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A new *Carex* L. variety and ten new records from China and Mongolia

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ABSTRACT

A new variety species of *Carex humida* Y. L. Chang et Y. L. Yan var. *orhonensis* L.Q. Zhao et Y. Xin, var. nov., discovered in Mongolia, is detailed in this study. The *C. humida* var. *orhonensis* var. nov. closely resembles the *C. humida*, yet it is characterized by significantly denser pubescence on the lower leaf sheaths and bract sheaths (vs the lower leaf sheaths and bract sheaths glabrous or sparsely pilose), and the utricles exhibit sparse hairiness, including the beak orifice (vs utricles hairless or only minimally hairy on both sides of the beak orifice). This species inhabits floodplain environments. In addition, ten newly recorded plant species are reported. These include four species newly recorded from China (*Acanthophyllum herniarioides* (Boiss.) Madhani & Zarre, *Astragalus pseudovulpinus* Sanchir ex N.Ulziykh., *Carex relaxa* V.I. Krecz., *Rosularia marnieri* (Raym.-Hamet ex H.Ohba) H.Ohba); and six species newly recorded from Mongolia (*Delphinium reverdattoanum* Polozhij & Revjakina, *Echinops dissectus* Kitag., *Ephedra distachya* L., *Huperzia appressa* (Bach.Pyl. ex Desv.) Á.Löve & D.Löve, *Lycium depressum* Stocks, and *Stellaria bistyla* Y.Z.Zhao. Diagnostic features, updated distributions, and detailed illustrations for ten taxa are provided. Voucher specimens are deposited in the Herbarium of Inner Mongolia University (HIMC).

KEY WORDS

China,
Mongolia,
floristical updating,
morphology,
new records,
new variety.

RÉSUMÉ

Une variété nouvelle de Carex L. et dix espèces nouvellement mentionnées de Chine et de Mongolie.

Une nouvelle variété de *Carex humida* Y.L.Chang & Y.L.Yan, var. *orhonensis* L.Q.Zhao & Y.Xin, var. nov., découverte en Mongolie, est détaillée dans cette étude. La variété *C. humida* var. *orhonensis* var. nov. ressemble étroitement à *C. humida*, mais se caractérise par une pubescence nettement plus dense sur les gaines des feuilles inférieures et des bractées (par rapport aux gaines des feuilles inférieures et des bractées glabres ou peu poilues), et les utricules présentent une légère pilosité, y compris l'orifice du bec (contre des utricules glabres ou à peine poilus sur les deux côtés de l'orifice du bec). Cette espèce peuple les environnements de plaines inondables. De plus, dix espèces végétales sont nouvellement signalées. Celles-ci comprennent quatre espèces nouvellement signalées de Chine (*Acanthophyllum herniarioides* (Boiss.) Madhani & Zarre, *Astragalus pseudovulpinus* Sanchir ex N.Ulziykh., *Carex relaxa* V.I. Krecz., *Rosularia marnieri* (Raym.-Hamet ex H.Ohba) H.Ohba); et six nouvellement signalées de Mongolie (*Delphinium reverdattoanum* Polozhij & Revjakina, *Echinops dissectus* Kitag., *Ephedra distachya* L., *Huperzia appressa* (Bach.Pyl. ex Desv.) Á.Löve & D.Löve, *Lycium depressum* Stocks et *Stellaria bistyla* Y.Z.Zhao). Les caractéristiques diagnostiques, les distributions mises à jour et des illustrations détaillées pour ces dix taxons sont fournies. Les spécimens de référence sont déposés à l'herbier de l'Université de Mongolie intérieure (HIMC).

MOTS CLÉS
Chine,
Mongolie,
mise à jour floristique,
morphologie,
signalements nouveaux,
variété nouvelle.

INTRODUCTION

Plants, as key components of biodiversity research, are important for understanding the patterns and processes of biodiversity (Shen *et al.* 2022). In recent years, human activities and climate change, among other factors, have severely affected plants and all closely related life forms on earth, driving changes in plant diversity (Mendes & Prevedello 2020; Dekhkonov *et al.* 2021; Kesavan & Latha 2023). This is often manifested in extinctions, adaptive evolution and changes in distribution patterns (Walther *et al.* 2002; Walther *et al.* 2009). Therefore, investigating the flora of a region can help determine species distribution, assess extinction risk, understand the response of plant to external environmental conditions, and provide a fundamental basis for effective conservation and biodiversity management.

Our study areas include China and Mongolia, with a particular focus on the Inner Mongolia Autonomous Region, Xinjiang Uygur Autonomous Region, and the Xizang Autonomous Region – three significant regions in China characterized by vast areas, complex landscapes, and highly distinctive plants. However, these areas now face a series of ecological problems, such as decreased diversity of rare and endangered plants (Zhang & Zhao 2021), widespread spread of toxic plants (Zhang *et al.* 2017), invasion of alien species (Eminniyaz *et al.* 2013; Yu *et al.* 2021), and destruction of ecosystems (Zhao & Squires 2010). In Mongolia, grassland degradation due to natural and anthropogenic factors, including overgrazing and land reclamation, has caused significant damage that is difficult to reverse (Meng *et al.* 2020; Munkhzul *et al.* 2021). Therefore, understanding the dynamic distribution of species over time and controlling the loss of plant resources are crucial strategies for enhancing biodiversity protection.

