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Updated Checklist of Vascular Plants Endemic to Mongolia

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Citation: Baasanmunkh, S.; Urgamal, M.; Oyuntsetseg, B.; Grabovskaya-Borodina, A.; Oyundelger, K.; Tsegmed, Z.; Gundegmaa, V.; Kechaykin, A.A.; Pyak, A.I.; Zhao, L.Q.; et al. Updated Checklist of Vascular Plants Endemic to Mongolia. *Diversity* **2021**, *13*, 619. https://doi.org/10.3390/d13120619

Academic Editors: Adriano Stinca and Michael Wink

Received: 8 November 2021
Accepted: 22 November 2021
Published: 25 November 2021

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Abstract: The aim of the present study is to update the checklist of vascular plants endemic to Mongolia using previous checklists, publications, herbarium collections, and field observations. The revised checklist includes 102 endemic taxa (95 species, five subspecies, and two nothospecies) from 43 genera and 19 families. The majority of endemic taxa were distributed in western and central Mongolia, and high endemic species richness was identified in four phytogeographical regions, namely Mongolian Altai, Khangai, Dzungarian Gobi, and Gobi Altai, which harbor 49, 27, 20, and 16 endemic taxa, respectively. For each endemic taxon, we compiled information about growth form, conservation status (if already assessed), phytogeographical distribution, and voucher specimens. Data on each taxon's type specimen were also collected, and the majority of the type specimens were accessioned at the LE (58 taxa), MW (20 taxa), and UBA (7 taxa) herbaria.

Keywords: endemism; conservation; flora; vascular plant; type specimen

1. Introduction

The term "endemism" is used in biogeography to refer to taxa that have restricted geographical distribution. The richness of a region's endemic species is often cited as evidence to support the designation of an area as a diversity hotspot and is, therefore, critical for conservation management [1]. Mongolia is located in the mid-latitude (between 41°35′ N–52°09′ N and 87°44′ E–119°56′ E), covering approximately 1.6 million km^2 and roughly equaling western and central Europe. As of 2021, approximately 3200 vascular plant species belonging to 684 genera and 112 families have been reported in Mongolia [2–7]. The area is not particularly speciose but, due to its geographical location at the junction of two subcontinents (northern and central Asia), harbors feature of

multiple floras [8,9]: boreal (central Siberian–Daurian) in the northern part, Altai Mountain (Mid-Asian) in the western part, central Asian in the Gobi, deserts, and desert-steppes of the southern part, and ancient Mediterranean in the steppes and forest steppes in central and eastern Mongolia. Despite the fact that the Mongolian flora includes elements from various floristic regions, endemic plants in Mongolia are primarily represented by central Asian elements [10].

The identification of endemic species within a country's territory is crucial [10]. Several studies have evaluated the endemic taxa of Mongolia. Grubov [11] compiled the first endemic plant checklist, which included 86 species, and Ulziikhutag [12] and Gubanov [13] provided revised lists of 145 and 143 species, respectively. More recently, Urgamal and Oyuntsetseg [14] published a list of 120 endemic species, which together accounted for 3.2% of the country's flora. In addition, the geographical distribution, conservation status, and population genetics of endemic plant taxa in the high mountains of southern Mongolian were investigated by Wesche et al. [15,16], who reported that the highly isolated southern Mongolia dry mountains harbored several endemic species that should be targeted for conservation by the Mongolian government. Unfortunately, none of those endemic species were included in either the Mongolian Red Data Book [17] or the IUCN International Red List [15]. Therefore, compiling a list of endemic species and their corresponding conservation status is crucial for both regional and national conservation.

The aim of the present study was to update the checklist of endemic vascular plants of Mongolia using previous checklists, publications, herbarium collections, and field observation data between 2014 and 2020. As a result of thoroughly investigating species records, information about the locations of type specimens and the regional conservation statuses of endemic species were also compiled and reported.

2. Materials and Methods

Publications used to revise the checklist included the Checklist of Endemic Vascular Plants [11–14], Conspectus of the Vascular Plants of Mongolia [2,13,18,19], Flora of Khangay [20], Legumes of Mongolia [21], four volumes of the Flora of Mongolia [22–25], and five volumes of Plants of Central Asia—plant collections from China and Mongolia [26–39]. Recent (2014–2020) publications related to the discovery, description, and/or first records of taxa in Mongolia were also considered and included Nobis [30], German [19], Bekket et al. [31], Kechaykin and Kutsev [32], Kechaykin [33,34], Gundegmaa and Kechaykin [35], Yurtseva et al. [36], Erst et al. [37], Ovchinnikova and Korolyuk [38], Zhao et al. [39], Pyak and Pyak [40], Ovchinnikova [4,41], and Pyak et al. [42]. Publications related to a six-year field survey that resulted in addition of new taxa to the region's flora [5–7,43–52] were also considered.

In the present study, endemic taxa were defined as vascular plant taxa that only occur within the borders of Mongolia, and sub-endemic species, which also occur in neighboring areas [11,12,19], were excluded from the analysis. After the list of endemic taxa was compiled, the distribution of each taxon was cross-checked using information from the Flora of China [53], the virtual guide of Mongolia [54], and various herbaria (ALTB, GLM, GWF, HAL, LE, MW, NS, OSBU, TK, P, UBA, and UBU; herbarium codes according to Thiers [55]). Information about the taxa's type specimens was also retrieved from various herbaria, mainly from LE (http://en.herbariumle.ru/; accessed on 25 September 2021; Grubov [56]), MW (https://plant.depo.msu.ru/; accessed on 30 September 2021; Gubanov [57]), and UBA. The nomenclature follows POWO [58] and the original descriptions were checked using POWO and IPNI [59]. The conservation status (i.e., threat categories) of each taxon was also reported according to regional red lists [60–62]. Furthermore, the general distribution of each taxon among Mongolia's phytogeographical regions was evaluated [2,13,18,47].

3. Results

The present study recognized a total of 102 taxa (including 95 species, five subspecies, and two nothospecies) that are currently endemic to Mongolia (Appendix A). The most endemic taxa-rich families were the Fabaceae (29 taxa), Asteraceae (21 taxa), Rosaceae (15 taxa), Ranunculaceae (9 taxa), and Boraginaceae (7 taxa), and each of the remaining 14 represented families included only one to four endemic taxa. Meanwhile, the most endemic taxa-rich genera were *Astragalus* (16 taxa), *Potentilla* (13 taxa), *Oxytropis* (11 taxa), *Craniospermum* (6 taxa), and *Saussurea* (5 taxa. However, no strictly endemic families or genera were identified. High endemic taxa richness was noted for four regions, including Mongolian Altai, Khangai, Gobi Altai, and Dzungarian Gobi, which harbored 49, 27, 22, and 20 endemic taxa, respectively (Figure 1). Each of the remaining regions harbored only one to fourteen endemic taxa.

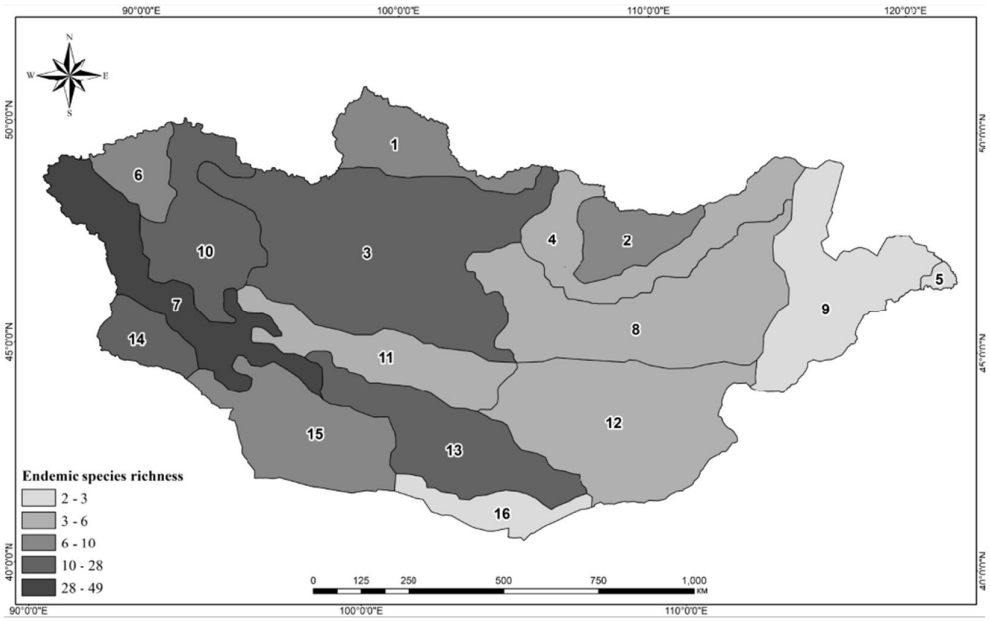

Figure 1. Richness of endemic taxa among the phytogeographical regions of Mongolia. 1–Khuvsgul, 2–Khentei, 3–Khangai, 4–Mongolian Dauria, 5–Foothills of Great Khyangan, 6–Khovd, 7–Mongolian Altai, 8–Middle Khalkh, 9–East Mongolia, 10–Depression of Great Lakes, 11–Valley of Lakes, 12–East Gobi, 13–Gobi Altai, 14–Dzungarian Gobi, 15–Transaltai Gobi, 16—Alashan Gobi.

The number of endemic species reported from Mongolia has also varied over the past decades. For example, 47 endemic taxa were reported between 1980 and 2000, and 28 taxa have been reported since 2010 (Figure 2A). Furthermore, most of the taxa's type specimens, including holotype, paratype, and isotype specimens, were accessioned at LE and MW herbaria (Figure 2B).

Only 18 of the 102 taxa have been assessed for IUCN International Conservation Status. However, eight taxa were identified as critically endangered or endangered, and two species were assessed as vulnerable (Appendix A). During our field surveys, endemic taxa were photographed, which were mostly from type localities (Figures B1 and B2).

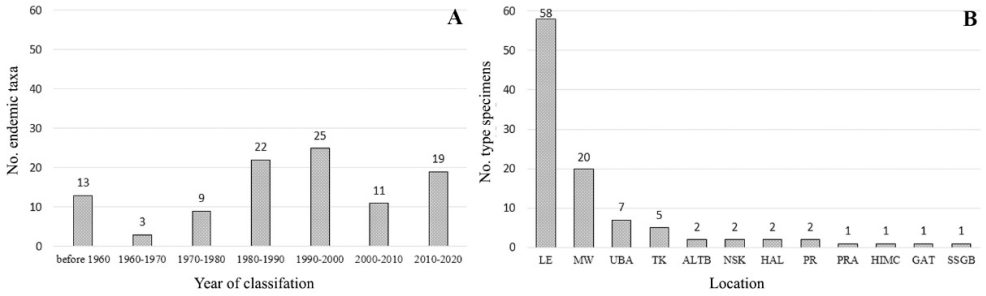

Figure 2. (**A**) Distribution of classification years; (**B**) Distribution of type specimens among herbaria.

4. Discussion

According to the critical revision of endemic vascular plants in Mongolia, 102 taxa were recognized as truly endemic to Mongolia. This is less than on the most recently published list [14], owing to the fact that 24 of the species included by Urgamal and Oyuntsetseg [14] are found to be occurring in the neighboring regions of China and Russia [37,63,64]. In addition, 18 endemic taxa are replaced by synonyms of other taxa [19,58], which are given in Appendix C. For example, *Swertia banzragczii* Sanchir was listed as endemic to Mongolia by Urgamal and Oyuntsetseg [14], but it was reported to occur in Xinjiang, China, by Chen et al. [65]. Furthermore, the new list also includes several newly described species, such as *Stipa austromongolica* M. Nobis [30], which were not included in earlier lists [2,14], because they were not yet recognized to occur in the local flora. Several species that have been newly described from western Mongolia [32,36,39,41,42] were added to the updated checklist as well.

