

***Shortia rotata* (Diapensiaceae), a new species from Vietnam**

L. L. Gaddy & Maxim S. Nuraliev

Summary: *Shortia rotata*, originally thought to be conspecific with *Shortia sinensis* Hemsl., is described as a new species that considerably differs from any other species of the genus *Shortia*. Unlike *S. sinensis* and most other species of *Shortia*, *S. rotata* has a cylindrical corolla tube with rotate lobes. It is found at high elevation sites [1600–2200 meters (5250–7220 feet)] in the Hoang Lien (Son) Mountains of northwestern Vietnam. Illustrations of both species are provided as well as a key to all species of *Shortia* in China and Vietnam. Geographical distribution and species diversity of the genus *Shortia* in Vietnam is discussed.

Keywords: *Shortia rotata*, *Shortia sinensis*, Diapensiaceae, Hoang Lien Son Mountains, Vietnam, China, sp. nov.

Shortia sinensis Hemsl. is found in southeastern Yunnan province in the People's Republic of China at several localities southeast of Mengzi, its type locality. It is known to occur between 1000 and 2000 meters elevation on moist, mossy, vertical rock faces (BARNES 1990; QIN & BARTHOLOMEW 2005). Previous to NURALIEV (2010), it had been reported from The Socialist Republic of Vietnam by NGUYEN TIEN BAN (2005), but it was never confirmed there by any herbarium specimen. NURALIEV (2010) collected a plant he thought to be *S. sinensis* in a gorge below Thac Bac (also known as Silver Waterfall), a waterfall in the Hoang Lien Mountains, northwest of Sa Pa and published images of this plant.

This site was visited by Gaddy in January 2017. He tracked northward to a known population of *Shortia sinensis* near Pingbian (Yunnan province) on Da Wei Shan, part of a large montane national park in the People's Republic of China. After several days of observing *Shortia sinensis* in China, it was concluded that the material seen at the Nuraliev site was not *S. sinensis*. The Vietnamese plants were different: they bloomed earlier, their floral color was slightly different, and, most importantly, the corolla morphology was different from typical *S. sinensis*. After consultation with Dr Nuraliev, it was concluded that the plant in Vietnam previously thought to be *S. sinensis* (NURALIEV 2010) was a species new to science.

***Shortia rotata* Gaddy & Nuraliev, sp. nov. (Fig. 1)**

Shortia sinensis auct., non Hemsl.: Nuraliev, Wulfenia 17: 25 (2010).

Type. Vietnam, Lao Cai province, Sa Pa district, San Sa Ho municipality, Hoang Lien National Park, Thac Bac waterfall area, bank of Thac Bac river, on a rock, N 22°21'20" E 103°47'30", 1620 m, 23 November 2010, *Nuraliev 227* [Holotype MW: MW0595621].

Description. Perennial herbs, rhizomatous, generally glabrous. Rhizomes 3–5 mm in diam.; scales crowded immediately below leaves, covering stem base, green, gradually becoming larger and similar to foliage leaves distally. Leaves in basal rosette, numerous, dull green, variable in size; petiole variable in length and generally shorter than leaf blade; leaf blade ovate-oblong, up to 10 cm long, up to 5.5 cm wide, surface rugose, base rounded to abruptly narrowed and attenuate