In recent years, the author and his team have been conducting the vegetation of China and Mongolia, discovering several new plant taxa (Yi-ru-gui & Zhao 2023; Aogan *et al.* 2023; Xin *et al.* 2023). From 2016 to 2023, through field studies and detailed comparisons with related taxa using literature

and specimens, we identified 11 plant taxa, including a taxon from Mongolia reassessed as a new variety, four new records from China, and six from Mongolia.

MATERIAL AND METHODS

During our vegetation survey, we collected plant specimens and photographed them. The plant specimens collected from the field and those preserved in the Herbarium of Inner Mongolia University were examined, and their morphological characteristics were analyzed using a microscope (OLYMPUS SZX 16). Digital specimens (ALTB, BM, E, K, MW, WNU) stored on online websites such as China Digital Herbarium (CVH 2024), Global Biodiversity Information Agency (GBIF 2024), Plants of the World Online (POWO 2024), and Global Plant Platform (JSTOR 2024) were examined by consulting relevant literature. This was done to confirm the accuracy of the identifications and to compare the morphology of related species. Voucher specimens are deposited in the Herbarium of Inner Mongolia University (HIMC).

SYSTEMATICS

NEW VARIETY

Family CYPERACEAE Juss.

Genus *Carex* L.

Carex humida Y.L.Chang & Y.L.Yan
var. *orhonensis* L.Q.Zhao & Y.Xin, var. nov.
(Fig. 1)

TYPE MATERIAL. — **Mongolia** • Selenge, Orkhontul Sum, river flood plain; 6.VII.2017; L.Q. Zhao MG-092; holo-, HIMC[HIMC0014424]; isolecto-, HIMC[HIMC0014425].

