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Addition to the flora of Kyrgyzstan

Alexey A. Kechaykin^{1*}, Georgy A. Lazkov², Alexander I. Shmakov¹ & Sardor A. Usmanov¹

Alexey A. Kechaykin^{1*}
e-mail: alekseikechaikin@mail.ru

Georgy A. Lazkov²
e-mail: glazkov1963@mail.ru

Alexander I. Shmakov¹
e-mail: alex_shmakov@mail.ru

Sardor A. Usmanov¹

¹ Altai State University, Barnaul, Russia

² Institute for Biology and Soil Science,
National Academy of Sciences, Bishkek,
Kyrgyzstan

* corresponding author

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ABSTRACT

The paper proposes new data and contributions related to distribution of some species from the family Rosaceae in Kyrgyzstan. Five species of the genus *Potentilla* are newly recorded for the flora of Kyrgyzstan, of which *Potentilla tuvinica* is a new taxon for the Tian Shan Mountain Range. One species from the genus *Fragariastrum* and one from the genus *Sibbaldia*, as well as 16 species of *Potentilla* have been indicated for some biogeographic regions of Kyrgyzstan for the first time. The area of distribution of *Potentilla ferganensis* is specified, and data on distribution of *Potentilla tobolensis* are supplemented. Specific habitats are reported for *Potentilla exuta* and *Potentilla penniphylla* described from Kyrgyzstan, but not included in the lists of plants growing in this territory. For each species presented, the general distribution outside Kyrgyzstan is indicated. The endemism of the genus *Potentilla* in the study area is analyzed. For *Potentilla biflora*, a nomenclature correction is provided. A map of the biogeographic regions of Kyrgyzstan is presented. It displays the distribution of the rarest *Potentilla* species.

Keywords: floristic findings, Pamir-Alai, Tian Shan, Rosaceae, *Potentilla*, *Sibbaldia*, *Fragariastrum*, general distribution, endemism

РЕЗЮМЕ

Кечайкин А.А., Лазьков Г.А., Шмаков А.И., Усманов С.А. Дополнение к флоре Кыргызстана. Представлены новые данные о распространении представителей семейства Rosaceae на территории Кыргызстана. Впервые приводятся 5 видов рода *Potentilla*, из которых *P. tuvinica* является новым таксоном для горной системы Тянь-Шаня. По одному виду родов *Fragariastrum* и *Sibbaldia*, а также 16 видов *Potentilla* впервые указаны для отдельных биogeографических районов. Уточняется район распространения *Potentilla ferganensis* и дополняется информация о распространении *Potentilla tobolensis*. Для *Potentilla exuta* и *Potentilla penniphylla*, описанных с Кыргызстана, но не включенных в списки растений данной территории, приводятся конкретные местонахождения на территории республики. Распространение наиболее редких видов указано на схематической карте биogeографического районирования. Для каждого вида дано общее распространение. Для *Potentilla biflora* дается коррекция автора этого таксона. Проводится анализ эндемизма рода *Potentilla* флоры исследуемой территории.

Ключевые слова: флористические находки, Памиро-Алай, Тянь-Шань, Rosaceae, *Potentilla*, *Sibbaldia*, *Fragariastrum*, общее распространение, эндемизм

This study is devoted to new findings from the family Rosaceae Juss., namely, the genus *Potentilla* L. and close taxa of the flora of Kyrgyzstan. The country is located in Central Asia (the term Middle Asia is used in most Russian-language sources). The main part of Kyrgyzstan is occupied by the Tian Shan and Pamir-Alai mountain ranges, intermountain hollows and depressions. In the north-eastern part, there is Issyk-Kul, one of the largest mountain lakes of Eurasia. The highest mountain ranges that cover more than 75 % of the area and large water reservoirs make the climate of Kyrgyzstan unique, which causes its floral diversity. According to the estimates by Lazkov & Sultanova (2014), the flora of Kyrgyzstan includes 3927 species of wild and adventive vascular plants from 834 genera that belong to 114 families. However, Kamelin (2002) stated more than 4000 species of vascular plants from 870–875 genera and 140 families growing in Kyrgyzstan. For comparison, the floristic diversity of Mongolia with the area almost eight times greater than that of Kyrgyzstan and not less unique nature includes 3127 vascular plants from 683 genera and 112 families (Urgamal et al. 2014).

One of the most numerous families in Kyrgyzstan's flora is the family Rosaceae, where the genus *Potentilla* is the first in the number of species. The abundance and, hence, diversity of the species composition of the genus *Potentilla* in floras of the Central Asian republics of the former USSR differ significantly. Thus, only 8 species of *Potentilla* are cited for Turkmenistan's flora (Blinovsky 1950); for Uzbekistan's flora – 28 species (Botchantsev 1955); for Kyrgyzstan's flora – 29 species (Kashchenko 1957); for Tajikistan's flora – 34 species (Ovczinnikov & Koczkareva 1975); for Kazakhstan's flora – 48 species (Baytenov 1961). Uneven distribution of species abundance is primarily due to the confinement of these regions (or their proximity) to mountain ranges, which genesis has no common features. For example, the species diversity of *Potentilla* (and many genera from other families) in Kazakhstan is affected by four different mountain ranges: the Urals (the southern part), the Tian Shan, the Djungar Alatau and the Altai.

