

**Pharmacognostical Studies on the Crude Drugs of  
Orchidaceae from Taiwn (IX)<sup>1)</sup>  
On “Chheng-thian-liông-thiâu” (青天竜柱)**

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(Received October 27, 1981)

The crude drug, “Chheng-thian-liông-thiâu” (青天竜柱), has been used in Taiwan as a folk remedy for hemoptysis, epistaxis, chronic dysentery, and as a tonic, etc.

The botanical source of “Chheng-thian-liông-thiâu” was believed to be the entire plant of *Spiranthes sinensis* (PERS.) AMES. of Orchidaceae. In China, the plant, *S. sinensis*, is named “Pân-lóng-shēng” and is used as a crude drug for fever, cough, hemoptysis, leucorrhoea, etc. But both above two things have not yet been proved. To clarify the botanical origin of “Chheng-thian-liông-thiâu,” found in Taiwan herb stores, histological studies were made and its characteristics compared with illustrations and morphological descriptions of “Pân-lóng-shēng” recorded in “Zhí-wù-míng-shí-tú-kào” (植物名実図考).

The results show that “Chheng-thian-liông-thiâu” is prepared from the entire plant of *S. sinensis*; that “Pân-lóng-shēng” collected from Peiking is derived from *S. sinensis* var. *amoena*; and that “Pân-lóng-shēng” recorded in “Zhí-wù-míng-shí-tú-kào” may also be derived from *S. sinensis* or *S. sinensis* var. *amoena*.

“Chheng-thian liông-thiâu\*” (青天竜柱), a precious folk remedy in Taiwan, has been used as a crude drug in the treatment of hemoptysis, epistaxis, headache, chronic dysentery, meningitis, and as a tonic, etc.<sup>3)</sup> In addition to its formal name, “Chheng-thian-liông-thiâu,” it has also been named on the Taiwan market as “Chheng-liông-thiâu\*” (青竜柱), “Chheng-bêng-chhàu\*” (清明草), and “Chhun-thang\*” (春虫).

“Chheng-thian liông-thiâu” has been assumed by Kan<sup>3)</sup> to be derived from the entire plant of *Spiranthes sinensis* (PERS.) AMES. of the Orchidaceae. However this has not been proved yet.

In China, the plant, *S. sinensis*, is named “Pân-lóng-shēng” (盤竜参), which has been referenced in “Zhí-wù-míng-shí-tú-kào” (植物名実図考)<sup>4)</sup>, and is used as a crude drug in the treatment of fever, cough, hemoptysis, vertigo, low back pain, emission, leucorrhoea, furunculosis, keratitis and good for general weakness.<sup>5)</sup>

This work consists of histological studies, on the commercial drug “Chheng-thian-liông-thiâu” in the Taiwan herb stores and on the crude drug “Pân-lóng-shēng” collected from Peiking, and was undertaken in order to ascertain their derivative plants. In addition, they were compared with the illustrations and morphological descriptions of “Pân-long-shēng” recorded in “Zhí-wù-míng-shí-tú-kào.”

1) Part VIII: C. C. Lin and T. Namba, *Shoyakugaku Zasshi*, **35**, 303 (1981).

2) Location: 2630, Sugitani, Toyama, 930-01 Japan.

\* U. L. Kam, “A Dictionary of the Amoy Vernacular,” The Ho Tai Hong Printing Factory, Tainan, 1955, p. 17, 85, 89, 124, 458, 739, 749, 752.

3) W. S. Kan, “Manual of Vegetable Drugs in Taiwan,” The Chinese Medicine Publishing Inc., Taipei, 1968, Part III, p. 84 (in Chinese).

4) C. C. Wu, “Zhi-wu-ming-shi-tu-kao,” Shun-wo Publishing Inc., Shanghai, China, 1957, Vol. I. 15, p. 404 (in Chinese).

5) Chiang Su New Medicinal College, “Dictionary of Chinese Crude Drug” (中藥大辭典), Shanghai Scientific Technologic Publisher, Shanghai, 1977, p. 2188 (in Chinese).

## Experimental

### Materials

Chheng-thian-liông-thiâu:

1. In-fun Herb Store (瀛芳百草舖), Taichung, March 18, 1979.
2. Chên-an Temple (鎮安廟), Hualien, July 7, 1979.

Pàn-lóng-shéng:

The samples were supplied by Specimen Room of Pharmaceutical Department of Peiking Medical College (1981).

