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A new intersectional hybrid in the genus *Potentilla* (Rosaceae) from Northern Mongolia

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Summary. *Potentilla* × *vanzhilibii* is described as a new intersectional hybridogenous species found in Northern Mongolia. The plant has been gathered twice in the north-eastern part of the Tarbagatai Range, Central Khangai (Khangai botanical-geographical region of Mongolia). *Potentilla nivea* (sect. *Niveae*) and *P. multifida* (sect. *Multifidae*) are supposed to be parental species for *P.* × *vanzhilibii*. Besides, *P. altaica*, *P. rhipidophylla*, and *P. tuvinica* are found to be related to *P.* × *vanzhilibii*. The features that distinguish these closely related species from *P.* × *vanzhilibii* are indumentum and the morphology of leaf blades and generative organs. The distribution area, ecology and illustrations of the new nothospecies are provided, and its stability is proved. Determination key for *P.* × *vanzhilibii* and related species is also given.

Новый межсекционный гибрид в роде *Potentilla* (Rosaceae) из Северной Монголии

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Ключевые слова: Алтай, Архангайский аймак, Монголия, новый нотовид, Хангай, хребет Тарбагатай, *Potentilla* × *vanzhilibii*.

Аннотация. *Potentilla* × *vanzhilibii* описывается как новый межсекционный гибридогенный вид, обнаруженный в Северной Монголии. Растение было дважды собрано в северо-восточной части хребта Тарбагатай в Центральном Хангае (Хангайский ботанико-географический район Монголии). Предполагаемыми родительскими видами *P.* × *vanzhilibii* являются *P. nivea* из секции *Niveae* и *P. multifida* из секции *Multifidae*. Выявлено, что, кроме родительских видов, близкими к *P.* × *vanzhilibii* являются также *P. altaica*, *P. rhipidophylla* и *P. tuvinica*. От *P.* × *vanzhilibii* близкие виды отличаются особенностью опушения, морфологией листовых пластинок и генеративных органов. Охарактеризована область распространения и экология, приведено изображение нового гибридогенного вида; доказана его стабильность. Составлен ключ для определения *P.* × *vanzhilibii* и родственных видов.

Introduction

During the field study on the territory of Northern Mongolia in 2016, the scientists from the Mongolian National University of Education discovered an interesting population of plants from the genus *Potentilla*. Some individuals from this population distinctly differed from other *Potentilla* species of the Mongolian flora. The revision of herbarium materials from UBA (Biological Institute, Academy of Sciences of the Mongolian People's Republic, Ulaanbataar) revealed a specimen collected in 1976, whose morphological features were identical to those of the species found in 2016. This specimen differed from our plants by greater height of the stems only (30–40 cm in contrast to 10–25 cm for our plants). All the specimens of this interesting *Potentilla* species were gathered in the north-eastern part of the Tarbagatai Range situated in the center of the Khangai Mountains. This territory belongs to Tariat somon of Arkhangai aimak and corresponds to the Khangai botanical-geographical region according to V. I. Grubov (1982). The study of materials on the genus *Potentilla* in herbaria of Russia (ALTB, IRK, LE, MW, NS, and NSK) and Europe (HAL, HEID, OSBU, and PR), which contain large collections on the Mongolian flora, did not reveal specimens with this morphology. We noted that the specimens of the discovered *Potentilla* grew in the same population as *P. nivea* L., nom. cons. prop. and *P. multifida* L. and combined the morphological features of both species. Therefore, we suggest that the above-mentioned specimens represent a newly discovered taxon of hybridogenous origin which we describe herein as *P. × vanzhilii* V. Gundegmaa et Kechaykin, nothosp. nov. The study of the herbarium materials and determination keys of the Asian *Potentilla* species (Soják, 2012), enabled us to identify three species closely related to *P. × vanzhilii*. Similar to the supposed parental species (*P. nivea* and *P. multifida*), these species differ from the new taxon by the nature of indumentum and the morphology of leaf blades and generative organs. The description, illustration and affinity of *P. × vanzhilii* are given below. The paper also provides the image of the paratype of *P. rhipidophylla* Soják, the species closely related to the new taxon, and the determination key for related species.

Taxonomic treatment

Potentilla × *vanzhilii* V. Gundegmaa et Kechaykin, **nothosp. nov.**; *P. nivea* L., nom. cons. prop. × *P. multifida* L. (Fig. 1).

Type: “Arkhangai aimak, Tariat somon, the right bank of the Khunzhiliin gol river (source) 1 km to the north of the Khadat spring near the border with Khubsugul aimak, on the edge of the sparse forest. N48.2220°, E99.5410°, 2046 m a. s. l. 20 VI 2016. V. Gundegmaa” (UBA; iso – ALTB, UBA).

