‘Little hedgehog’ (*Paeonia suffruticosa* ‘Xiao Ci Wei’)—A Unique Chinese Tree Peony Cultivar Possessing Special Bicolored Petals With Tubular Tip Structure (Paeoniaceae)

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Abstract. There exist large accumulations of natural genetic diversifications under the natural and artificial selections on the flower among the Chinese tree peony cultivars incited by ornamental and medicinal uses in the past over 1500 years in China. *Paeonia suffruticosa* ‘Xiao Ci Wei’ is a unique Chinese tree peony cultivar possessing special bicolored petals with tubular tip structure (Paeoniaceae). This natural mutant is not only a unique ornamental, but also a valuable material for scientific researches in Evodevotics.

Because it is well-known, there exist more than 1000 Chinese tree peony cultivars with various kind of flower colors and flower forms selected artificially for ornamental and medicinal uses in the past over 1500 years, as introduced in various publications (Li, 2006; Page, 2005; Wang, 1998). Traditionally, Chinese breeders (flower farmers) and/or tree peony gardens are always very proud of their new cultivars bred by themselves. These have greatly promoted the accumulation of natural genetic diversifications under the natural and artificial selections on the flower among the Chinese tree peony cultivars. As part of the work of a project for making an assessment on germ-

plasm resources of Chinese tree peony cultivars (Chen et al., 2005), here we report a Chinese tree peony cultivar with unique morphologic characteristics.

Origin

‘Little hedgehog’ (*Paeonia suffruticosa* ‘Xiao Ci Wei,’ and ‘Xiao Ci Wei’ in Chinese pronunciation or Chinese pinyin) is a tree peony cultivar of Caozhou Hundred-Flower Garden, Heze, Shandong Province, China. In 1978, Jing-yu Sun (head of the technician group) together with the other technicians found a unique flower produced by a seedling among a lot of seedlings in Caozhou Hundred-Flower Garden and gave it this cultivar name, because the flower is in globular form, may make people connect with the little hedgehog mentally. The plant was divided into four ramets soon after naming and has also been propagated by grafting. Its parents are unknown.

Description and Performance

Plant. Two plants (ramets) of ≈28-years-old, growing nearly under the crown of a big tree (*Diospyros kaki* Linn., Ebenaceae), ≈6 m east from the Tree Peony Female Celestial sculpture, were investigated. The plants are ≈110 cm high, with a crown range from 90 to 98 cm in the direction of north to south and

103 to 119 cm west to east. Number of stem at basal level each plant is four with the diameter of the largest stem is 4.0 to 5.0 cm. There are six to eight flowers and flowerbuds on each plant, because scions have been taken from the plants in the previous years.

Flower. The flower in full blossom is globular, looks like a little hedgehog in shape, 11.5 to 15.6 cm in diameter, 8.0 to 9.5 cm in height (see Fig. 1). From the base upward, the color of grained petals becomes lighter gradually from light purple (RHS 75B) to purple (RHS 75D). A fine tubular (cylindrical) structure formed by the narrow and thin, upper petal tissue part (3.5–5.0 mm wide, 1–1.2 cm long), through conduplication along with the central line of the inner petal, gray-green (RHS 195A, B) in color or mixed more or less with nonuniform gray-purple (RHS 186B), ≈2 mm in diameter. Two tiny lobes (≈1.5 mm long and wide) at the upper end of each petal enveloped the upper mouth of the tube by turning around.

At the beginning of the flowering process, the bud grows and opens slightly, and becomes a kind of “convex-laminated flower-bud” as called by the local flower farmers (as shown in the upper and right corner of Fig. 1), which was 4.5 to 5.5 cm in diameter and ≈3.6 cm in height. The undeveloped petals, green (RHS 138B) to gray-green (RHS 195A), suffused with some gray-red color (RHS 182 C, D) slightly. The stage of “convex-laminated flower-bud” may last for 5 to 8 d before entering the full blossom depending on the air temperature. The light purple color (RHS 75B) of the petal emerges slowly and gradually from the base upward, accompanying the swollen and elongation processes of the undeveloped petal tissue below the tubular structure. The area of the flat petal part (thicker) is much larger than the petal tissue part (thinner), which formed the tubular structure. This indicated that the developmental mode and synthesis of pigments are quite different between the petal tissues in/under the tubular structure, which is unique among tree peony cultivars to our knowledge.

At full blossom time, pistils are 25 to 28 mm in height, ovary surface, gray-green (RHS 194B), with dense vellus hairs of ≈2 mm long (see Fig. 2). Stigma is 0.4 to 0.5 mm in height, gray-green (RHS 193B), with its upper edge in gray-purple color (RHS 185A,

Fig. 1. A lateral view of a flower.

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Fig. 2. An overlook of a flower.