The above data on the number of *Potentilla* species in the Central Asian regions of the former USSR obtained in

the middle of the last century have changed so far. In particular, according to Lazkov & Sultanova (2014), the species composition of the genus *Potentilla* s.l. (including *Argentina* Hill, *Drymocalis* Fourr. ex Rydb. and *Schistophyllidium* (Juz. ex Fed.) Ikonn.) in Kyrgyzstan is represented by 40 species. For more than 55 years, the flora of Kyrgyzstan has been replenished with 11 new *Potentilla* taxa. Within five years after the release of the second volume of the Cadastre of Flora of Kyrgyzstan (Lazkov & Sultanova 2014), new data have been gained, which expand understanding of the flora in the study area and distribution of individual *Potentilla* species.

MATERIAL AND METHODS

The study was performed on the specimens from the genus *Potentilla* L. and close taxa of the Kyrgyzstan's flora investigated in several of the largest herbaria, and on the materials collected during fieldworks. Herbarium specimens were investigated in Russian herbaria: LE (St. Petersburg), MW (Moscow), TK (Tomsk), and in collections from other countries: DR (Germany, Dresden), PR (Czech Republic, Prague) and TASH (Uzbekistan, Tashkent). In addition, some of the materials used were taken from electronic herbaria K (Royal Botanic Gardens Kew 2019), MW (Seregin 2019) and E (Royal Botanic Garden Edinburgh 2019). Fieldworks were carried out in the Prifergansky biogeographic region in 2018. The materials collected during these works are stored in the Herbarium ALTB collections (Russia, Barnaul). Modern revisions of the flora of the Central Asia were used to identify species of the genus *Potentilla* and related taxa (Li et al. 2003, Soják 2004, 2012, Shah 2009). A map of the biogeographic regions of Kyrgyzstan proposed by Abdrashitova et al. (1996) in the Cadastre of the genetic fund of Kyrgyzstan and Lazkov & Sultanova (2011) in the Cadastre of Flora of Kyrgyzstan (Fig. 1) was used in the study:

NK – Northern Kyrgyzstan (Chui valley, the Chon-Kemin river valley with adjacent northern slopes of the Kyrgyz range and Kungei Ala-Too);

PI – Issyk-Kul valley (including northern slopes of the Terskei Ala-Too, southern slopes of the Kungei Ala-Too and the Tup river valley);

CT – Central Tian Shan (Sary-Djaz river basin);

WT – Western Tian Shan (including the Toktogul depression, and Talas and Chatkal valleys);

SF – Subfergansky regions of Kyrgyzstan (including southern slopes of the Chatkal and Fergana ranges and northern slopes of the Alai and Turkestan ranges);

IT – Inner Tian Shan (in the north, the region is bounded by the Kyrgyz range, in the southwest, it is bounded by the Fergana range, and in the southeast, it is bounded by the Kokshaal-Too range);

A – Alai valley (including southern slopes of the Alai and northern slopes of the Zaalai ranges).

The taxon nomenclature is given in accordance with the *Potentillinae* J. Presl subtribe system proposed by Kechaykin & Shmakov (2016), and the International Plant Name Index ([http://www/ipni.org/](http://www.ipni.org/)). Herbarium acronyms are listed according to Index Herbariorum (Thiers 2017). The relevant species and indication of their distribution in Kyrgyzstan and outside the study area are listed below. We provide all data from the herbarium label that can be used to refer the species to a specific biogeographic region. The biogeographic regions where the species was newly found are marked with "*". For some of the taxa, comments are provided. The distribution of the rarest *Potentilla* species in Kyrgyzstan is displayed on the map.

RESULTS AND DISCUSSIONS

New species in the flora of Kyrgyzstan

Potentilla flabellata Regel et Schmalh.

A: "Alai range, dry meadow steppe, Kosh-Karchi (Kochkorchu) riv. head. 30.06.1936. No. 147. I. Tyshchenko, M. Rozhkovskaya" (MW0840212); "Alai valley, Dzhaylyau Kosh-Carchi, alpine meadows. 27.06.1931. No. 223. S. Lipschitz" (MW0840211, MW0840216) (Fig. 1).

General distribution: Central Asia.

