

THE STAR CALLED "CHI-SHIH"^{A, 1} THAT WASN'T

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For many a year the ancient Chinese star named. Chi-Shih, Tseih-She, or Tsi-Chi (piled-up corpses, or accumulated corpses) has been associated with the well-known variable star Algol (β Persei). This nomenclature has been noted by many astronomers. In particular, it is mentioned in two modern books, *An Introduction to The Study of Eclipsing Variables* by Kopal(1946)² and *Interacting Binary Stars* by Sahade and Wood(1978)³. Recently Budding(1988) called for the search of the brightness variation of Algol, again referred to as Tsieh-She, in ancient records as a continuing effort in the study of the nature of this interesting star.⁴ But as one looked into the Chinese star lists and star charts, one found that Chi-Shih might not be Algol as some astronomers thought.⁵ As seen in many Chinese star lists, Algol has always been called Ta-Ling-Wu,^b the fifth(wu) one of the group of eight stars called Ta-Ling, or Daling(Imperial Tomb),^c but not Chi-Shih. A chart of Ta-Ling and Chi-Shih is shown in Fig. 1a, copied from *Pu Tien Ko*,^{d, 6} which gives the relative positions of the stars in question. The configurations of the star groups are also shown in other Chinese star charts, some of which will be mentioned later. This paper is written in order to set the record straight.

When and where the original misidentification occurred are difficult to trace. However, one finds the misnomer in the book, *Sing Chin Khao Youen*,^e *Uranographie Chinoise* by Schlegel(1875),⁷

"Cet asterisme consiste en une seule etoile noire, dont nous avons indique la position dans la sphere dans notre gravure a la page 349, dans le centre de la grande fosse, et repondant a l'etoile β dans la tete de Meduse. Cet asterisme represente les cadavres qu'on jetait dans la fosse commune. Sa clarte presage que les morts seront(nombreux) comme le sable.* Quand Mars entre dans ce signe, cela presage qu'il y aura beaucoup de gemissements et de pleurs dans l'empire : c'etait, par consequent, un presage heureux si cet asterisme etait invisible ou obscurci."

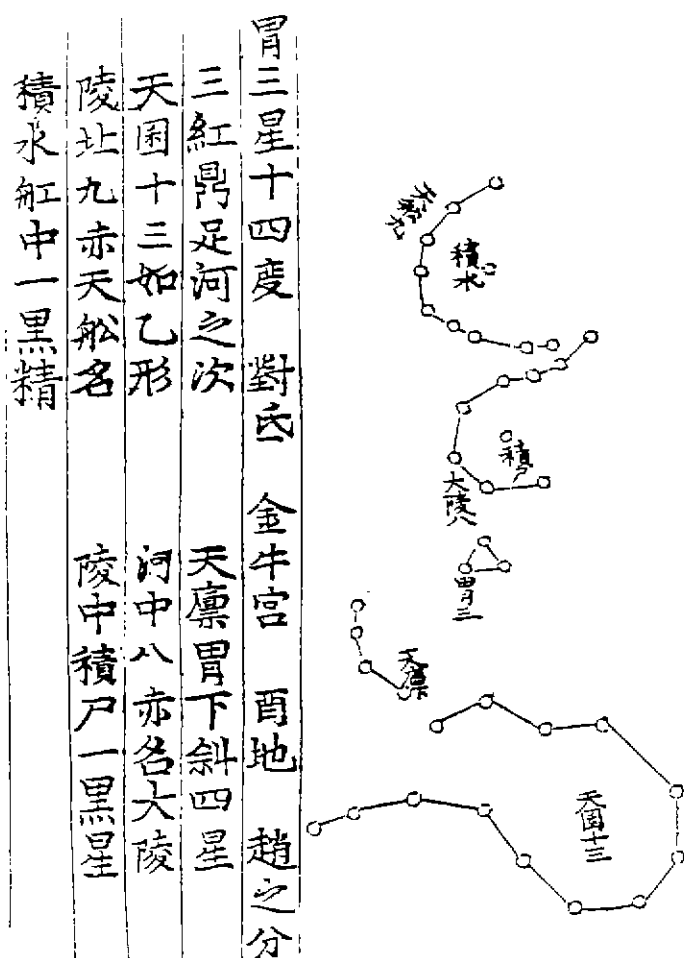


Fig. 1a. The configuration of Ta-Ling(eight stars) is shown as a hook above the triangular figure; Chi-Shih (in Perseus) is to the right of Ta-Ling.