Approximately 70% of the 102 endemic taxa are distributed in western and central Mongolia, particularly the Mongolian Altai, Dzungarian Gobi, Khangai, Depression of Great Lakes, and Gobi Altai regions (Figure 1). These regions include many montane habitats that likely harbor high species diversity as a result of their moist and diverse microclimate. Indeed, Gunin et al. [8] reported that the flora of high mountain areas in Mongolia is almost twice as rich as that of the lower elevation plains (up to 700 m a.s.l.). Wesche et al. [15] also reported that mountain ranges of the southeastern Gobi Altai, especially at high altitudes, have highly isolated plant populations and, not surprisingly, harbor a number of endemic species. This was proven by our study that 65% of the endemic taxa grow in the altitude range of 1700 to 3350 m. Many taxa found at high elevations have been proven to be ploypoids, e.g., *Artemisia* [66], *Taraxacum* [67,68], *Alchemilla* [69], *Potentilla* [70,71], which accords with the general observation that perennial herbs from high elevations in temperate zones are frequently polyploids, which in turn is interpreted as an adaptation to harsh environments [72]. Due to the large size of phytogeographical regions, it is difficult to define the protection status of the endemic taxa they contain. Thus, further studies of the population sizes and isolation of endemic taxa are needed to designate and modify protected areas in the country.

According to the Red Lists, only 18% of endemic species have been assessed for conservation status [60–62], and almost 70% of species have not been assigned to an international-level IUCN category. A few studies have evaluated the conservation status of specific Mongolian endemic plants, such as *Potentilla ikonnikovii* Juz., *Galitzkya macrocarpa* (Ikonn.-Gal.) V.V.Botschantz, and *Saussurea saichanensis* Komarov ex Lipsch, and concluded that the species are in no immediate danger [15,16]. However, because many endemic plants are restricted to type specimen localities or have limited geographical ranges [14,47], special attention should be given to the species' evaluation and protection.

During the last decades, researchers paid much attention to the floristic checklist, new records, and conservation status of vascular plants in Mongolia. However, more complete taxonomic revision based on morphology and molecular evidence is needed on

the several largest genera such as *Astragalus*, *Artemisia*, *Oxytropis*, *Potentilla*, and *Taraxacum*, which contain a high number of taxa, including a number of endemic plants in Mongolia.

Many countries have recently updated and published the checklist of endemic vascular plants from European and Asian countries. In Asia, for example, China has the most endemic plants (over 16,000 taxa) [73], followed by Russia (over 2700 taxa) [74], Kazakhstan (over 760 taxa) [75], and South Korea (312 taxa) [76], as well as the Tian-Shan Mountains (871 taxa) belonging to Central Asian countries [77]. While in Europe, for example, Italy (1598 taxa) [78] has the highest endemic taxa, along with Spain (1488 taxa) [79], Greece (1,435 taxa) [80], Croatia (349 taxa) [81], Austria (103 taxa) [82] and Czech Republic (82 taxa) [83]. Compared to the above-mentioned studies, the number of endemic plants in Mongolia (102 taxa, ca. 3% of the total flora) is not particularly high, which is due to the country's dry and harsh climate (mean precipitation 50–350 mm/year) that affects the floral diversity and endemism [84].

5. Conclusions

Overall, the number of vascular plants including endemic taxa is not particularly rich in Mongolia compared with adjacent countries [85–88] However, bcause these endemic taxa contribute to local biodiversity, Mongolia has a high level of responsibility for their conservation. Unfortunately, a significant gap remains in the understanding and assessment of the taxas' conservation status. Nevertheless, the present study could serve as a starting point for the systematic resolution of this problem. According to our results, endemic vascular plant species in Mongolia are primarily distributed in mountainous regions, which suggests that such areas should be prioritized for protection. Future research that accounts for population sizes and emerging threats is also needed to inform conservation efforts and protected area designation.

Author Contributions: Conceptualization, S.B.; methodology, S.B. and M.U.; formal analysis, S.B.; M.U. and Z.T.; resources, S.B., M.U., B.O., Z.T., A.G.-B., A.A.K., V.G., A.I.P. and L.Q.Z.; writing—original draft preparation, S.B.; writing—review and editing, S.B., K.O. and H.J.C; supervision, B.O. and H.J.C; project administration, H.J.C.; funding acquisition, H.J.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Korea National Arboretum, Korea, grant No. KNA 1-2-38, 20-5, B.O was funded by a "Seed Grant" from National University of Mongolia, Mongolia, A.G. was funded by the Komarov Botanical Institute RAS, grant No. AAAA-A18-118022090078-2, and A.I.P. was funded by the Russian Science Foundation, grant No. 20-67-46018.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: All the data obtained from herbaria, field surveys, and literature are referenced in the MS.

Acknowledgments: We thank Alex McAlvay (New York Botanical Garden, New York, NY, USA) for critical English editing. The authors are grateful to three anonymous reviewers for their critical reading of the manuscript with valuable comments.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Annotated Checklist of Vascular Plants Endemic to Mongolia

The families in the checklist are alphabetically ordered and, within them, the genera, species, and subspecies are alphabetically listed. The currently accepted names are highlighted in bold italics. Relevant synonyms are in italics. Furthemore, the effective place of publication of accepted names and synonyms is indicated according to IPNI [59].

After the taxon name and respective publication, the following information is provided: growth form (*Gf*) according to Grubov [18] and the main floristic works conducted in Mongolia.

The regional conservation status (*CS*) follows Nyambayar et al. (2011) [60], Oyuntsetseg et al. [61], Urgamal et al. [62]: CR = critically endangered, EN = endangered, VU = vulnerable, DD = data deficient.

Regional distribution (*RD*) in Mongolia was based on Grubov [18], Gubanov [13], Urgamal et al. [2], and Baasanmunkh et al. [47]: 1–Khuvsgul, 2–Khentei, 3–Khangai, 4–Mongolian Dauria, 5–Foothills of Great Khyangan, 6–Khovd, 7–Mongolian Altai, 8–Middle Khalkh, 9–East Mongolia, 10–Depression of Great Lakes, 11–Valley of Lakes, 12–East Gobi, 13–Gobi Altai, 14–Dzungarian Gobi, 15–Transaltai Gobi, and 16–Alashan Gobi.

Elevation (*E*) of each taxon was based on voucher specimen information, our field observations, and references.

Voucher specimens (*V*) of each taxon were noted according to the relevant herbarium records.

Type specimens' information was based on the respective herbarium collections and publications.

ASTERACEAE

Ajania grubovii Muldashev, Bot. Zhurn. (Moscow & Leningrad). 67(11): 1529. 1982.

IPNI: urn:lsid:ipni.org:names:899118-1
Synonym: *Chrysanthemum grubovii* (Muldashev) H.Ohashi & Yonek, J. Jap. Bot. 79(3): 189. 2004.
[*Gf*: Herb. *RD*: 7, 14. *E* (m): 1775–2345. *V*: LE (1), MW (5), UBA (4)]
Type: MONGOLIA. Gobi dzhungarica, vallis fl. Uenczin gol, 4 km infra ostium Fl. Putzacty-Gol, in declivi detritico ex saxis schistosis lateralis dextre desertum fruticosum in detritis gypsacio, 15 July 1979, *V.I. Grubov, and A.A. Muldaschev 1437* (LE 01012732 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01017232 accessed on 25 September 2021)
Photo: Khovd province, Dariv sum, Uliastain am, 12 August 2014, *V. Gundegmaa* (Figure B1A)

Artemisia assurgens Filatova, Novosti Sist. Vyssh. Rast. 19: 178. 1982.

IPNI: urn:lsid:ipni.org:names:899215-1
[*Gf*: Herb. *RD*: 7, 11, 13, 14, 15. *E* (m): 1105–2365. *V*: LE (7)]
Synonym: *Seriphidium assurgens* (Filatova) K.Bremer & Humphries ex Y.R.Ling, Bull. Bot. Res., Harbin 11(4): 7. 1991.
Type: MONGOLIA. Khovd province, Uyench river, 15 km east of Altai sum, 27 July 1973, *E.A. Volkiva and E.I. Rachkovskaya 6132* (holotype LE 01018065 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01018065 accessed on 25 September 2021)

Artemisia davazamczii Darijma & Kamelin, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 97(5): 65. 1992.

IPNI: urn:lsid:ipni.org:names:971028-1
[*Gf*: Herb. *RD:* 7, 10, 13, 15. *E* (m): 1450–2300. *V*: LE (1), MW (11)]
Type: MONGOLIA. Umnugobi province, Sevrei sum, Nemegt Nuruu, 2747m a.s.l., 8 July 1948, *V.I. Grubov 5562* (holotype LE, paratypes MW 0595062–0535064 [digtal images!]; the images of the paratypes are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Artemisia desertorum subsp. ***pseudojaponica*** Darijma & Kamelin, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 97(5): 66. 1992.

IPNI: urn:lsid:ipni.org:names:971029-1
[*Gf*: Herb. *RD*: 5. *E* (m): 845–1010. *V:* MW (6), UBA (18), UBU (2)]
Type: MONGOLIA. Dornod province, Khalkh Gol sum, Numrug river, Khanchandmani Mountain, 11 August 1991, *R.V. Kamelin and Sh. Darijma 1343* (holotype LE)

Artemisia vulgaris subsp. ***inundata*** Darjima, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 97(5): 68. 1992.

IPNI: urn:lsid:ipni.org:names:971031-1
[*Gf*: Herb. *RD:* 2, 3. *E* (m): 1695–1810. *V:* LE (1), MW (5), UBA (4)]

Type: MONGOLIA. Selenge province, western bank of Khuder river, south village Khuder sum, in marshy meadow, 11 August 1981, *E. Ganbold 138* (holotype UBA!, paratype MW 0595102 [digtal images!]; the image of the paratype is available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Aster sanczirii Kamelin & Gubanov, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 97(5): 69. 1992.

IPNI: urn:lsid:ipni.org:names:971032-1
[Gf: Herb. RD: 5. E (m): 1040–1050. V: HAL (1), MW (1), UBA (1), UBU (1)]
Type: MONGOLIA. Dornod province, Khalkh Gol sum, Numrug river, Khan Chandmani Uul, 18 July 1989, V. Khramov and Ch. Sanchir (holotype MW 0594965 [digtal images!]; the image of the holotype is available at https://plant.depo.msu.ru/ accessed on 30 September 2021)
Photo: Dornod province, Khalkh Gol sum, Numrug river, 17 July 2017, *H.J. Choi* (Figure B1C)

Brachanthemum mongolorum Grubov, Bot. Zhurn. (Moscow & Leningrad). 57(12): 1593. 1972.

IPNI: urn:lsid:ipni.org:names:185858-1
[*Gf*: Herb. *CS:* CR (60). *RD:* 9. *E* (m): 970–1060. *V*: GAT (1), LE (2), MW (1)]
Type: MONGOLIA. Dornod aimag 16 away and to the northeast of Arjagalant monastery, western part of mountain Tso-Undur in the pterphyte plant communities on the rocky top, 23 June 1971, *B. Dashnjam, E. Isatschenko* et al. (holotype LE 01017246 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01017246 accessed on 25 September 2021)

Chrysanthemum chalchingolicum Grubov, Bot. Zhurn. (Moscow & Leningrad). 57(12): 1592. 1972.

IPNI: urn:lsid:ipni.org:names:193362-1
Synonym: *Dendranthema chalchingolicum* (Grubov) K.Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23(2): 114. 1993.
[*Gf*: Herb. *CS:* CR (62). *RD*: 5, 9. *E* (m): 695–1070. *V*: LE (1), MW (1), UBU (1)]
Type: MONGOLIA. Dornod province, Khalkhin Gol river, Sumber terrain feature, steppe, 04 September 1928, Tug., Khalkhin Gol river 12 km south of Khukh-Undur-obo, slope on left bank (opposite common grave of 1939 War), arid solo netzic common cattail—cereal grass steppe, 15 August 1970, *V.I. Grubov, N. Ulzijkhutag and Tserenbalzhid s.n.* (holotype LE 01017251 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01017251 accessed on 25 September 2021)
Photo: Dornod province, Khalkh Gol sum, 20 August 2014, *B. Oyuntsetseg* (Figure B1B)

Crepis lomonosovae Tzvelev, Bot. Zhurn. (Moscow & Leningrad) 92(11): 1748. 2007.

IPNI: urn:lsid:ipni.org:names:77089375-1
[*Gf*: Herb. *RD*: 3, 13. *E* (m): 1985. *V*: LE (1)]
Type: MONGOLIA. Bayankhongor province, Bogd sum, Ikh Bogd Mt, north slopes, Butuutei canon, alpine zone, 12 August 1927, *M. Simukova s.n.* (holotype LE 01024538 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01024538 accessed on 25 September 2021)

Saussurea gubanovii Kamelin, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 93(5): 113. 1988.