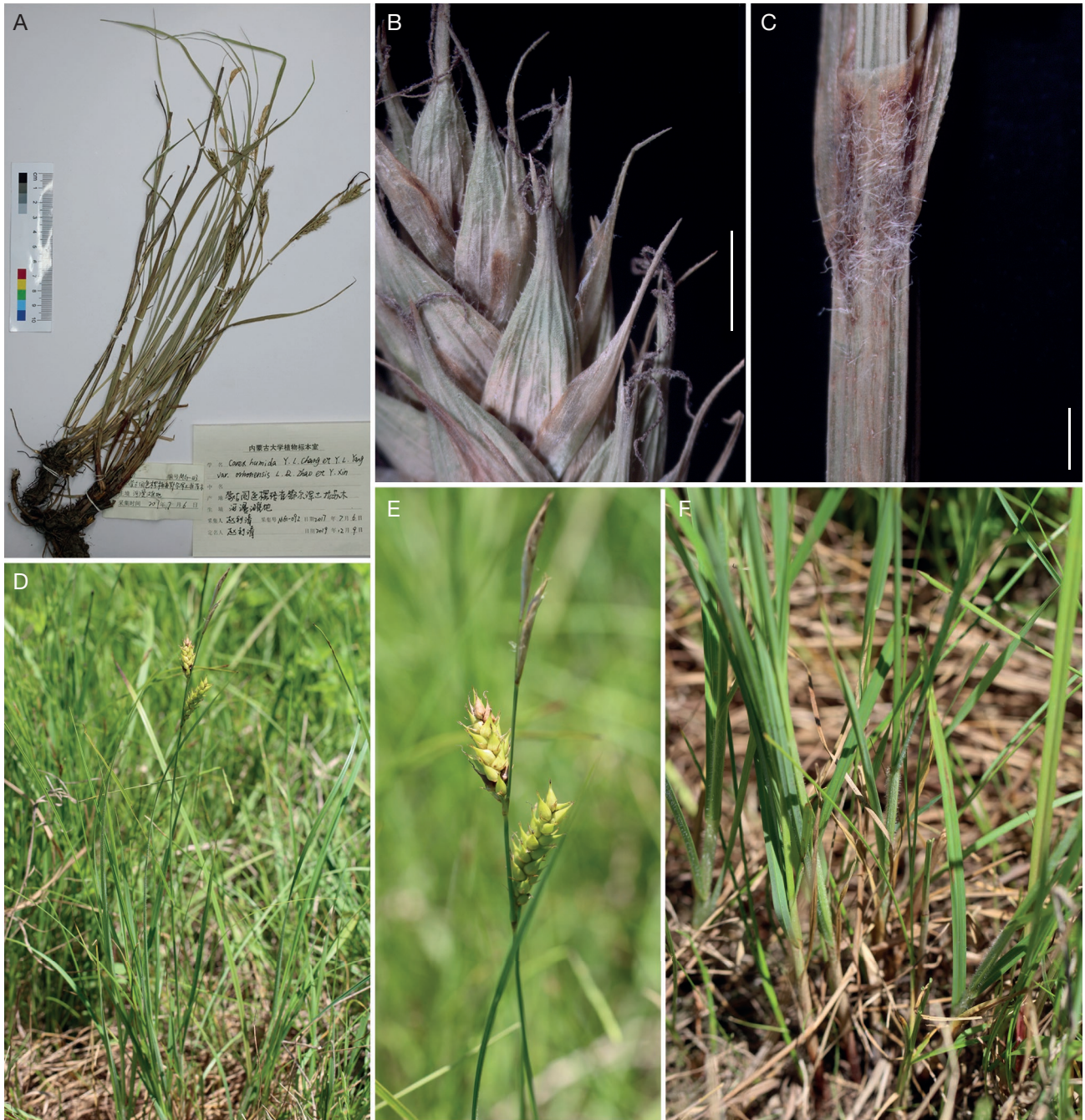


FIG. 1. — *Carex humida* Y.L.Chang & Y.L.Yan var. *orhonensis* L.Q.Zhao & Y.Xin, var. nov. (holotype): **A**, plant specimen; **B**, female spike; **C**, involucre bracts leafy; **D**, plant; **E**, spikes; **F**, lower part of leaf. Scale bars: B, 1 mm; C, 2 mm.

DIAGNOSIS. — *Carex humida* var. *orhonensis* var. nov. is distinguished from *Carex humida* Y. L. Chang & Y. L. Yang by its densely pubescent lower sheaths, with dense pubescence also present on both its involucre bracts and bract sheaths. The female glumes are occasionally hispidulous on the upper part of the midrib and densely hispidulous on both sides and in the middle of the awn. Additionally, the utricle margins, surfaces, and the sides from the beak orifice to the beak tube are sparsely hairy (Table 1).

ETYMOLOGY. — The specific epithet refers to Orkhontul Sum in Mongolia, where the species was found.

DISTRIBUTION AND HABITAT. — *Carex humida* is distributed in Heilongjiang, Jilin, Inner Mongolia in China, where it typically grows in moist environments such as watersides, swamps, ravines, swampy meadows, and gully meadows. *C. humida* var. *orhonensis* var. nov. is located in Selenge province, Mongolia, thriving in river floodplains.

ADDITIONAL SPECIMENS EXAMINED. — **China** • Inner Mongolia, Chifeng, Baolin Youqi, Wulanba Forestry, ravine; 19.VII.2011; L.Q. Zhao 1653; HMC[HMC0013253]! • Mirituba, 4.IX.2011, L.Q. Zhao 11-2845; HMC[HMC0013732]! • Chaganba, 18.VII.2011; L.Q. Zhao 1319; HMC[HMC0013562]!

TABLE 1. — Main distinctive morphological characters comparing *Carex humida* Y.L.Chang & Y.L.Yan var. *orhonensis* L.Q.Zhao & Y.Xin, var. nov. with *C. humida* Y.L.Chang & Y.L.Yan.

Type	<i>Carex humida</i> Y.L.Chang & Y.L.Yan var. <i>orhonensis</i> L.Q.Zhao & Y.Xin, var. nov.	<i>Carex humida</i> Y.L.Chang & Y.L.Yan
Lower leaf sheaths	Densely pubescent	Glabrous or sparsely pilose, mixed with few glandular and forked hairs
Lower leaves	Leaf blade densely pubescent above, less pilose below than above	Less pubescent below than above
Bract sheaths	Densely pubescent	Glabrous or sometimes sparsely pilose
Bracts	Densely pubescent, scabrous on margins	Pilose mixed with few hispidulous hairs, margin scabrous
Female glumes	Sometimes hispidulous on upper part of the midrib, densely hispidulous on both sides and in the middle of the awn	Awn middle and margin hispidulous, scale midvein glabrous
Utricles	Utricle margins, surface and sides of beak orifice to beak tube exhibit sparse hairiness	Hairless or only minimally hairiness on both sides of the beak orifice

NEW RECORDS FOR CHINA

Family CARYOPHYLLACEAE Juss.
Genus *Acanthophyllum* C. A. Mey.

Acanthophyllum herniarioides (Boissier) Madhani & Zarre
(Fig. 2)

Taxon 67 (1): 101 (Madhani *et al.* 2018).

TYPE MATERIAL. — **Afghanistan** • Kurrum valley, Sikaram; 7.VIII.1879; *J.E.T. Aitchison* 961; isolecto-, K[K000725698] photo!

PHENOLOGY. — Flowering from June to August.

ETYMOLOGY. — The specific epithet means similar in form and ecological habit to the *Herniaria* species.

DISTRIBUTION AND HABITAT. — Afghanistan, Kyrgyzstan, Kirgizstan, Pakistan, Tadzhikistan, Uzbekistan and China; new record for China, occurring in the Kizilsu Kirgiz Zizhizhou, Xinjiang. This species grows on riverbanks, sandy or stony hills.

ADDITIONAL SPECIMENS EXAMINED. — **China** • Xinjiang, Kizilsu Kirgiz Zizhizhou, Aqtau, strand; 10.VII.2022; *L.Q. Zhao* P98-001; HMC[HIMC0038465]!
Turkistania • Haussarif; 28.VI.1893; *V.L. Komarov s.n.*; K[K000725766] (photo!).

TAXONOMIC NOTES

Acanthophyllum herniarioides is morphologically similar to *A. sedifolium* (Kurz) Madhani et Zarre, which occurs in Xizang, China. However, it can be distinguished by the broader leaflets of *A. herniarioides* (Madhani *et al.* 2018).