### Comparative plants

1. *Spiranthes sinensis* (PERS.) AMES., Taipei, March 20, 1979.
2. *S. sinensis* (PERS.) AMES. var. *amoena* (M. BIEBERSTEIN) HARA, Toyama Prefecture, Toyama; Kyoto Prefecture, Maizuru; Fukui Prefecture, Fukui, Oct., 1980; Sri-Lanka, Hakgala Botanic Garden, Feb., 1980 (f. *albescens* HONDA).

### External structures

1. Chheng-thian-liông-thiâu (Plate 1-A) and *S. sinensis*

The drug is sold as a mass of the dried entire plant. The leaves usually number 5 and are linear-ob-lanceolate in outline, from 8 to 15 cm long and 4 to 10 mm wide, acute at the apex, obtuse at the base, and have margins which are nearly entire. It is a yellow-brown colour. The stem is about 10 to 25 cm long. The root attains a diameter of about 2 to 4 mm, externally light yellow-brown, internally whitish.

The drug has marked odour and tastes slightly bitter.

2. Pàn-lóng-shéng (Plate 1-B) and *S. sinensis* var. *amoena*

The external structures are the same as those of Chheng-thian-liông-thiâu except that its flowering stem has hairs.

### Internal structure

1. Chheng-thian-liông-thiâu

(Leaf) Fig. 1-B

The transverse sections show that the upper surface of the midrib is slightly concave and the lower surface projects distinctly. The upper epidermis of the midrib consists of one layer of elliptical to oblong or circular cells measuring from 40 to 60  $\mu\text{m}$  in length and 30 to 40  $\mu\text{m}$  in width; that of the lamina is composed of a single layer of oblong or elliptical to circular cells varying from 35 to 80  $\mu\text{m}$  in length and 20 to 40  $\mu\text{m}$  in width. The lower epidermis of the midrib consists of a layer of circular cells having a diameter of about 30 to 40  $\mu\text{m}$ ; that of the lamina is composed of a layer of elliptical to circular cells about 30 to 80  $\mu\text{m}$  in length and 20 to 40  $\mu\text{m}$  in width. Both the upper and lower epidermal cells have thick, outer periclinal walls covered with a dentate cuticle and having stomata on both surfaces. The palisade

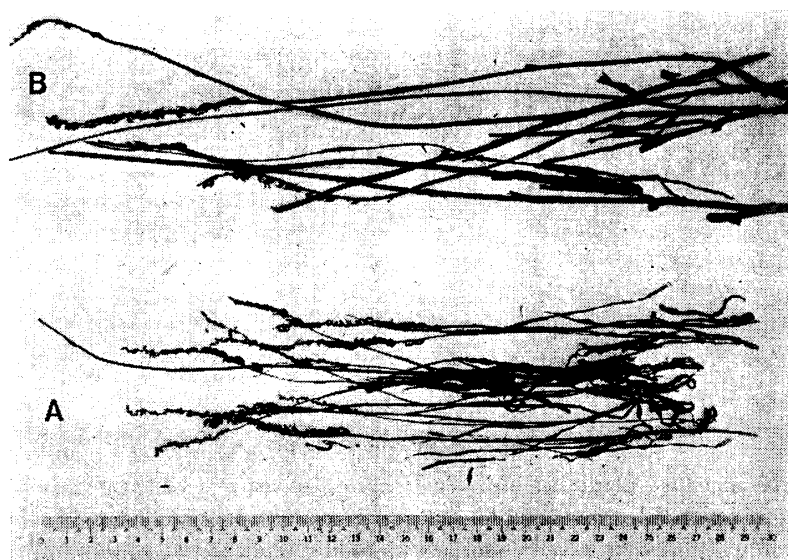


Plate 1. The Goods of "Chheng-thian-liông-thiâu" (A) in the Taiwan Herb Stores and "Pàn-lóng-shéng" (B) Collected from Peiking.