IPNI: urn:lsid:ipni.org:names:935804-1
[*Gf*: Herb. *RD*: 7, 14, 15. *E* (m): 1080–1440. *V*: MW (2), UBA (1)]
Type: MONGOLIA. Bayankhongor province, Oasis Shar-Khulst-Bulag, Solonchaks, 19 July 1984, *I.A. Gubanov 8895* (holotypes MW 0595165, MW 0595166 [digital images!]; the images of the holotypes are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Saussurea klementzii Lipsch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 458. 1954.

IPNI: urn:lsid:ipni.org:names:242357-1
[*Gf*: Herb. *RD*: 7. *E* (m): 1820–2940. *V*: LE (3), UBA (2)]
Type: MONGOLIA. Mongolian Altai, Da-Guna Khuree, 28 July 1897, *E. Klementz 114-a* (holotype LE 01024940, isotype LE 01024341 [digital images!]; the images of holotype and isotype are available at https://en.herbariumle.ru/ accessed on 25 September 2021)

Saussurea odorata E.Pjak, Phytotaxa 470(3): 236. 2020.

IPNI: urn:lsid:ipni.org:names:77212710-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2980–3100. *V*: MW (1), TK (12)]
Type**:** MONGOLIA. Khovd Province, Möst Sum, Mongolian Altai Mountains, Baga-Ulan-Daba Pass, granite talus slope, 3056m a.s.l., 46°41′41.48″ N, 92°17′19.00″ E, 23 July 2019, *A.I. Pyak, E.A. Pyak and V.V. Madyka 002340* (holotype TK 002340!, isotypes TK!, MW!)
Photo: Khovd province, Must sum, Baga Ulaan Davaa, 23 July 2019, *A. Pyak* (Figure B1F)
Note: *Saussurea odorata* is similar to *S. saichanensis* Komarov ex Lipsch. and *S. krylovii* Schischk. & Serg., but can be distinguished by its much-branched caudex, a larger number of capitula in a dense racemose synflorescence, and a strong odor due to the high density of glandular trichomes on both surfaces of leaves [42].

Saussurea ramosa Lipsch., Bull. Soc. Nat. Mosc., Biol. n. s., lix. Livr. 6: 72. 1954.

IPNI: urn:lsid:ipni.org:names:242586-1
[*Gf:* Herb. *RD:* 3, 10, 11, 15. *E (m):* 970–2400. *V:* ALTB (1), LE (2), MW (4), TK (5), UBA (8)]
Type: MONGOLIA. Schargin–Gobi, prope lacum Schargin-zagan-nor, in salsis, 11 September 1930, *E.G. Pobedimova 657* (holotype LE 01025136; [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01025136 accessed on 25 September 2021)

Saussurea saichanensis Komarov ex Lipsch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 340. 1960.

IPNI: urn:lsid:ipni.org:names:242616-1
[*Gf*: Herb. *RD:* 1, 2, 3, 6, 7, 13, 14. *E* (m): 1530–3340. *V:* GFW (2), HAL (12), MW (6), OSBU (1), US (1), UBU (2), UBA (13)]
Type: MONGOLIA. Gobi Altai province, Dund Saikhan Mountain, 19 August 1931, *N.V. Ikonnikov-Galitzky 4152* (holotype LE 01025160 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01025160 accessed on 25 September 2021)
Photo: Khovd province, Uyench sum, Khavtag Mountain, 25 July 201, *H.J. Choi* (Figure B1E)

Scorzonera grubovii Lipsch., Novosti Sist. Vyssh. Rast. 18: 229. 1981.

IPNI: urn:lsid:ipni.org:names:898706-1
[*Gf*: Herb. *CS:* EN (62). *RD:* 7, 14. *E* (m): 1250–1525. *V:* GLM (1), LE (2)]
Type: MONGOLIA. Khovd province, to the northeast/east 30 km from Altai sum, Serkhiin Nuruu mountain. Grasses–Salsola community, 2 July 1977, *E.A. Volkova and E.I. Rachkovskaja 7174* (holotype LE 01024340 [digital image!], isotype LE 01024341 [digital images!]; the images of holotype and isotype are available at https://en.herbariumle.ru/ accessed on 25 September 2021)

Senecio kenteicus Grubov, Opred. Sosud. Rast. Mongolii (Key Vasc. Pl. Mongolia) 255. 1982.

IPNI: urn:lsid:ipni.org:names:900940-1
[*Gf*: Herb. *RD*: 2. *E* (m): 980–1810. *V*: LE (1), MW (1), UBA (1)]
Type: MONGOLIA. Montes Kentei orientales ad fontes fluviorum Kerulen et Onon. Alpine meadow Khan-Kentei, 22 July 1928, *N.V. Ikonnikov-Galitzky 418* (holotype LE 01018200 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01018200 accessed on 25 September 2021)

Tanacetum changaicum (Krasch. ex Grubov) K.Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23(2): 102. 1993.

IPNI: urn:lsid:ipni.org:names:975082-1
Synonym: *Pyrethrum changaicum* Krasch. ex Grubov, Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS, 17: 23. 1955.
[*Gf*: Herb. *CS:* EN (62). *RD*: 3, 4, 7, 10. *E* (m): 1300–3300. *V:* HAL (1), KF (1), LE (1), MW (9), NS (3), OSBU (1), PE (1), UBA (1), UBU (1)]
Type: MONGOLIA. Arkhangai province, Urd Tamir, 28 July 1893, *E. Klementz 153* (holotype LE 01018001 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01018001 accessed on 25 September 2021)
Photo: Uvurkhangai province, Uyanga sum, Khuisiin Naiman Nuur, 13 August 2019, *Sh. Baasanmunkh* (Figure B1D)

Taraxacum inimitabile Kirschner & Štěpánek, Preslia 78(1): 57. 2006.

IPNI: urn:lsid:ipni.org:names:77073383-1
[*Gf*: Herb. *CS:* EN (62). *RD:* 13. *E* (m): 2130–2490. *V:* GG (1), L (1), PRA (1), PRC (1), UBA (2)]

Type: MONGOLIA. Gobi Altai, opp. Dalandzadgat, in pascuo ad rivum in angustio Jolyn-Amt, July 1989, *D. Blažková 4165* (holotype PRA 16709, isotypes PRA 16710, K, S, according to Kirschner et al. [89])

Taraxacum junatovii Tzvelev, Novosti Sist. Vyssh. Rast. 24: 221. 1987.

IPNI: urn:lsid:ipni.org:names:934047-1
[*Gf*: Herb. *RD:* 3, 7, 13, 14. *E (m):* 1720–2840. *V:* LE (7), MW (2), UBA (1)]
Type: MONGOLIA. Bayan-Ulgii province, Tolbo sum, Tolbo-Khungei-alatay mountain range. Alpine meadow with Kobresia, 3200m a.s.l., 05 August 1945, *A.A. Yunatov 11532* (holotype LE 01024364 [digital image!], paratype LE 01024365–01024370 [digital images!]; the image of the holotype is available at http://re.herbariumle.ru/01024364 accessed on 25 September 2021)

Taraxacum selengensis Tzvelev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 96(5): 72. 1991.

IPNI: urn:lsid:ipni.org:names:960333-1
[*Gf*: Herb. *CS:* EN (62). *RD:* 3. *E* (m): 960–1450. *V:* LE (1), MW(1), UBA (1)]
Type: MONGOLIA. Bulgan province, Selenge sum, Khutag-Undur uul, 25 June 1988, *R. Kamelin, V.I. Gubanov, Sh. Darijma, A. Budantzev, and E. Ganbold 60* (holotype LE 01024381 [digital image!]; the image of the holotype is available at http://re.herbariumle.ru/01024381 accessed on 25 September 2021)

Taraxacum submacilentum Tzvelev, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 96(5): 72. 1991.

IPNI: urn:lsid:ipni.org:names:960334-1
[*Gf*: Herb. *CS:* EN (62). *RD:* 7. *E* (m): 2110–2685. *V:* LE (1), MW(1), UBA (1)]
Type: MONGOLIA. North Mongolian Altai range, Bayan-Ulgii province, Tsengel Khairkhan passage Achagardag davaa, 25 km to the SW of village Sagsai sum, 2500m a.s.l., 14 July 1988, *A. Budantzev, V.I. Gubanov, Sh. Darijma, E. Ganbold, and R.* Kamelin *1415* (holotype LE 01024384 [digital image!], isotype MW; the image of the holotype is available at http://re.herbariumle.ru/01024384 accessed on 25 September 2021)

BORAGINACEAE

Anoplocaryum tenellum A.L. Ebel & Rudaya, Turczaninowia 5(2): 7. 2002.

IPNI: urn:lsid:ipni.org:names:20011572-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2470–3490. *V*: ALTB (1), LE (1), MW (1), NSK (1), TK(2)]
Type: MONGOLIA. Ditio Bajan-Ulgij, somon Tolbo, in adjacentibus lacus Duruu, regio subalpine ad pedes rupestribus; 2500 m a.s.l., 17 August 2001, *N.A. Rudaya and A.L. Ebel* (holotype TK 001914, isotypes LE, MW, SSBG, TK 001914, TK 001915)

Craniospermum desertorum Ovczinnikova & A. Korolyuk, Rast. Mir Aziatsk. Rossii 3(23): 34. 2016.

IPNI: urn:lsid:ipni.org:names:77163187-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2380–2570. *V*: LE (1), NSK (2), TK(2)]
Type: MONGOLIA. Bayan-Ulgii province, Altantsugts sum, 10–15 km from Mt Tsamgaragav, Khongor Ulan, 16 June 2004, *A.Yu. Koralyuk* (holotype NSK 0000710 [digital image!]; the image of holotype is available at http://herb.csbg.nsc.ru:8081/#fuzzy-label accessed on 25 September 2021)

Craniospermum gubanovii Ovczinnikova, Turczaninowia 23(2): 113. 2020.

IPNI: urn:lsid:ipni.org:names:77211298-1
[*Gf*: Herb. *RD*: 14. *E* (m): 2240. *V*: LE (1), MW (1)]
Type: MONGOLIA. Dzungaria, 15 km east of the Baytag-Bogdo outpost of the Kobdo aimak, northern macroslope of the ridge Baytag-Bogdo, forest and alpine zone of the Budun-Khargaytin-gol gorge, 1 August 1988, *I.A. Gubanov, R.V. Kamelin, A.L. Budantsev, E. Ganbold and Sh. Dariymaa 2767* (holotype MW, isotype LE)

Craniospermum kamelinii Ovczinnikova, Turczaninowia 23(2): 109. 2020.

IPNI: urn:lsid:ipni.org:names:77211297-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2530. *V*: LE (1)]
Type: MONGOLIA. Gobi-Altai province, 40 km to NNE from Tsogt sum, ridge Ichganeyn-Nuru (Mongolian Altai), in the fissures of rocks, 12 August 1973, *E.A. Isachenko and E.I. Rachkovskaya 6071* (holotype LE)

Craniospermum montanostepposum Ovczinnikova, Turczaninowia 23(2): 115. 2020.

IPNI: urn:lsid:ipni.org:names:77211299-1
[*Gf*: Herb. *RD*: 7. *E* (m): 1295. *V*: LE (1), MW (1)]
Type: MONGOLIA. Mongolian Altai, 23 km northeast of Bulgan sum, petrophytic forbcold meadow wheatgrass steppe on the slope of the northern exposure, 2200 m a.s.l., 5 July 1983, *E.A. Volkova and I.Yu. Sumerina 123* (holotype LE)

Craniospermum pseudotuvinicum Ovczinnikova & A.Korolyuk, Rast. Mir Aziatsk. Rossii 3(23): 37. 2016.

IPNI: urn:lsid:ipni.org:names:77163188-1
[*Gf*: Herb. *RD*: 10. *E* (m): 2205–2740. *V*: NSK (1), TK (3)]
Type: MONGOLIA. Khovd province, Chandmani sum, Jargalant Khairkhan Uul, 47°64′ N, 92°65′ E, 22 June 2004, *A. Yu. Koralyuk* (holotype NSK 0000710 [digital image!]; the image of holotype is available at http://herb.csbg.nsc.ru:8081/#fuzzy-label accessed on 25 September 2021)
Photo: Khovd province, Chandmani sum, Jargalant Khairkhan Mountain, 22 June 2004, *A. Pyak* (Figure B1G)

Craniospermum volkovae Ovczinnikova, Novosti Sist. Vyssh. Rast. 50: 149. 2019.

