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New localities of rare and noteworthy vascular plants in the Eastern Caucasus, Armenia, Northern Caspian and Central Asia

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Keywords: alien species, endemism, floristic records, herbarium revision, karst landscapes, phytogeography, range extension, rare plants, Red Data Book taxa.

Summary. This article presents new floristic records for vascular plant species in the Eastern Caucasus, Kazakhstan, Central Asia, and Armenia, based on field surveys conducted between 2018 and 2024 and a critical revision of herbarium specimens deposited in the collections of LE, ERE, TAD, PPIU, DAG, and MHA. In total, approximately 40 new localities are documented for 24 species, encompassing endemic, Red Data Book, and alien taxa. In Tajikistan (Eastern Gissar and Central Zeravshan subregions), five new populations of endemic species were recorded: *Nepeta subhastata*, *N. odorifera*, *N. gontscharovii*, *Eminium alberti*. In Kazakhstan (Inder Solyanokupolnyy Province [belongs to the Caspian Lowland; located within the Inder District in the north of the Atyrau Region of Kazakhstan], West Kazakhstan Region), seven species are reported as new to the regional floras, including *Astragalus sareptanus*, *A. astrachanicus*, *Matthiola superba*, *Zygophyllum ovigerum*, *Rorippa wolgensis*, and *Jurinea persimilis*; most of these findings are associated with karst landscapes that served as refugia during the Khvalynian transgression of the Caspian Sea. In the Russian Federation, *Tanacetum macrophyllum* and *Digitalis ferruginea* subsp. *schischkinii* are reported for the first time for Dagestan, *Poa cynosuroides* – for Kalmykia (based on herbarium re-identification), and the North American invasive *Grindelia squarrosa* – for the Astrakhan Region, where it is actively spreading along roadsides. In Armenia, twelve new locality records are provided for eight species across several floristic regions, including the endemic *Ferula dseghica* (Yerevan floristic region), the relict *Monotropa hypopitys* (Sevan floristic region), new records of *Parnassia palustris* for the Zangezur floristic region, and the adventive *Digitaria ciliaris* for the Yerevan floristic region. The results highlight the conservation significance of karst landscapes in Kazakhstan and subalpine habitats in Tajikistan as refugia for rare endemics and underscore the active expansion of alien species along transportation corridors in the Caspian lowlands. The data contributes to updating regional floristic checklists and Red Data Books.

Новые местонахождения редких и примечательных видов сосудистых растений Восточного Кавказа, Армении, Северного Прикаспия и Средней Азии

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Ключевые слова: карстовые ландшафты, Красная книга, расширение ареала, ревизия гербария, редкие виды растений, фитогеография, флористические находки, чужеродные виды, эндемизм.

Аннотация. В данной статье представлены новые флористические данные по видам сосудистых растений Восточного Кавказа, Казахстана, Средней Азии и Армении, основанные на полевых исследованиях, проведённых в период с 2018 по 2024 годы, и критической ревизии гербарных образцов, хранящихся в коллекциях LE, ERE, TAD, PPIU, DAG и МНА. В общей сложности задокументировано около 40 новых местонахождений для 24 видов, включая эндемичные, занесённые в Красные книги и чужеродные таксоны. В Таджикистане (Восточный Гиссар и Центральный Зеравшан) зарегистрировано пять новых популяций эндемичных видов: *Nepeta subhastata*, *N. odorifera*, *N. gontscharovii*, *Eminium alberti*. В Казахстане (Индерский Солянокупольный регион на Прикаспийской низменности, Западно-Казахстанская и Атырауская области) семь видов отмечены как новые для региональных флор, в том числе *Astragalus sareptanus*, *A. astrachanicus*, *Matthiola superba*, *Zygophyllum ovigerum*, *Rorippa wolgensis* и *Jurinea persimilis*; большая часть этих находок связана с карстовыми ландшафтами, служившими рефугиумами во время Хвалынской трансгрессии Каспийского моря. В Российской Федерации *Tanacetum macrophyllum* и *Digitalis ferruginea* subsp. *schischkinii* впервые зарегистрированы в Дагестане, *Poa cynosuroides* – в Калмыкии (на основании повторной идентификации гербария), а североамериканский инвазивный вид *Grindelia squarrosa* – в Астраханской области, где он активно распространяется вдоль дорог. В Армении зарегистрировано двенадцать новых местонахождений восьми видов в различных флористических регионах, включая эндемичный вид *Ferula dseghica* (Ереванский флористический регион), реликтовый вид *Monotropa hypopitys* (Севанский флористический регион), новые находки *Parnassia palustris* для Зангезурского флористического региона и инвазивный вид *Digitaria ciliaris* для Ереванского флористического региона. Результаты подчеркивают природоохранное значение карстовых ландшафтов Казахстана и субальпийских местообитаний Таджикистана как убежищ для редких эндемиков, а также указывают на активное распространение чужеродных видов вдоль транспортных коридоров в Каспийской низменности. Данные способствуют обновлению региональных флористических списков и Красных книг.