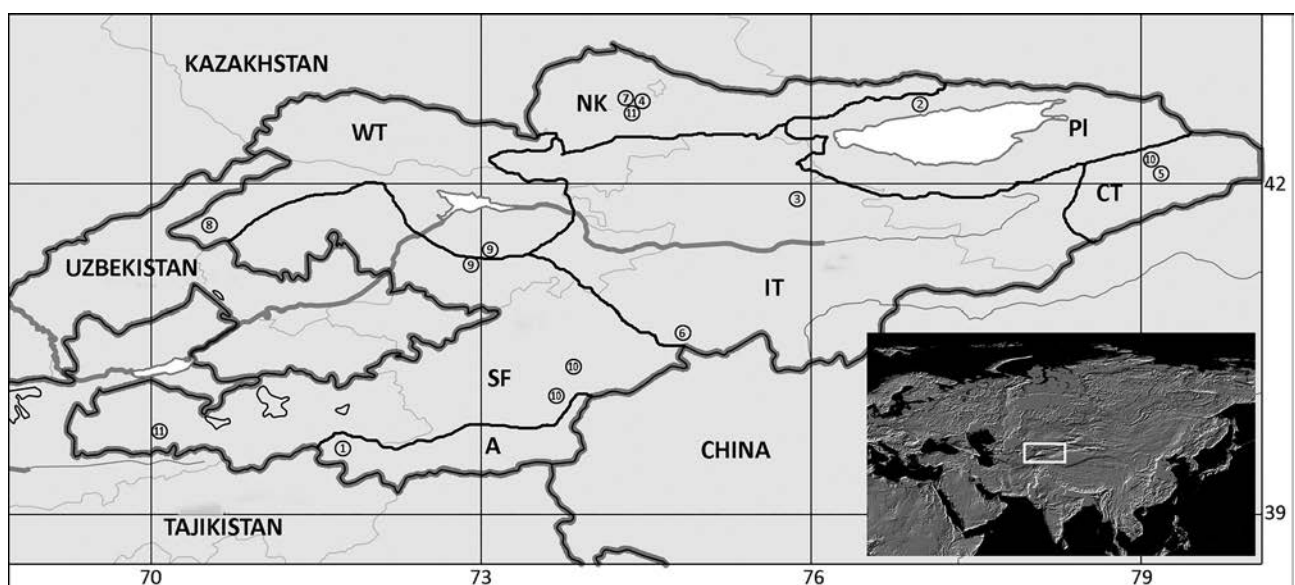


Figure 1 A map of the biogeographic regions of Kyrgyzstan (see explanation in the text) and distribution of the rarest *Potentilla* L. species (number in circles: 1 – *P. flabellata* Regel et Schmalh., 2 – *P. regelina* Th. Wolf, 3 – *P. twinica* Artemov, 4 – *P. × ala-arçxae* Soják, 5 – *P. exuta* Soják, 6 – *P. ferganensis* Soják, 7 – *P. × bishkeekensis* Soják, 8 – *P. kamelinii* Lazkov, 9 – *P. recta* L., 10 – *P. penniphylla* Soják, 11 – *P. algida* Soják

The species occurs in four countries: the south-western part of Uzbekistan (Gissar, Zeravshan and Turkestan ranges), Tajikistan (except Khatlon region and northern part of Sogd region), the north-eastern regions of Afghanistan and the north of Pakistan in the Hindu Kush. A new locality discovered in Kyrgyzstan is in the northern boundary of the *P. flabellata* habitat.

Potentilla recta L.

SF: "East Fergana, Jalal-Abad distr. Tentyak-su riv. basin, Arslanbob riv. head, walnut forest. 20.06.1927. No. 157, 167. E.P. Korovin" (TASH); "Jalal-Abad region, Fergana range, Bazar-Korgon distr., Kara-Unkur riv. head. 41°22'54"N, 72°56'04"E. H=2200 m a.s.l. 22.07.2018. S.A. Usmanov" (ALTB) (Fig. 1).

General distribution: North Africa (Algeria); Europe; North (Altai), Southwest, Central and South (northwest) Asia; North America.

Potentilla regelina Th. Wolf

PI: "S slope of Kungei-Alatau range. Bakhtu-Dolonoto riv. basin. 26.06.1936. No. 106. T. Semenikhina" (TASH) (Fig. 1).

Some authors considered *P. regelina* as a synonym for *P. evestita* Th. Wolf (Adylov 1976, Soják 2004, 2009, 2012). The species independence of *P. regelina* is beyond any doubt (Lipsky 1910, Juzepchuk 1941, Baytenov 1961, Kechaykin et al. 2014).

General distribution: North (Altai) and Central Asia.

Potentilla turczaninowiana Stschegl. (*P. turczaninowiana* Stschegl. subsp. *nephogena* Soják; *P. nephigena* Soják, nom. nud. (in sched.)).

WT: "Susamyr range, S and N slopes of Kurumdy pass. 1.08.1925. No. 1231, 1242. M. Sovetkina" (TASH).

SF: "Kirgisia, montes Alai: in pratis subalpinis supra pagum Sachimardan (Chamzaabad) ad merid. versus ab oppido Fergana. H=2000 m a.s.l. 10.07.1979. J. Soják" (K000762410; LE; PR).

CT: "Przhevalsky distr., Myntur pass. 28.07.1912. V. Sapozhnikov, B. Shishkin" (TK); "Central Tian Shan. Syrts, right bank of Sor-Bulak riv. (right-bank tributary of Kuilu riv.). 29.08.1956. I. Shchukin" (MW0840766).

General distribution: North (southern Siberia) and Central Asia.