IPNI: urn:lsid:ipni.org:names:77206600-1
[*Gf*: Herb. *RD*: 10. *E* (m): 2720. *V*: LE (2)]
Type: MONGOLIA. Great Lakes Depression, Mt Jargalant-Uul in the system of Bumbat-Khairkhan Ridge, petrophyte forb-wheat grass (*Agropyron nevskii*) community on scree southwestern slope, 2050 m a.s.l., 23 July 1983, *E.A. Volkova, I.Yu. Sumerina, U. Beckett, and H. Buyan-Orshikh 199* (holotype LE 01064110, isotype LE 01064111 [digtal images!]; the images of holotype and isotype are available at https://en.herbariumle.ru/ accessed on 25 September 2021)

BRASSICACEAE

Dontostemon gubanovii (D.A.German) D.A.German, Komarovia 6(2): 85. 2010.

IPNI: urn:lsid:ipni.org:names:77107274-1
Synonym: *Dontostemon senilis* subsp. *gubanovii* D.A.German, Novon 17(2): 173(–174). 2007.
[*Gf*: Herb. *RD*: 6, 7, 10. *E* (m): 1225–3080. *V*: GAT (1), LE (1), MW (4)]
Type: MONGOLIA. SE bank of Atschit Nuur (Ubsunur aimak), rock crevices in desert steppe, 1500 m a.s.l., 28 August 1984, *I.A. Gubanov 9221* (holotype MW)

Galitzkya macrocarpa (Ikonn.-Gal.) V.V.Botschantz., Bot. Zhurn. (Moscow & Leningrad) 64(10): 1442. 1979.

IPNI: urn:lsid:ipni.org:names:284479-1
Synonym: *Berteroa macrocarpa* Ikonn.-Gal., Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 189. 1937.
[*Gf*: Herb. *RD*: 13, 15. *E* (m): 1590–2290. *V*: GFW (1), HAL (7), MW (4), NSK (1), OSBU (7), UBU (2)]
Type: MONGOLIA. SE bank of Atschit Nuur (Ubsunur aimak), rock crevices in desert steppe, 1500 m a.s.l., 28 August 1984, *I.A. Gubanov 9221* (holotype MW)
Photo: Umnugobi province, Khurmen sum, Zuunsaikhan Mountain, 28 August 2012, *B.* Oyuntsetseg (Figure B1H)

Smelowskia mongolica Kom., Feddes Repert. Repert. 9: 393. 1911.

IPNI: urn:lsid:ipni.org:names:289894-1
[*Gf*: Herb. *RD*: 3. *E* (m): 1200–2920. *V*: GFW (3), HAL (1), NS (1), MW (3), UBA (1)]
Type: MONGOLIA. Arkhangai province, Sagistai, 26 July 1895, *E. Klementz 125* (Type material LE)

CAMPANULACEAE

Adenophora changaica Gubanov & Kamelin, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 93(5): 111. 1988.

IPNI: urn:lsid:ipni.org:names:935803-1
[*Gf*: Herb. *CS:* CR (62). *RD:* 3. *E* (m): 1865. *V:* LE (1), MW (1)]
Type: MONGOLIA. Arkhangai province, Bulgan sum, Urd Tamir river from Bulgan sum center, 5 August 1980, *I.A. Gubanov 8330* (holotype MW 0594941 [digital image!], isotype LE 01042544 [digital image!]; the image of holotype is available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

CARYOPHYLLACEAE

Silene mongolica Maxim., Enum. Pl. Mongol. 88. (1889)

IPNI: urn:lsid:ipni.org:names:157851-1
[*Gf*: Herb. *RD:* 10, 13. *E* (m): 1170–2910. *V:* ALTB (1), MW (2), UBA (1)]

Type: MONGOLIA. Gobi borealis, Montibus Tostu, 18 August 1886, *G.N. Potanin* (Type material LE 01013464!, according to Grubov [56].

CLEOMACEAE

Cleome gobica Grubov, Opred. Sosud. Rast. Mongolii (Key Vasc. Pl. Mongolia) 118. 1982.

IPNI: urn:lsid:ipni.org:names:899497-1
[*Gf*: Herb. *CS:* CR (62). *RD:* 15. *E* (m): 1430–1505. *V:* LE (4), UBA (2)]
Type: MONGOLIA. South Gobi, Namingiin Gobi, Atas Bogd 112 km from Urgustei Khudug, 25 August 1979, *V.I. Grubov, A. Muldashec and S. Darijma 1749* (holotype LE 01014674, isotypes LE 01014675, LE 01014676, paratype LE 01014677!, according to Grubov [56].

FABACEAE

Astragalus chamonobrychis Podlech, Sendtnera 8: 162. 2002.

IPNI: urn:lsid:ipni.org:names:20010384-1
Synonym: *Astragalus potaninii* N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(2): 77. 1990.
[*Gf*: Herb. *RD: 7. E* (m): 2155–2370. *V:* LE (4)]
Type: MONGOLIA. Bayan-Ulgii province, Altai sum, Mongolian Altai Mt., Chikhertei river, rocky slopes, 2400 m a.s.l., 08 July 1877, *G.N. Potanin* (holotype of *A. potaninii* LE 01017805, isotype LE 01017806, paratype LE 01017867, LE 01017868!)

Astragalus changaicus Sanchir ex N.Ulziykh., Fl. Khangaya 121. 1989.

IPNI: urn:lsid:ipni.org:names:938667-1
[*Gf*: Herb. *CS:* EN (62). *RD:* 3, 7. *E* (m): 2640–2930. *V:* MW (1), UBA (3)]
Type: MONGOLIA. Zavkhan province, Otgon sum, Otgontenger Mt. in the system of Khangai Mt. Shrublands, 47°65′57.3′′ N, 97°66′53.1′′ E, 3150 m a.s.l., 24 June 1974, E. Ganbold (holotype LE!)

Astragalus chubsugulicus Gontsch. ex N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(1): 110. 1990.

IPNI: urn:lsid:ipni.org:names:939208-1
[*Gf*: Herb. *RD:* 1. *E* (m): 1990–2430. *V:* UBA (4)]
Type: MONGOLIA. Khuvsgul province, Khuvsgul lake, trajectus Nicegun, vallis australis ad ripas rivotrum alpinorum, 16 July 1902, *V.L. Komarov* (holotype LE 01018314, isotype UBA)

Astragalus gobicus Hanelt & Davaz. Feddes Repert. 70: 41. 1965.

IPNI: urn:lsid:ipni.org:names:477638-1
[*Gf*: Herb. *RD:* 14, 15. *E* (m): 780–1560. *V:* GAT (1), INM (1), MW (1), NS (1), UBA (2)]
Type: MONGOLIA. Umnugobi province, Noyon; Tal Bilgekhiin bulag 15–20 km, rocky stony slopes and valley, 1150 m a.s.l., 31 July 1943, *A.A. Yunatov* (holotype GAT, paratype UBA)

Astragalus granitovii Sanczir ex N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(2): 81. 1990.

IPNI: urn:lsid:ipni.org:names:940156-1
[*Gf*: Herb. *CS*: EN (62). *RD*: 7, 14. *E* (m): 1510–3480. *V:* LE (1), MW (2), TK (5), UBA (3)]
Type: MONGOLIA. Dzungarian Gobi, ad declive principale boreale montis Chabtag-Ula, 80 km ad meridiem a centro districtus Altai, 21 July 1984, *Ch. Bujan-Orschich* (holotype UBA 00004002!)

Astragalus gubanovii N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 92(5): 112. 1987.

IPNI: urn:lsid:ipni.org:names:933575-1
[*Gf*: Herb. *RD:* 7, 10. *E* (m): 1000–1870. *V:* HAL (4), MW (3), TK (4), UBA (2)]
Type: MONGOLIA. Uvs province, Ulaangom, from center 14 km, dry, rocky, and desert slopes, 1100 m a.s.l., 1 September 1984, *I.A. Gubanov* (holotype MW 0593128 [digital image!], paratypes HAL, MW 0593128 [digital image!]; the images of holotype and paratype are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Astragalus kenteicus N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(1): 111. 1990.

IPNI: urn:lsid:ipni.org:names:939209-1

[*Gf*: Herb. *RD:* 2. *E* (m): 1065–2280. *V:* LE (7), UBA (1)]
Type: MONGOLIA. Tuv province, Erdene sum, Tuul goliin ekh, forest edge, meadow and shrublands, 1700 m a.s.l., 28 June 1929, *V.A. Ikkonnikovy-Galitzkiy* (holotype LE 01016100, isotype LE 01017801, LE 01017802, paratype LE 01017871–01017873 [digital images!]; the images of types are available at https://en.herbariumle.ru/ accessed on 25 September 2021)

Astragalus klementzii N.Ulziykh., Fl. Khangaya 121. 1989.

IPNI: urn:lsid:ipni.org:names:938668-1
[*Gf*: Herb. *RD:* 3. *E* (m): 2160–2190. *V:* LE (1), UBA (1)]
Type: MONGOLIA. Arkhangai province, Tariat sum, Terkhiin Tsagaan lake, forest edge and mountain shrublands, 10 June 1896, *N.E. Klementz 40* (holotype LE)

Astragalus koslovii B.Fedtsch. & N.Basil. ex N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(2): 85. 1990.

IPNI: urn:lsid:ipni.org:names:940159-1
[*Gf*: Herb. *RD:* 13. *E* (m): 1220–2675. *V:* LE (4), TK (2)]
Type: MONGOLIA. Bayankhongor province, Bogd sum, Ikh Bogd-Uul Mt., rocky and dry mountain steppe, 26 August 1926, *A. Tugarinov* (holotype LE 01016098; image!, isotype LE 01016099, paratype LE 01017210, LE 01017211 [digital image!]; the images of types are available at https://en.herbariumle.ru/ accessed on 25 September 2021)
Photo: Khovd province, Must sum, Baga Ulaan davaa, 23 July 2019, *A. Pyak* (Figure B3I)

Astragalus pseudotesticulatus Sanchir ex N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(2): 82. 1990.

IPNI: urn:lsid:ipni.org:names:940157-1
[*Gf*: Herb. *RD:* 7. *E* (m): 1870–2740. *V:* LE (3), MW (2), NS (1), UBA (1)]
Type: MONGOLIA. Bayan-Ulgii province, Altai Mongolicus, 10 km to the north of Kok-Togoj, dry scree in high mountain slopes, 15 July 1959, *A.A. Yunatov* (holotype LE 01017804, paratype LE 01017869, LE 01017870 [digital images!]; the images of holotype and paratype are available at https://en.herbariumle.ru/ accessed on 25 September 2021)

Astragalus pseudovulpinus Sanczir ex N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(1): 115. 1990.

IPNI: urn:lsid:ipni.org:names:939212-1
[*Gf*: Herb. *RD*: 14. *E* (m): 1500–2190. *V*: LE (1), MW (3), UBA (1)]
Type: MONGOLIA. Khovd province, Khuren-Bogdyn-nuru mountain range, 15 km west and southwest of Tsargin border post, on pebbly trails, 1220 m a.s.l., 13 August 1977, *E.A. Volkiva and E.I. Rachkovskaya 7473* (holotype UBA!, paratype LE 01017803, MW 0593202; [digital image!]; the image of holotype is available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Astragalus saichanensis Sanchir, Bot. Zhurn. 59(3): 366. 1974.

IPNI: urn:lsid:ipni.org:names:479634-1
[*Gf*: Herb. *RD:* 7, 13. *E* (m): 1140–2715. *V:* MW (2), UBA (5)]
Type: MONGOLIA. Gobi-Altai province, Altai sum, Khan Taishir Mt., rocky slopes, 14 July 1947, *A.A. Yunatov* (holotype UBA, isotype LE)

Astragalus sanczirii N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(1): 114. 1990.

IPNI: urn:lsid:ipni.org:names:939211-1
[*Gf*: Herb. *RD*: 7, 14. *E* (m): 1200–1975. *V*: UBA (2). *Ref:* Ulziykhutag (2003)]
Type: MONGOLIA. Khovd province, 75 km east of Altai sum center, on sandy soil; 2 August 1977, *E.A. Volkiva and E.I. Rachkovskaya 7162* (holotype LE, isotype UBA)
Photo: Khovd province, Uyench sum, Baitag Bogd Mountain, *B. Oyuntsetseg* (Figure B1J)

Astragalus tamiricus N.Ulziykh., Fl. Khangaya 124. 1989.