Paratype: “Arkhangai aimak, Tariat somon, Tarbagatai Range, near the Khadat spring, meadows of the river valley, dry river bed. 31 VII 1976. E. Ganbold” (UBA!).

Description of the new taxon

Perennial plant 10–40 cm high. Caudex simple, covered with dark-brown remains of decayed stipules. Stems 2–7, ascending at base, rarely erect, sometimes curved along the entire length. Basal leaves ternate, 2–7 cm long. Leaflets 0.8–2 cm long and 0.5–0.7 cm wide, sessile, sometimes the terminal leaflet with a short petiole 1–2 mm long. Leaflets pinnately dissected to 2/3 or even to midrib into 3–5(6) almost linear pointed segments at each side. Lower leaflet surface covered with whitish or grayish tomentum mixed with short crispate hairs, upper surface covered with sparse short curved appressed and semi-appressed hairs. Cauline leaves similar in morphology to basal ones, not numerous, 1–2(3), 1–3 cm long with short petioles. Leaf petioles very thin, covered with crowded short crispate hairs 0.5–0.8 mm long and single curved hairs up to 0.8 mm long (rarely curved hairs absent). Stipules with entire acute auricles, the outer side covered with sparse grayish tomentum mixed with short crispate hairs, the inner side glabrous. Inflorescence typically multiflorous. Flowers small, 0.8–1 cm in diameter. Calyx densely covered with short crispate and longer curved appressed hairs. Sepals (calyx segments) narrow-triangular, acute, 3–4 mm long, equal to or slightly higher than lanceolate episeals (epicalyx segments). Petals obovate, with a small mucro in the upper part, light yellow, typically up to 4 mm long, slightly exceeding the calyx. Styles thin, short, typically curved, 0.6–0.7 mm long, identical along the entire length, with slightly widened stigma in the upper part, sometimes with slightly widened base. Mature nutlets (achenes) light green, typically 1 mm long, with small (narrow and shallow) wrinkles. Stamens 20, arranged in two whorls, the outer whorl of stamens with short anther filaments, the inner whorl of stamens with long anther filaments. No glandular indument, or occasional glandules observed on stems, leaf petioles and stipules.

Distribution area. *Potentilla* × *vanzhilii* was discovered in two closely situated localities in the



Fig. 1. *Potentilla* \times *vanzhilibii*, nothosp. nov. Scale bar: 1 cm. Drawn by K. Shcherbinin based on type material.