In one of the studies, J. Soják described *P. turczaninowiana* Stschegl. subsp. *nephogena* Soják from his own materials collected in 1981 in Kazakhstan: Zailiyskiy Alatau, Bolshaya Almaatinka (Soják 1988). This subspecies is distinguished by petioles and leaflets hairy on the underside (these are usually bare in type subspecies). Earlier, J. Soják collected interesting specimens in Kyrgyzstan, labeled them as *P. nephigena* sp. n. and deposited one of these specimens as an isotype into LE herbarium (cited above). This taxon was not published by J. Soják. Our study of herbarium materials showed that *P. nephigena* and *P. turczaninowiana* subsp. *nephogena* are identical plants. Later, J. Soják pointed out that the subspecies identified by him has an ambiguous status since its specimens are found throughout the entire habitat of *P. turczaninowiana* along with type specimens (Soják 2009). Our observations of these plants in nature and the study of herbarium materials revealed transitional forms between *P. turczaninowiana* subsp. *nephogena* and type subspecies. Thus, we support the opinion of J. Soják and consider that the presence of a small number of hairs on petioles and leaflets of subsp. *nephogena* can be ecomorphosis. The main morphological differences between *P. turczaninowiana* and closely related taxa are indicated in the studies by J. Soják (1988, 2004, 2007, 2009, 2012).

Potentilla tuvinica Artemov

IT: "N slope of Kara-Jorgo range, Tashkechuu gorge, low-grass subalpine meadows. 28.06.2010. M.R. Tanybaeva" (LE) (Fig. 1).

General distribution: North and Central Asia (Altai).

This single herbarium specimen is represented by two different species. The upper part of the herbarium specimen dis-

plays two specimens of *P. tuvinica*; the lower part shows one specimen of *P. evestita* Th. Wolf. The upper specimens are cited by G.A. Lazkov as *P. multifida* L. × *P. sp.* Indeed, *P. tuvinica* is a hybrid species originated through hybridization between *P. multifida* and *P. evestita*, with several closely related taxa (Artemov 2005, Gundegmaa & Kechaykin 2018). *P. tuvinica* is newly recorded for the Tian Shan mountain range. The nearest locality of this species is approximately 1300 km to the northeast in the Altai Mts.

New species in some biogeographic regions of Kyrgyzstan

Fragariastrum biflorum (Willd. ex D.F.K. Schldtl.) Kechaykin et Shmakov

KYRGYZSTAN: NK, PI, SF and IT as *Potentilla biflora* Willd. ex D.F.K. Schldtl. (Lazkov & Sultanova 2011); CT* – "Irtash riv. basin and Jaman-Su riv. valley. 08.1936. No. 419. E. Korovin" (TASH)

General distribution: North and Central Asia; North America.

Schlechtendal is cited as the only author of *P. biflora* in one of the studies (Braun & Heuchert 2013) and in the International Plant Name Index and Tropicos (<http://www.tropicos.org/>) databases. In other studies, Willdenow is referred to as the only author of this species (Soják 2004, 2012). Most likely, a technical error was made in the sources cited above. Not only the name, but also the description of this species was first given by Willdenow. Like many other Willdenow's potentillas, *Potentilla biflora* was validated by Schlechtendal after the death of Willdenow (Schlechtendal 1816). Thus, according to Art. 46 of the International Code of Nomenclature for Algae, Fungi, and Plants (Turland et al. 2018), this species must be attributed to Willd. ex D. F. K. Schldtl.

Potentilla agrimonioides M. Bieb.

KYRGYZSTAN: IT as *P. stanjukoviczii* Ovcz. et koczk. (Lazkov & Sultanova, 2011); A* – "Osh region, S slopes of Alai range, vill. Daraut-Korgon, 3 km to the north. Rocks outputs. H = 3600 m a.s.l. 25.08.1957. Yu.Ya. Fedorov" (MW0839897), "Vill. Daraut-Korgon env., rocks. H = 3000 m a.s.l. 29.07.1957. Yu.Ya. Fedorov" (MW0839898), "Alai range, alpine meadows in Lenin Peak env. 19–21.07.1975. S. Tumanyan" (MW0894809), "Alay valley, Daraut-Tag mountain. N slope. Rocks and scree slope. 26.06.1936. No. 94. I. Tyshchenko, M. Rozhkovskaya" (TASH); PI* – "Terskey-Alatau, catchment of Chon-Kyzyl-Su riv., Kara-Bashkak riv. valley. H=3200 m a.s.l. 22.06.1949. T. Gordeeva" (MW0839899), "Korumdu-Tal am nordl. Abh. von Terskei-Tau. 1.06.1902. No. 8. V. Saposhnikov" (DR); CT* – "Sary-Djaz riv. basin, lower part of Berkut riv. valley. 07.1961. I. Shchukin" (MW0839901), "Central Tian Shan. Right bank of Inylchek riv., above confluence of Achek-Tash riv. The second terrace. 27.06.1939. No. 29. V. Yakovleva" (LE), "Sarydschass-Tal neben Määdung Kuelu. Terrassen. 06.1902. No. 11. V. Saposhnikov" (DR).

General distribution: Eastern Europe (southeast); North (southern Siberia), Southwest, Central, South (northwest) Asia.

This mountain-steppe and rock species that is wide-spread in Eurasia exhibits several variations within its habitat (Soják 1987a), which are geographically undifferentiated. We agree with the opinion of J. Soják that *P. stanjukoviczii* is synonymous with *P. agrimonioides* (Soják 1987a, Soják 2009).