IPNI: urn:lsid:ipni.org:names:938669-1
[*Gf*: Herb. *RD:* 3. *E* (m): 1525–1995. *V:* LE (3), MW (4), UBA (3)]
Type: MONGOLIA. Arkhangai province, Ikhtamir sum, Khoid Tamir river, monasterium Tzetza-Van, shrublands, 19 August 1926, *N. Pavlov* (holotype LE 01017820, paratype LE 01017821, LE 01017822, isotype MW 0593230; [digital

images!]; the images of holotype and paratype are available at https://en.herbariumle.ru/ accessed on 25 September 2021)
Photo: Arkhangai province, Battsengel sum, Khoid Tamir river, type location, 20 August 2020, Sh. Baasanmunkh (Figure B1K).
Note: This species is very similar to *A. laguroides* Pall. but a little different in the shape of the leaves, sizes of the standard, calyx teeth, and bracts.

Astragalus ulziykhutagii Sytin, Kew Bull. 51(2): 376. 1996.

IPNI: urn:lsid:ipni.org:names:988799-1
Synonym: *Astragalus alexandri* N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(1): 107. 1990, nom. illeg.
[*Gf*: Herb. *RD:* 7. *E* (m): 1300–3045. *V:* LE (1), UBA (1)]
Type: MONGOLIA. Khovd province, Bulgan sum, upper course of Kharagaitu-gol river, left bank tributary of Bulgan river, larch forest, 24 August 1947, *A.A. Yunatov 12990* (holotype *A. alexandri* N.Ulziykh. LE 01016095 [digital image!], image of the holotype is available at http://re.herbariumle.ru/01017820 accessed on 25 September 2021)

Astragalus viridiflavus N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(2): 78. 1990.

IPNI: urn:lsid:ipni.org:names:940154-1
[*Gf*: Herb. *RD:* 1, 2, 3, 4. *E* (m): 1200–1700. *V:* LE (5), UBA (4)]
Type: MONGOLIA. Tuv province, Khentii Mt., Siberian larch forests and shrubland (Steppa inter locum Songino dictum et stationem Schara-Chubu), 14 June 1895, *E. Klementz* (holotype LE 01017807, isotypes LE 01017808–01017811; [digital images!]; the images of holotype and isotype are available at https://en.herbariumle.ru/ accessed on 25 September 2021)

Caragana gobica Sanchir, Trudy Inst. Bot. (Ulan Bator). 1: 244. 1975.

Synonym: *Caragana gobica* subsp. *occidentalis* Kamelin & Yakovlev, Rast. Tsentral. Azii 8a: 33. 1988.
[*Gf*: Shurb. *CS*: VU (60). *RD*: 7, 12, 13. *E* (m): 1070–2270. *V*: HAL (1), MW (6), UBA (5)]
Type: MONGOLIA. Khovd province, Bulgan sum, Zagan Ulaan, 17 July 1984, *Sh. Darijma and R.V. Kamelin 548* (holotype LE)

Oxytropis bungei Kom., Repert. Spec. Nov. Regni Veg. 13: 229. 1914.

IPNI: urn:lsid:ipni.org:names:511348-1
[*Gf*: Herb. *RD*: 3, 6, 7, 8, 10, 11, 12, 13, 14. *E* (m): 1200–3300. *V*: LE (1), MW (5), UBA (4), UBU (3)]
Type: MONGOLIA. Mongolian Altai, Uzun-Dzyur [Dzuilin-Gol] river, 2 verstas (1 versta = 1.067 km) beyond Da-Guna Khure, on talc–clay–shale cliff, 28 July 1896, *E.N. Klementz s.n.* (holotype LE)
Note: Some herbarium specimens were collected from China and were stored in NMNH herbarium. However, voucher specimens from China were not clearly identified as *Oxytropis bungei* (https://www.gbif.org/occurrence/1675933050 accessed on 25 September 2021).

Oxytropis fragilifolia N.Ulziykh. Bot. Zhurn. 64(9): 1234. 1979.

IPNI: urn:lsid:ipni.org:names:511469-1
[*Gf*: Herb. *RD:* 7, 13. *E* (m): 1345–3180. *V:* MW (1), TK (1), UBA (4)]
Type: MONGOLIA. Mongolian Altai, Khasagtu-Khairkhan mountain range, upper gorge of Khunkheriin-Am under summit of Tsagan-Irmegt, on southern slope, on rubbly placer, 2980 m a.s.l., 23 August 1972, *V.I. Grubov, N. Ulzijchuttag, and D. Tzetzegma 1157* (holotype LE 01024657, IT 01024658)
Photo: Khovd province, Chandmani sum, Jargalant Khairkhan Mountain; 22 June 2004, *A. Pyak* (Figure B1M)

Oxytropis junatovii Sanchir, Trudy Inst. Bot. Akad. Nauk MNR 1985(7): 90. 1985.

IPNI: urn:lsid:ipni.org:names:1002840-1
[*Gf*: Herb. *RD:* 13. *E* (m): 1665–2250. *V:* HAL (1), LE (1), UBA (1)]
Type: MONGOLIA. Gobi-Alt. (north trail of Gurban-Saikhan mountain range along road to Dalanzadagad from Bayandalai sum, feather grass desert steppe, 6 May 1941, *A.A. Yunatov* (holotype LE)

Oxytropis klementzii N.Ulziykh., Bot. Zhurn. 56(12): 1795. 1971.

IPNI: urn:lsid:ipni.org:names:511583-1
[*Gf*: Herb. *RD*: 2, 3, 4, 8. *E* (m): 1030–2920. *V:* LE (1), MW (2), UBA (9)]
Type: MONGOLIA. Khentii province, Bor-Gudzhir, Tsenkher Gol, 1 June 1895, *D.A. et E.N. Klementz 41b* (holotype LE 01024679)

Oxytropis lavrenkoi N.Ulziykh., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 92(5): 114. 1987.

IPNI: urn:lsid:ipni.org:names:933576-1
[*Gf*: Herb. *RD:* 12. *E* (m): 1300. *V:* LE (1), MW (3)]
Type: MONGOLIA. Dornogobi province, 200 km from Sainshand, Khutag Uul; 1100–1400 m. a.s.l., 19 June 1980, *I.A. Gubanov* (holotype MW 053300, paratype MW 0533001, LE 01024693, isotype LE 01024692, MW 0533002 [digital images!]; the images of holotype and paratype are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Oxytropis micrantha Bunge ex Maxim., Bull. Acad. Imp. Sci. Saint Pétersbourg xxvi. 470. 1880.

IPNI: urn:lsid:ipni.org:names:511682-1
[*Gf*: Herb. *RD:* 3, 6, 7, 10, 11. *E* (m): 1260–2995. *V:* GFW (4), LE (2), MW (4), UBA (12)]
Type: MONGOLIA. Khangai, Chudshirtu, in arenosis, 19 July 1877, (lectotype LE 01024699, syntype LE 01024700)

Oxytropis pavlovii B.Fedtsch. & Basil., Bull. Soc. Nat. Mosc., Sect. Biol., n. s., 38: 96. 1929.

IPNI: urn:lsid:ipni.org:names:511762-1
[*Gf*: Herb. *RD:* 3, 8, 11, 12, 13. *E* (m): 1120–3585. *V:* HAL (1), MW (5), NS (3), OSBU (2), UBA (23)]
Type: MONGOLIA. Khangai, Tuin gol, 30 August 1924, *N.V. Pavlov* (holotype MW 0593314 [digital image!]; the image of holotype is available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Oxytropis potaninii Bunge ex Palib., Bull. Herb. Boissier Ser. II. 8: 160. 1908.

IPNI: urn:lsid:ipni.org:names:511791-1
[*Gf*: Herb. *RD:* 7, 10. *E* (m): 1400–3200. *V:* LE (1), UBA (6)]
Type: MONGOLIA. Mongolian Altai, Terekty river, 6 July 1903, *G.E. Grum-Grzhimailo* (holotype LE 01024729)

Oxytropis sutaica N.Ulziykh., Bot. Zhurn. 64(9): 1233. 1979.

IPNI: urn:lsid:ipni.org:names:511907-1
[*Gf*: Herb. *CS*: EN (62). *RD:* 3, 7. *E* (m): 2190–2925. *V:* LE (1), MW (5), UBA (3), UBU (1)]
Type: MONGOLIA. Mongolian Altai, Sutai Uul, southeast slope of upper Dzuilin Gol, 3400 m a.s.l., 24 June 1971, *V.I. Grubov, N. Ulzijchutag and Sh. Darijma 234* (holotype LE 0101024755, isotype UBA)
Photo: Bayan-Ulgii province, Altai Tavan Bogd Mountain; 14 June 2020, *B. Oyuntsetseg* (Figure B1L).

Oxytropis tenuis Palib., Bull. Herb. Boissier Ser. II. 8: 160. 1908.

IPNI: urn:lsid:ipni.org:names:511924-1
[*Gf*: Herb. *RD:* 6, 7. *E* (m): 1610–2825. *V:* UBA (3)]
Type: MONGOLIA. Mongolian Altai, Bugotor river—high Altay plateau between Burchum and Kran, 11 June 1903, *G.E. Grum-Grzhimailo* (holotype LE 01024760 [digital image!]; the image of holotype is available at http://re.herbariumle.ru/01024760 accessed on 25 September 2021)
Photo: Zavkhan province, Ider sum, Ider river, 11 June 2017, *V. Gundegmaa* (Figure B1M)

Oxytropis ulzijchutagii Sanchir, Trudy Inst. Bot. Akad. Nauk MNR 1985(7): 93. 1985.

IPNI: urn:lsid:ipni.org:names:1002841-1
[*Gf*: Herb. *RD:* 7. *E* (m): 1510–3045. *V:* UBA (3)]
Type: MONGOLIA. Mongolian Altai, Tsogt sum, Tsakhar-Khalgany-Nuru mountains, in Cobresia thickets on rocks, 3200 m a.s.l., 13 August 1973, *E. Isachenko and E. Rachovskaya, 6079* (holotype UBA!)

Thermopsis longicarpa N.Ulziykh., Izv. Akad. Nauk MNR 2: 92. 1971.

IPNI: urn:lsid:ipni.org:names:77221959-1
[*Gf*: Herb. *CS*: EN (62). *RD:* 6, 10. *E* (m): 1180–1580. *V:* LE (1), UBA (1)]
Type: MONGOLIA. Uvs province, Achit Nuur (holotype UBA, isotype LE)
Note: This species is not well distinguished from other species of *Thermopsis* in Mongolia. In addition, some publications provided its synonym of *T. mongolica* [13].

IRIDACEAE

Iris schmakovii Alexeeva, Turczaninowia 21(4): 145. 2018.

IPNI: urn:lsid:ipni.org:names:77195336-1

Synonym: *Iris humilis* Georgi var. *umbrosa* Alexeeva
[*Gf*: Herb. *RD:* 1. *E* (m): 1220–1810. *V:* ALTB (1), LE (3), UBA (1)]
Type: MONGOLIA. Khusvgul province, Arbulag sum, Khuvsgul lake; 1738 m a.s.l., 50°34′ N, 100°28′ E, 6 July 2007, *R.V. Kamelin, A.I. Shmakov and Sh. Dariimaa* et al. *23* (holotype of *Iris humilis* var. *umbrosa* LE 01042608, isotypus ALTB, UBA)

LAMIACEAE

Lagopsis darwiniana Pjak, Kew Bull. 62(1): 109. 2007.

IPNI: urn:lsid:ipni.org:names:77079549-1
[*Gf*: Herb. *CS*: EN (61). *RD: 10. E* (m): 1640–3280. *V:* NS (1), TK (1)]
Type: MONGOLIA. Khovd province, mountain pass leading to Lake Durgun-Nuur, a saddle between the ridges Jargalant Hayrhan and Boombat Hayrhan; gravel site and sandy deposits on sayr (dry stream bed), 1640 m a.s.l., 47°23′26.5″ N, 93°12.40′5″ E, 19 June 2004, *A.I. Pyak s.n.* (holotype TK 001726!, isotypes NS!, TK 001727, TK 0012728, paratypes TK 001729, TK 001730)
Photo: Khovd province, Chandmani sum, Jargalant Khairkhan Mountain; 11 August 2013, *B. Oyuntsetseg* (Figure B1O).

Scutellaria grandiflora subsp. ***gymnosperma*** Kamelin & Gubanov, Byull. Moskovsk, Obshch. Isp. Prir., Otd Biol. 94(5): 110. 1989.