Introduction

The vast territory stretching from the lowland semi-deserts of the Northern Caspian to the high-mountain systems of the Caucasus, Pamir-Alai, and the Armenian Highland represents one of the most floristically diverse and biogeographically complex areas of the Old World. Here, the distributional boundaries of European, Central Asian, and Middle Eastern floras intersect, giving rise to exceptionally high levels of endemism and a mosaic of ecosystems ranging from halophytic desert communities to subalpine meadows and riparian forests. Despite this diversity, the flora of several constituent regions – particularly the Inder Solyanokupolnyy Province of Kazakhstan (belongs to the Caspian Lowland; located within the Inder District in the north of the Atyrau Region of Kazakhstan), the Eastern Gissar and Central Zerafshan subregions of Tajikistan, and parts of the Eastern Caucasus and Armenia – remains insufficiently studied in terms of species composition, distribution, and conservation status.

Ongoing anthropogenic and climatic pressures are rapidly transforming natural landscapes across the region. Accelerated desertification, overgrazing, industrial development, and habitat fragmentation pose a serious threat to the survival of many plant species, including endemics with narrow ecological niches. Simultaneously, the expansion of alien species along transportation corridors and in anthropogenically disturbed habitats is altering the structure of native plant communities. These processes underscore the urgency of comprehensive floristic inventories and the regular updating of regional Red Data Books.

A further, often underappreciated source of new floristic data lies in herbarium collections. A significant portion of historical specimens housed in major repositories has not been subject to critical taxonomic revision, and re-examination of such material routinely yields new records – either through corrected identifications or through the discovery of overlooked specimens of rare or range-restricted species. The integration of newly collected

field material with a systematic revision of archival herbarium specimens therefore provides a more complete picture of species distributions than either approach alone.

This paper presents the results of floristic surveys carried out between 2018 and 2024 in four regions: the Republic of Tajikistan (Eastern Gissar and Central Zeravshan botanical-geographical subregions), the Republic of Kazakhstan (Inder Solyanokupolnyy Province, West Kazakhstan and Atyrau regions), the Russian Federation (Republic of Dagestan, Republic of Kalmykia, Astrakhan Region), and the Republic of Armenia (all floristic regions). Field data were supplemented by a critical revision of more than 5000 herbarium specimens from the collections of the Komarov Botanical Institute of Russian Academy of Sciences (LE), Lomonosov Moscow State University (MW), Institute of Botany of the National Academy of Sciences of Armenia (ERE), Institute of Botany, Plant Physiology and Genetics of the NAS of Tajikistan (TAD), and M. Utemisov West Kazakhstan University (PPIU). The combined approach allowed us to: (1) document new localities of rare and range-restricted species within the study area; (2) clarify the distribution of Red Data Book taxa and regional endemics; and (3) identify cases where current distributional records deviate substantially from historical data, reflecting dynamic changes in the flora under both natural and anthropogenic influences.

Special attention is given to endemic taxa, whose narrow habitat requirements make them sensitive indicators of ecosystem integrity. The data obtained are of significance both for regional taxonomy and phytogeography and for the development of evidence-based biodiversity conservation strategies in the context of ongoing climate and land-use change.

Materials and Methods

The study encompassed key floristic regions of the Caspian macroregion and adjacent territories: Tajikistan (Eastern Gissar and Central Zeravshan botanical-geographical subregions), Kazakhstan (Inder Solyanokupolnyy Province, West Kazakhstan and Atyrau Regions), Russia (Republic of Dagestan, Republic of Kalmykia, Astrakhan Region), and Armenia (all floristic regions). Fieldwork was carried out from 2018 to 2024, with collecting schedules adjusted to account for the seasonal phenology of target taxa.

Field methods. Plant specimens were collected following standard herbarium methodology

(Skvortsov, 1977; Bridson, Forman, 1995), with mandatory inclusion of reproductive organs. In total, 412 herbarium sheets were prepared and deposited in the herbaria of LE, ERE, TAD, and PPIU (acronyms follow Thiers (2026), continuously updated). GPS coordinates were recorded using handheld navigators (accuracy $\pm 3\text{--}5$ m); all coordinates are given in the WGS84 datum.

