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Identity of *Clematis tatarinowii* and *C. pinnata* var. *ternatifolia* (Ranunculaceae)

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Based on herbarium and field observations, combined with a transplant experiment, *Clematis pinnata* Maxim. is shown to be a variable species, and the names *C. tatarinowii* Maxim. and *C. pinnata* var. *ternatifolia* W.T. Wang are reduced to its synonymy.

Key words: *Clematis*, Ranunculaceae, taxonomy, transplant experiments

Maximowicz (1876) described *Clematis tatarinowii* and *C. pinnata* based on two unnumbered collections (LE!) (Fig. 1) made by Tatarinov around 1845 near Beijing, northern China. Maximowicz stated in the protologue that *C. tatarinowii* has four connivent sepals and bijugate-pinnatisect leaves, whereas *C. pinnata* has four spreading sepals and 2-pinnatisect leaves with five leaflets. On the basis of the differences in the sepals, Handel-Mazzetti (1939) placed *C. tatarinowii*, albeit with some doubt because he had not seen any specimen of this species, in section *Viorna* subsection *Tubulosae*, which is characterized by having bell-shaped flowers with erect sepals. Handel-Mazzetti (1939) placed *C. pinnata* in section *Flammula* subsection *Vitalbae*, which is characterized by having saucer-shaped flowers with spreading sepals. This placement has been accepted by most of the later researchers (Fang *et al.* 1980, Johnson 1997, Grey-Wilson 2000), indicating that they all consider these two species distinctly different from each other. Kuntze (1885), however, pointed out that the erect *vs.* spreading sepals is not a stable character in *C. pinnata*, in which the sepals are first erect but later become spreading or bent backwards, and thus this character cannot be used to distinguish *C. tatarinowii* from *C. pinnata*. Kuntze (1885) considered that *C. tatarinowii* is very similar to *C. pinnata* in all the other characters except in the habit, with the former being a suberect and firm plant, while the latter is a weak and slender one. Kuntze also noticed the variation of the hairiness of the filaments in *C. pinnata*, noting that the filaments are somewhat hairy at least at apex, although sometimes indeed totally glabrous as Maximowicz (1876) had described. Hence Kuntze treated *C. tatarinowii* as a variety of *C. pinnata*, i.e. *C. pinnata* var. *tatarinowii* (Maxim.) Kuntze.

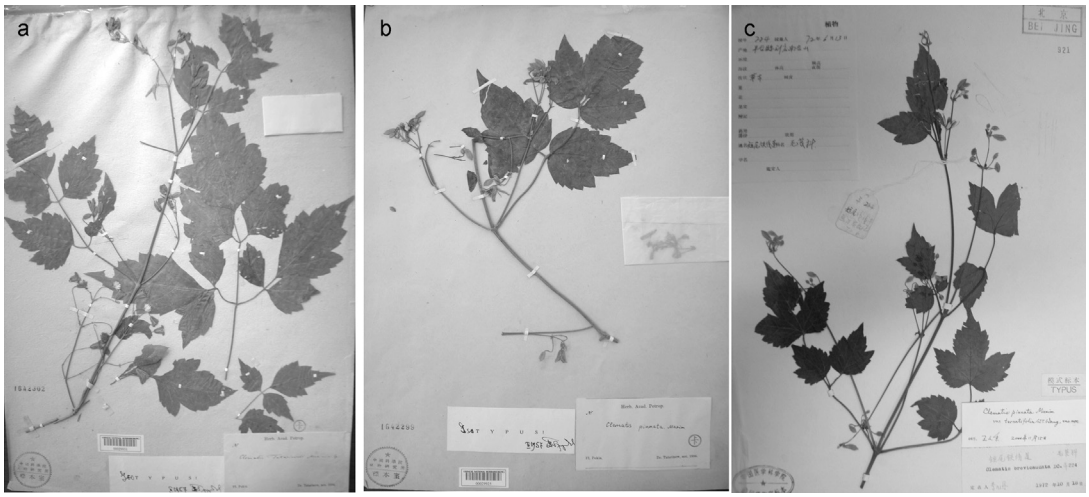

Fig. 1. — **a**: Isotype of *Clematis tatarinowii* (PE). — **b**: Isotype of *C. pinnata* (PE). — **c**: Holotype of *C. pinnata* var. *ternatifolia* (PE).

Kuntze's (1885) treatment has long been almost completely overlooked by later researchers until Wang (2001) also noticed the clear similarity in the flower structure of *C. tatarinowii* and *C. pinnata*, and transferred *C. pinnata* from section *Flammula* into section *Tubulosae*. He also established the subsection *Pinnatae*, in which he included the two species treated here and a Japanese species, *C. takedana*. Under *C. pinnata*, Wang (2001) described a new variety, var. *ternatifolia*, based on a single specimen from Pinggu County, Beijing (*Pinggu Exped. 224*, PE!; Fig. 1c), stating that this variety is different from the typical expression by having ternate leaves.