IPNI: urn:lsid:ipni.org:names:951260-1
[*Gf*: Herb. *RD:* 7, 13. *E* (m): 2020. *V:* MW (2), UBU (2)]
Type: MONGOLIA. Bayan-Ulgii province, Dellun sum, upper part of river Buyant, 10 km from village Tugrug to the south on the rocky slopes, 6 July 1979, *I.A. Gubanov 7254* (holotype MW 0594438, isotype MW 0594439 [digtal images!]; the images of holotype and isotype are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Thymus gobi-altaicus (N.Ulziykh.) Kamelin & A.L.Budantzev, Byull. Moskovsk, Obshch. Isp. Prir., Otd Biol. 95(3): 97. 1990.

IPNI: urn:lsid:ipni.org:names:948190-1
Synonym: *Thymus gobicus* subsp. *gobi-altaicus* N. Ulziykh., Trudy Inst. Prir. Soedin. AN MNR Ulan-Bator 1975(1): 60. 1975.
[*Gf*: Herb. *RD:* 13. *E* (m): 2240–2555. *V:* UBA (1)]
Type: MONGOLIA. Gobi-Altai, Arcz-Bogdo, montana Bag-Bajan, montana-steppa, in schistosis unacum Junipersus pseudosabina, 10 August 1967, *N. Ulziichutag and P. Aygangonor* (holotype UBA!)

PAPAVERACEAE

Papaver baitagense Kamelin & Gubanov, Byull. Moskovsk, Obshch. Isp. Prir., Otd Biol. 95(2): 86. 1990.

IPNI: urn:lsid:ipni.org:names:940160-1
[*Gf*: Herb. *RD:* 6, 7, 14. *E* (m): 1690–2695. *V:* MW (8), UBU (4)]
Type: MONGOLIA. Khovd province, Bulgan sum, Baitag Bogd Mountain, Nariin Khargait River, 31 July 1988, *I.A. Gubanov and E. Ganbold 2562* (holotype MW 0592489, isotype MW 0592490, paratype MW 0592492 [digital images!]; the images of types are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)
Photo: Khovd province, Bulgan sum, Baytag Bogd Mountain, Buduun Khargait river; 11 August 2017, *Sh. Baasanmunkh* (Figure B2A).

PLANTAGINACEAE

Veronica* × *sapozhnikovii Kosachev, Turczaninowia 6(1): 24. 2003.

IPNI: urn:lsid:ipni.org:names:60433714-2
[*Gf*: Herb. *RD:* 7, 14. *E* (m): 1800–2190. *V:* ALTB (5), SSBG (1), UBA (1)]
Type: MONGOLIA. Bajan-Ulegej, in ripa sinistra fl.[uminis] Tzagan Gol, in cursu superiore, vallis ad 5 km supra ostium fluminis Nalia-Gol, 49°07.5′N, 88°14′E; 1463 m a.s.l., 2 August 2001, *R.V. Kamelin, A.I. Schmakov,* et al. (holotype SSBG)

PLUMBAGINACEAE

Limonium gobicum Ikonn.-Gal., Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 2: 260. 1936.

IPNI: urn:lsid:ipni.org:names:686793-1
[*Gf*: Herb. *CS*: CR (62). *RD:* 12. *E* (m): 1030–1115. *V:* LE (1), UBA (1)]
Type: MONGOLIA. Eastern Gobi (road from Alashan to Urgu; on road to Tsatego-Tsagan well from Bulygin-Urto area, derris bushes, 6 June 1909, *S.S. Czetyrkin 78* (holotype LE 010142622)

Limonium grubovii Lincz. Bot. Zhurn. (Moscow and Leningrad) 56(11): 1635. 1971.

IPNI: urn:lsid:ipni.org:names:686801-1
[*Gf*: Herb. *CS*: CR (62). *RD: 9*. *E* (m): 660–890. *V:* LE (2), MW (2), UBA (1)]
Type: MONGOLIA. East. Mong. (Tamtsagskii ledge, Lag-Nur lake, south, fringe of lake basin, solonetzic snakeweed–wild rye steppe, 13 August 1970, *V.I. Grubov, N. Ulzijkhutag and Tserenbslzhid* (holotype LE 01037068, isotype 01037067)

Limonium klementzii Ikonn.-Gal., Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 2: 261. 1936.

IPNI: urn:lsid:ipni.org:names:686828-1
[*Gf*: Herb. *RD:* 7, 10, 15. *E* (m): 1990–2110. *V:* GFW (1), HAL (1), LE (2), MW (5), UBA (1)]
Type: MONGOLIA. Mongolian Altay (between Tunkul' lake and Kharatei mountains, beyond which lies Khulmu lake, 2 August 1896, *E.N. Klementz* (holotype LE 01042853, isotype 01042854)

POACEAE

Stipa austromongolica M.Nobis, Folia Geobot. 49(2): 301. 2013.

IPNI: urn:lsid:ipni.org:names:77140631-1
[*Gf*: Herb. *RD:* 10. *E* (m): 1300–2290. *V:* LE (2)]
Type: MONGOLIA. Khuisyn Gobi basin, 27 km E of a complex of salt lakes, on the way to Daribi, steppe on flat land, 21 June 1971 *V.I. Grubov, N. Ulreikhuteg and Sh. Dariima 154a* (holotype LE 01015546 [digital image!], isotypes LE 01015547, KRA; the image of holotype is available at http://re.herbariumle.ru/01015546 accessed on 25 September 2021)

Stipa khovdensis L.Q.Zhao, *Ann. Bot. Fenn. 56(1–3): 95. 2018.*

IPNI: urn:lsid:ipni.org:names:77195775-1
[*Gf*: Herb. *RD:* 3, 6. *E* (m): 1690–1920. *V:* HIMC (2)]
Type: MONGOLIA. Uvs province, Turgen sum, in mountain slopes, 50°05′19.07″ N, 91°18′15.19″ E, 1914m a.s.l., 13 June 2017, *L.Q. Zhao and X. Ri, Alatanzhula MG1741* (holotype, paratype HIMC!).
Photo: Uvs province, Turgen sum. Turgen Mountain, 13 July 2017, *V. Gundegmaa* (Figure B2B)

POLYGONACEAE

Atraphaxis kamelinii Yurtseva, Phytotaxa 268(1): 22. 2016.

IPNI: urn:lsid:ipni.org:names:77156666-1
[*Gf*: Shrub. *RD:* 14. *V:* LE (1), ALTB (1)]
Type: MONGOLIA. Khovd province, the Dzungarian Gobi, S. slope of Saertaengijin-Khuvch Uul, near junction to Khaldzan-Ula, 27 July 1984, *Sh Daryima and R. Kamelin 765* (holotype LE 01031020; [digital image!], paratype ALTB)

RANUNCULACEAE

Aconitum gubanovii Luferov & Vorosch., Byull. Moskovsk, Obshch. Isp. Prir., Otd. Biol. 96(4): 111. 1991.

IPNI: urn:lsid:ipni.org:names:959368-1
[*Gf*: Herb. *RD*: 7, 14. *E* (m): 2165–2340. *V*: MW (6), UBU (2)]
Type: MONGOLIA. Bayan-Ulgii province, Bulgan sum, Ikh Jargalant Mountain; 27 July 1988, *V.I. Gubanov and R.V. Kamelin 2225a* (holotype MW 0592359; paratype MW 0592354–0592357, isotype 0592358; [digital images!]; the images of types are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)
Photo: Khovd province, Munkhkhairkhan sum, Naiman Nuur, 27 July 2016, HJ. Choi (Figure B2C)

Aconitum kamelinii A.A.Solovjev, Turczaninowia 1(2): 5. 1998.

IPNI: urn:lsid:ipni.org:names:1018404-1
[*Gf*: Herb. *RD*: 3, 13. *E* (m): 1450–2560. *V*: LE (7)]
Type: MONGOLIA. Khangai, pratis in vallis fl. Khaitu-Tamir, 15 August 1926, *N. Pavlov 346* (holotype, paratype, isotype, LE)

Adonis mongolica Simonovich, Novosti Sist. Vyssh. Rast. 125. 1968.

IPNI: urn:lsid:ipni.org:names:708128-1
[*Gf*: Herb. *CS*: EN (60). *RD*: 1, 2, 3, 4, 8. *E* (m): 1000–2310. *V*: LE (1), MW (6), UBA (18), UBU (2)]
Type: MONGOLIA. Changaj province, Arkhangai district, Undur-Ulan (10 km ad septentrio-orientem ab oppidulo centrali), steppa montana variiherbosa, July 1966, *D. Banzragcz s.n* (holotype LE 01014075)
Photo: Ulaanbaatar city, Botanical Garden of MAS, 11 May 2018, *M. Urgamal* (Figure B2D).

Aquilegia daingolica Erst & Shaulo, Sist. Zametki Mater. Gerb. Krylova. Tomsk. Gosud. Univ. 108: 15. 2013.

IPNI: urn:lsid:ipni.org:names:77160705-1
[*Gf*: Herb. *CS*: VU (61). *RD*: 7. *E* (m): 2270–2365. *V*: MW (1), TK (1), UBA (1), UBU (2)]
Type: MONGOLIA. Northwestern Mongolia, the Daingol lake, western slopes, 27 July 1909, *V.V. Sapozhnikov* (holotype TK 001467!, paratype TK 001468!)
Photo: Bayan-Ulgii province, Sagsai sum, Dayan Nuur, type location, 17 July 2018, *Sh. Baasanmunkh* (Figure B2E)

Aquilegia grubovii Erst, Luferov, Wei Wang & K.I.Xiang, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. 114: 3. 2016.

IPNI: urn:lsid:ipni.org:names:77161552-1
[*Gf*: Herb. *RD*: 1, 2, 3, 4. *E* (m): 1065–1725. *V*: LE (2), UBA (2)]
Type: MONGOLIA. Eastern Khentii Mountains, upstream of Kerulen and Onon river, bare rocky peaks, Khentii-Han, western slope, among the boulders, 26 July 1928, *V.A. Ikonnikov-Galitskiy 546* (holotype LE)
Photo: Khuvsgul province, Ulaan Uul sum, Mongorog Gol, 08 August 2019, *Sh. Baasanmunkh* (Figure B2F).

Delphinium changaicum N.Friesen, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(5): 128. 1990.

IPNI: urn:lsid:ipni.org:names:958154-1
[*Gf*: Herb. *RD*: 3, 13. *E* (m): 1440–2895. *V*: MW (12), NS (2), UBA (1), UBU (1)]
Type: MONGOLIA, Khangai declive austral jugi magistralis, 20 km ad boreali-occidentem a pago Dzun-Bayan-Ulan ditionis Uver-Changai, Steppa montana, 2000 m a.s.l, 28 July 1984, *I.A. Gubanov 8869* (holotype MW 0592319 [digital image!]; the image of holotype is available at https://plant.depo.msu.ru/ accessed on 30 September 2021)
Photo: Arkhangai province, Bulgan sum, Khulsain davaa, type location, 19 August 2020, *Sh. Baasanmunkh* (Figure B2G).

Delphinium gubanovii N.Friesen, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 95(5): 130. 1990.

IPNI: urn:lsid:ipni.org:names:958155-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2715. *V*: MW (2)]
Type: MONGOLIA. Mongolian Altai, Munkh-Khairkhan mountain 75 km from Khovd city to the west and east. Near sidle Ulan-Daba, on the rocky bank of Lake Olgoi, 3000 m a.s.l., 12 July 1982, *I.A. Gubanov* (holotype MW 0532927, isotype MW 0592326; [digital images!]; the images of holotype and isotype are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Ranunculus arschantynicus Kamelin, Schmakov & S.V.Smirn, Turczaninowia 7(3): 6. 2004.

IPNI: urn:lsid:ipni.org:names:77077914-1
[*Gf*: Herb. *RD*: 7, 14. *E* (m): 1580–1960. *V*: ALTB (1), LE (1), UBA (1)]
Type: MONGOLIA. Kovd province, montes Arschantyn-Nuru, ad 8 km austro-orientem ab summitate monte Mogojin-Ulan-Ula, in declivibus schistoso-lapidosis, 46°16′ N, 91°17′ E, 1598 m a.s.l., 12 May 2002, *S. Smirnov, D. German, S. Djaczenko, and P. Kossaczev* (holotype LE, isotype ALTB)

Ranunculus sapozhnikovii Schegol. Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. 96: 13. 2006.