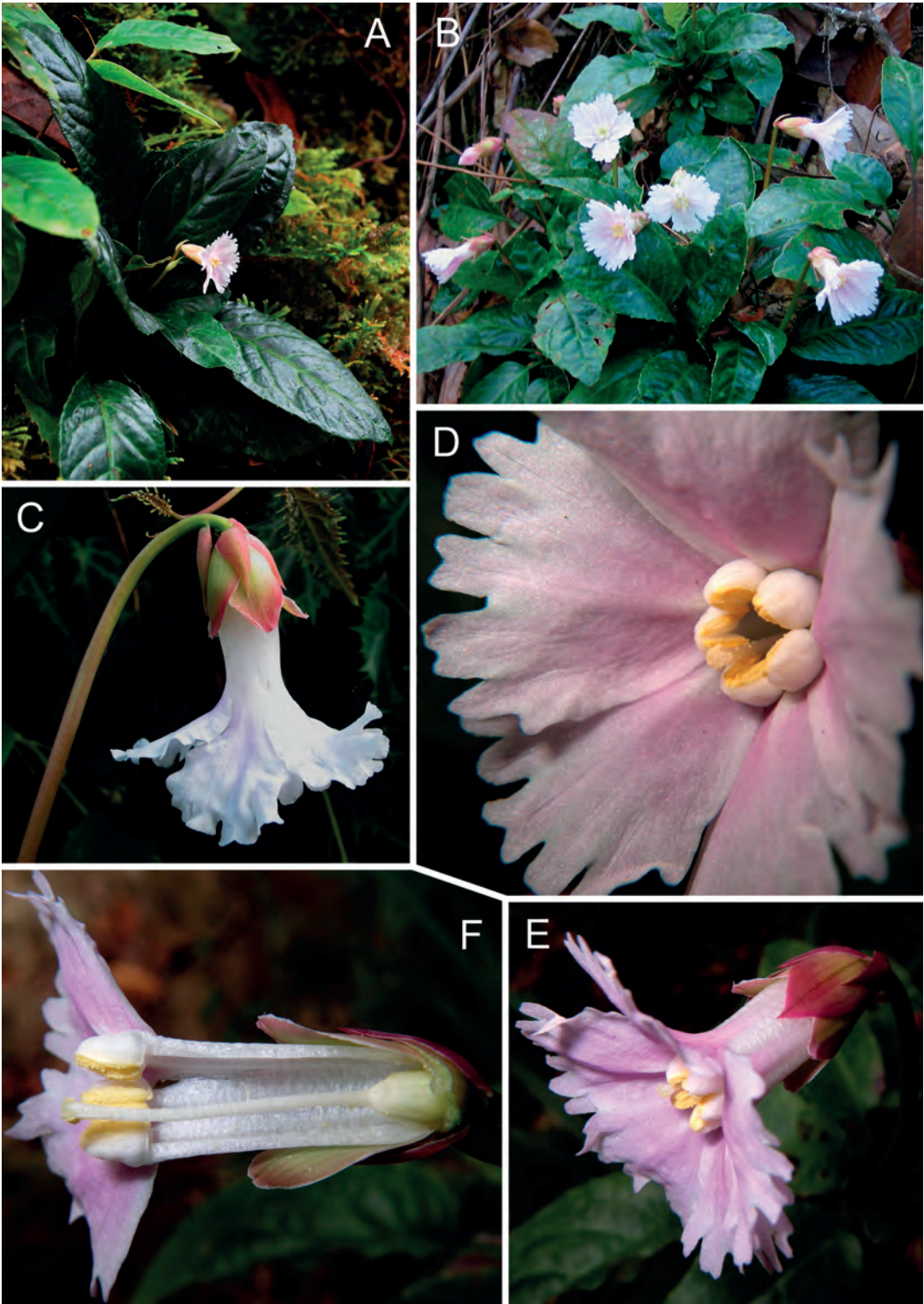


Figure 1. *Shortia rotata*. A – habit, Y Ty area (photo by A.J. Floden, *FMWJ 13409*); B – habit, Y Ty area (photo by B. Wynn-Jones, *BSWJ 11765*); C – flower, side view (photo by B. Wynn-Jones from cultivated plant); D–F – details of flower structure (photos by M.S. Nuraliev from Thac Bac River Gorge): D, front view; E, oblique view; F, longitudinal section (reproduced from NURALIEV (2010): note long corolla tube).

