

# On the Question of a Northern Boundary for Geographical Distribution of *Viola diamantiaca* Nakai in the Russian Far East

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**Herbarium specimens are being revised for *Viola diamantiaca* Nakai from South Primorye, which was previously identified as *Viola rossii* Hemsley. This new species is from the South Manchuria region of Russia. Its habitat within the Kedrovaya Pad Natural Reserve represents its northern limit of geographical distribution in the Far East. Here, we provide descriptions and the main diagnostic characteristics for both *V. diamantiaca* and *V. rossii*.**

*Keywords:* distribution, Far-East Russia, misidentification, *Viola diamantiaca*, *Viola rossii*

The Russian floral species *Viola diamantiaca* Nakai was originally, and erroneously, identified as *Viola rossii* Hemsl. (Kozhevnikova, 2003). *V. rossii* had first been described by W. B. Hemsley based on a collection by John Ross for a joint publication of work with Forbs "Index Florae Sinensis" in 1886. Komarov (1901, 1903, 1905) made reference to this plant in the Russian-language literature in three volumes of "Flora of Manchuria", which indicated that the species was found in the Mukden province of Northeast China. Although *V. rossii* was next included in a compilation of Russian flora by Komarov and Klobukova-Alisova (1932), the authors did not specify exact locations for those plants. Later still, even the distribution of *V. rossii* in the Russian Far East was called into question. In fact, when debating its inclusion as a taxon in "Flora of the USSR" (Juzepczuk, 1949), this species was not considered because of a lack of corresponding herbarium materials.

Woroschilov (1960) confirmed the existence of this species in the Russian Far East flora on the basis of Vorobjev's specimens of 1941, as well as on his own collections with Vorobjev in 1953 and with Skripka in 1956. Herbarium material was collected in the Khasansky District of the Primorsky Territory of the Kedrovaya Pad Natural Reserve. From that point forward, *V. rossii* was then mentioned as a native species in all floristic works for that region in Russia (Vorobjev et al., 1966; Woroschilov, 1966, 1982, 1985; Bezdeleva, 1987; Czerepanov, 1995).

Some authors, however, focused on a number of essential differences between this Russian Far East species and plants from China. Rakova (1980, 1988, 1992) first reported the presence of lengthened underground plagiotropic rhizomes in the Russian samples, which provided vegetative mobility. In addition, the formation of an original "rosette" that consisted of several scale-shaped leaves and a unique green leaf with a lengthened leafstalk (Bezdeleva, 1987) conflicted with descriptions of pink petals and smaller sepals, the absence of rhizomes, and a large number of leaves in the rosettes of Chinese plant samples. These con-

traditions again forced researchers to question whether *V. rossii* was part of the established, and named, vegetation in the Russian Far East, so that studies began on the literature available about such flora in Japan, Korea, and northeastern China (Lee, 1993; Fu, 1995; Igari, 1996; Lee, 1996; Akiyama and Ohba, 2001).