In Tajikistan and Kazakhstan, where plant community structure was systematically documented, a transect-based approach was employed. Temporary sampling plots were established: 10×10 m for woody and shrub communities, 4×4 m for herbaceous vegetation. For each plot, the following parameters were recorded: altitude, slope aspect and gradient, substrate type, total projective cover and species cover of the target taxon (according to the Braun-Blanquet scale), and a list of associated species.

In the Republic of Armenia, fieldwork was conducted across all floristic regions of the country in a variety of habitats, including wetlands, forests, gorges, montane meadows, steppes, and roadsides. Field surveys were carried out from June to October 2023 and from March to September 2024.

In Russia, floristic surveys were conducted in Dagestan (Tsuntinsky District), Kalmykia (Yashkulsky District), and the Astrakhan Region (Krasnoyarsky District) during expeditions in 2019–2024. In addition, the record of *Poacynum sareptanum* for Kalmykia is based on the re-identification of herbarium specimen collected in 2007 by A. Kuvaev and N. Stepanova and housed at the Herbarium of the Main Botanical Garden of RAS (MHA).

Herbarium revision. A critical revision of more than 5000 herbarium specimens was carried out in the collections of the Komarov Botanical Institute of RAS, St. Petersburg (LE), Lomonosov Moscow State University, Moscow (MW), Institute of Botany of the NAS of Armenia, Yerevan (ERE), Institute of Botany, Plant Physiology and Genetics of the NAS of Tajikistan, Dushanbe (TAD), and M. Utemisov West Kazakhstan University, Uralsk (PPIU). Species identification was carried out using regional floristic treatments, including “Flora Armenii” (1954–2009), “Flora yevropeyskoy chasti SSSR” (“Flora Vostochnoy Yevropy”) (1974–2004), “Flora Kazakhstana” (1956–1966), and “Flora Tadzhikskoy SSR” (1957–1991). Critical morphological features were examined under a dissecting microscope.

Nomenclature and novelty verification. Scientific names were aligned with “International

Plant Names Index” (IPNI. URL: <http://www.ipni.org>) and “Plants of the World Online” (POWO. URL: <https://powo.science.kew.org/>). Prior to reporting each taxon as a new record for a given territory, its occurrence was verified against major electronic databases, including “Global Biodiversity Information Facility” (GBIF. URL: <https://www.gbif.org/>), “Plants and lichens of Russia and neighboring countries: open online galleries and plant identification guide” (Plantarium. URL: <https://www.plantarium.ru>), and “Moscow Digital Herbarium” (Seregin, 2026). In certain cases, georeferenced occurrence records for the reported taxa were found to be already available in GBIF or other databases prior to the submission of this manuscript. Where such records lack habitat characterization, phytosociological data, or biogeographical analysis, we consider their publication here to constitute a substantive contribution beyond the mere registration of locality coordinates. Such cases are explicitly noted in the relevant species accounts.

Species reported for the first time for regions are preceded by an asterisk (*).

Results and discussions

Republic of Tajikistan

Eminium alberti (Regel) Engl.: “In the Eastern Hisor subregion, on the southern slope of the Karateghin Range, along the road toward the tunnel through the Darai Dzhvoni Gorge, on clayey, variegated, open slopes, in the belt of tall-grass semi-savannas with shrub fragments, *Hordeum bulbosum* formation, 1700 m a. s. l., 38°48′04.32″N, 69°41′48.45″E. 19 V 2022. K. A. Bobokalonov, Sh. M. Mubalieva, S. S. Abrorov” (TAD168928). – Occurs in belts of semi-savannas and shrublands on silty, often clayey slopes and level areas in valleys, in low-herb, tall-grass, and tall-herb semi-savannas, and ephemeral communities at 650–2000 m a. s. l. The plant community includes *Hordeum bulbosum* L., *H. vulgare* subsp. *spontaneum* (K. Koch) Asch. et Graebn., *Thinopyrum intermedium* (Host) Barkworth et D. R. Dewey, *Poa bactriana* Roshev., *Poa* sp., *Ferula kuhistanica* Korovin, *Prunus bucharica* (Korsh.) Hand.-Mazz. (= *Amygdalus bucharica* Korsh.), *Aegilops triuncialis* L., *Phlomis bucharica* Regel, *Celtis caucasica* Willd. Total cover: 95 %, species cover: 1 %. A rather rare species, endemic to Middle Asia.

