonexistence dichotomy is actually the Nonexistence" (*buluo youwu zhi you wei wu*, 不落有無之有即無), "The Diagrams and Numbers are actually the empty space" (*xiangshu ji xukong*, 象數即虛空). These propositions are Fang Yizhi's inventions, and they are repeatedly discussed in his works.¹⁶⁸
- (2) Fang Yizhi was a famous Ming loyalist in the early Qing dynasty, who would rather be a "free man of the Ming" dynasty than bend to the new dynasty then eagerly seeking for his submission and cooperation.¹⁶⁹
- (3) To evade the pursuit of the Qing government, he had to convert to Buddhism and to hide out from time to time. For the same reason, and also as way to express his loyalty to the old dynasty, he often used anonymous name in his works during this period, as can be seen from the two riddles at the end of his prefaces to the *Yiyu* and *Dongxi jun*, which indicate the real name of the author, i.e. "Ming Fang Yizhi" 明方以智 (Fang Yizhi of the Ming) and "Daming Fang Yizhi" 大明方以智 (Fang Yizhi of the Great Ming).¹⁷⁰
- (4) In traditional Chinese vocabulary, the word "Zhi" 知 is actually a homophonic equivalence of the last word in his name Zhi 智, which is also an enigmatic hint of the real name of the author.
- (5) In the spring of 1653, Fang Yizhi secretly fled all the way from Guanxi 廣西 to Nanjing and stayed there till the autumn of 1655.¹⁷¹ In the same period, Fang Zhongtong was in the same city and acquainted himself with Xue Fengzuo, through whom he also met Smogulecki and became his disciple in astronomy and mathematics.¹⁷² Therefore, Fang Yizhi also had the opportunity to met Xue Fengzuo and Smoguleski and to write a preface to their work.
- (6) Most decisively, there are two seals at the end of the signature (Fig. 7). The first of them can be recognized as Wukedaoren 無可道人,¹⁷³ which is one of the several

Yizhi's anthologies published in the early Qing dynasty, i.e. *Fushan wenji qianbian* 浮山文集前編 (Fang Yizhi's Anthology, Former Collection), *Fushan wenji houbian* 浮山文集後編 (Fang Yizhi's Anthology, Later Collection), and *Fushan cicangxuan bieji* 浮山此藏軒別集 (Fang Yizhi's Anthology, Another Collection from the Cicangxuan).

¹⁶⁸ Fang Yizhi uses the first proposition as a metaphor to describe the relationship between Substance (*ti* 體) and its Function (*yong* 用). This metaphor is used repeatedly in his *Dongxijun* 東西均 (Evenness of East and West), p.19; *Yiyu* 易餘 (Remnant Discourse of the Change), chapt.1, pp.70 and 145; and *Tongya*, p.51. The second proposition is related to Fang Yizhi's epistemological concept about the contradiction and unification of such dichotomies as Existence and Nonexistence, which is discussed in e.g. *Yiyu*, chapt.1, p. 71 and *Dongxijun*, pp.16-29 and 40. The last proposition is put forth by Fang Yizhi in his discussion of the relationship between *liqi* 理氣 (Principle and Ether) and *xiangshu* 象數 (Diagrams and Numbers), in his colophon to the *Zhouyin shilun hebian* 周易時論合編 (Assembled Compilation of Current Discourses on the Change), p.9. For recent studies of the last two propositions, see Pang Pu (1996) and Zheng Wangeng (2002).

¹⁶⁹ Ren Daobin (1983), p.180.

¹⁷⁰ Pang Pu (2001), p.25.

¹⁷¹ Ren Daobin (1983), pp.182, 194.

¹⁷² See footnote 50 above.

¹⁷³ Characters on this kind of seals are very difficult to decipher. Previously, the characters on this seal was recognized as *Wuhe chu* 無何處 by an expert of seal-carving on the basis of my inexpert counterdraw. See Shi Yunli (2006). The new decipherment is done by an expert on ancient books and seals from the Rare Book

the aliases (*hao* 號) used by Fang Yizhi after he converted to Buddhism.¹⁷⁴ Besides, one of his numerous aliases (*zi* 字) in this period is Wuke 無可, as is well known.¹⁷⁵

Figure 7: The Seals at the end of the “*Tainbu zhenyuan yin*”



Source: From Copy No. XV in Table 1.

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Department of the National Library of China on the basis of the original imprints contained in copy Nos.I and III in Table 1.

¹⁷⁴ *Qingbai leichao*, chapt.3, p.14.

¹⁷⁵ Ren Daobin (1983), pp.2-4.

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