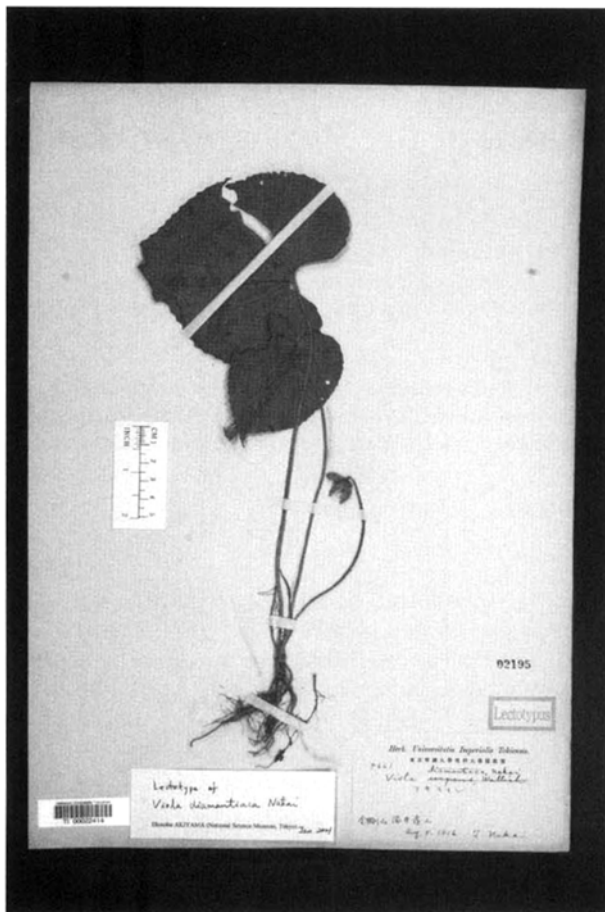
## MATERIALS AND METHODS

The objective of our project here was to examine the preserved materials for *V. rossii* and *V. diamantiaca*, which are maintained in the Herbaria of Hokkaido University in Sapporo (SAPA), Kyoto University in Kyoto (KYO) and the National Science Museum in Tsukuba (TNS). We focused especially on herbarium samples from the Kedrovaya Pad Natural Reserve, which were earlier determined as *V. rossii*. This plant was first described by the Japanese botanist Nakai in 1919 from collections in Korea at Mountain Kongosan. The original description of these samples did not mention the existence of chasmogamous flowers. Regarding the Latin diagnosis, the author argued that the taxon was close to *V. rossii*, but differed in the presence of stolons. Lee and Yook (1972) then reported that *V. rossii* varied from *V. diamantiaca* with regard to runners, leaf size, root sections, leaf epidermes, and the occurrence of flavonoid compounds. From modern research into the flora of Korea (Lee, 1993, 1996), a more complete description of this plant, including samples with chasmogamous flowers, has now been published. Although each of these authors has pointed to the affinity between *V. diamantiaca* and *V. rossii*, those stolon-shaped rhizomes and the presence of cleistogamous flowers have proven to be distinctive attributes.

## RESULTS AND DISCUSSION

The descriptions offered here are rather brief but they do provide some different details from those given originally by the species author. Therefore, this has allowed us to conclude authentically that it is *V. diamantiaca*, rather than *V.*

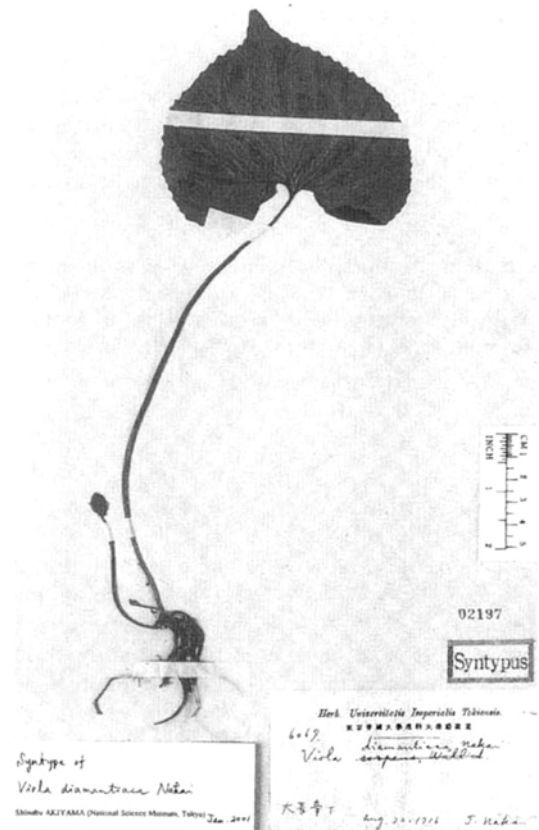
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**Figure 1.** Lectotype of *V. diamantiaca* Nakai [DB no. 02195]. Label: Korea (Corea) media. In montibus Kongosan, T. Nakai no. 5661, 5 August 1916.

*rossii*, that grows in the Russian Far East, as was previously, and erroneously, believed. Furthermore, the “Catalogue of the Type Specimens Preserved in the Herbarium, Department of Botany, the University Museum, the University of Tokyo” issued by Tokyo University (TI) (Akiyama and Ohba, 2001) provided us with photos of the Lectotype and Syntypes of *V. diamantiaca* (Fig. 1, 2). Figures 3 through 6 present specimens that were collected by Vorobjev, Rakova, and other botanists from the Kedrovaya Pad Natural Reserve, and which are kept in the Herbarium of Institute Biology and Soil Sciences of the Far East Branch of the Russian Academy of Sciences (Vladivostok, VLA). In fact, one of these (Fig. 3) had been examined earlier by Komarov. These were originally identified as *V. rossii*, as were similar specimens from the herbaria of the Komarov Botanical Institute of the Russian Academy of Sciences (St. Petersburg), the Main Botanical Garden of the Russian Academy of Sciences (Moscow, MHA), and Lomonosov State University (Moscow).

