

# The Positive Influence of Buddhism Upon the Development of Science and Technology in Ancient China

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It is important and worthwhile to discuss what kind of influence Buddhism cast on the development of science and technology in ancient China. The author does not agree with Joseph Needham's view: "There can be little doubt that on the whole its action was powerfully inhibitory", and the author thinks Buddhism took a positive promotion and influence on the development of science and technology in ancient China as a whole. There were four main ways of Chinese Buddhism influence on ancient science and technology: (1) The Buddhist scriptures actually contain a wealth of knowledge of science and technology; the eminent Buddhist monks introduced them into China through translation, therefore enriched contents of science and technology in ancient China. (2) Some knowledge of science and technology in ancient Indian and other districts got into China along with the spread of Buddhism. (3) Ancient Chinese Buddhists took part in science and technology practice actively at that time, and they had got a series of achievements in science and technology. (4) Being inspired and affected by Buddhist scientific knowledge, those non-Buddhist scientists had engaged in many created work in a further step, and made much contributions to development of science and technology. The doctrine of Buddhism was not a complete hindrance to the development of science and technology, and the result turned out contrary in many respects that it had promoted development of science and technology. In fact, Chinese Buddhism had made many important contributions in the fields of astronomy, mathematics, medicine, and so on.

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It is important and worthwhile to discuss what kind of influence Buddhism cast on the development of science and technology in ancient China. In Joseph Needham's great book *Science and Civilization in China*, the second volume *History of Scientific Thought*, he definitely said: "It is for us, however, to attempt some estimate of the influence which Buddhism exerted on Chinese science and scientific thought. There can be little doubt that on the whole its action was powerfully inhibitory" (Needham, 1956, p. 417). But we cannot agree with this view, we think as a whole Buddhism once took a positive promotion and influence on the development of science and technology in ancient China.

## **Some Important Characteristics of Chinese Buddhism Which Are Closely Connected With Development of Science and Technology**

According to our opinions, there are at least three important characteristics of Chinese Buddhism which are closely connected with development of science and technology.

### **The Chinese Buddhism Had a Strong Spirit to Get Into the Secular Society**

As we know, since Buddhism arrived at China, only Great Vehicle books and thought propagated wildly and conducted deep influence in large district of China (except the minority nationalities lived in the Southwest China). In early Little Vehicle theory, Buddhism really had a tradition that kept off the secular society. Then such tradition was criticized by Great Vehicle Buddhism when it took place and became actively to join in common affairs of the secular society. The present Buddhism researching circle has got a same view on it to a large extent. For instance, Du Jiwen (杜继文) said in his book *History of Buddhism (佛教史)*: “The basic characteristic of Great Vehicle was to participate and intervene in the common people’s life of secular society” (Du, 2006, p. 78). It was the real fact when Great Vehicle Buddhism spread in the most part of China.

No doubt, such spirit of Great Vehicle in the Chinese Buddhism was an important thinking premise and theory foundation for it to take part in science research and technology action. Science or technology is one of social actions closely linked with ordinary life, also is one of significant sources to promote social progression, so it was naturally to cause the Chinese Buddhism paying interest and attention in science and technology.

### **The Chinese Buddhism Had a High Adaptability to Its Existence Environment**

As an outside culture, Buddhism could take root deeply and prospered successfully on Chinese earth, then even surpassed development in its own country; no one could deny that it was a result owing to its high adaptability to its existence environment. History of Buddhism developing in China, actually was a process of transforming itself unceasingly in order to suit Chinese reality, to suit changes of social superstructure and economy foundation, to suit spirit need of intellectuals and common people, therefore it could spread wildly and get more and more prosperous.

Buddhism adapted to Chinese society comprehensively that naturally included adapting to development of science and technology. Science and technology is an important factor to promote social productive forces and economic development, meanwhile is a major force which would bring about changes of people’s thought and action pattern; it also required Buddhism to adapt and throw into. Therefore we could say that the spirit of Buddhism actively getting into the secular society provided a possibility for itself to take part in science and technology actions, if so, we could also admit that the adaptability of Chinese Buddhism had turned such possibility into reality, as well as had gained many important achievements of science and technology.