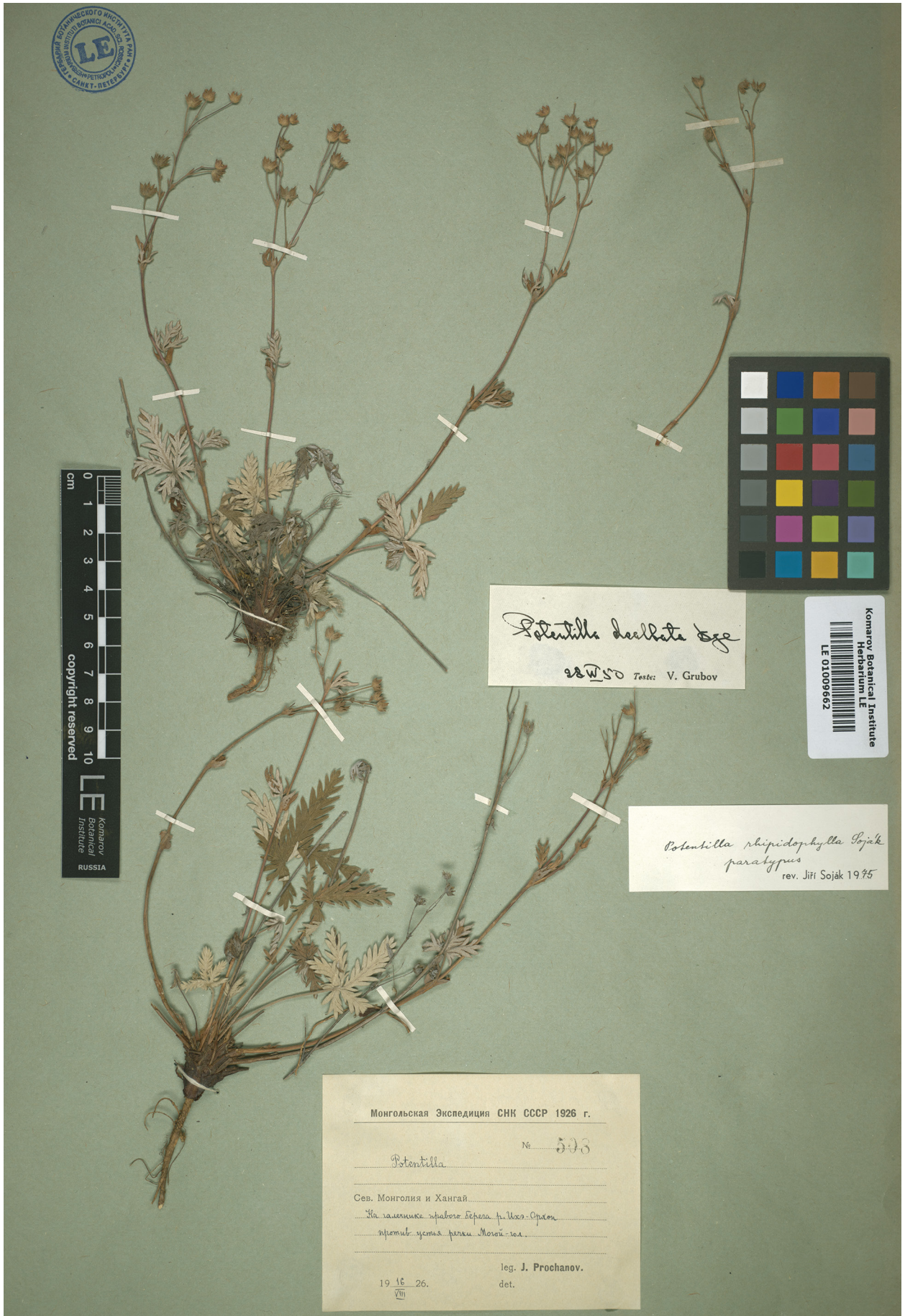


Fig. 2. Typical specimen of *Potentilla rhipidophylla* (LE10009662).

north-eastern part of the Tarbagatai Range in the central Khangai (Tariat somon, Arkhangai aimak, on the border with Khubsugul aimak). No other collections of the nothospecies are currently known.

Ecology. *Potentilla* × *vanzhilibii* belongs to the mesophytic group of *Potentilla*. It grows on pebbles and open stony slopes in valleys of small rivers, among bushes near hemlock forests.

Etymology. The hybridogenous species is named after Vanjil Choijinjav, the father of the first author of the present paper, in token of the gratitude for assistance in the organization of many fieldworks on the territory of Mongolia and for direct participation in *Potentilla* gathering.

Affinity. The described hybridogenous species is assumed to have originated through hybridization between *P. nivea* and *P. multifida*. Unlike *P. nivea*, *P. × vanzhilibii* does not have a flaky tomentum on petioles of leaves and stalks; it has smaller petals (4–5 mm in contrast to 7–9 mm for *P. nivea*) and styles of the same width along the entire length or slightly widened at base (not clearly widened at base with expressed papillose tubercles). Additionally, in contrast to *P. nivea*, the described taxon has deeply pinnatifid leaves (dissected to 2/3 or even to midrib unlike those dissected to 1/3 for *P. nivea*). The features that distinguish the described taxon from *P. multifida* are indumentum (stalks and petioles are covered with crispate and curved hairs as well as very short straight appressed hairs), leaf blades (leaves are ternate rather than pinnate), and wrinkled vs. smooth nutlets (achenes). In addition to the supposed parental species, three more *Potentilla* species are related to *P. × vanzhilibii*. One of them is *P. rhipidophylla*. This species is described from the Khangai region and, in Sojak's opinion, it is a hybridogenous taxon originated through hybridization between *P. crebridens* Juz. and *P. multifida* (Soják, 1986). The taxon differs from *P. × vanzhilibii* by digitate (or palmate) leaves (not ternate), longer hairs that cover stalks and petioles (1–1.5 mm on average unlike 0.5–0.8 mm), larger leaflets (1.3–3(4) × 0.6–1.2 cm in contrast to 0.8–2 × 0.5–0.7 cm) that are dissected into more numerous segments (on average, 5–9 segments at each side unlike 3–5 segments). A scanned image of one of the *P. rhipidophylla* paratypes is given for visual comparison (Fig. 2). The other species related to *P. × vanzhilibii* is *P. altaica* Bunge originated purportedly through hybridization between *P. arenosa* (Turcz.) Juz. and *P. multifida* (Peschkova, 1979; Soják, 1986, 2009). This species is characterized by several features distinguishing