Having compared all the available information, we determined that the first mention of *V. rossii* was made in “The Flora of Manchuria”, by Komarov (1901, 1903, 1905), who stated that these plants came from the Mukden province of China. We also concluded that the Russian description, which was based on Ross's collections, had been overlooked, as

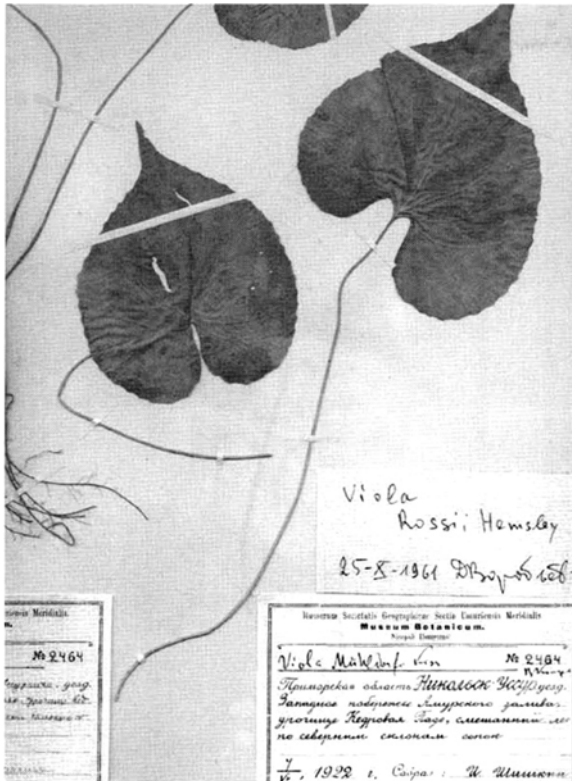


**Figure 2.** Syntype of *V. diamantiaca* Nakai [DB no. 02197]. Label: Korea (Corea) media. In montibus Kongosan, T. Nakai no. 6067, 22 August 1916.

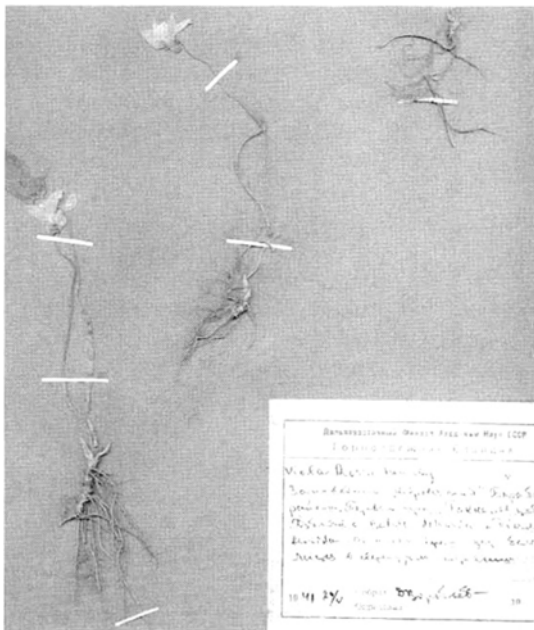
was the Latin diagnosis, so that both referred to *V. rossii*. Moreover, in “Key of Plants of Far East Region” (Komarov and Klobukova-Alisova, 1932), all the attributes used in that key (i.e., “a rhizome is more or less lengthened, segmental, sometimes with elongated creeping suckers”) should have indicated *V. diamantiaca*, but were instead wrongly accepted by the authors as pertaining to *V. rossii*. The number of chromosomes,  $2n=24$ , published for *V. rossii* (Probatova and Sokolovskaya, 1988) also raised concerns about that classification.

In Russia, *V. diamantiaca* is found in the Kedrovaya Pad Natural Reserve, near the Great Peter Gulf (Japan Sea), as well as 100 km NE of the mouth of the Tumangan (Tumanyaya) River, and in bordering regions (e.g., the Khasansky District, Primorsky Territory). Plants of that species live near wooded streams on flat slopes within oak forests, or, less often, in mixed deciduous woods (ca. 50 to 100 m above sea level).