Family CRASSULACEAE J. St.-Hil.
Genus *Rosularia* (DC.) Stapf

Rosularia marnieri (Raym.-Hamet ex H.Ohba) H.Ohba
(Fig. 3A-E)

Journal of Japanese Botany 52 (1): 7 (Ohba 1977). — *Rosularia alpestris* subsp. *marnieri* (Raym.-Hamet ex H. Ohba) Eggli, *Bradleya* 6 (Suppl.): 47 (Eggli 1988). — *Sedum marnieri* Raym.-Hamet ex H. Ohba, *Journal of Japanese Botany* 49: 260 (Ohba 1974).

TYPE MATERIAL. — **Nepal** • Marsiandi; 11.IX.1950; *Lowndes, Donald* 1506; iso-, E[E00393031] photo!

ETYMOLOGY. — This specific epithet is named after the French botanist and horticulturist Julien Marnier-Lapostolle.

PHENOLOGY. — Flowering from July to September.

DISTRIBUTION AND HABITAT. — Distributed in India and Nepal on exposed or arid, stony or sandy slopes, and in rock crevices. *Rosularia alpestris* subsp. *marnieri* (Raym.-Hamet ex H.Ohba) Eggli was recorded in Xizang, China in 1993 (GBIF 2024). However, we have not yet found additional sites or specimen records to confirm the presence of this species in the region. This collection of *Rosularia marnieri* in Xizang provides a basis for further research into the distribution of this species.

ADDITIONAL SPECIMENS EXAMINED. — **China** • Xizang, Zanda County, On the way from Xiangzi township to Diya township; 1.IX.2018; *L.Q. Zhao* X13-073; HMC[HIMC0015323]! • Ngari, South Border Crossing, Puran County; 1.IX.2018; *L.Q. Zhao* X13-074; HMC[HIMC0015324]!
India • Ganges Valley, on dry banks; 15.VII.1883; *Duthie J.F.* 866; BM[BM 000603561] (photo!).
Afghanistan • Alishang, upper part of Darrah Rastyon; 15.VII.1969; *L. Ekberg & Per E.B. Wendelbo* 9650; E[E00361487] (photo!).

TAXONOMIC NOTES

Rosularia marnieri is morphologically similar to *R. alpestris* (Kar. & Kir.) Boriss., but can be distinguished by its conspicuously glandular trichome throughout except for stamens and nectar scales (vs stem glabrous), rosette leaves glabrous, not prominently glandular, cauline leaves both surfaces densely glandular (vs hispidulous-ciliate on the margin only at the apex, otherwise glabrous), cauline leaves narrowly lanceolate to narrowly elliptic (vs cauline leaves oblong-lanceolate or oblong), inflorescence compact (vs inflorescence few-flowered), calyx glandular, lobes ovate or triangular-ovate (vs calyx glabrous, lanceolate), petals ovate, apex obtuse or rarely acute, margin minutely erose, ascending at flowering (vs petals recurved and divergent at the apex), hypogynous scales square, apex irregularly lobed (vs hypogynous scales semiorbicular, truncate or rounded at the tip, entire), carpels sparsely papillate (vs carpels glabrous) (Borisova 1939; Ohba & Rajbhandari 2012).



FIG. 2. — *Acanthophyllum herniarioides* (Boissier) Madhani & Zarre: **A**, plant specimen; **B**, **C**, plant; **D**, calyx; **E**, **F**, floret; **G**, seeds. Scale bars: D-F, 2 mm; G, 0.5 mm.

Family CYPERACEAE Juss.
Genus *Carex* L.

Carex relaxa V.I.Krecz.
(Fig. 3F, G)

Flora of the U.S.S.R., Vol. 3: 379, 616 (Kreczetovicz 1935).

TYPE MATERIAL. — **Russia** • *Transbaikalia region, the Nercha and Kuenga Rivers, at the summit of the Sukhoi valley along the road to Nizhniye Klyuchi*; 18 VI 1911; V. Sukachev & G. Poplavskeya 812; holo-, LE [LE01006982] photo!

PHENOLOGY. — Flowering and fruiting from May to July.

ETYMOLOGY. — The specific epithet refers to the fact that the spikelets are far apart from each other, giving the whole inflorescence a loose form.



FIG. 3. — **A-E**, *Rosularia marnieri* (Raym.-Hamet ex H. Ohba) H. Ohba: **A**, plant specimen; **B**, stamen; **C**, **D**, plant; **E**, nectar scale; **F**, **G**, *Carex relaxa* Krecz.: **F**, plant specimen; **G**, plant. Scale bars: **B**, 1 mm; **E**, 0.2 mm.

DISTRIBUTION AND HABITAT. — *Carex relaxa* grows in wet grasslands and is distributed in Irkutsk, Mongolia. *C. relaxa* was recorded in the IPNI as being distributed in China, and specifically in Qinghai province in 1998 according to GBIF, however, no specimen photographs were provided (GBIF 2024; IPNI 2024). It is hypothesized that this might actually be a case of misidentification, with the plant being *C. helingeeriensis* L.Q.Zhao & J.Yang. In our field studies, we found only *C. helingeeriensis* in the region, with no reliable specimens of *C. relaxa* ever being documented. In 2012, we collected *C. relaxa* in *Stipa grandis* P. A. Smirn. grasslands and *S. baicalensis* Roshev. grasslands of Hulunbeier City, Inner Mongolia, thereby providing substantiated evidence of its presence in China.