### **The Chinese Buddhism Possessed Fine Thinking Level**

Another excellent point of the Chinese Buddhism was that it had fine thinking level, because it attracted many intellectuals, promoted itself to bring forth new ideas and development in practice constantly. Such fine thinking level not only reflected making a careful and detail analysis to everything of universe, embodied outstanding dissection, and detailed inspection actions of the mankind psychology, but also displayed at lasting exploration and profound grasp to formal logic and dialectical thought of the mankind thinking law.

This exquisite theory level and dialectical thinking element of the Chinese Buddhism provided a necessary support of thinking method for Buddhists to take part in science and technology actions, still further to recognize and understand natural world. Science needs logic, not only formal logic but also dialectical logic, as well as needs theory; it could not go without theory. The Chinese Buddhism was not short of either logic or theory; on the contrary it unusually resembled scientific thinking method at some special angle of view. When it held such theory thinking level to get into the secular society, suit the tide of science and technology at that time, made efforts in researching and spreading science and technology knowledge, therefore it was a rather

natural thing for the Chinese Buddhism which had got a series of achievements in many fields of science and technology.

### **Main Ways of the Chinese Buddhism Influence on Ancient Science and Technology**

Now let's discuss how the Chinese Buddhism actually carried out its influence on the development of ancient science and technology. According to our research, there were four main channels.

#### **The Buddhist Scriptures Actually Contain a Wealth of Knowledge of Science and Technology; the Eminent Buddhist Monks Introduced Them Into China Through Translation, Therefore Enriched Contents of Science and Technology in Ancient China**

It has been a common view by researchers of Buddhist philosophy and the history of science and technology that there are unusual rich knowledge of science and technology in the extant Chinese Buddhist scriptures. From their own disciplines, some researchers had made effort to analyze and list the knowledge of science and technology in the Buddhist scriptures, and had got obvious achievements. Generally speaking, the contents of science and technology knowledge in the Chinese Buddhist scriptures mostly are about astronomy and medical science, also concern mathematics, geography, and so on.

Those astronomy materials in Chinese Buddhist scriptures which had been listed carefully and detailedly are in a book named *Gazing Into the Western Sky: Source and Course About Astronomy in the Buddhist Scriptures Translated Into Chinese* (西望梵天: 汉译佛经中的天文学源流) written by Niu Weixing (钮卫星) (2004). In this book, the writer classified to display astronomy materials in those Buddhist scriptures for five respects: (1) about quantity and measurement; (2) about cosmology; (3) about the galaxy; (4) about the sun and moon; (5) about planets. These five respects of astronomy materials lie in 97 kinds of Buddhist scriptures as a whole. The work by Niu Weixin (钮卫星) had testified that astronomy materials in the Chinese translated Buddhist scriptures are really very rich.

Still there are another large number of medicine knowledge in the Chinese Buddhist scriptures that also caused academic circles to pay much attention. According to the statistics by Li Liangsong (李良松) (1997) in his book *Summary of General Catalogue About Medicine Books in the Buddhist Scriptures* (佛教医籍总目提要), there are 85 monographs which on medicine, as for the other books involved medicine content, even extend more than 370 volumes.

Except the knowledge of astronomy and medicine, the Chinese Buddhist scriptures still included scientific materials of mathematics, geography, and so on. No doubt, the eminent Buddhist monks introduced such knowledge into China through translating Buddhist scriptures; their work and effort brought about an active result to promote a further development of science and technology in ancient China.

#### **Though Some Knowledge of Science and Technology in Ancient Indian and Other Districts Was Not Actually Invented by Buddhism or Not Only Possessed by Buddhism, But They Got Into China Along With the Spread of Buddhism**

For instance, in ancient China there were a sort of science and technology works named "Brahman" (婆罗门), such as *Brahman Astronomy*, *Brahman Mathematics*, *Brahman Prescription*, and so on. The great part of these works have been lost now, so we cannot conclude that these knowledge of science and technology whether or not belonged to Buddhism itself. But anyway, the sending of these knowledge and materials and getting to China were together with the spread of Buddhism.

Except for India works and knowledge, there still were other west countries' works and materials that were introduced into China by the spread of Buddhism. For example, in medicine field, there are more than 10 works recorded in *Sui Shu-Classics Volume* (隋书·经籍志). The Song (宋) Dynasty scholar Zheng Qiao (郑樵) also recorded the above works' names in his book *Complete History-Art and Literature Column* (通志·艺文略) and displayed them as a special kind which called “胡方” (“Non-Han Prescription”). It is clear that such medicine works have reached a large scale and conducted certain influence.