into petiole, margin crenate-serrate and ciliate particularly towards apex, apex acute; secondary veins 6–9 on each side of midvein, conspicuous at both leaf sides. Peduncles 1–6, in axils of upper leaves, slender, shorter than leaves in flower; basal scales probably 2, lanceolate, ca. 1 cm long. Racemes one-flowered, bearing 3–4 scales inserted at base of calyx or up to 1 cm below on scape. Scales similar to sepals in shape and color but more narrow and acute. Flowers more or less parallel to ground, ca. 2–2.5 cm in length and 2–3 cm in width at corolla opening. Sepals green or greenish lavender, gradually becoming darker distally, conspicuously veined, rigid, scarious, ovate, subequal, ca. 9–10 × 4–5 mm, apex acuminate with a short mucro. Corolla whitish-pink to dark lavender, basally with well-defined cylindrical tube as long as or longer than lobes, lobes rotate or sub-rotate, overlapping, obovate, veined, apically with 7–8 small rounded teeth. Stamens equal to corolla length or slightly exerted, attached at distal margin of corolla tube; anthers erect, large, obscuring barely visible filaments. Staminodes absent. Ovary ovoid. Style as long as or slightly longer than stamens; stigma capitate to slightly 3-lobed. Fruits and seeds unknown.

Additional images of *S. rotata* examined. Vietnam: Lao Cai province, Sa Pa district, San Sa Ho municipality, Hoang Lien National Park, Thac Bac Gorge (near type locality), N22°21'29.74" E 103°46'50.01", 19 January 2017, *L.L. Gaddy s.n.*; Lao Cai province, Bat Xat district, south and west of Y Ty, in the forest behind a fish farm not more than a mile off the main road, 2200 m, 06 November 2011, *A.J. Floden s.n.* (said to be collected as *Bleddyn and Susan Wynn-Jones FMWJ 13409*); Lao Cai province, Bat Xat district, near Y Ty, 1910 m, 28 November 2006, *Bleddyn and Susan Wynn-Jones BSWJ 11765*.

Specimens from China labelled as *S. sinensis* examined. China: Yunnan province, Mengtze, southeastern mountains, 1500 m, 10 January, *A. Henry 11490* [isotype K: K000768033; isotype MO: MO5425558; isotype NY: NY00329066]; Yunnan province, Da Wei Shan, 2030 m, 13 March 2014, *B.L. Yang 046* [KUN: KUN1249535]; Yunnan province, Guangaw, Malipo, under open woods, 10 February 1940, *C.W. Wang 86713* [KUN: KUN35014, KUN35015, KUN35016, KUN0235225]; Yunnan province, Da Zhai Xiang, 1500 m, 15 December 1958, *X.W. Li 510* [KUN: KUN35017, KUN35018, KUN0235230]; Yunnan province, Lao Jun Shan (Maguan), 07 December 1947, *K.M. Feng 13690* [KUN: KUN35024, KUN35025; PE: PE00052911].

Images of *S. sinensis* examined. China: Yunnan province, Da Wei Shan, near Pingbian, high-elevation old-growth forest park, *L.L. Gaddy s.n.*

Specimens of *Shortia* sp. examined (all lacking flowers). Vietnam: Lao Cai province, Sa Pa area, 17 January 1975, *A.L. Takhtajan 8374* [LE]; Lao Cai province, Bat Xat district, Y Ty municipality, N 22°37'15.8" E 103°37'21.2", 1930 m, 9 April 2017, *Bui Hong Quang 200* [HN; MW: MW0753851, MW0753852, MW0753853, including photos]; Ha Giang province, Hoang Su Phi district, Ho Thau municipality, around Chien Thang village, about 4 km to NW of Ho Thau village, primary closed cloud evergreen broad-leaved forest with *Rhodoleia* and *Rhododendron* along ridge composed with shale and granite with quartzite, N 22°37'24" E 104°38'00", 1600–1800 m (terrestrial herb on shady rock slope, occasional), 10 March 2005, *L. Averyanov, P.K. Loc, N.T. Vinh, A. Averyanova HAL6683* [LE: LE01026037; MO: MO6734150]; Ha Giang province, Yen Minh district, Du Gia municipality, E slopes of Phu Tha Ca mountain system, primary evergreen broadleaved very wet mossy cloud forest on very steep quartzite slopes, N 23°56' E 105°13', 1600–1900 m (lithophytic forb on mossy shady vertical quartzite cliff,

Table 1. Comparison of *Shortia rotata* and *S. sinensis*.