ADDITIONAL SPECIMENS EXAMINED. — **China** • Inner Mongolia, Hulunbeier City, East of Xinbalhu Zuoqi, *Stipa grandis* P.Smirn. grassland community; 17.VI.2012; L.Q. Zhao N12-6001; HMC[HIMC0014358]! • Ewenke Qi, Yiminhe Township, *Stipa baicalensis* Roshev. grassland community; 16.VII.2012; L.Q. Zhao N12-7001; HMC[HIMC0014354]! **Mongolia** • Sukhbaatar, grasslands, 1600 m; 22.VII.1991; I.A. Gubanov s.n.; MW[MW0172429] (photo!). **Russia** • Zabayskysk Krai, Borzinskii raion county; 18.VI.1972; V. Kuvaev s.n.; MW[MW0040266] (photo!).

TAXONOMIC NOTES

Carex relaxa is morphologically similar to *C. helingeeriensis* L.Q.Zhao & J.Yang. However, they are differentiated by their leaves, utricles, and styles. *C. relaxa* features involute leaves, utricles with conspicuous ribbed veins that are obovate or subglobose, nutlets that fill the utricle at maturity, and a style base that is not expanded. In contrast, *C. helingeeriensis* has conduplicate or spreading leaves, utricles with no veins or inconspicuous veins that are elliptic-trigonal, nutlets that do not fill the utricle at maturity, and an expanded style base (Kreczetovicz 1935; Zhao *et al.* 2013).

Family FABACEAE Lindl.
Genus *Astragalus* L.

Astragalus pseudovulpinus Sanchir ex N. Ulziykh.
(Fig. 4)

Byulleten' Moskovskogo Obshchestva Ispytatelei Prirody. Otdel Biologicheskii. Moscow 95 (1): 115 (Ulzikhutag 1990).

TYPE MATERIAL. — **Russian** • Western Mongolia, 31.VII.1972; I. A. Gubanov s.n.; para-, MW[MW0593202] photo!

PHENOLOGY. — Flowering and fruiting from July to September.

ETYMOLOGY. — The specific epithet refers to the plant's growth form and inflorescence pattern resembling that of a fox.

DISTRIBUTION AND HABITAT. — Mongolia and China; new record for China, occurring in Qitai county, Xinjiang. This species grows in Gobi and gully.

ADDITIONAL SPECIMENS EXAMINED. — **China** • Xinjiang, Qitai, Beitashan pre-mountain plain wash; 4.VIII.2016; L.Q. Zhao XJ16-8023; HMC[HIMC0013432]! • Qinghe, South of Sartogou Township; 4.VIII.2016; L.Q. Zhao XJ16-8024; HMC[HIMC0013433]!

TAXONOMIC NOTES

This species is morphologically similar to *Astragalus vulpinus* Willd., belonging to the same group, Sect. *Alopecias* (Stev.) Bunge. It is distinguished by several traits: its standard blade is ovoid, unlike the oblong-obovate standard blade of *A. vulpinus*, its claw is subequal to the blade compared to the claw being 1.5 times longer than the limb in *A. vulpinus*, and its leaflets are abaxially villous at the midvein, featuring curly ciliate margins with a retuse or emarginate apex, in contrast to the sparsely white hairy leaflets with a rounded apex found in *A. vulpinus* (Xu & Dietrich 2010).

NEW RECORDS FOR MONGOLIA

Family ASTERACEAE Bercht. & J.Presl
Genus *Echinops* L.

Echinops dissectus Kitag.
(Fig. 5A-E)

Journal of Japanese Botany 11: 171 (Kitagawa 1935).

TYPE MATERIAL. — **China** • Liaoning, Shenyang city, Tiger Beach; 1.IX.1910; M. Nishimura s.n.; holotype; designated by Kitagawa (1933).

PHENOLOGY. — Flowering and fruiting from July to August.

ETYMOLOGY. — This species epithet refers to the deeply lobed leaf blades.

DISTRIBUTION AND HABITAT. — China, Korea, Russia, Mongolia; the new record for Mongolia, occurs in Khuvsgul province. It grows in forest margins, moist grasslands, river margins, stony sunny slopes, 1300-1800 m (Shi & Greuter 2011).

ADDITIONAL SPECIMENS EXAMINED. — **Mongolia** • Khuvsgul, Northwest of Lashant Sum, intermountain sandy grassland; 15.VIII.2015; L.Q. Zhao M15-8008; HMC[HIMC0013423]! **China** • Inner Mongolia, Chifeng, Keshketeng Qi; 10.VIII.1958; Y.Q. Ma s.n.; HMC[HIMC0028296] (photo!).

TAXONOMIC NOTES

Echinops dissectus is morphologically similar to *E. ritro* L., which is known to occur in Mongolia. *E. dissectus* plants are taller than *E. ritro*, reaching up to 2 m tall, with simple stems, larger pseudocephalia (5-6 cm) in diam, and paper-thin leaves, but *E. ritro* stems are solitary or tufted, unbranched or apically branched, and pseudocephalia are 3.5-4.5 cm in diam, leaf mostly leathery.