Potentilla algida Soják

KYRGYZSTAN: SF; NK* – "Kirgisia, Tian-Schan montes Kirgizskij Chrebet: locis graminosis in valle rivuli Ala-Arca ad meridiem versus ab oppido Frunze, H=1500–2000 m a.s.l. 8.07.1979. J. Soják" (E00663808) (Fig. 1).

General distribution: Central Asia.

Potentilla angustiloba T.T. Yü et C.L. Li.

KYRGYZSTAN: IT* – "Kara-Tash tract, bank of Tulek riv. 8.07.1937. K. Halzova" (TASH); PI* – "Issyk-Kul depression, 15 km to the southeast of Rybachiy. Desert on the

southern shore of lake. 1.06.1958. No. 1032. I.A. Gubanov" (MW0839905, MW0839906).

General distribution: North (Altai) and Central Asia.

This species was previously cited for the flora of Kyrgyzstan. CT: "Semirech. region, Przhhevskiy distr., Kuelu riv. opposite Torp[u] riv. N steppe slope. 11.08.1912. V. Sapozhnikov, B. Shishkin" (herbarium specimen is defined as *P. multifida* L. var. *angustifolia* Lehm. and *P. multifida* L. var. *nubigena* Th. Wolf) (TK) (Kechaykin 2016); "Semirech. region, Przhhevskiy distr., Ken-Su riv., Aksai western source, h. solon. desert steppe. 7.07.1913 V. Sapozhnikov" (TK) (Kechaykin 2016).

Potentilla approximata Bunge

KYRGYZSTAN: NK; PI* – "Issyk-Kul depression, Kungei-Alatau range, 75 km on NNE from Rybachiy. Steppe zone of mountains, Cholpon-Ata gorge. 3.07.1958. I.A. Gubanov" (MW0839930), "Issyk-Kul depression, Kara-Bulung peninsula. 07.1975. I. Shchukin" (MW0839894), "Depression of lake Issyk-Kul, south-eastern coast of lake, vill. Pokrovka env., along aryk bank. 15.07.1975. I. Shchukin" (MW0839932), "Issyk-Kul depression, Karakol distr., vill. Sokolovka env. W slope of mountains. 20.08.1932. G. Sumnevich" (the specimen collected from vill. Sokolovka env. is defined as *P. fedtschenkoana* Siegf. ex Th. Wolf) (TK), "S slope of Kungei-Alatau range, Ak-Shibak tract, foothills, right side of Kara-Su riv." (TASH).

General distribution: Eastern Europe; North and Central Asia.

Potentilla argentea L.

KYRGYZSTAN: NK, PI, WT and IT as *P. impolita* Wahlenb. (Lazkov & Sultanova 2011); SF* – "Jalal-Abad region, Fergana range, Aksy distr., lake Sary-Chelek env. 41°53'11"N 71°59'05"E. H=2300 m a.s.l. 16.07.2018. S.A. Usmanov" (ALTB).

General distribution: Europe; North (except the northern part), Southwest, Central (up to northwestern China), East (north), South (northwest) Asia; North America.

Potentilla blanda Soják

KYRGYZSTAN: WT* – "Western Tian Shan. N slope of Chatkal range, Mazar-su gorge env., subalpine belt. 17.08.1962. No. 191. V. Pavlov" (MW0840081); NK* – "Kirgisia, Tian-Schan montes Kirgizskij Chrebet: locis graminosis in valle rivuli Ala-Arca ad meridiem versus ab oppido Frunze, H=1500–2000 m a.s.l. 8.07.1979. J. Soják" (E00664151 et E00664152).

General distribution: Central Asia.

The species was described from the specimens collected in Alai valley: Alai range, near Sary-Tash (Soják 1983). Type specimens of *P. blanda* are stored in LE herbarium. Apart from Sary-Tasha env., we identified new localities of this rare species in A: "right bank of Ailyama riv., alpine meadow" (MW0840431); "Berg-Region bei Irkeshtam" (DR). *P. blanda* was previously cited for PI: "Tian Shan. Terskey-Tau, Korumda valley (later. valley of Konurulen riv.). Alpine meadow and tundra. 1.06.1902. No. 19. V. Sapozhnikov" (TK) (Kechaykin 2016).

Potentilla desertorum Bunge

KYRGYZSTAN: NK; WT; SF; IT; PI* – "Terskei Alatau range, Akterek riv. valley. 07.1961. I. Shchukin" (MW0840181, MW0840180), "Tian Shan, Terskei Alatau range. Chon-Kyzyl-Su riv. basin, right bank of Kashkator riv. H=2950 m a.s.l. 17.07.1932. Zhiryakov" (MW0840175).

General distribution: North (south Siberia) and Central Asia.

Potentilla grisea Juz.

KYRGYZSTAN: NK; SF; A* – "Alai valley, Kuramda mountain, subalpine meadow. 15.08.1953. Tzipinskaya" (TK), "S slope of Alai range, Koksuv riv. head. Abramov glacier basin. H=3900 m a.s.l. 13.07.1986. V. Nozdryuhin" (TASH).