Character	<i>S. rotata</i>	<i>S. sinensis</i> ¹
Leaf surface	rugose	reticulate
Corolla shape	cylindric tube and (sub)rotate lobes	campanulate
Corolla orientation	90 degrees (parallel to ground)	45 degrees (nodding)
Corolla color	whitish pink to lavender	white to pink
Flowering dates	November to mid-January	mid-January to March
Elevation	1600–2200 m	1000–2000 m
Habitat	on mossy rock faces and trees in gorges and mountains	on mossy rock faces in mountains

¹ Data from 'Flora of China' (QIN & BARTHOLOMEW 2005) and populations on Da Wei Shan in Pingbian County, China. See Fig. 2.

flowers white, common), Cao Bang Limestone, 3 May 1999, *P.K. Loc, P.H. Hoang, L. Averyanov CBL 2079* [LE; MO: MO5157102; P: P04571276].

Taxonomic notes. *Shortia sinensis* very closely resembles the North American *S. galacifolia* Torr. & A. Gray. *Shortia rotata*, although clearly a species of *Shortia*, does not appear to be closely related (morphologically) to any other species of the genus. The main morphological and ecological differences between *S. rotata* and *S. sinensis* are summarized in Table 1. *Shortia rotata* differs from *S. sinensis* in corolla shape and orientation, shape and orientation of petal lobes, corolla color and flowering dates. The most noteworthy distinguishing characters in *S. rotata* are: 1) a cylindric shape of tube at the base of the corolla; 2) the rotate or sub-rotate shape of petal lobes; 3) the (predominantly) pale to dark lavender color of the corolla; and 4) the strongly rugose leaves versus the reticulate leaves of *S. sinensis*. *Shortia rotata* flowers earlier than *S. sinensis*, with little overlap in flowering dates. Elevation and habitat for the species are similar.

Key to species of *Shortia* in China and Vietnam

1. Leaf blades orbiculate to orbiculate-ovate, up to 5 cm long
(Taiwan, also Ryukyu Islands) *S. rotundifolia* Makino
- Leaf blades ovate-oblong, some longer than 7 cm 2
2. Corolla campanulate *S. sinensis*
- Corolla with cylindric tube and rotate lobes *S. rotata*

Etymology. The specific epithet '*rotata*' refers to the rotate shape of corolla that differentiates this species from the most similar *Shortia sinensis*.

Distribution and phenology. Currently only known from Lao Cai province in Northern Vietnam. Based on specimens and images, we have concluded that at least two major (and several sub-) populations of *Shortia rotata* grow in Vietnam. These populations include two sites in Hoang Lien National Park, the type and an additional site in Thac Bac River Gorge and several sites in the north in the Y Ty area (documented only by images). Additional populations or sub-populations undoubtedly exist in gorges, under waterfalls and on inaccessible slopes on and around Fansipan (Phan Xi Pang), Vietnam's highest peak (Fig. 3) in Hoang Lien National Park. *Shortia rotata* is documented to flower from November to mid-January.