IPNI: urn:lsid:ipni.org:names:77135105-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2540–2670. *V*: NS (1), TK (3), UBA (1)]
Type: MONGOLIA. Kovd province, Erdeneburen sum, Tsambagarav Mountains, southwest macroslope,14 June 2004, *N. Schegoleva* (holotype TK 001419, isotype NS)
Photo: Bayan-Ulgii province, Altantsogt sum, Tsast Uul, 16 June 2004, *A. Pyak* (Figure B2H).

ROSACEAE

Alchemilla changaica V.N.Tikhom., Byull. Moskovsk, Obshch. Isp. Prir., Otd. Biol. 88(5): 98. 1983.

IPNI: urn:lsid:ipni.org:names:901385-1
[*Gf*: Herb. *CS*: CR (62). *RD:* 3. *E* (m): 1250–2180. *V:* HAL (1), MW (25), UBA (1), UBU (1)]
Type: MONGOLIA. Arkahngai province, Khoton sum, northeast Khangai mountain, 30 km to the south of village Tuvshruulekh, Basin river Khukh sum, in edge of larch forest; 1800 m a.s.l., 25 July 1980, *I.A. Gubanov 499* (holotype

MW 0592825, paratypus MW 0592816–0592821, MW 0592826, MW 0595590, isotype MW 0592822; [digital images!]; the images of types are available at https://plant.depo.msu.ru/)
Photo: Arkangai province, Tsenkher sum, in forest, 19 June 2018, *B. Oyuntsetseg* (Figure B2I)

Potentilla coriacea Soják, Folia Geobot. Phytotax. 5: 108. 1970.

IPNI: urn:lsid:ipni.org:names:727905-1
[*Gf*: Herb. RD: 3. *E (m):* 1200–1300. V: B (1), BM (1), E (2), K (1), LE (1), MW (1), PR (1), WU (1)]
Type: MONGOLIA. declivia silvatica collis versus orientem supra vicum Tarialan (Tarjalang; inter oppida Bulgan et Muren), 1200–1300 m a.s.l., 13 August 1965, *M. Deyl and J. Soják* (holotype PR 616265!, isotypes B 100295738, BM 000622421, E 00275839, 00010726, K 000762366, LE 01016069!, MW 0592755!, WU 0068019)

Potentilla ekaterinae Kamelin ex Kechaykin, Novosti Sist. Vyssh. Rast. 48: 84. 2017.

IPNI: urn:lsid:ipni.org:names:77192852-1
[*Gf*: Herb. *RD:* 13. *E* (m): 2020–2632. *V:* LE (1)]
Type: MONGOLIA. South Gobi aimag, 40 km N of Gurvan–Tes settlement, Nemegetu-Ula Mt., wet cracks of the rocks along N slope, 2632 m a.s.l., 29 July 1972, *N.P. Guricheva and E.I. Rachkovskaya 2557* (holotype LE 01031030!)

Potentilla gobica Soják, Willdenowia 36(2): 867. 2006.

IPNI: urn:lsid:ipni.org:names:77075653-1
[*Gf*: Herb. *RD:* 7, 14. *E* (m): 1785–1850. *V:* ALTB (1), UBA (1). *Ref: Bekket* et al. (2015)]
Type: MONGOLIA. Dzungarian Gobi, Great Gobi B Strictly Protected Area, scree slopes in summit region Baitag Bogd mountain, 2500 m a.s.l., 45°0.62′ N, 92°2.51′ E, July 2003, *H. von Wehrden* (holotype HAL 0131621!)

Potentilla hilbigii Soják, Willdenowia 16(1): 135. 1986.

IPNI: urn:lsid:ipni.org:names:930241-1
[*Gf*: Herb. *CS*: CR (62). *RD:* 3. *E* (m): 1090–2225. *V:* HAL (1), LE (1), PR (1)]
Type: MONGOLIA. Changai: Archangaj Aimak, Öndör–Ulaan somon, am Caňon des Čuluutyn gol; 10 July 1983; *W. Hilbig s.n.* (holotype HAL 0056607!, isotypes LE, PR 616258!)

Potentilla hubsugulica Soják, Willdenowia 33(2): 417. 2003.

IPNI: urn:lsid:ipni.org:names:50426616-2
[*Gf*: Herb. *RD:* 1. *E* (m): 1670–2800. *V:* B (1), BM (1), E (1), K (1), LE (1), PR (1), PRC (1); UBA (1)]
Type: MONGOLIA. In regione alpine et subalpine montium ad ripam occidentalem lacus Chubsugul (Hubsugul, Chövsgöl), 15–20 km septentr. A vico Chadchal; 2000–2800 m a.s.l., August 1965, *Deyl and Soják* (holotype PR 616257!, isotypes B 100112630, BM, E, K, LE, PRC 452352)

Potentilla ikonnikovii Juz., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 225. 1955.

IPNI: urn:lsid:ipni.org:names:728273-1
[*Gf*: Herb. *CS*: EN (62). *RD:* 7, 13. *E* (m): 1430–3200. *V:* E (2), GFW (1), HAL (6), LE (22), MW (5), OSBU (2), PE (2), UBA (2)]
Type: MONGOLIA. Gobi-Altai, Bain Tsagan Mt., in the shade near rocks along the mountain slope; 9 August 1931, *N.V. Ikonnikov-Galitzky 3980* (holotype LE 01017097!, paratypes LE 01017095!, 01017096!, 01017098-01017102!)
Photo: Umnugobi province, Khurmen sum, Zuunsaikhan Mountain, 12 August 2015, *B. Oyuntsetseg* (Figure B2J)

Potentilla inopinata Soják, Willdenowia 16(1): 130. 1986.

IPNI: urn:lsid:ipni.org:names:930238-1
[*Gf*: Herb. *RD*: 6, 7. *E* (m): 1800–2510. *V*: *GFW (2),* LE (1), MW (1), UBA (1)]
Type: MONGOLIA. Bajan Ulegej ajmak, Cagan nur somon, srednee tecenie Cagan nurin gol, Objur ula, sev. sklon v niz. pojase gor, 49°30′ N, 90° E, 2 August 1945, *A. Junatov 11594* (holotype LE 01009663!)

Potentilla laevipes Soják, Willdenowia 16(1): 125. 1986.

IPNI: urn:lsid:ipni.org:names:930236-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2000–3500. *V*: ALTB (4), LE (1), MW (1), TK (3), UBA (1)]
Type: MONGOLIA. Kobdosskij rajon, r. Bujantu—Mongolskij AItaj, Bulugunskij rajon; verchovja Uinči, 12 September 1930, *Baranov s.n.*(holotype LE 01017104!)
Photo: Khovd province, upper river of Bodonchiin Gol, pass Tsagaan Khutul, 2893 m a.s.l.; 46°46′372″ N, 92°05′007″ E; *A.A. Kechaykin* (Figure B2N)

Potentilla laevissima Kamelin, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 100(1): 88. 1995.

IPNI: urn:lsid:ipni.org:names:989000-1
[*Gf*: Herb. *RD*: 7. *E* (m): 2155–3340. *V*: MW (2), UBA (1)]
Type: MONGOLIA. Altai Mongolicus, jugum Munch-Chairchan, in valle Ich-Chak, in salsis, 2700 m a.s.l., 8 August 1991, *G. Ogureeva* (holotype MW 0592765!, paratype MW 0592766!) the images of holotype and isotype are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)

Potentilla mongolica Krasch., Severnaya Mongoliya 1: 161. 1926.

IPNI: urn:lsid:ipni.org:names:77153423-1
[*Gf*: Herb. *RD*: 3. E (m): 1005–2350. *V*: LE (2), MW (3), NS (1), UBA (2)]
Type: MONGOLIA. Fl. Uber-Dshargalante, in locis arenosis stepposis, 47° N, 104° E; 10 August 1925, *H. Krascheninnikov* (holotype LE 01017105!, isotype LE 01017106!)
Photo: Bulgan province, Jargalant sum, Khan Jargalant Mountain, 6 July 2017, *V. Gundegmaa* (Figure B2L)

Potentilla schmakovii Kechaykin, Feddes Repert. 126(3–4): 73. 2015.

IPNI: urn:lsid:ipni.org:names:77153423-1
[*Gf*: Herb. *RD*: 7, 14. *E* (m): 2300–3095. *V*: ALTB (6), B (1), MW (1), TK (1)]
Type: MONGOLIA. Kobdo aimak, Mongolian Altai ridge, upper reaches of Bodanchiyn-Gol, pass Tsagaan Hetel, 46°46′372″ N, 92°05′007″ E, 2893 m a.s.l., 10 June 2013, *A.I. Shmakov and A.A. Kechaykin MKD 485* (holotype ALTB 1100035745!, isotypes ALTB 1100035437!, B 100676068)
Photo: Khovd province, Bulgan sum, Baitag Bogd Mountain ridge, Khushoot-Shivaetiyn-Gol, 45°25'85″ N, 91°06'44″ E, 24 May 2015, *A.A. Kechaykin* (Figure B2M)

Potentilla tytthantha (Soják) Kechaykin, Turczaninowia 22(4): 74. 2019.

IPNI: urn:lsid:ipni.org:names:77205272-1
[*Gf*: Herb. *RD:* 6, 7. *E* (m): 2000–3295. *V:* ALTB (7), LE (1)]
Synonym: *Potentilla chamaeleo* Soják var. *tytthantha* Soják, Bot. Jahrb. Syst. 106(2): 207. 1986.
Type: MONGOLIA. Chobdosskij ajm., Bulugun sum., Mongolskij Altaj, bassejn r. Bulugun, pereval Charagajtu chutul, *Junatov 13080* (holotype LE)

Potentilla* × *vanzhilii Gundegmaa and Kechaykin, Turczaninowia 21(1): 175. 2018.

IPNI: urn:lsid:ipni.org:names:77186086-1
[*Gf*: Herb. *RD*: 3. *E* (m): 2000–2390. *V*: ALTB (1), UBA (3)]
Type: MONGOLIA. Arkhangai province, Tariat sum, 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, 48°22′20″ N, 99.54′10″ E, 2046 m a.s.l., 20 June 2016, *V. Gundegmaa* (holotype UBA!, isotype ALTB!)
Photo: Arkhangai province, Tariat sum, Tarbagatai Range, near the Khadat spring, 20 June 2016, *V. Gundegmaa* (Figure B2N)

Rosa baitagensis Kamelin and Gubanov, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 93(5): 110. 1988.

IPNI: urn:lsid:ipni.org:names:935802-1
[*Gf:* Shrub. *RD*: 14. *E* (m): 1150–2400. *V*: MW (6), UBA (3), UBU (3)]
Type: MONGOLIA. Khovd province, Bulgan sum, Baitag Bogd Mountain, Buduun Khargait River, 29 July 1979, *I.A. Gubanov 7771* (holotype MW 0592911, isotype MW [digital image!]; the images of holotype and isotype are available at https://plant.depo.msu.ru/ accessed on 30 September 2021)
Photo: Khovd province, Bulgan sum, Baitag Bogd Mountain, Buduun Khargait River, type location, 28 July 2019, *Sh. Baasanmunkh* (Figure B2O).
Note: According to Kamelin and Gubanov [90] that *R. baitagensis* is similar to *R. sergievskiana* Polozh and Prozorova with respect to its white petal.

RUBIACEAE

Asperula gobicola Grubov, Kat. Tip. Obr. Sosud. Rast. Tsentral Azii Gerb. Bot. Inst. V.L. Komarova, 210. 2000.

IPNI: urn:lsid:ipni.org:names:77217406-1

Synonyms: *Asperula saxicola* Grubov, Opred. Sosud. Rast. Mongolii (Key Vasc. Pl. Mongolia) 230. 1982, nom. illeg.; *A. gobica* Govaerts, Skvortsovia 4(3): 79. 2018, nom. illeg., according to Grabovskaya-Borodina [91].
[*Gf*: Herb. *RD*: 13, 16. *E* (m): 1000–1150. *V*: LE (1), MW (8)]
Type: MONGOLIA. Gobi-Altai province, Khurkh-Uul, pad Altyn-ama at the second spring in lower part of the canyon, in dry gravelly and rocky slopes, 27 July 1970, *V.I. Grubov, N. Ulziikhutag and G. Tserenbaljid 331* (holotype LE 01016156)

SOLANACEAE

Physochlaina albiflora Grubov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 22. 1955.