**Ancient Chinese Buddhists (Including Those Foreign Buddhists Who Lived in China and Those Buddhists Who Lived at Home) Took Part in Science and Technology Practice Actively at That Time, and They Had Got a Series of Achievements in Science and Technology**

No one could be greater than the Tang (唐) Dynasty talent monk Yi Xing (一行) who had got outstanding achievements in astronomy in ancient China. He compiled *Da Yan Almanac* (大衍历) which was one of few “most excellent almanacs” in Chinese history. It did not only use in China, but also passed on into Japan and continued to use for many years. He also created a batch of new astronomy instruments together with Liang Lingzan (梁令瓚), meanwhile had got a series of new results about astronomical phenomena observation and the regularities of celestial body movement on this foundation. The great success achieved by Yi Xing (一行) in astronomy, calendar, and mathematics, was enough to establish him an important position in Chinese history of science.

The most closed relation was between astronomy and mathematics. In Chinese history those persons who were proficient in astronomical mathematics were always called as “Chou Ren (畴人)”. Therefore in Buddhist circles who had special talent at astronomy, also were scholars at mathematics. Among them Zhen Luan (甄鸾) proved himself competent as a true and famous mathematician. He lived in the North and South Dynasties (南北朝), and believed in Buddhism. He had written two mathematics books which were named *Wu Cao Arithmetic Classic* (五曹算经) and *Arithmetic in Five Classics* (五经算术), and he also had done explanatory notes to many famous mathematics works. These mathematics works together with Zhen Luan (甄鸾)'s explanations were compiled in *Ten Mathematics Classics* (算经十书) in the Sui (隋) and Tang (唐) Dynasty. They were elected as textbooks for mathematics education in the Imperial College, and necessary teaching materials in imperial examinations, which had a great influence in Chinese mathematics history. Then these mathematics works were brought into the Korea and Japan, and also played an important role in mathematics education in East Asia countries.

Medicine work done by Chinese Buddhists was even more. According to our rough calculation, there were nearly 100 important Buddhist monks who had taken part in medicine researching and practicing activities, and who left their names and deeds in history. Such was not included about those persons who were in Tibetan Buddhism and Southwestern Buddhism, and still was not included those groups which made medicine work in some special temples such as Shao Lin Temple (少林寺), Bamboo Forest Temple (竹林寺), and so on. If account them as a whole, that must be a big number team.

Except mentioned above, Chinese Buddhist also had taken part in other scientific activities in the fields of geography, agronomy, architecture, technology, and so on, meanwhile had got many achievements. No doubt, all of such science and technology practice and excellent achievements made by Chinese Buddhists were a kind of important way to influence on the development of science and technology.

### **Inspired and Affected by Buddhist Scientific Knowledge, Those Non-Buddhist Scientists Had Done Many Created Work in a Further Step, and Made Much Contributions to Development of Science and Technology**

In the respect of astronomy knowledge of ancient India spread with Buddhism which had produced good result to Chinese non-Buddhist astronomers, we can take He Chengtian (何承天) and his *Yuan Jia Almanac* (元嘉历) as an example. He lived in the Northern and Southern Dynasties (南北朝) and did not believe in Buddhism, but he absorbed essence from the ancient Indian astronomy knowledge and put them into *Yuan Jia Almanac* (元嘉历) compiled by himself. In Chinese astronomical history, *Yuan Jia Almanac* (元嘉历) was an important calendar. It was not only published and used at that time, but also displayed much influence on almanac after the Tang (唐) and Song (宋) Dynasties. According to Niu Weixing (钮卫星)'s research, there were five main reformations in *Yuan Jia Almanac* (元嘉历), and all these reformations kept a close link with ancient Indian astronomy knowledge, and at least we can find two of them which had obviously relevant way of doing.

It was more prominent for Buddhist medicine knowledge which exerted influence on medical experts of non-Buddhists in ancient China. There was a famous medical expert Sun Simiao (孙思邈) who lived in the Tang (唐) Dynasty, though he was a Taoist scholar, but was affected powerfully by Buddhism. In his great medical writing *Qian Jin Major Prescriptions* (千金方), he once clearly quoted the Buddhist scriptures in order to explain medical theory. Besides above-mentioned, according to textual research by Fan Xingzhun (1936) that is in Sun Simiao (孙思邈)'s another work *Qian Jin Assistant Prescriptions* (千金翼方) which had more than 20 prescriptions sourced from Indian recipes, all of these had relations with the spread of Buddhism.