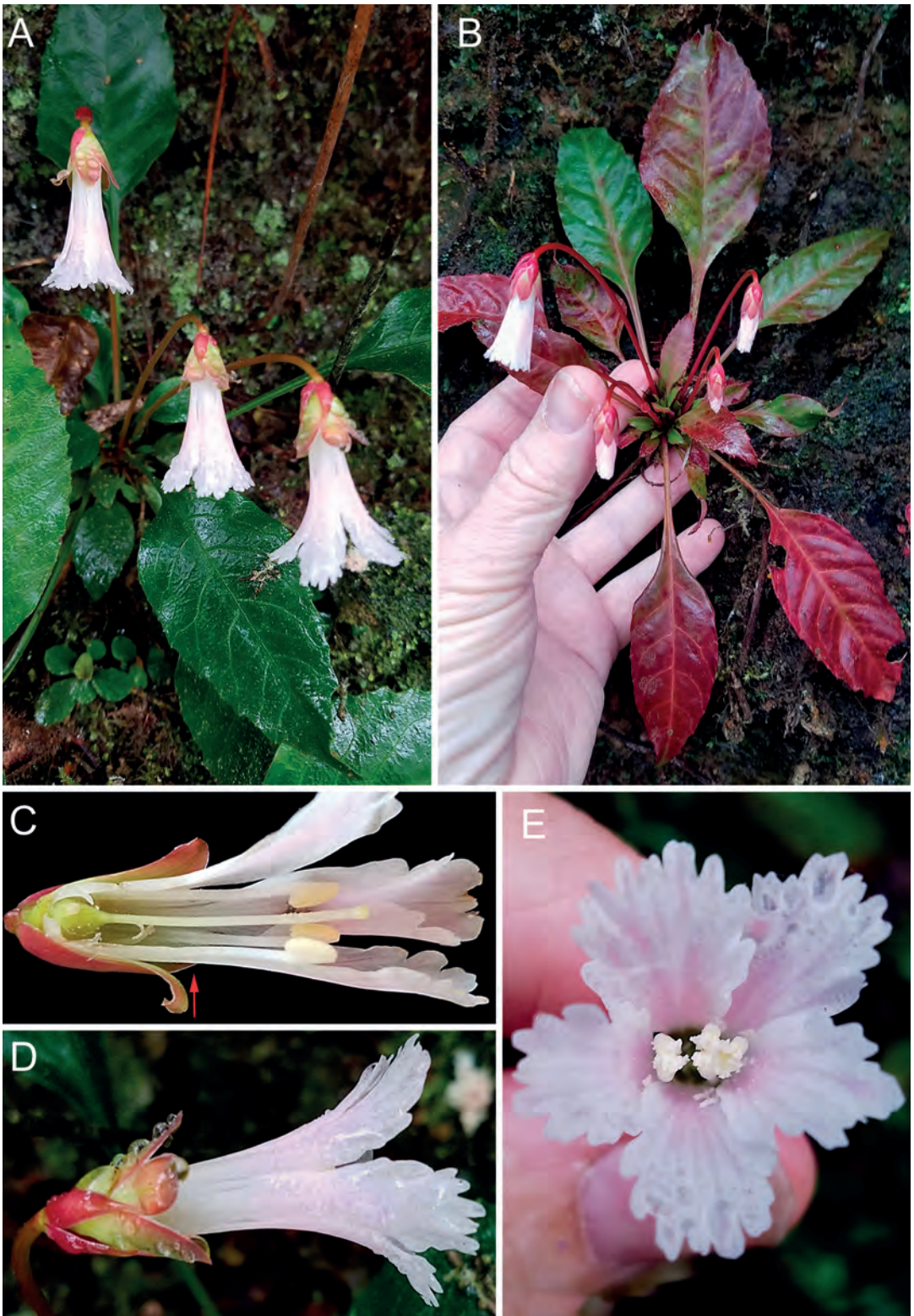


Figure 2. *Shortia sinensis* from Da Wei Shan. A – habit (note campanulate whitish flowers in nodding posture); B – distressed plant tinged with red; C – longitudinal section of flower (note short corolla tube (top indicated with arrow) and erect lobes); D – flower, side view; E – flower, front view. All photos by L.L. Gaddy.