In the figure on p. 349 of his book, Schlegel showed that Ta-Ling was the group of stars, κ , 30, ι , ω , ρ , 24, 17 Persei and 15 Trianguli, which he referred to *Tien youen li li*, or *Thien Yuan Li Li*(Thien Yuan Calendar)¹, a book written by Hsu Fa² in 1682. One of the footnotes in his text, here marked as* in the quoted passage, is referred to *Hsing Chin* (Classics of Stars)³ indicating variation of the brightness of this star.⁴ Schlegel's book might indeed be the source of misinformation to many astronomers in the modern time.

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Needham(1959)¹⁰ wrote,

"Schlegel sought for as many correspondences as possible between the Chinese and the European nomenclatures because he was anxious to prove that Chinese astronomy was the origin of all astronomy. Most of his arguments, however, seem very far-fetched."

Also Needham included in a footnote in his English translation of what Schlegel wrote,

"Another correspondence, suggested to us by Mr. D. H. Kelley, might be seen in the names of Algol(β Persei). This star is called in Chinese Chi-shih(Heaps of corpses) and is surrounded by other stars in Perseus forming a constellation called Ta-ling(common grave); Algol is of course al-gul, a demon of death, but it was only what the Arabs made of the gorgon's head...."

Concluding this matter, he continued,

"Perhaps a re-examination of these matters in the light of the more accurate and extended knowledge now at our disposal, and with the collaboration of egyptologists, assyriologists and iranists, would justify some of Schlegel's comparisons; but the impression of one reader, at any rate, has been that his chapter on this subject is too full of special pleading to convince, especially when the role of probable coincidence is given due allowance."

As noted by Pan and Wang(1981),¹¹ there are often many errors in comparing and matching the lists of Chinese star names with those of Western names. This is mainly due to the uncertainty of the recorded Chinese coordinates. These authors compiled a list of 360 stars whose positions were observed in the Sung' dynasty during the Huang You period(1049~1053). They transformed the recorded Chinese coordinates, *guji du*^k and *ruxiu du*^l(see Kiang, 1972),¹² to the corresponding declinations and right ascensions of A. D. 1052, and then calculated the 1975 coordinates. These star coordinates can be compared directly with the modern coordinates of the Western stars.

To show that Chi-Shih is in the current Chinese literatures, two works are considered here. One is the *Astronomical Chapters of Chin Shu*^m, a book by Ho(1966).¹³ This book is an English translation from Chin Shu, or Jin Shu, which is a history of the Chinⁿ dynasty(256~420). Among the Chinese groups of stars in the book, Ta-Ling consists of eight stars, η , τ , ι , κ , β , ρ , 16, and 12 Persei. Chi-Shih is the star half-enclosed by Ta-Ling, and is called π Persei. The other work is The Star List of Huang You, the jour-

nal article by Pan and Wang(1981) as mentioned above, in which Chi-Shih is ρ Per. Why it is given as ρ Per instead of π Per is a puzzle which is not intended to be solved here.

To add perplexity to the predicament, it happens that there is yet another Chi-Shih, which is the star at the center of Yu-Kuei, or Yugui(ghost vehicle),⁹ the 23rd *hsui*¹⁰(lunar mansion). In Ho's book, this star is given as 38 Cancri, and the other four stars of Yu-Kuei are γ , δ , θ and η Cancri. In the list of Pan and Wang. it is the Praesepe. This Chi-Shih in Cancer is shown in Fig. 1b, also from *Pu Tien Ko*, where it is described as