General distribution: Central Asia

Potentilla hololeuca Boiss. ex Lehm.

KYRGYZSTAN: NK; PI; WT; SF; IT; A* – "Alai range, alpine meadows, Lenin Peak env. 19–21.07.1975. S. Tumanyan" (MW0894818), "S slope of Alai range. Koksuv riv. head, Abramov glacier basin. H=3850 m a.s.l. 15.08.1986. V. Nozdryuhin" (TASH).

General distribution: Southwest and Central Asia.

Potentilla inclinata Vill., nom. cons.

KYRGYZSTAN: NK, WT and IT as *P. canescens* Besser (Lazkov & Sultanova 2011); SF* – "Jalal-Abad region, Fergana range, Bazar-Korgon distr., Kara-Unkur riv. head. 41°22'54" N, 72°56'04" E. H=2200 m a.s.l. 22.07.2018. S.A. Usmanov" (ALTB), "Jalal-Abad region, Fergana range, Aksy distr., lake Sary-Chelek env. 41°53'11"N 71°59'05"E. H=2300 m a.s.l. 16.07.2018. S.A. Usmanov" (ALTB), "Jalal-Abad region, Fergana range, Suzak distr., 5 km north of vill. Kara-Alma. 41°13'53"N 73°19'54"E. H=1500 m a.s.l. 18.07.2018. S.A. Usmanov" (ALTB).

General distribution: Europe; North (Altai), Southwest and Central (up to northwestern China) Asia; North America.

Studies by European scientists have shown that the type specimens of *P. inclinata* and *P. canescens* are identical (Kurtto et al. 2004, Soják 2005, Gregor et al. 2009). A stabilized hybrid species of *P. inclinata* results from hybridization between *P. argentea* L. and *P. recta* L. Most of the Soviet and Russian botanists consider this taxon as *P. canescens*, a species described much later than *P. inclinata*. The name *P. inclinata* was preserved vs. the previously unknown homotypic synonym *P. assurgens* Vill. (Gregor et al. 2009).

Potentilla multifida L.

KYRGYZSTAN: NK, PI, WT, IT and A as *P. asiae-mediae* Ovcz. et Kocz. (Lazkov & Sultanova 2011); SF* – "Turkistan range, Karavshin riv. head, Karasu gorge above vill. Vorukh. H=2000–2300 m a.s.l. 27.07.1989. R.G. Arefieva" (MW0839891 and MW0839892), "Fergana region, Isfayram-Sai, road up to Tengizbai pass, on rocks. 22.06.1931. No. 143. S. Lipschitz" (MW0840394), "Turkistan, prov. Fergana. Distr. Osh. In pratis in valle fl. Gulca. 22.05.1900. W. Tranzschel" (DR); CT* – "Central Tian Shan, mouth of Berkut riv. valley (tributary of Sary-Djaz riv.). 07.1961. I. Shchukin" (MW0840412), "Central Tian Shan, Sary-Djaz riv. basin, Sulun tract, mountain syntry. 16.07.1959. V. Zazhigin" (MW0840414, MW0840413).

General distribution: Europe; North, Southwest (Iran), Central, and South (northwest) Asia.

In one of the studies, Soják considered *P. asiae-mediae* as a synonym for *P. multifida* (Soják 2004). Our herbarium and field studies showed that these taxa are virtually identical.

Potentilla nervosa Juz.

KYRGYZSTAN: NK; PI; WT; SF; IT; A* – "Right bank of Ailyama riv., alpine meadow. 1.07.1986. No. 544-5. V. Kuvaev, G. Skrynnikov" (MW0840431), "Alai valley, vill. Bardoba env., rocky slopes. 13.08.1931. No. 838. S. Lipschitz" (MW0840422), "Alai valley, N side of Bardoba gorge, alpine lawn. 7.07.1931. No. 410. S. Lipschitz" (MW0840423, MW0840424), "East Alai, between Ailyama riv. and Tau-Murun pass. 7.08.1933. No. 619. I. Tyschenko" (TASH), "Alai range. S slopes. Road to Irkeshtam outpost, 37 km from Sary-Tash. H=3200 m a.s.l. 2.08.1962. No. 164. Puchkova" (TASH), "Zaalaisky range. Right bank of Nura riv., 10 km from Irkeshtam outpost. H=2850 m a.s.l. 4.08.1962. No. 313. Puchkova" (TASH); CT* – "Central Tian Shan, mouth of Berkut riv. valley (tributary of Sary-Djaz riv.). 07.1956. I. Shchukin" (MW0840426).

General distribution: Central Asia.

Potentilla pamiroalaica Juz.

KYRGYZSTAN: WT; SF; A* – "Zaalaisky range, Pamir highway, Bardoba outpost, small tributary of Kyzyl-Art riv., N slope of the valley. 39°30'29" N, 73°16'40" E. 28.07.2016. No. A-1812. A. Seregin" (MW0894824), "Osh region, Sary-Tash env. along Pamir highway. 27.06.1949. No. 1480.