it from *P. × vanzhilibii*. Petioles are covered with straight bristly semi-appressed or horizontally arranged leaves up to 1.2 mm long mixed with very short curved (not crispate) hairs. *Potentilla altaica* has a root rosette formed by a mix of digitate leaves comprising three, four, or five leaflets (unlike *P. × vanzhilibii* with only ternate leaves). Leaflets of *P. altaica* are always dissected nearly to midrib (unlike prevailing 2/3 for *P. × vanzhilibii*). Beneath along veins, *P. altaica* leaflets are covered with numerous straight appressed hairs up to 1 mm long that often form a silky indumentum (*P. × vanzhilibii* does not have such hairs). Styles of *P. altaica* exhibit a widened base with large expressed papillose tubercles (style base in *P. × vanzhilibii* is widened only slightly and has no papillose formations). The last taxon close to *P. × vanzhilibii* is *P. tuvinica* Artemov, which originated through hybridization between *P. evestita* Th. Wolf and *P. multifida* (Artemov, 2005). This taxon is distinguished from newly described hybridogenous species by styles with relatively small papillose tubercles observed at the base. Petioles of *P. tuvinica* are covered with long (ca. 1 mm long) semi-appressed and patent, straight or curved (though not crispate) hairs. Stems of *P. tuvinica* are almost glabrous or covered with sparse appressed or relatively straight semi-appressed hairs. Unlike *P. × vanzhilibii*, indumentum in *P. tuvinica* is additionally formed by numerous small glandules clearly visible under magnification on petioles and stalks as well as on calyx; nutlets in *P. tuvinica* are smooth.

Below is the determination key for *P. × vanzhilibii* and its related taxa.

Determination key

1. Petals obovate or spatulate, 4–5 mm long 2
..... + Petals usually obcordate or orbicular, (6)7–10 mm long 7
2. Basal leaves pinnate *P. multifida*
..... + Basal leaves ternate or digitate 3
3. Basal leaves digitate (sometimes mixed with ternate and quadruple) 4
..... + Basal leaves ternate only 5
4. Leaflets with 5–9 pairs of teeth
..... *P. rhipidophylla*
..... + Leaflets with 2–4 pairs of teeth *P. altaica*
5. Petioles, stems and calyx with numerous glands *P. tuvinica*
..... + Petioles, stems and calyx eglandular 6
6. Styles at base thickened and papillose
..... *P. altaica*

- + Styles at base neither thickened (sometimes slightly thickened) nor papillose *P. × vanzhilii*
7. Petioles with straight hairs only *P. arenosa*
- + Petioles with crisped-floccose hairs only or with a mixture of crisped straight hairs 8
8. Petioles with a mixture of crisped (strongly curved-flexuous) and straight hairs. The whole plant or at least sepals distinctly glandular *P. evestita*
- + Petioles with crisped-floccose hairs only. The whole plant eglandular 9
9. Terminal leaflet with 3–6(7) pairs of teeth *P. nivea*
- + Terminal leaflet with 6–12(14) pairs of teeth *P. crebridens*

Discussion

As mentioned above, besides the supposed parental species, three other taxa appear related to *P. × vanzhilii*. We believe that *P. × vanzhilii* and these taxa are characterized by a common origin, namely, they all share *P. multifida* as one of the parental species. The small size of leaflets, at least, supports this hypothesis (see determination key). In our opinion, the closest relative of *P. × vanzhilii* is *P. rhipidophylla* which is also restricted to the Khangai region and so far has not been found elsewhere. Soják described *P. rhipidophylla* based on the two findings, by D. A. Klements in 1894 (holotype – LE10009660!) and by Ya. I. Prokhanov in 1924 (paratypes – LE10009661!, LE10009662!) in the interfluvium of the Tamir and Orkhon rivers in the east-

ern Khangai and no further collections are hitherto known. The approximate straight-line distance between the *P. × vanzhilii* and *P. rhipidophylla* localities is 130 km. Similar to *P. rhipidophylla* (at least, judging from herbarium materials), morphological characters of specimens of *P. × vanzhilii* are stable. Unfortunately, we failed to gather *P. × vanzhilii* at fruiting stage (in June all plants were at flowering stage). Yet, several plants gathered by E. Ganbold at the end of July had numerous well-formed ripe nutlets. It should be noted that the time interval between Ganbold's and our findings of *P. × vanzhilii* is 40 years. All the above facts contribute to the idea that *P. × vanzhilii* is the stabilized hybridogenous species represented by two known local populations in the territory of Khangai.

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