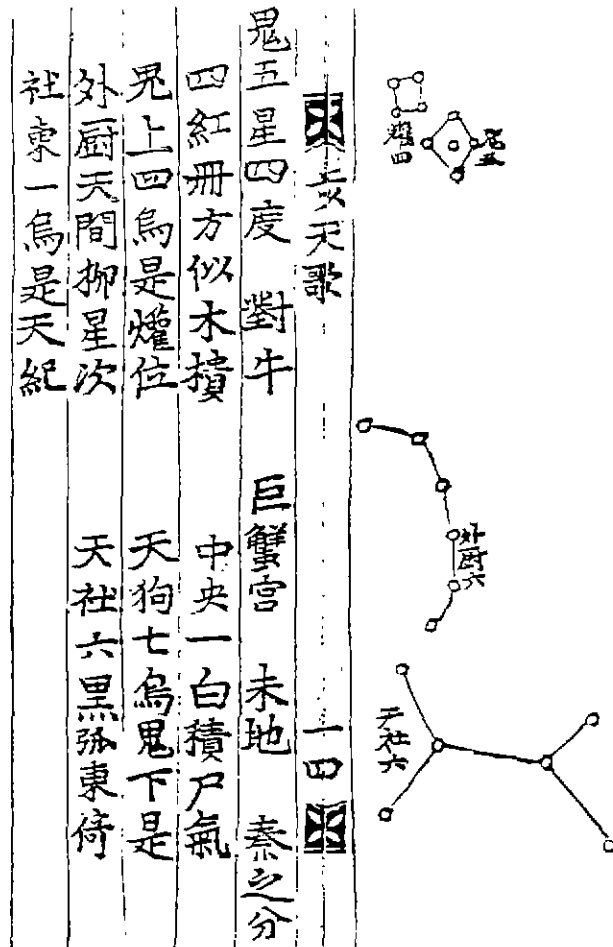


Fig. 1b. The configuration of Yu-Kuei(five stars) is diamond shaped with Chi-Shih(in Cancer) in the middle.

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a white gas, while Chi-Shih in Perseus, Fig. 1a, is described as a black star.¹⁴

These two configurations of the star groups are shown on other Chinese star charts. For example, they may be seen on the map in *Hsin I Hsiang Fa Yao* (New Description of an Armillary Clock)^a which was written by Su Sung^r around 1091 in the Sung dynasty,¹⁵ the Suchow (Su Zhou)^s planisphere¹⁶ which was prepared by Huang Shang^l in 1193 in the Southern Sung^u dynasty, and the chart of the armillary-sphere projection of celestial bodies by Hsu Kwan-Chiⁱ (1562~1633) in the Ming^w dynasty.¹⁷ Thus on the Chinese star maps of Sui,^x Sung, Ming and modern days, Chi-Shih is clearly separated from the star group Ta-Ling.

In conclusion, the name, *Ta-Ling-Wu*, has always been used by the Chinese for β Persei, even in modern literature. In the coming years, while astronomers still may ponder the nature of the Demon star, Algol, they can leave the "corpses" to rest in peace.¹⁸

References

1. These are the Wade-Giles spellings for the Chinese pronunciations. In the Pinying transcription system, which becomes standard usage in recent years, this name is Ji-shi.
2. Z. Kopal, *An Introduction to the Study of Eclipsing Variables* (Harvard University Press, Cambridge, Mass. 1946), p. 3. As a student of close binaries, the writer was fascinated by Prof. Kopal's account.
3. J. Sahade and F. B. Wood, *Interacting Binary Stars* (Pergamon Press, New York, 1978), p. 131, where this writer wrote the Chinese characters of Chi-Shih for his teachers, colleagues, and friends.
4. E. Budding, "Was there an ancient knowledge of Algol's variability?" *South Stars* 32 (1988), 180~190.
5. The idea that Chi-Shih might not be Algol came to the writer sometime after he obtained from Prof. I. S. Nha of Yonsei University, Korea, a copy of the book, *Pu Tien Ko* in 1981.
6. This copy appears to be a reproduction of a modern version of the original book which was written in China by Tan Yuan Tzu (Wang Hsi-Ming)^{aa} in the Sui dynasty (581~618). It is probably a copy of *Hsi Pu Tien Ko* (West Pu Tien Ko),^{bb} a revised version produced in the Jesuit period since it contains Chinese names of the Western constellations; for example, the constellation of Chin niu^{cc} (golden cow or Taurus) was written next to the