In the Ming (明) Dynasty, Li Shizhen (李时珍) also recorded a large number of medicines from India and Southern Asia in his great book *Compendium of Materia Medica* (本草纲目), and extensively quoted the Buddhist scriptures to make a check. Some of them were given indication by Sanskrit term, such as "tulip", "datura", and so on. From these instances we can see that prescriptions of ancient India and Southern Asia had slowly mixed together with Chinese traditional medicine system, and the Buddhist medicine brought obvious influence on non-Buddhist circles.

To put it briefly, above four main ways might be summarized for the Chinese Buddhism giving influence to science and technology in ancient China.

### **Some Contents in Buddhist Doctrine Which Are Beneficial to Promote Development of Science and Technology**

The first, the "Empty (空)" theory in Buddhist doctrine actually pointed out that "principal and subsidiary causes" is the last origin for everything in universe to emerge. The Buddhist world outlook told us that all appearance of things would always change themselves from birth to death; no one could be existed isolatedly and could have no change forever. Now that it exposed universal contact of the objective world as well as the law of eternal change to a certain degree, these views are very similar to the views of science.

The next, Buddhism considered that all things in the world have inevitable relations between cause and effect. "If this one exists, would cause another one to exist; if this one rises, would cause another one to rise; when this one disappears, another one would follow it to disappear; when this one goes to die, another one would follow it to go to die". Though this idea of causality was mainly used to explain ethical principles such as "Good is rewarded with good, and evil with evil", it could be in the same way to explain everything in the

nature. It was very close to the law of causation for which scientists always make their efforts to seek among natural things. A book named *Things Responded With Each Other* (物类相感志) written by the Song (宋) Dynasty talent monk Zan Ning (赞宁) was to search after the law of cause and effect between different sorts of things. It put great influence on the writing of scientific works later, such as Li Shizhen (李时珍)'s *Compendium of Materia Medica* (本草纲目) and so on.

The third, Buddhism thought that it was a necessary way for someone who wanted to be a Buddhist to practice "The Five Clarities". These five clarities include "Sound Clarity" (knowledge about language, characters, and so on); "Craft Clarity" (knowledge about handicraft, technology, calendar system, calculation, and so on); "Medical Clarity" (knowledge about medical skill, medicine making, and so on); "Logic Clarity" (knowledge about cause and effect, true and false, argument, and so on); "Inside Clarity" (knowledge about Buddhism theory itself). In above five items, there are at least three items related with science and technology; they are "Craft Clarity", "Medical Clarity", and "Logic Clarity", which covered contents of many fields in science and technology.

Except what we have mentioned above, Buddhism still advocated using many ways to accumulate merit in its doctrine. These ways include building images of Buddha and towers, planting trees and constructing gardens, giving medicines and curing sickness, erecting bridges and making boats, digging wells and providing toilets, and so on. All these things would bring about an active result on development of architecture, medicine, gardening, and botany.

In short, the doctrine of Buddhism was not to hinder the development of science and technology completely; the result turned out contrary in many respects that it had promoted development of science and technology. Like summarized by us at the second section, Chinese Buddhism had played an active influence on the development of ancient science and technology through many ways, and had made important contributions in the fields of astronomy, mathematics, medicine, and so on. Since it was so, how could we have any reasons to doubt such a historical fact that Chinese Buddhism had put an active and helpful role in the development of ancient science and technology?

### References

- Du, J. W. (2006). *History of Buddhism* (佛教史). Nanjing: Jiangsu People's Publishing House.
- Fan, X. Z. (1936). Check on Non-Han Prescriptions (胡方考). *Chinese Medical Magazine*, 22(12).
- Li, L. S. (1997). *Summary of general catalogue about medicine books in the Buddhist scriptures* (佛教医籍总目提要). Xiamen: Lujiang (鹭江) Publishing House.
- Needham, J. (1956). *Science and civilization in China, volume 2: History of scientific thought*. Cambridge: The Syndics of the Cambridge University Press.
- Niu, W. X. (2004). *Gazing into the Western Sky: Source and course about astronomy in the Buddhist scriptures translated into Chinese* (西望梵天: 汉译佛经中的天文学源流). Shanghai: Shanghai Traffic University Publishing House.