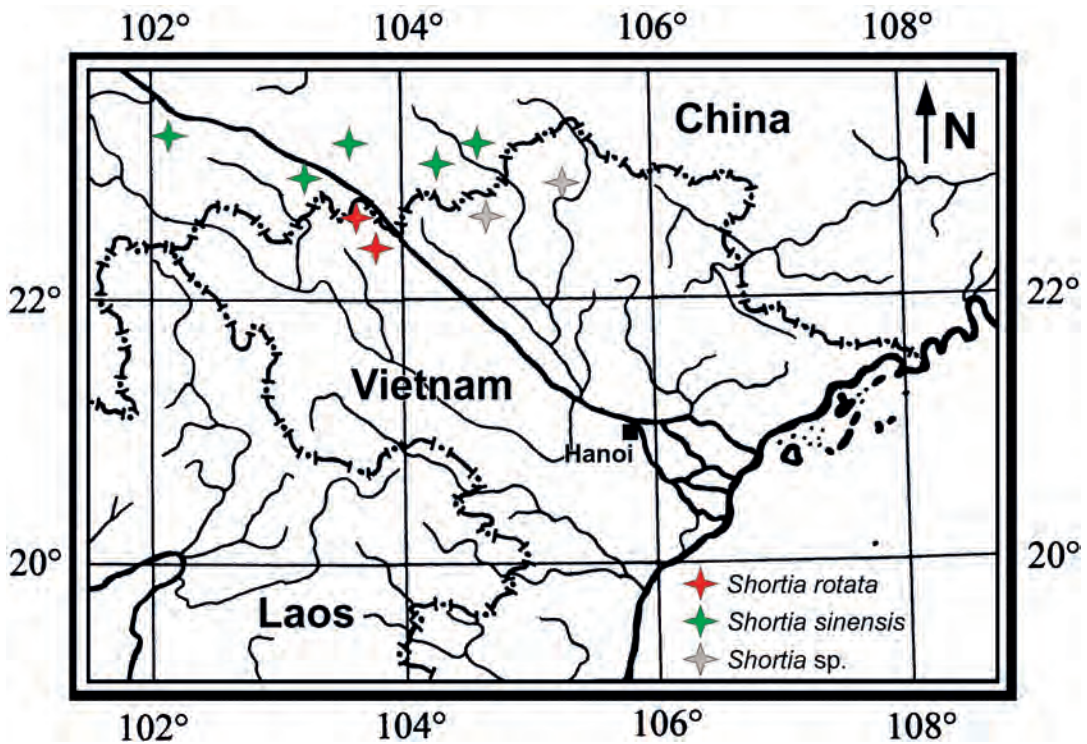


Figure 3. Known ranges of *Shortia rotata*, *S. sinensis* and *Shortia sp.*

Notes on distribution of the genus *Shortia* in Vietnam and Mainland China. Besides the documented records of *S. rotata*, at least four collections of *Shortia* from Northern Vietnam exist. As no anthetic flowers are available in these specimens and the key taxonomic features cannot be observed, we have found it impossible to conclusively determine them to the species level. They are listed above as *Shortia sp.* Thus, the number of species of *Shortia* in the flora of Vietnam remains uncertain. The specimen A.L. Takhtajan 8374 originates from Sa Pa area and therefore most likely represents *S. rotata*; similar speculation is applicable to Bui Hong Quang 200 from Y Ty area. Two specimens from Ha Giang province (east of the Red River) are located quite far from any known population of *S. rotata* or *S. sinensis*; however, when collected, they both were thought to be a primrose (*Primula sp.*), leading us to believe that they may also belong to *S. rotata*. Additional fieldwork will be necessary to better understand the ranges and ecology of *S. rotata* and *S. sinensis* (see Fig. 3).

The Chinese Virtual Herbarium (www.cvh.org.cn) lists 38 herbarium sheets of *Shortia sinensis*. From these (all in SE Yunnan province), only four localities were represented: Da Wei Shan, Malipo, Lao Jun Shan and Da Zhai Xiang. The precise location of the type locality near Mengzi (also in Yunnan) is unknown. Plants from Da Wei Shan were examined and photographed by Gaddy in January 2017 (Fig. 2).

Based on the sites the authors visited, the number of specimens in existence and reports (substantiated by images of flowers) by other field workers (Aaron J. Floden, personal communication), it is estimated that at least five (and probably more) populations/subpopulations of the genus *Shortia* exist in two Vietnamese provinces. *Shortia rotata* populations are found as close as 50 km from the

nearest *S. sinensis* populations in China. Future fieldwork along the Chinese-Vietnamese border should shed light on the precise ranges and habitats of these two species.

Conservation status. Because of its currently known range, *Shortia rotata* could be deemed 'critically endangered' according to IUCN standards (IUCN 2017); however, the full extent of its range is probably unknown. Therefore, we do not recommend listing the species at the moment and suggest to classify it as data deficient (DD), although it appears that the species is a narrow endemic.

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Addresses of the authors:

L. L. Gaddy
terra incognita
125 S. Edisto Avenue
Columbia, South Carolina 29205
USA
E-mail: llgaddy2@gmail.com

Maxim S. Nuraliev (corresponding author)
Joint Russian-Vietnamese Tropical Scientific and Technological Center
Cau Giay
Hanoi
Vietnam
Lomonosov Moscow State University
Faculty of Biology
Leninskie Gory 1 (12)
119234 Moscow
Russia
E-mail: max.nuraliev@gmail.com

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