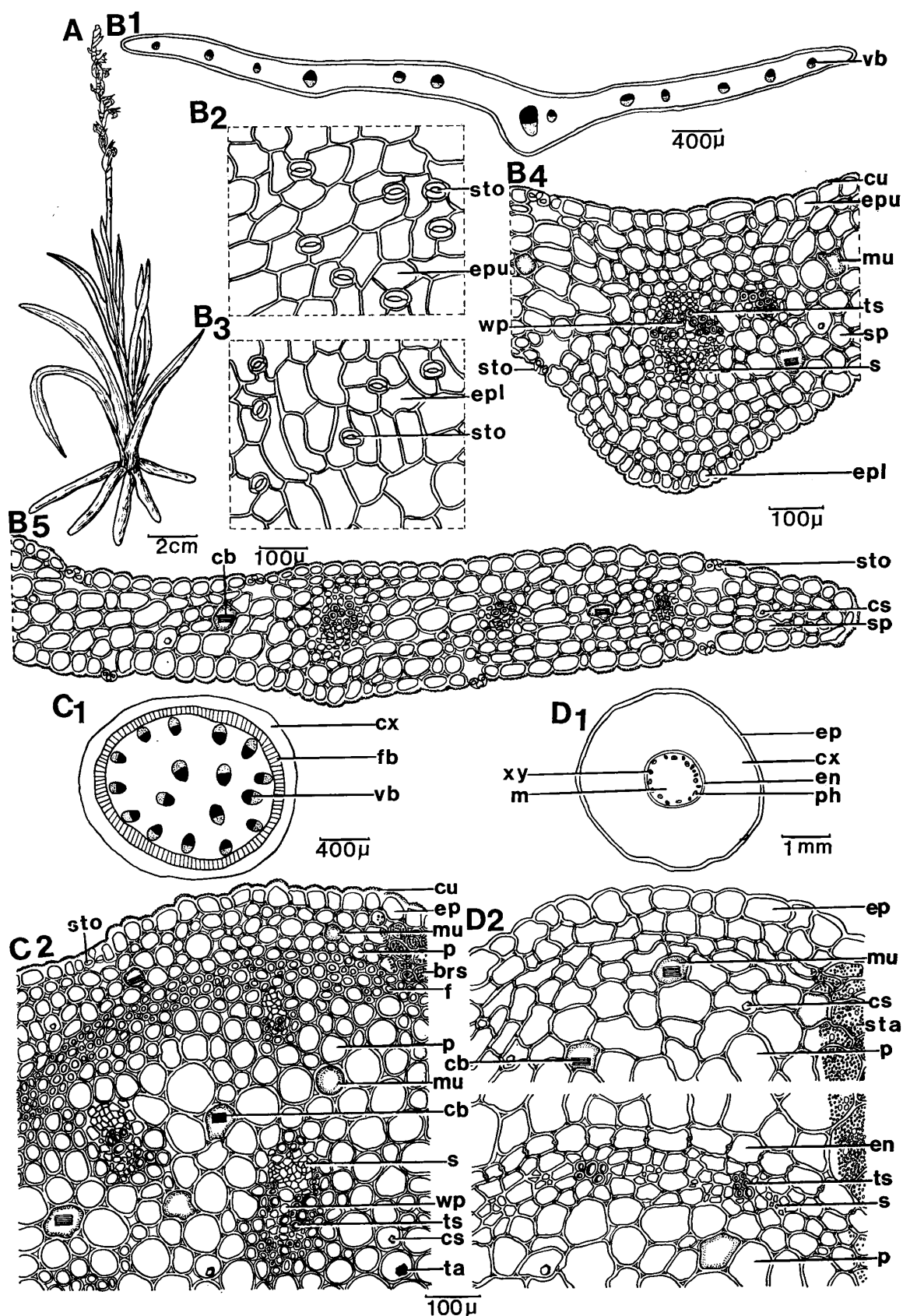


Fig. 1. *Spiranthes sinensis*

A, sketch of entire plant; B, transverse sections of leaf. 1, diagram; 2, 3, surface view; 4, 5, detailed drawings. C, transverse sections of stem. 1, diagram; 2, detailed drawing. D, transverse sections of root. 1, diagram; 2, detailed drawing.

tissue is indistinct or rarely composed of a single layer of elliptical cells varying from 40 to 60  $\mu\text{m}$  in length and 30 to 40  $\mu\text{m}$  in width. The spongy tissue is composed of 2 to 4 layers of circular to elliptical cells having a length of about 30 to 80  $\mu\text{m}$  and a width of about 30 to 40  $\mu\text{m}$ . Some cells in this region contain mucilage and calcium oxalate in raphide bundles about 40 to 60  $\mu\text{m}$  long and in solitary crystals about 10 to 15  $\mu\text{m}$  in diameter. The intercellular air space is frequently observed on the mesophyll. Through the center of the mesophyll course the collateral vascular bundles, with xylem above and phloem beneath. The xylem portion consists of spiral tracheids about 10 to 20  $\mu\text{m}$  in diameter and wood parenchyma cells. The phloem is made up of distinct sieve tubes. The surface view of the upper epidermis reveals polygonal cells; that of the lower epidermis reveals elliptical to polygonal cells. Numerous elliptical stomata are present on the both surfaces. The stomata, measuring about 40 to 45  $\mu\text{m}$  in length, are of the Ranunculaceous type and are surrounded by 2 to 4 neighboring cells (Fig. 1-B-2, 3).