- chart containing Perseus, and Chu hsieh^{dd}(giant crab or Cancer) next to the chart containing Cancer.
7. G. Schlegel, *Sing Chin Khao Youen, Uranographie Chinoise*(La Haye, Libraire De Martinus Nijhoff, 1875), 349~351, where the writer got the wrong idea.
 8. This star manual is said to be originated from writings of both Shih Shen^{ee} of the state of Chhi^{ff} and Kan Te^{gg} of the State of Wei^{hh} during the time of the Warring States(475 ~220 BC). The writing of the stars appears to have an astrological overture.
 9. The footnote in Chinese" says essentially "dead bodies [pile up] like mountain when Chi-Shih is bright."
 10. J. Needham, *Science and Civilization in China*, Vol. 3(Cambridge University Press, London, 1959), p.273.
 11. N. Pan and D. C. Wang, "The star list of Huang You," *Acta Astronomica Sinica*, 22 (1981), 107~119. ["The Huang-You star list of the Song dynasty—a Chinese star list of the early medieval period," *Chinese Astronomy and Astrophysics*, 5(1981), 441~448.] Their list of stars, in both Chinese and Western names, is considered to be quite reliable.
 12. T. Kiang, "The past orbit of Halley's comet," *Mem. R. astr. Soc.* 76(1972), 22-66. A good account of the Chinese Uranography is given.
 13. P.-Y. Ho, *The Astronomical Chapters of the Chin Shu*(Mouton & Co., Paris, 1966).
 14. The lyric descriptions of the stars accompanied with the star charts are in seven character lines which are arranged in two vertical lines in a column from right to left. In Fig. 1a, the sixth line says, "Chi-Shih in the Tomb is a dark(black) star,"ⁱⁱ and in Fig. 1b, the second line says, "the white [object] in the middle is Chi-Shih gas."^{kk}
 15. J. Needham(ref. 7), p.277, where the map is shown.
 16. W.C. Rufus and H.-C. Tien, *The Soochow Astronomical Chart*(University of Michigan Press, Ann Arbor, 1946). The Soochow(Suchow) Astronomical Chart is an ink rubbing of the thirteen century stone engravings. It shows only seven stars of Ta-Ling, as described by these authors in their explanatory notes ; "Seven stars of Perseus hooked about [Chi-Shih]." Without references, they also wrote about Chi-Shih : "The heap of corpses [is] a single star, Algol, head of Medusa." The star map is also shown on p.280 of ref. 7. At the meeting of the International Astronomical Union Colloquium 107, *algols*, Dr. R. H. van Gent, Astronomical Institute Utrecht, called the writer's attention to this reference. Pan and Wang(ref. 11) had consulted the maps of *Hsin I Hsiang Fa Yao*(ref. 15) and of Suchow planisphere in their work.
 17. B. Hsu, *Free China Review*, 36(1986), p.18, where the map is shown.

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18. The 4.6-magnitude A2V star, π Persei, has not been observed to be variable in modern time. But did Chi-Shih change its brightness in the ancient time as suggested in the writing of *Hsing Ching*(ref. 9)? This question is certainly in need of future investigation.

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|--------|---------|-------------|-------------|
| a 積尸 | j 皇祐 | s 蘇州 | dd 巨蟹 |
| b 大陵五 | k 去極度 | t 黃裳 | ee 石申 |
| c 大陵 | l 入宿度 | u 南宋 | ff 齊 |
| d 步天歌 | m 晉書 | v 徐光啓 | gg 甘德 |
| e 星辰考原 | n 晉 | w 明 | hh 魏 |
| f 天元曆理 | o 輿鬼 | x 隋 | ii 積尸明則死人如山 |
| g 徐發 | p 宿 | aa 丹元子(王希明) | jj 陵中積尸一黑星 |
| h 星經 | q 新儀象法要 | bb 西步天歌 | kk 中央一白積尸氣 |
| i 宋 | r 蘇頌 | cc 金牛 | |