S.S. Sakhobiddinov, A.D. Li" (TASH), "E part of Alai valley. Foothills of Zaalaisky range, a hill near Kurumda riv., 3 km to W. 24.08.1929. No. 266, 270. E. Korovin, I. Tyshchenko" (TASH); IT* – "Central Tian Shan. Kochkur riv. basin, vill. Kochkur env. (second terrace of Chu riv.). 3.06.1926. No. 15. A. Polyakova" (TASH), "Przhevalsky distr., near Petrov glacier. H=3600 m a.s.l. 1935 year. [P.]D. [G.]imer" (MW0840519).

General distribution: North (Altai) and Central Asia.

***Potentilla pensylvanica* L.**

KYRGYZSTAN: NK, PI and WT as *P. strigosa* Pall. ex Tratt. (Lazkov & Sultanova 2014); IT* – "Central Tian Shan. Eastern part of Susamyr valley, Jamansai tract. 21.07.1965. No. 206. A. Pyataeva, R. Kolomazova" (TASH).

General distribution: Southern and Eastern Europe; North, Central and East (north) Asia; North and Central America.

***Potentilla tephroleuca* Th.Wolf**

KYRGYZSTAN: WT; IT* – "Ketmen-Tyube depression, Iyru-suu riv., alpine zone. 18.07.1961. No. 1110. M. Botbaeva" (MW0840702).

General distribution: Central Asia.

***Potentilla virgata* Lehm.**

KYRGYZSTAN: NK; PI; WT; IT; A* – "Vill. Irkeshtam env. 18.09.1940" (MW0840780).

General distribution: Eastern Europe; North (southern Siberia) and Central Asia.

***Sibbaldia cuneata* Edgew.**

KYRGYZSTAN: NK as *S. olgae* Juz. et Ovcz. (Lazkov & Sultanova 2011); WT* (on the border with IT) – "Ketmen-Tyube depression, Talas Ala-Too, Muztor pass, moraine. 14.07.1960. No. 2423. M. Botbaeva" (MW0840793).

General distribution: Central, South and East Asia.

Other additions

1. In 1986, Soják described a new species of *Potentilla exuta* Soják based on materials collected earlier in Mongolia, Eastern Siberia and Kyrgyzstan (Soják 1986). Subsequently, no data on *P. exuta* were available in the studies on the flora of Kyrgyzstan. Type specimens of this species were collected from Kuyandy riv. head, Przhevalsky distr. by Sapozhnikov in 1913. This locality in Sary-Djaz riv. basin is a part of the Central Tian Shan (CT) (Fig. 1). The specimen from Kuyandy riv. stored in LE collection is a paratype of *P. exuta*.

2. According to Lazkov & Sultanova (2011), *Potentilla ferganensis* Soják can be found in the Prifergansky distr. of Kyrgyzstan (SF). This species is described from specimens collected in Suyek tract, At-Bashinsky distr., which corresponds to the Inner Tian Shan (IT) (Fig. 1). The only type specimen of *P. ferganensis* is stored in LE herbarium.

3. In 1987, *Potentilla penniphylla* (Soják 1987b) was described from the southwestern and northeastern parts of Kyrgyzstan, but the species was not included in the lists of species growing in the study area. According to the protolog and type materials stored in LE, *P. penniphylla* Soják occurs in the following biogeographic regions of Kyrgyzstan: SF – Alai range: Cholak boguz (locus classicus); CT – Kuelu riv. valley, right tributary of Sary-Djaz riv.; SF – Alai range, Osh distr., Tor-Chetan (Fig. 1). Note that we did not find the herbarium specimen from Tor-Chetan. Recently *P. penniphylla* has been newly recorded for the flora of Russia: the south-east of Western Siberia (Kechaykin 2016). Thus, new localities of *P. penniphylla* are likely to be found in the areas between Kyrgyzstan and Western Siberia.

4. According to Lazkov & Sultanova (2014), *Potentilla tobolensis* Th. Wolf ex Juz. is distributed in PI and WT biogeographic regions of Kyrgyzstan. In addition, a new locality was reported for *P. tobolensis*: Toguz-Torau tract, Kokirim riv., vill. Titovka env. (Kechaykin 2016). This collection stored in TK herbarium belongs to the Inner Tian Shan (IT). *P. tobolensis*, hybridogenic taxon with a wide range of habitat, is actively distributed by seeds dispersed along the roads, railway tracks, and along the banks of large rivers, lakes and water reservoirs (Kechaykin 2012, 2013).

Analysis of endemism of the genus *Potentilla* L. s. str. flora of Kyrgyzstan

Endemic elements are a specific part of any flora. Identification of these elements and their subsequent research are crucial for differentiation of particular flora from others. In some cases, endemic species grown in isolation in small localities are carriers of a unique genebank, and therefore are of high conservation priority (Lazkov & Umralina 2015). According to the Cadastre of Flora of Kyrgyzstan (Lazkov & Sultanova 2014), 15 endemic and subendemic species of the genus *Potentilla* s. str. can be found in Kyrgyzstan, some of them are quite rare and localized within specific boundaries. However, the atlas Endemics and Rare Plant Species of Kyrgyzstan does not provide any data on these species (Lazkov & Umralina 2015). Thus, the analysis of endemism of the genus *Potentilla* from Kyrgyzstan is of high relevance.