Family CARYOPHYLLACEAE Juss.
Genus *Stellaria* L.

Stellaria bistyla Y.Z.Zhao
(Fig. 5F, G)

Bulletin of Botanical Research 5(4): 142 (Zhao 1985). — *Stellaria bistylata* W.Z. Di & Y. Ren, *Acta Botanica Boreali-Occidentalia Sinica* 5 (3): 231 (Ren & Di 1985).

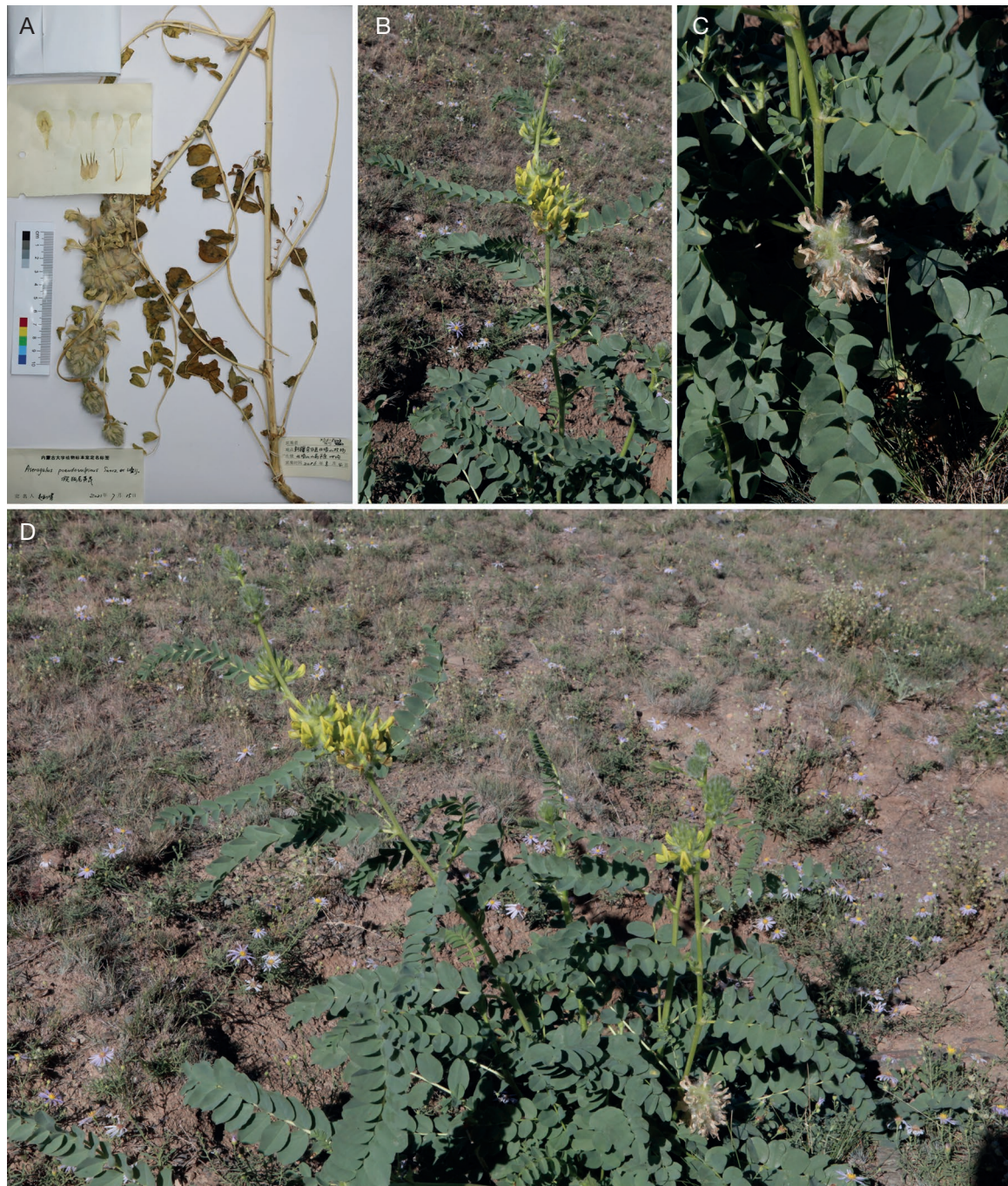


FIG. 4. — *Astragalus pseudovulpinus* Sanchir ex N. Ulziykh.: **A**, plant specimen; **B**, **C**, inflorescence; **D**, habit.

TYPE MATERIAL. — **China** • Inner Mongolia, Helan Mountain, 27.VII.1984; *s.n.*; holo-, EHNWU (WNU6413).

ETYMOLOGY. — This species addition means that the plant has 2 styles.

PHENOLOGY. — Flowering from July to August, fruiting from August to September.

DISTRIBUTION AND HABITAT. — China and Mongolia; new record for Mongolia, occurring in Umnugobi province, This species grows in hillside forestsand hillside crevices, 2000-2600 m.

ADDITIONAL SPECIMENS EXAMINED. — **Mongolia** • Umnugobi, South-east of Khanbogd Sum, stony hill area; 25.VI.2011; *L.Q. Zhao MG11-6002*; HIMC[HIMC 0012346]!