The general structures of the leaf base are the same as those of the leaf blade.

(Stem) Fig. 1-C

The transverse sections are more or less circular in outline.

The outermost tissue is the epidermis which is composed of circular or elliptical to irregular cells which measure from 30 to 70  $\mu\text{m}$  in diameter and have thickened outer walls covered with a dentate-wavy slightly smooth cuticle. The stomata are present on the epidermis in very small number but occur very rarely on the epidermis of the lower part. Beneath the epidermis is a cortex composed of 3 to 4 layers of circular or more or less elliptical parenchyma cells varying from 30 to 50  $\mu\text{m}$  in diameter. These cells are packed with brown substance. Scattered within the cortex are several cells containing mucilage and calcium oxalate in raphide bundles and in solitary crystals but rarely in clustered crystals. Found within the innermost region of the cortex is a distinct compact sclerotic cylinder composed of 3 to 4 rows of fibers which measure from 15 to 40  $\mu\text{m}$  in diameter and 650 to 1,100  $\mu\text{m}$  in length. Scattered irregularly throughout the stele are collateral bundles. Each vascular bundle shows an outer phloem and an inner xylem. The xylem is composed of spiral tracheids varying from 15 to 30  $\mu\text{m}$  in diameter and wood parenchyma cells. The ground tissue of the stele is composed of circular cells about 40 to 100  $\mu\text{m}$  in diameter, some of which near the fibrous ring and vascular bundles have sclerified and lignified walls. Mucilage, tannin, calcium oxalate in raphide bundles and in solitary crystals may be found in the stele.

(Root) Fig. 1-D

The transverse sections are circular and reveal an outer peripheral cortical portion and a central stelar region. The outermost tissue is the epidermis which is composed of rectangular to irregularly polygonal cells varying from 50 to 90  $\mu\text{m}$  in length and 40 to 70  $\mu\text{m}$  in width. The walls of these cells have spiral crests and are somewhat lignified. Below the epidermis is a parenchymatous cortex composed of several layers of thin-walled, elliptical to irregular cells having a length of about 100 to 220  $\mu\text{m}$  and a width of about 60 to 150  $\mu\text{m}$ . Many cortical cells contain starch grains which are mostly simple or compound and have a diameter of about 15 to 20  $\mu\text{m}$ . Some of the cortical cells possess mucilage, brown substance, and calcium oxalate in raphide bundles and in solitary crystals. An endodermis is also present, having a distinct casparian strip, and composed of a layer of rectangular to oblong cells about 40 to 90  $\mu\text{m}$  in length and 35 to 60  $\mu\text{m}$  in width. Scattered within the stele are radial vascular bundles of 9 to 14 xylem patches alternating with as many phloem arms. The xylem is composed of spiral tracheids reaching a diameter of 15 to 30  $\mu\text{m}$ , while the sieve tubes of the phloem are distinct. The parenchyma cells of the medulla measure in diameter from 50 to 200  $\mu\text{m}$ . The cell contents are the same as those of the cortical cells.

All the structures of "Chheng-thian-liông-thiâu" described previously are completely the same as those of *S. sinensis*.

## 2. Pán-lóng-shéng and *S. sinensis* var. *amoena*

The internal structures are completely the same as those of *S. sinensis*. But calcium oxalate in clustered crystals can usually be found in the stem of this species collected from Sri-Lanka.

## Results and Discussion

1. The characteristics of the external and internal structures of "Chheng-thian-liông-thiâu" show that "Chheng-thian-liông-thiâu," as found in the Taiwan herb stores, is derived from the entire plant of *Spiranthes sinensis* (PERS.) AMES. and that "Pán-lóng-shéng" collected from Peiking is derived from the entire plant of *S. sinensis* (PERS.) AMES. var. *amoena* (M. BIEB.) HARA. The plant, *S. sinensis*, is widely dis-



Plate 2. "Pán-lóng-shēng" Recorded in "Zhí-wù-míng-shí-tú-kào".

tributed in India, Siberia, China, Japan, Indo-China, Malaya peninsula, Java, Sumatra, the Philippines, Borneo, New Caledonia, Australia, New Zealand and Tasmania. Generally, varieties in the north are with hairs, while those in the south are without. However, the distribution boundaries are not distinct.<sup>6)</sup> The internal structures of these two plants, *S. sinensis* and *S. sinensis* var. *amoena*, are too similar to be distinguished. The hairs of the flowering stem may be correlated with the geography, wheather or the special environment of the island. It would be of some interest to dertemine whether or not these two plants are actually the same species.