Close examination of the type material of *C. tatarinowii* (Fig. 1a) and *C. pinnata* (Fig. 1b), and of other specimens so named in PE and BJFC showed that the sepals in *C. pinnata* are indeed highly variable, as Kuntze (1885) pointed out. An intensive field investigation was carried out throughout the entire geographical range of the two species (Fig. 2) to achieve a better understanding of their morphological variation among and within populations. In the field, only plants referable to *C. pinnata* were found, none of the specimens were clearly referable to *C. tatarinowii*. Five individuals of *C. pinnata* were transplanted from the field into the greenhouse of the Botanical Garden, Institute of Botany, Chinese Academy of Sciences, for further observations of its morphological variation. Just as Kuntze (1885) had noticed, the flowers were found to be bell-shaped, with erect sepals (Fig. 3a) at the early flowering stage, and then they became saucer-shaped, with spreading sepals at the later stage (Fig. 3b). It is clear, therefore, that the difference in the flower shape and sepal characters between *C. tatarinowii* and *C. pinnata* are only expressions of different developmental stages of the flowers, and that no essential difference exists between the two species in the floral structure.

The other character used by Maximowicz (1876) to distinguish *C. tatarinowii* from *C. pinnata*, i.e. that the former has bijugate-pinnatisect leaves while the latter has pinnate leaves throughout the plant, exhibits great variation even in a single plant individual. In the field, we found that *C. pinnata* usually had pinnate leaves, yet occasionally it had ternate leaves in the upper part. Five such individuals were transplanted into the greenhouse of the Botanical Garden, Institute of Botany, Chinese Academy of Sciences (Fig. 4a), two of which were found to produce bijugate-pinnatisect leaves in the following summer (Fig. 4b), and the remaining three were found to produce both pinnate and ternate leaves. It is clear that *C. pinnata* var. *ternatifolia* represents the upper parts of *C. pinnata*. Also in the field we noticed that the upper leaves of *C. pinnata* are mostly ternate. In the recently published *Flora of China* (Wang & Bartholomew 2001), a tenuous dif-

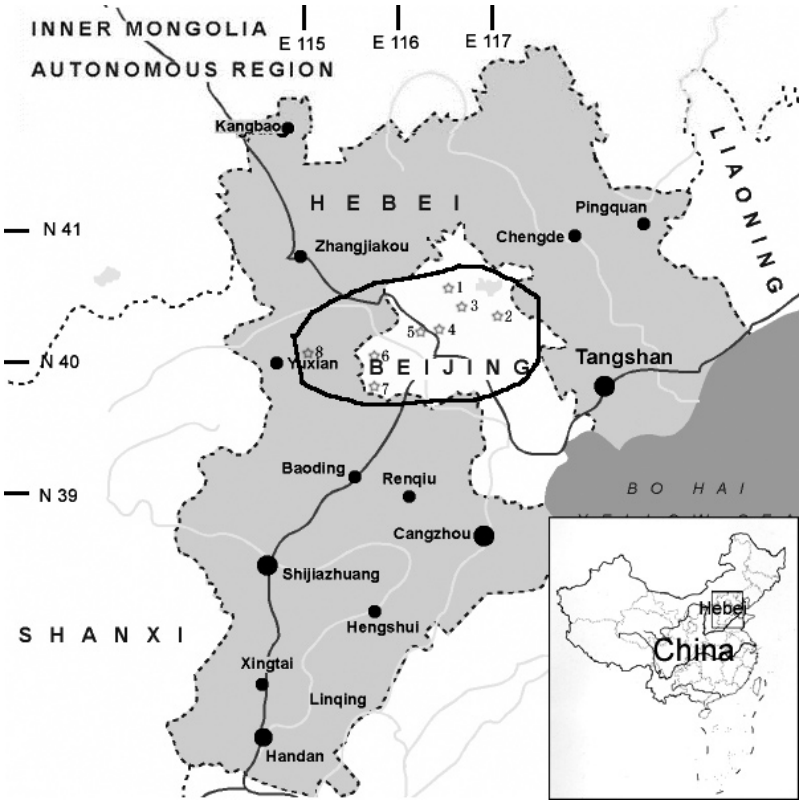

Fig. 2. Map of the fieldwork itinerary. Closed line shows the distribution of *Clematis pinnata* and *C. tatarinowii*. Expedition sites: 1: Zhuijiuyu, Changping District, Beijing. 2: Nanjishan, Pinggu District, Beijing. 3: Shentangyu, Huairou District, Beijing. 4: Jiufeng, Haidian District, Beijing. 5: Miaofengshan, Mentougou District, Beijing. 6: Baihuashan, Mentougou District, Beijing. 7: Shidu, Fangshan District, Beijing. 8: Xiaowutaishan, Yuxian County, Hebei Province.