Our short description of this species was derived by examining herbarium materials that had been collected from the Primorsky Territory in the Kedrovaya Pad Natural Reserve. We also compiled an analysis of the available references (e.g., Nakai, 1919; Bezdeleva, 1987; Lee, 1993,



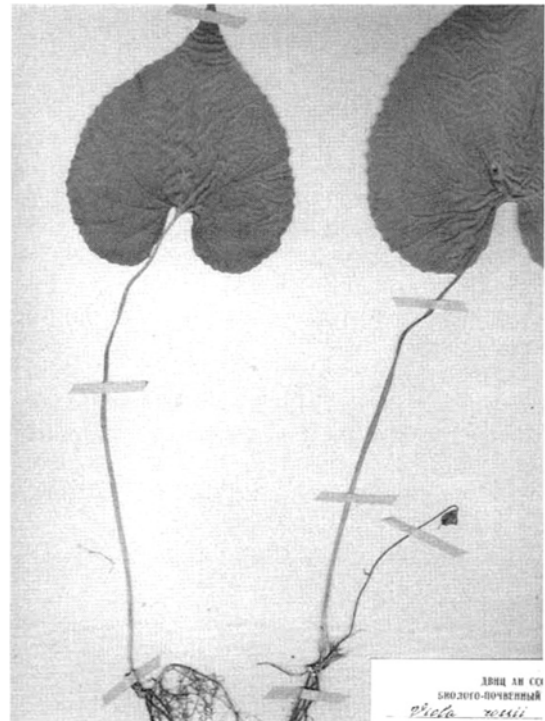
**Figure 3.** Herbarium specimen of *V. diamantiaca* from the Primorsky Territory, originally identified as *V. rossii* (Herbarium VLA). Label: Primorskaya oblast, Nikolsk-Ussuriysky uyezd., Western coast of the Amursky Bay, Kedrovaya Pad tract, mixed forest on the northern slopes of mounds (hills), I. Schischkin, 4 July 1922. (First determined by V. L. Komarov, last identified by D. P. Vorobjev)



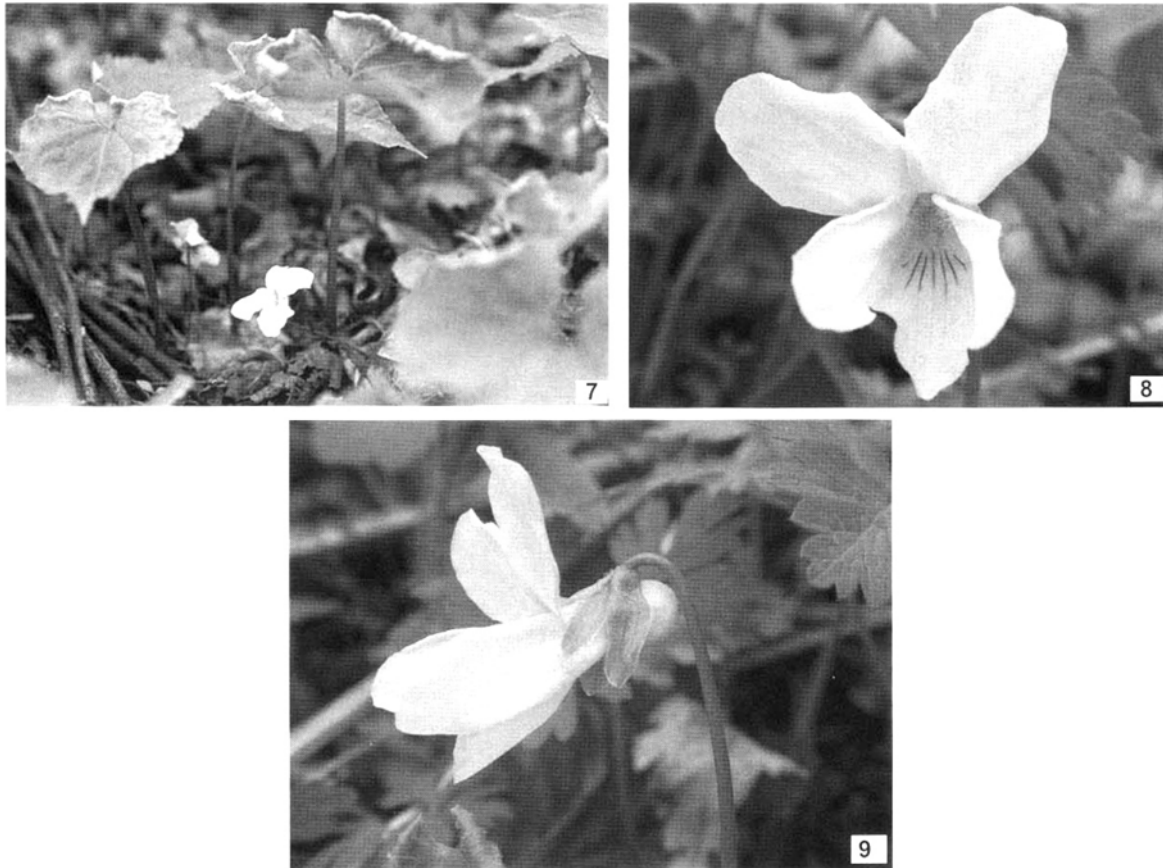
**Figure 4.** Herbarium specimen of *V. diamantiaca* from Primorsky Territory, originally identified as *V. rossii* (Herbarium VLA). Label: "Kedrovaya Pad" Reserve of Barabasch (Khasansky) District., Pass across the "Gakkelev mountain ridge", Oak-forest with *Betula dahurica* and *Diervilla florida*, along the road., Flowers are white, leaves are in a convoluted condition., D. P. Vorobjev, 20 May 1941.