IPNI: urn:lsid:ipni.org:names:817632-1
[*Gf*: *Herb.* RD: 3, 4. *E (m): 1120–1385*. V: LE (4), UBA (1)]
Type: MONGOLIA. Bulgan province, Khangal sum, Khutagiin Davaa, 18 May 1947, *A.A. Yunatov* (holotype LE 01043059; [digital image!], paratypes LE 01043060–01043062!; the image of holotype is available at http://re.herbariumle.ru/01043059 accessed on 25 September 2021)

ZYGOPHYLLACEAE

Zygophyllum neglectum Grubov, Opred. Sosud. Rast. Mongolii (Key Vasc. Pl. Mongolia) 176. 1982.

IPNI: urn:lsid:ipni.org:names:901312-1
[*Gf*: Herb. *CS:* DD (62). *RD*: 10, 13, 14, 16. *E* (m): 1520–1960. *V:* GLM (1), HAL (3), LE (1), MW (1)]
Type: MONGOLIA. Khovd province, 67 km from Altai sum to the southwest, Argalant Mountain and on the way to Khairkhan sum, in rocky slopes of hill, scattered vegeatation, 19 August 1979, *V.I. Grubov, Sh. Darijma and A.A. Muldashev* (holotype LE 01025043 [digital image!]; the image of holotype is available at http://re.herbariumle.ru/01025043)

Appendix B. Photographs of Some Endemic Vascular Plants in Mongolia

Figure A1. Representative taxa of the endemic vascular plants of Mongolia. (**A**) *Ajania grubovii*; (**B**) *Chrysanthemum chalchingolicum*; (**C**) *Aster sanczirii*; (**D**) *Tanacetum chanaicum*; (**E**) *Saussurea saichanensis*; (**F**) *Saussurea odorata*; (**G**) *Craniospermum pseudotuvinicum*; (**H**) *Galitzkya macrocarpa*; (**I**) *Astragalus koslovii*; (**J**) *Astragalus sanczirii*; (**K**) *Astragalus tamiricus*; (**L**) *Oxytropis sutaica*; (**M**) *Oxytropis fragilifolia*; (**N**) *Oxytropis tenuis*; (**O**) *Lagopsis darwiniana*. Photos: (**A**,**N**) by V.Gundegmaa; (**B**,**H**,**J**,**L**,**O**) by B.Oyuntsetseg; (**F**,**G**,**I**,**M**) by A.Pyak; (**C**,**E**) by HJ.Choi; and (**D**,**K**) by S. Baasanmunkh.

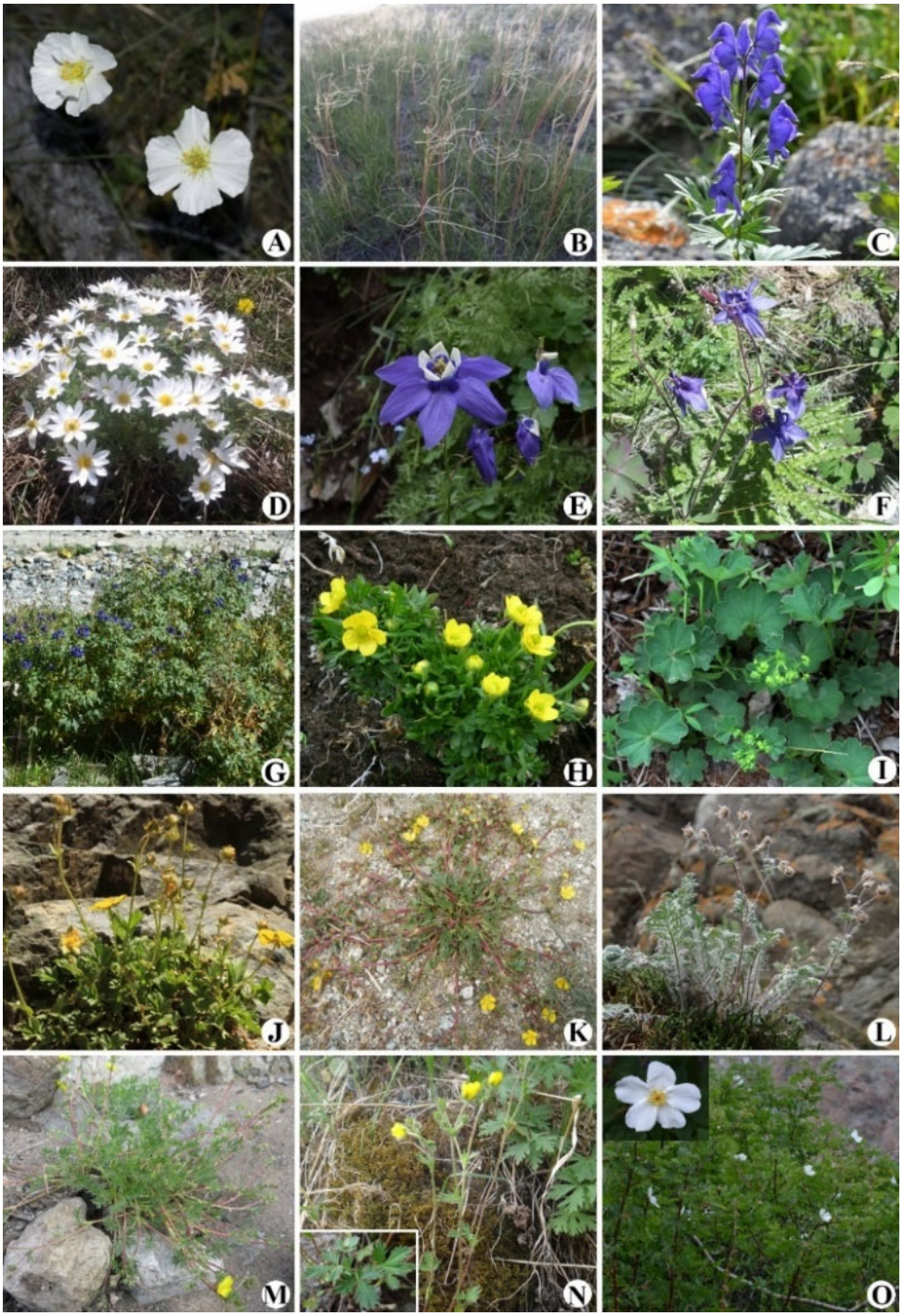

Figure A2. Representative taxa of the endemic vascular plants of Mongolia. (**A**) *Papaver baitagense*; (**B**) *Stipa khovdensis*; (**C**) *Aconitum gubanovii*; (**D**) *Adonis mongolica*; (**E**) *Aquilegia daingolica*; (**F**) *Aquilegia grubovii*; (**G**) *Delphinium changaicum*; (**H**) *Ranunculus sapozhnikovii*; (**I**) *Alchemilla changaica*; (**J**) *Potentilla ikonnikovii*; (**K**) *Potentilla laevipes*; (**L**) *Potentilla mongolica*; (**M**) *Potentilla schmakovii*; (**N**) *Potentilla x vanzhilii*; (**O**) *Rosa baitagensis*. Photos: (**A**,**C**,**E**,**F**,**G**,**O**) by S.Baasanmunkh; (**B**,**L**,**N**) by V. Gundegmaa; (**D**) by M.Urgamal; (**H**) by A.Pyak; (**I**,**J**) by B.Oyuntsetseg; and (**K**,**M**) by A.Kechaykin.

Appendix C. List of excluded endemic taxa in this study

No.	Previously endemic to mongolia based on Urgamal and Oyuntsetseg [14]	Recorded in adjacent countries and replaced synonym in this study	Reference
1	*Alchemilla gubanovii* V.Tichomirov	Russia, Kazakhstan, Tajikistan	GBIF [92]
2	*Alchemilla pavlovii* Juz.	Russia	GBIF [92]
3	*Aquilegia ganboldii* Kamelin & Gubanov	China (Inner Mongolia)	Erst et al. [37]
4	*Artemisia feddei* subsp. *arschantinica* (Darijma) Gubanov & Kamelin	Synonym of *Artemisia lancea* Vaniot	POWO [58]
5	*Artemisia santolinifolia* subsp. *stepposa* Darijma	Synonym of *Artemisia santolinifolia* Turcz. ex Besser	POWO [58]
6	*Asterothamnus molliusculus* Novopokr.	China (Inner Mongolia)	POWO [58]
7	*Astragalus baitagensis* Sanchir ex N.Ulziykh.	China (Xinjiang)	Floras [53]
8	*Astragalus banzragczii* N.Ulziykh.	Synonym of *Astragalus hamiensis* S.B.Ho	POWO [58]
9	*Astragalus gregorii* B.Fedtsch. & Basil.	China (Xinjiang)	eFloras [53]
10	*Astragalus gobi-altaicus* N.Ulziykh.	Synonym of *Astragalus laguroides* Pall	POWO [58]
11	*Astragalus pavlovii* B.Fedtsch. & Basil.	China (Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang)	Floras [53]
12	*Astragalus pseudochorinensis* N.Ulziykh	Synonym of *Astragalus chorinensis* Bunge	POWO [58]
13	*Astragalus rudolfii* N.Ulziykh.	China (Xinjiang)	POWO [58]
14	*Caragana gobica* subsp. *occidentalis* Kamelin & Yakovlev	Synonym of *Caragana gobica* Sanchir	POWO [58]
15	*Chesneya grubovii* Yakovlev	Synonym of *Chesneya ferganensis* Korsh	POWO [58]
16	*Corydalis grubovii* Mikhailova	Russia (SW Siberia to NW), China (Xinjiang)	Nobis et al. [93]
17	*Crucihimalaya rupicola* (Krylov) A.L.Ebel &D.A.German	Russia (SW Siberia)	German [19]
18	*Hedysarum chalchorum* N.Ulziykh.	China (Inner Mongolia)	POWO [58]
19	*Hedysarum kamelinii* N.Ulziykh.	Central Asia to Mongolia	POWO [58]
20	*Juncus arcticus* subsp. *grubovii* (Novikov) Novikov, Kirschner & Snogerup	Siberia to Mongolia	POWO [58]
21	*Luzula changaica* V.S.Novikov	Synonym of *Luzula rufescens* var. *macrocarpa* Buchenau	POWO [58]
22	*Neotorularia grubovii* (Botsch.) Botsch.	Synonym of *Neotorularia brevipes* (Kar. et Kir.) Hedge et J. Léonard	German [19]
23	*Neotorularia mongolica* Botsch. & Gubanov	Synonym of *Braya humilis* (C.A. Mey.) B.L. Rob.	German [19]
24	*Oxytropis diantha* Bunge ex Maxim.	SW. Siberia to Mongolia	POWO [58]

25	*Oxytropis rhizantha* Palib.	China (Qinghai), Russia (Altai)	POWO [58]
26	*Papaver pseudotenellum* Grubov	Synonym of *Papaver croceum* Ledeb.	POWO [58]
27	*Papaver rubro-aurantiacum* subsp. *chalchorum* Kamelin	Synonym of *Papaver nudicaule* subsp. *nudicaule*	POWO [58]
28	*Papaver rubro-aurantiacum* subsp. *changaicum* (Kamelin) Kamelin	Synonym of *Papaver nudicaule* subsp. *nudicaule*	POWO [58]
29	*Papaver saichanense* Grubov	SW Siberia to Mongolia.	POWO [58]
30	*Potentilla chenteica* Sojak	Synonym of *Potentilla acervata* Soják	POWO [58]
31	*Potentilla x drymeja* Sojak	Subarctic to Mongolia	POWO [58]
32	*Potentilla inopinata* Sojak	Russia (Altai, Tuva)	POWO [58]
33	*Potentilla serrata* Sojak	China (Hebei), Russia (Altai, Tuva)	POWO [58]
34	*Rhinactinidia eremophila* subsp. *grubovii*	Synonym of *Rhinactinidia eremophila* (Bunge) Novopokr. ex Botsch.	POWO [58]
35	*Saussurea catharinae* Lipsch.	China	POWO [58]
36	*Scrophularia hilbigii* Jäger	Synonym of *Scrophularia canescens* Bong.	Kosachev [94]
37	*Stellaria pulvinata* Grubov	China, Kazakhstan	POWO [58]
38	*Swertia banzragczii* Sanchir	China	Chen et al. [65]
39	*Taraxacum bornuurense* R.Doll	Synonym of *Taraxacum ussuriense* Kom.	POWO [58]
40	*Thalictrum minus* subsp. *appendiculatum* (C.A. Mey.) Gubanov	Synonym of *Thalictrum appendiculatum* C.A.Mey.	POWO [58]
41	*Valeriana saichanensis* Kom.	Russia (Siberia), China	Kosachev [94]
42	*Veronica x smirnovii* Kosachev and D.A.German	China	Kosachev [94]

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