China • Inner Mongolia, Helan Mt., rock crevices on sunny slopes, 2600 m; 27.VII.1963; *Y.Q. Ma 205*; HIMC[HIMC0008026]!

Family EPHEDRACEAE Dumort.

Genus *Ephedra* L.*Ephedra distachya* L.

(Fig. 6A-C)

Species Plantarum 2: 1040 (Linnaeus 1753). — *Chaetocladius distachys* (L.) J. Nelson, *Pinaceae*: 162 (Nelson 1866).

TYPE MATERIAL. — **Netherlands** • Clifford George *s.n.*; lecto-, BM[BM000647523] photo!

ETYMOLOGY. — This species adjective refers to the plant having pairs of spikes or clusters in its inflorescence.

PHENOLOGY. — Pollination from May to June, seed maturity July.

DISTRIBUTION AND HABITAT. — Europe to northern China, S. Russian far east and Mongolia; new record for Mongolia, occurring in Zavkhan province, Uvs Province, Khovd province, Umnugobi province. This species grows in grasslands, sandy places, rocky mountain slopes, below 900 m (Fu *et al.* 1999; Zhao *et al.* 2019).

ADDITIONAL SPECIMENS EXAMINED. — **Mongolia** • Zavkhan, Tes Sum, sandy grassland; 11.VII.2017; L.Q. Zhao *et al.* M17-7276; HIMC[HIMC0014658]! • Uvs, Situlun Sum, sandy grassland; 12.VII.2017; L.Q. Zhao *et al.* M17-7278; HIMC[HIMC0014659]! • Khovd, Bouvet Sum, grassland; 26.VII.2017; L.Q. Zhao *et al.* M17-7279; HIMC[HIMC0014842]! • South-east of Umnugobi, low hills of the Altai Mt.; 9.VI.2013; L.Q. Zhao *et al.* M13-6071; HIMC[HIMC0011241]!

China • Inner Mongolia, Ulanqab, Siziwang Qi, Wulan-hua Township, mountain ridge; 03.VII.1991; Y.Z. Zhao 1183; HIMC[HIMC0002165] (photo!).

TAXONOMIC NOTES

This species shows close morphological similarity to *Ephedra sinica* Stapf, yet it can be distinguished by several features: its branchlets are curved or twisted, in contrast to the straight branchlets of *E. sinica*, the apex of the free part of its leaf is obtuse or subacute, unlike the subulate to narrowly triangular apex found in *E. sinica*, and its seeds are lanceolate or nearly linear with a spiked apex, contrasting with the ovate seeds and non-pointed apex of *E. sinica* (Fu *et al.* 1999; Zhao *et al.* 2019).

Family LYCOPODIACEAE P. Beauv. ex Mirb.

Genus *Huperzia* Bernh.*Huperzia appressa* (Desvaux) Á.Löve & D.Löve

(Fig. 6D, E)

Botaniska Notiser 114: 34 (Löve & Löve 1961). — *Huperzia selago* subsp. *appressa* (Bach.Pyl. ex Desv.) D. Löve, *Botaniska Notiser* 109: 164 (Löve & Freedman 1956). — *Huperzia selago* var. *appressa* (Bach. Pyl. ex Desv.) Ching, *Acta Botanica Yunnanica* 3: 303 (Ching 1981).

TYPE MATERIAL. — **France** • Without location; without date; *La Pilaye B. de s.n.*; holo-, P[P00263092].

ETYMOLOGY. — The specific epithet refers to the leaves being appressed to the stem.

DISTRIBUTION AND HABITAT. — It is distributed from the subarctic to the Himalaya (Zhang & Iwatsuki 2013). GBIF recorded that *H. appressa* was distributed in Mongolia in 2001, and included photos of the plant specimens (GBIF 2024). However, it was not listed as being present in Mongolia in POWO (POWO 2024), nor does it appear in the most recent list of Mongolia's vascular plants (Baasanmunkh *et al.* 2022). In 2017, our collection of this species in Uvs province, Mongolia, supported its presence in the region.

ADDITIONAL SPECIMENS EXAMINED. — **Mongolia** • Uvs, Kobdo sum, hilly area; 16.VII.2017; L.Q. Zhao *et al.* M17-7147; HIMC[HIMC0014772]! • Bayan-Ulgii; 28.VII.2001; Kamelin R.V. *et al.* *s.n.*; ALTB[ALTB1010003598] (photo!).

TAXONOMIC NOTES

Huperzia appressa is morphologically similar to *H. selago*, which is known to occur in Mongolia. In our Mongolian collections, the plants displayed gemmae distinctly distributed along the entire length of the annual shoot increment (Gilman & Testo 2015). Based on relevant literature (Björk 2020), we have confirmed the identification of these specimens as *H. appressa*.

Family RANUNCULACEAE Juss.

Genus *Delphinium* L.*Delphinium reverdattoanum* Polozhij & Revjakina

(Fig. 7A-C)

Flora of Siberia, Vol. 6.: 122, 123 (Friesen 2003).

TYPE MATERIAL. — **Russia** • Mountain Altai, Katunsky Ridge, Tekelyu River Valley (Akkem), Upper part of the forest belt, on damp rocks; 1.VIII.1975; O. Mikhaylova *s.n.*; holo-, TK • Akoyuk River Valley, Lakeshore; elevation 2400 m; 28.VII.1975; E. S. Nechitayeva & O. Mikhaylova *s.n.*; para-, TK.