**Figure 5.** Herbarium specimen of *V. diamantiaca* from Primorsky Territory, originally identified as *V. rossii* (Herbarium VLA). Label: Primorsky Territory, Khasansky District., "Kedrovaya Pad" Reserve., M. V. Rakova, May 1976.



**Figure 6.** Herbarium specimen of *V. diamantiaca* from Primorsky Territory, originally identified as *V. rossii* (Herbarium VLA). Label: Primorsky Territory, Khasansky District., "Kedrovaya Pad" Reserve., "Second Golden" stream, deciduous forest on the slope., R. I. Korkischko, 15 June 1981.



**Figures 7-9.** Field photos of *V. diamantiaca* in the Kedrovaya Pad' Natural Reserve (May, 2003). 7. Habitat of flowering plant, 8-9. Chasmogamous flowers.

1996; Fu, 1995; Oh and Pak, 2001), as well as field investigations (Fig. 7-9). The present-day herbarium samples come from the Russian Far East (LE, MHA, MW, VLA) and were previously determined to belong to *V. rossii* rather than to *V. diamantiaca*. Although these plants may be similar to *V. rossii*, they can be distinguished by the presence of stolons and cleistogamous flowers. The following is a detailed presentation of *V. diamantiaca* Nakai, and includes the most important distinctive attributes that separate the two species in question:

*V. diamantiaca* Nakai, 1919, Bot Mag Tokyo 33: 205

Perennial; rhizomes thick, slanting, creeping, form lengthened stolons. Roots snarl and spread widely. All leaves arise from roots and have no stems. Petioles 8-21 cm long, hairy

and purple-spotty on upper portion. Laminae heart-shaped with acuminate tops, 6.5-10.0 cm long and 6-11 cm wide; margins crenate or toothed; green and hairy on upper portion, light-green beneath, especially on veins. Chasmogamous flowers are white, pedicels are shorter than leaves. Cleistogamous flowers occur underground. Two bracts located above center of pedicel. Bell is naked. Fruit is boll, 1.3 cm long, purple-spotty; pedicel is one-fifth to one-third the length of leaf. Seeds are 2.0 to 2.5 mm wide.

Plants are distributed in northeastern China and in the central and northern part of the Korea Peninsula (more than 700 m above sea level), as well as in the southern part of the Russian Far East (Khasansky District of the Primorsky Territory).

Number of chromosomes:  $2n = 24$  (Probatova and Sokolovskaya, 1988; sub *V. rossii*).

| <i>V. diamantiaca</i> Nakai   | <i>V. rossii</i> Hemsl.   |
|---|---|
| Rhizomatous, rosetteless plant. One green leaf. Forms lengthened plagiotropic rhizomes 10 to 15 (50) cm long that comprise the vegetative growth of an individual.  | Rhizomatous plant with rosette. Two to five green leaves. Lengthened plagiotropic rhizomes are absent.  |
| Petals of chasmogamous flowers are white with slight tinge of purple, the lower one is shorter and wider than the others. Top and lateral petals do not adjoin their margins and the interval between them is always significant. | Petals of cleistogamous flowers are pink, the lower one having the same size and shape as the others. All petals adjoin their margins, and lack an interval between the top and lateral petals. |
| Cleistogamous flowers are formed on a regular basis, usually one, rarely two.   | Cleistogamous flowers do not occur.   |

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