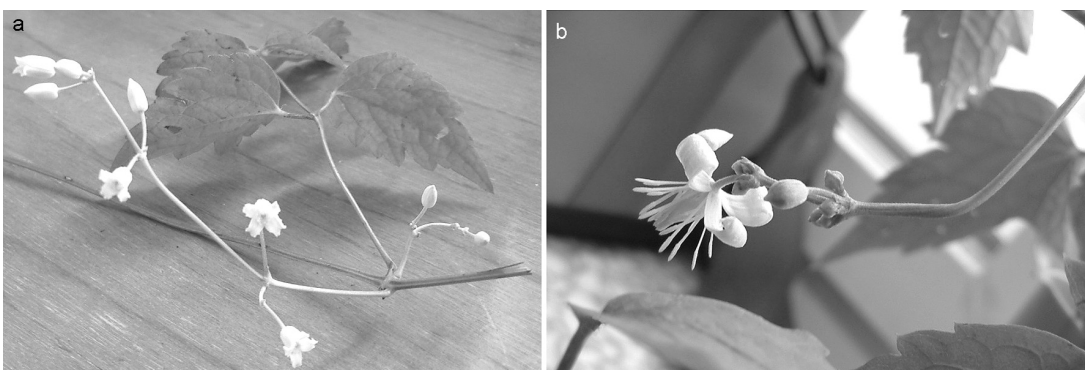

Fig. 3. Flowering branches of *Clematis pinnata*. — **a**: Young flowers. — **b**: Older flowers.

ference between *C. pinnata* and its variety, var. *ternatifolia*, was given, with the filaments of the former being described as pilose or glabrous at apex whereas those of the latter were described as pilose. Numerous filaments of *C. pinnata* were carefully checked by us under the binocular microscope, and all the filaments were found to be more or less pilose at apex, although some were found to be subglabrous, only with 2–3 hairs at apex. The same situation was observed in the specimens referred to var. *ternatifolia*. As mentioned above, Kuntze (1885) had also noticed such a variation in the hairiness of the filaments in *C. pinnata*.

The difference in the habit between *C. pinnata* and *C. tatarinowii* noted by Kuntze (1885) is by no means diagnostic. The habit of *C. pinnata* depends on whether the plant is growing on an overgrazed slope, when it remains erect, or

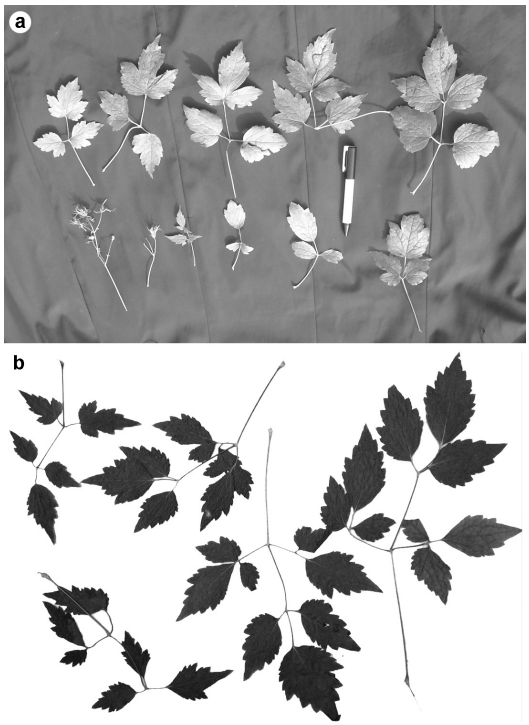

Fig. 4. Leaves of *Clematis pinnata*. — **a**: Variation of the compound leaves on an individual observed in the field. — **b**: Bijugate-pinnatisect leaves from the lower part of a plant after it had been grown in the greenhouse for one year.

on a non-grazed slope with favorable ecological conditions, when it adopts a slender and weak habit with numerous branches.

From the observations discussed above, it is clear that *C. pinnata* is a variable species and that *C. tatarinowii* and *C. pinnata* var. *ternatifolia* must be reduced to its synonymy.

Clematis pinnata Maxim.

Bull. Acad. Imp. Sci. Saint-Pétersbourg 22: 216. 1876. — Type: China. Beijing, ca. 1845, *Tatarinov s.n.* (holotype LE!, photo PE!; isotype PE!).

C. tatarinowii Maxim., Bull. Acad. Imp. Sci. Saint-Pétersbourg 22: 216. 1876, *syn. nov.* — Type: China. Beijing, ca. 1845, *Tatarinov s.n.* (holotype LE, photo PE!; isotype PE!).

C. pinnata Maxim. var. *ternatifolia* W. T. Wang, Acta Phytotax. Sin. 39: 331. 2001, *syn. nov.* — Type: China. Beijing, Pinggu, Mt. Nanjishan, 13.VI.1972 *Pinggu Exped. 224* (holotype PE!).

Additional specimens examined. — **China**. Beijing. Xishan, *s. leg. 735* (PE); Baihuashan, *S. Y. Ho 15037* (PE); Huairou, *s. leg. 621* (PE); Yanqing, *Licent 9831* (PE); Jinshan, *s. leg. 44919* (BJFC); Badaling Yanqing, *Lu & Li 40445* (BJFC); Miyun, *Lu 41716* (BJFC); Mentouguo, *Lu 22288* (BJFC). Hebei. Xiaowutaishan, *s. leg. 2057* (PE); Yixian, *Yixian Exped. 140* (PE); Qinglong, *Chengde Exped. 1775* (PE).

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