PHENOLOGY. — Flowering and fruiting from July to September.

ETYMOLOGY. — This specific epithet is named after the Russian botanist Viktor Vladimirovich Reverdatto (1891-1969), head of the biology department at the University of Tomsk.

DISTRIBUTION AND HABITAT. — South-west of Siberia; new record for Mongolia, occurring in Bayan-ulgii province. It grows on the cliffs of the subalpine belt (Friesen 2003).

ADDITIONAL SPECIMENS EXAMINED. — **Mongolia** • Bayan-ulgii, Altai Mt., stony hillside scrub; 24.VII.2017; L.Q. Zhao *et al.* M17-7085; HIMC[HIMC00148001]!

TAXONOMIC NOTES

Delphinium reverdattoanum and *D. barlykense* Lomon. & Khanm. are morphologically similar. However, they can be distinguished by the characteristics of stem hairiness, ovary and follicle texture, and staminode limb morphology. *Delphinium reverdattoanum* features stems that are pubescent with a mix of simple and glandular hairs, glabrous ovaries and follicles, and a deeply emarginate staminode limb. In contrast, *D. barlykense* has glabrous stems, pilose ovaries and follicles, and a staminode limb that is crenate or shallowly emarginate at the tip (Friesen 2003).



FIG. 5. — **A–E**, *Echinops dissectus* Kitag.: **A**, plant specimen; **B**, plant; **C**, lower part of the plant; **D**, phyllaries; **E**, corolla; **F, G**, *Stellaria bistyla* Y.Z.Zhao: **F**, plant specimen; **G**, plant. Scale bars: D, E, 2 mm.

Family SOLANACEAE Juss.
Genus *Lycium* L.

Lycium depressum Stocks
(Fig. 7D)

Hooker's Journal of Botany and Kew Garden Miscellany 4: 179
(Hooker 1852).

TYPE MATERIAL. — **Afghanistan** • Ghus to Shasgr; 1879; *J. W. Johnston* 161; lecto-, K[K 000759455] photo!

ETYMOLOGY. — The specific epithet refers to low plants

PHENOLOGY. — Flowering and fruiting from June to September.

DISTRIBUTION AND HABITAT. — Eastern Mediterranean to Central Asia and Mongolia; new record for Mongolia, occurring in Umnugobi province. It grows on grassland.



FIG. 6. — **A–C**, *Ephedra distachya* L.: **A**, plant specimen; **B**, plant; **C**, seed cones; **D**, **E**, *Huperzia appressa* (Desvaux) Å.Löve & D.Löve: **D**, plant specimen; **E**, plant.

ADDITIONAL SPECIMENS EXAMINED. — **Mongolia** • Umnugobi, Bayan-Ovoo Sum south, hollow; 26.VI.2011; *L. Q. Zhao* M-6021; HMC[HIMC0012532]!

Pakistan • Hills above Kelat towards Johan; 1867; *Stocks* 1117; K[K000759453] (photo!).

TAXONOMIC NOTES

Lycium depressum and *L. dasystemum* Pojark exhibit morphological similarities, but can be distinguished by their floral characteristics: the filament bases and adjacent corolla tubes are pubescent in *L. depressum*, while these structures are glabrous in *L. dasystemum* (Nowak *et al.* 2020).

DISCUSSION

This report significantly advances our understanding of species distributions and specimen collection, particularly by furnishing critical specimens and data for species with previ-

ously ambiguous distributional records. For instance, *Carex relaxa* is documented in China, yet the absence of physical specimens suggests potential misidentification, possibly as *Carex helingensis*. Similarly, *Rosularia alpestris* subsp. *marnieri* is reported in China without supportive specimen evidence, highlighting a gap in documentation. Moreover, while *Huperzia appressa* is recorded in the GBIF database as being distributed in Mongolia, it is notably absent from the latest POWO and the most recent Siberian and Mongolian vascular plant records (GBIF 2024; POWO 2024). Notably, *Delphinium reverdattoanum*, typically associated with Russia's Altai mountain range (Olonova *et al.* 2013; Ebel 2015), was also found in Mongolia during our recent collections, broadening its known geographical range.

Our research focuses on the regions of Inner Mongolia Autonomous Region, the Xinjiang Uygur Autonomous Region, and the Xizang Autonomous Region in China, along with the country of Mongolia. Given the prevailing cold arid steppe



Fig. 7. — **A–C**, *Delphinium reverdattoanum* Polozhij & Revjakina: **A**, plant specimen; **B**, inflorescence; **C**, plant; **D**, *Lycium depressum* Stocks, plant specimen.

and cold arid desert climates, our usage of Central Asia aligns closely with Grubov's definitions (Grubaov 1999). Central Asia constitutes a fragile and sensitive ecosystem, highly susceptible to both natural and anthropogenic pressures, and thus a region likely to encounter substantial challenges impacting plant diversity. The results of the above studies also indicate the need for further vegetation surveys, especially the collection of plant specimens, in order to grasp the distribution of plants and to provide a sound basis for the study and conservation of plant diversity.

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