A list of endemic and subendemic species proposed by Lazkov & Sultanova (2014) with indication of species distribution in Kyrgyzstan with regard to new data is provided below

Legends:

[E] – endemic species (occur in Kyrgyzstan only);

[SE] – sub-endemic species (cover Kyrgyzstan and some areas of Central Asian republics of the former USSR and Northwest China).

1. *P. × ala-arczuae* Soják: NK; [E].
2. *P. algida* Soják: NK, SF; [SE].
3. *P. asiae-mediae* Ovcz. et Kocz.: NK, PI, SF, WT, IT, A, CT; [SE].
4. *P. asiatica* (Th.Wolf) Juz.: NK, PI, WT, SF; [SE].
5. *P. × bisbkeekensis* Soják: NK; [E].
6. *P. fedtschenkoana* Siegr. ex Th.Wolf: WT, SF; [SE].
7. *P. ferganensis* Soják: IT; [E].
8. *P. grisea* Juz.: A, NK, SF; [SE].
9. *P. kamelinii* Lazkov: WT; [E].
10. *P. nervosa* Juz.: A, NK, PI, WT, SF, IT, CT; [SE].
11. *P. pamirica* Th.Wolf: SF; [SE].
12. *P. pamiroalaica* Juz.: A, IT, WT, SF; [SE].
13. *P. stanjukoviczii* Ovcz. et Kocz.: A, IT, PI, CT; [SE].
14. *P. tephroleuca* (Th.Wolf) B. Fedtsch.: IT, WT; [SE].
15. *P. tephrosericea* Juz.: WT, SF; [SE].

We propose to exclude some of the *Potentilla* species listed above, which, according to some data, have a wider area of distribution (marked with "#" in the list) from the category of subendemic species of Kyrgyzstan. These species include *P. algida* growing in Afghanistan (Soják 2012); *P. asiae-mediae* that is considered synonymous with *P. multifida* (see above); *P. asiatica* growing in the area from Afghanistan to Eastern Siberia (Soják 2004, 2012, Kechaykin 2012); *P. grisea* restricted to Afghanistan, Pakistan and Kashmir (Soják 2009, 2012); *P. pamirica* and *P. pamiroalaica* distributed from Turkey to Altai (Soják 2007, 2012, Kurbatsky & Ebel 2011,

Kechaykin et al. 2014); *P. stanjukoviczii* that is considered synonymous with *P. agrimonioides* (see above).

Thus, only 8 *Potentilla* endemics occur in the flora of Kyrgyzstan, of which 4 species are local endemics that require special observation and monitoring (*P. × ala-arvzuae*), *P. × bishkekensis*, *P. ferganensis* and *P. kamelinii* (Fig. 1), and 4 species are subendemic (*P. fedtschenkoana*, *P. nervosa*, *P. tephroleuca* and *P. tephrosericea*). The number of endemics and subendemics is 18.6 % of the total number of *Potentilla* s. str. growing in Kyrgyzstan. Such low percentage, in our opinion, does not reflect the autochthonous tendencies in the formation of the *Potentilla* species composition in this area. The highest occurrence of endemics and subendemics of *Potentilla* in the flora of Kyrgyzstan is observed in the Western Tian Shan biogeographic region, where 5 species are found to grow. In addition, three more *Potentilla* species found nowhere else and associated with *P. fedtschenkoana* have been described from the Western Tian Shan. In Uzbekistan, these are *P. × solitaria* Soják and *P. tschimganica* Soják found in the Big Chimgan Mountain Range; in Kazakhstan – *P. karatarica* Juz. growing in the Karatau range. These species are likely to occur in Kyrgyzstan as they grow in close proximity to the border. The physiographic conditions of the Western Tian Shan make it an area with active speciation in the genus *Potentilla* associated primarily with processes of hybridization.

CONCLUSION

Within five years after the release of the second volume of the Cadastre of Flora of Kyrgyzstan, the number of species of the genus *Potentilla* in the study area have increased by nine taxa, and now it accounts for 49 species s. l. or 43 species s. str. In this paper, 5 new *Potentilla* species with specific localities have been newly recorded for the first time for the flora of Kyrgyzstan. Of these, *P. twinica* is a newly recorded species from the Tian Shan mountain range. The conducted analysis of endemism showed that 8 endemic and subendemic *Potentilla* species occur in the flora of Kyrgyzstan. The endemics and subendemics of *Potentilla* are mostly found in the Western Tian Shan biogeographic region associated with species formation of the genus in this area. We believe that the study of the genus *Potentilla* and close taxa is currently being initiated in Kyrgyzstan, and in the Tian Shan and Pamir-Alai mountain ranges. New findings are expected to expand the overall picture of the genus *Potentilla* in Central Asia. In conclusion, we would like to quote the words of R.V. Kamelin, a famous expert on the flora of Central Asia, "Such is the flora of Kyrgyzstan, which has not been fully studied in terms of its systematic composition and for practical needs" (Kamelin 2002).

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