B, C). Red-purple (RHS 62A) or green (RHS 141B) stigmas were also observed.

Floral discs are irregularly triangular and lamellar in shape. From the base upward, the floral disc color may become lighter gradually, from purple (RHS 75A, 75B, 75C) to white (155A, 155B). In other full blooming flowers, the floral disc may become a very small piece of degenerated floral disc tissue with its surface in red-purple color (RHS 75B). Almost no stamen was observed. The flower produces no significant fragrance.

In general, the population flowering period of the tree peony cultivars in the Garden is from 10 Apr. to 10 May, depending on the preflowering development and the air temperature at Heze City. Spring Tree Peony Flower Fair (for tourists to visit and enjoy the tree peony flowers) is from 15 Apr. to 26 Apr. commonly, also depending on the forecast of the population flowering time of the tree peony cultivars. Usually, the highest air temperature may be up to $\geq 30^{\circ}\text{C}$ after 28 Apr. Over 90% of the tree peony cultivars in the Garden finished their flowering processes by 28 Apr. By 10 May, petals of the extremely late flowering tree peony cultivars (≈ 6 cultivars) in the Garden have been forced to fall off commonly. The peak blooming time of the two plants of *Paeonia suffruticosa* 'Xiao Ci Wei' occurred from 28 Apr. to 10 May 2006. If the flowering time is calculated from the beginning of the stage of "convex-laminated flower-bud," a single flower may bloom for 15 to 18 d, and the flowering period of the two plants of *Paeonia suffruticosa*

'Xiao Ci Wei' should be from 16 Apr. to 10 May 2006.

Leaf. The biternately compound leaf (No. 3 or 4 from the base of the floral shoot) (see Suo et al., 2005) consists of nine leaflets commonly. According to investigation done on 29 Apr. 2006, the biternately compound leaf was ≈ 56.5 cm long and 34 cm wide and the main petiole length was ≈ 26 cm. Full length of the main compound leaf was ≈ 30.3 cm. Full length of the lateral compound leaf was ≈ 22.2 to 22.9 cm. Terminal leaflet was ≈ 11.7 to 12.6 cm long and 9.3 to 10.9 cm wide, lateral leaflet was ≈ 6.0 to 12.1 cm long, and ≈ 3.9 to 5.2 cm wide. Leaf surface, green (RHS 137C), and the lower side, gray-green (RHS 191C), with obviously protruding main vein and no vellus hairs on it. The lower side of petioles was green (RHS 141D), and the upper sulcus, red-purple (RHS 59A, B), when exposed in the sunlight.

Branch and bud. At the full blossom time, the pedicel is green (RHS 142B), 28 to 36 cm long, 1 to 1.3 cm in diameter. Internode, 1.6 to 8.6 cm long, commonly 2.5 to 5.5 cm. The older bark of the stem is grey (RHS 199D or 201C). The bark of second-year-old branches is grey (RHS 201C). Bud is normally axillary, narrow prolate to prolate in shape, and green (RHS 141C) at the lower one-third part (sometimes up to two-thirds) of the bud scale with a light red-purple bud tip (RHS 69A), and transitional colors were observed in the area between the lower one-third place of the bud scale and the light red-purple tip on 7 Nov. 2005.

Fruit. No seed set has been observed in the past years. Some ovaries looked like normal, and some narrow ovaries were also observed. At the full blossom time of 'Little hedgehog' ('Xiao Ci Wei'), it is difficult to find pollen from other late flowering tree peony cultivars, which commonly produce no pollen in their globular flowers. Artificial pollination experiments are necessary for testing its seed-set ability in the future.

Use. If this cultivar grow under moderate conditions (such as a site with half-shaded sunlight condition, air temperature $\approx 25^{\circ}\text{C}$, relative humidity 60–80%, nearly no strong winds, and rains during its flowering season),

the flowering period might be much longer than that at Heze City. Within a petal, the cells have different behavior physiologically and genetically, as described above in/below the tubular petal structure. This implies that the occurrence of the tubular structure of petal tissue which has not been documented in genus *Paeonia* L. (family Paeoniaceae Rudolphi) might provide us an opportunity to reestimate the significance of similar morphologic characteristics used in plant classification and evolution. Its bicolor pattern is unique among tree peony cultivars, indicating that it might be interesting for scientists to investigate if special mutations have occurred naturally and ingeniously in the genomic regions related to genes involving metabolic pathways of pigments. This natural mutant (cultivar) is not only a unique ornamental, but also a valuable material for scientific researches in Evodevotics. It can be propagated easily by grafting, but no effective method has been found yet for flower forcing cultivation.

Availability. Scientist interested in some plants of this cultivar for research purposes should contact the Manager (Mr. Bao-chen Sun, elected as manager since Jan. 2004) of Caozhou Hundred-Flower Garden, Heze, Shandong Province 274,001, China.

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