



## **Cheng Dawei, the Most Famous Chinese Ancient Zhusuan Expert with International Significance**

*By Jiang Zhiwei, P.R.C.*

Cheng Dawei is very famous in both Chinese and world history of zhusuan. This is not only because his works the "Collection of Algorithms" is the collection of algorithms and calculation theory and is popular in China for about 300 years and he is honored as great master of zhusuan by later generations, but also because the book spread to Japan, Korea, North Korea, Southeast Asia, Europe and America etc. He becomes an expert of zhusuan in ancient China with international significance.

### **Part I**

Cheng Dawei, with the styled name of Rusi and assumed name of Binqu, from Shuaikou, Xiuning County of Anhui Province, was born on May 3rd, 1533 and dead on September 18th, 1606. "The Collection of Algorithms" was generally recognized as the works which has the greatest and long lasting influence. His invention, "measure foot-vehicle "is generally recognized as "the first tape measure in the world".

The lifetime of Cheng Dawei is truly a lifetime of zhusuan. Cheng was intelligent when he was a child. He is good at science of zhusuan. When he was very young, he was a little boy with wonderful calculation in the eyes of old people in his hometown. When he was about 20, he left his hometown and traveled the middle and back- ward reaches of the Yangtze River in order to expand field of vision and raise calculation skill. He visited famous teachers, read widely and studied seriously the science of zhusuan. At the age of 40, Cheng returned and thought at the riverside of Shuaishui. With 20 years' efforts and at the age of 60, Cheng finished the "Collection of Algorithms" which was published in May 1592 in Binqu and was popular in the world. The people who are engaged in zhusuan collected his works at home. Some people said that his book was the best of those calculation works such as "Four books and five classics". In 1598, Cheng Dawei edited a 4 volumes "Summary of Algorithms", which is more easily to spread. This year is 8 years away from his death.

Cheng Dawei spent 20 years on collecting materials, and another 20 years on writing and finished "Collection of Algorithms" which is applied math book and magnum opus of zhusuan. This book consists of 17 volumes. The main content of Volume 1 and volume 2 are about motto of elder wisdom and able generation, outline of arithmetic, explanation of math noun, length, capacity & weight, farmland system, pithy formula of addition & subtraction of zhusuan, etc. Volume 3 to volume 12 is about resolution and calculation of applied question with drawing. Volume 13 to volume 16 is about collection of difficult problems. Volume 17 is about various methods. The last appendix lists 51 kinds of math books from 1084 AD. The whole book consists of texts and pictures and it explains profound ideas in simple terms, which is very easy for us to remember and recite.

"The Collection of Algorithms" was spread eastward to Japan which usher in anew era. Famous expert of zhusuan, Yan Dunjie, has summarized in *Summary & Explanation of algorithms* about this period "A Japanese acted under orders of Toyotomi Hideyoshi and came to China to learn zhusuan at the end of Ming Dynasty and returned with the "Collection of Algorithms", then he wrote

I volumes' book and teach people in his country. In 1627 Japanese mathematician Yoshida Mitsuyoshi wrote "Jinko-ki", the postscript of which shows that this book has referred to the "Collection of Algorithms" .Our Chinese famous expert of zhusuan Mr. Yu Jieshi pointed accurately: "spreading to Japan and opening the history of zhusuan in Japan".

The time for the Japanese learner coming to learn zhusuan in China is from 1590 to 1598. But the "Collection of Algorithms" was published openly in 1592. So the spreading period to Japan is between 1592 and 1598. It was directly spread to Japan by the learner, not by the third country.

## Part II

Cheng's contributions to Chinese and world's history of zhusuan are as follows:

Firstly, accelerated the development from counter calculation to zhusuan. Cheng Dawei's era is the transition period from the combination of counter calculation and zhusuan to zhusuan. In books of calculation before him, people had solved problems of arithmetic by counter calculation or by combination of arithmetic by counter calculation and zhusuan. With 595 applied math problems in "Combination of Algorithms", Cheng throwaway traditional methods and only make use of zhusuan, which is important in Chinese history of zhusuan.

Secondly, he created the miracle of zhusuan works becoming bestseller. The "Collection of Algorithms" and the "Summary of Algorithms" created many records in terms of the number of editions, circulation, spread area and spread time. Preliminary remarks written by Wei Gengren, professor of Shanxi Normal University said "During 300 years from the end of Ming Dynasty to the Republic of China there are more than 100 editions which are reprinted by booksellers in different places. It is un - believable that the circulation is so bigk, the spread is so wide lasting in world history of mathematic. This shows the special charm of *the "Collection of Algorithms"* and also enlighten us how to write applied mathematics and popular science books.

Thirdly, it is the example of zhusuan export. *The collection of algorithms* was spread to Japan, which ushered in anew era of zhusuan. H they do not have Cheng Dawei's book, zhusuan will not develop so quickly in Japan and in the world there will not be so good situation of zhusuan. In the parade of Zhusuan Festival on Aug 8th, in Japan every year, the people raise highly a huge portrait "Talent of zhusuan", who is Ancient Chinese zhusuan expert, Cheng Dawei.

Fourthly, he preserved some names of classics for Chinese mathematics history. It has listed 51 kinds of mathematics works from 1084 to 1592. Among them 36 kinds were lost.

Fifthly, he standardized zhusuan for the first time. He standardized pithy formulas. Traditional pithy formula handing down from ancient times was basically standardized by Cheng Dawei. The spread area is very wide and the influence is lasting. At present, there are many people who use this method. The appearance of pithy formula of zhusuan formed zhusuan method with Chinese characteristic .It marked that Chinese math has come into a new era which is centered on zhusuan.

In a word, Cheng Dawei's contributions to Chinese & world zhusuan are incomparable. Because of this, in May 1994, International Zhusuan Theory Symposium organized by China Zhusuan Association was held in Huang-shan, Anhui Province, the hometown of Cheng Dawei .In October 1996, in the First World Conference on Zhusuan in Weifang, Shandong Province, 400 experts from different countries and areas visited historical relics of abacus exhibited in Cheng Dawei Memorial Hall with great interests.

### Part III

Strengthening the research of Cheng Dawei and his works is not only the important task of Chinese zhusuan field but also the subject of world Zhusuan field. Because in long term, the research of *the "Collection of Algorithms"* is not deep and complete.

In fact, the research content of Cheng Dawei and his *"Collection of Algorithms"* is very rich and the subject is very wide. For example:

-During his childhood he left his hometown and traveled in the middle and backward position of the Yan-gtze River. Whether is he a traditional traveling business- man or touring to study?

-The edition process of 17 volumes of Cheng Dawei's *the collection of algorithms*  
-Cheng Dawei referred to different methods of experts of zhusuan and edited *the collection of algorithms*.

What are "what were methods not mentioned in former works"? What were he added? "What were he deleted?" What were things he detailed? "What were he revised?" What are his gains in depth of comprehension?

-Had the Japanese learner gone to old Huizhou? Was there direct contact between Cheng Dawei and the learner? Why was the learner so interested *in the collection of algorithms* and brought it back to Japan as teaching material?

- The process of spread and ushering in a new era in a new era in Japan of the *collection of algorithms*?

-Why was Cheng Dawei thought as "Talent of zhusuan "in Japan? How about the course?

\_ Why under “physiocracy & restraining business” was the collection of algorithms so popular about 300 years? What are enlightening to us?

\_ Why did nobody dare to reprint the collection of algorithms after entering Qing Dynasty? Was it only because of avoiding disaster?

**Courtesy:**

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