2. The description of "Pán-lóng-shēng" as recorded in "Zhí-wù-míng-shí-tú-kào" is as follows:

"Pán-lóng-shēng" also grows on the slope of the mountain in Yuán-zhōu (袁州) [present in Yí-chūn Prefecture (宜春縣) of Kiangsi Province] and Héng-zhōu (衡州) [present in Heng-yang Prefecture (衡陽縣) of Hunan Province] in China. Their long leaves are similar to the young leaf of *Hemerocallis* plant but are larger and more easily broken. The flowers emerge in the spring, secund, spiral in shape, coloured pink, about the size of beans, with a recurved, denticular lip and a white column, and are arranged on the stem in a spike formation. The root contains mucilage. It has been used by herbal doctors of Héng-zhōu, and as a remedy for general weakness in the south of Yunnan. The root of "Pán-lóng-shēng" is similar to asparagus but is smaller and yellow (Plate 2). *S. sinensis* or *S. sinensis* var. *amoena* is widely distributed in China,<sup>7-15)</sup> common in grassy, moist lowlands and slopes of mountains, above 400 to 3,211

- 6) F. Maekawa, "The Wild Orchids of Japan in Colour," Seibundo-Shinkosha, Tokyo, 1974, p. 36, 244 (in Japanese).
- 7) Institutum Botanicum Academia Sinicae, "Incographia Cormophthorum Sinicorum," Tomus V, Scientific Publishing Co., Peking, 1976, p. 658 (in Chinese).
- 8) Instituto Botanico Boreali-Occidentali Academiae Sinica, "Flora Tsinlincensis," Tomus I, Scientific Publishing Co., Peking, 1976, p. 419 (in Chinese).
- 9) Health Bureau of Hubei Revolutionary Committee, "Chinese Herb Flora of Hubei" (湖北中草藥誌), Hubei People Publishing Co., 1978, p. 918 (in Chinese).
- 10) Health Bureau of Neimenggu Self-governing Dominion, "Chinese Herb Flora of Neimenggu" (內蒙古中草藥), Neimenggu Self-governing Dominion People Publishing Co., 1972, p. 666 (in Chinese).
- 11) Health Bureau of Shanxi Revolutionary Committee, "Chinese Herb Flora of Shanxi" (山西中草藥), Shanghai People Publishing Co., Shanghai, 1972, p. 363 (in Chinese).
- 12) Yunnan Medicine Institute, "List of Medicinal Plant of Yunnan" (雲南藥用植物名錄), Kunming, p. 406 (1975).
- 13) Instituto Botanico Huanan, "Flora Guangzhounica" (廣州植物誌), Scientific Publishing Co., Peking, 1956, p. 726 (in Chinese).
- 14) Instituto Botanico Guangdong, "Flora Hainanica" (海南植物誌), Vol. 4, Scientific Publishing Co., Peking, 1977, p. 197 (in Chinese).
- 15) Instituto Botanico Jiangsu, "Flora Jiangsunica" (江蘇植物誌), Jiangsu People Publishing Co., 1977, p. 406 (in Chinese).

m. Their spikes have many spirally arranged flowers. These flowers are rather closed, and are pink or rarely white. The leaves are linear, and the stems are rather stout or slender. The roots are elongate, fleshy, white, and cylindrical.

The habitat, locality and morphological characteristics of *S. sinensis* or *S. sinensis* var. *amoena* are completely the same as those of “Pán-lóng-shēng” recorded in “Zhí-wù-míng-shí-tú-kào.” It can be presumed that “Pán-lóng-shēng” is also derived from the *S. sinensis* or *S. sinensis* var. *amoena*.

3. The entire plant of *Spiranthes* has been used as a folk medicine in Taiwan and in the China mainland. The *Spiranthes* plant is not found used elsewhere. Its medicinal value will be subsequently investigated.

**List of Abbreviation:** **cu**, cuticle; **cx**, cortex; **cs**, solitary crystal; **cb**, raphides in bundle; **ep**, epidermis; **epu**, upper epidermis; **epl**, lower epidermis; **f**, fiber; **fb**, fiber bundle; **en**, endodermis; **p**, parenchyma; **ph**, phloem; **mu**, mucilage; **sto**, stoma; **m**, medulla; **sta**, starch; **ta**, tannin; **ts**, spiral tracheid; **vb**, vascular bundle; **wp**, wood parenchyma; **sp**, spongy tissue; **brs** brown substance.