General distribution: found in Tajikistan and northern Afghanistan, as well as in the south of Turkmenistan (Kopetdag) and Uzbekistan

(Vvedensky, 1932, 1963; Merkulovich, 1941). This is a rare species for Tajikistan.

Nepeta gontscharovii Kudrjasch.: “In the Eastern Hisor subregion, on the southeastern slope of the Karateghin Range, above the Degdonak village in the Mujikharv Gorge, on rocky-silty areas along small streams, in the belt of subalpine meadows and tall-herb semi-savannas, *Koenigia coriaria* formation, 2300 m a. s. l., 38°56′08.22″N, 69°49′28.56″E, 17 VII 2021, K. A. Bobokalonov, Sh. M. Mubalieva, S. S. Abrorov” (TAD168925). – An endemic species previously known only from the Tuvish and Pandema river valleys (above the settlement of Komsomolabad) and also from the Gulkhar River valley in blackwood forest belts with interspersed thermophilic juniper, subalpine meadows, herbaceous steppes, and tall-herb semi-savannas at 1800–2900 m a. s. l.

The plant community includes *Nepeta podostachys* Benth., *Dianthus crinitus* subsp. *tetralapis* (Nevski) Rech. f., *Nepeta bucharica* Lipsky, *Prangos pabularia* Lindl., *Eremurus robustus* Regel, *Hordeum bulbosum* L., *Hordeum vulgare* subsp. *spontaneum* (K. Koch) Asch. et Graebn., *Poa bactriana* Roshev., *Poa* sp., *Thinopyrum intermedium* (= *Elytrigia trichophora* (Link) Nevski). Total cover 70 %, species cover 2 %.

General distribution: endemic to Tajikistan (Kochkareva, 1986). This is a rare species for Tajikistan.

N. odorifera Lipsky: “Eastern Hisor subregion, southeastern slope of the Karateghin Range, near the Kazdon village, in the Hakimi Gorge, in moist areas along small stream beds, in the belt of subalpine meadows and tall-herb semi-savannas, *Ferula kuhistanica* formation, 1900 m a. s. l., 38°53′19.61″N, 69°47′26.33″E, 17 V 2022, K. A. Bobokalonov, Sh. M. Mubalieva, S. S. Abrorov” (TAD168926). – An endemic species to Tajikistan (Western Pamir and lowlands of Pamir-Alai) (Tsukervanik, 1987) typical for blackwood forest belts with interspersed thermophilic juniper, subalpine meadows, tall-herb semi-savannas, found on red sandstone outcrops at 2400–3400 m a. s. l. Previously recorded only in the Central Hisor, Northern Darvaz, and Eastern Tajikistan floristic subregions of the Hisor-Darvaz botanical-geographical region. The plant community includes *Koenigia coriaria* (Grig.) T. M. Schust. et Reveal (= *Polygonum coriarium* Grig.), *Prangos pabularia* Lindl., *Incarvillea olgae* Regel, *Acer platanoides* subsp. *Turkestanicum* (Pax) P. C. de Jong, *Eremurus robustus* Regel, *Spiraea baldshuanica* B. Fedtsch., *Cotoneaster* sp. Total cover 90 %, species cover 2 %.

General distribution: endemic to Tajikistan (Kochkareva, 1986). This is a rare species for Tajikistan.

N. subhastata Regel: “Eastern Hisor botanical-geographical subregion, southeastern slope of the Karateghin Range, near the Tagikamar village, in the Hakimi Gorge, on rocky slopes in the juniper belt with blackwood fragments, *Juniperus seravschanica* Kom. formation, 1900 m a. s. l., 38°53′19.61″N, 69°47′26.33″E, 17 V 2022. K. A. Bobokalonov, Sh. M. Mubaliev, S. S. Abrorov” (TAD168929). – An endemic species of the Pamir-Alai region (Kochkareva, 1986; Tsukervanik, 1987), primarily found the upper belts of blackwood forests and thermophilic juniper stands, growing in rock crevices at altitudes of 1900–2500 m a. s. l. A new locality was documented during our fieldwork. The community includes *Acer platanoides* subsp. *turkestanicum* (Pax) P. C. de Jong, *Malus domestica* (Suckow) Borkh. (= *M. sieversii* (Ledeb.) M. Roem.); in the lower layer dominated by polycarpic herbaceous plants like *Eremurus robustus* (Regel) Regel, *Iris baldshuanica* O. Fedtsch., *Iris bucharica* Foster, *Incarvillea olgae* Regel, *Ferula kuhistanica* Korovin, *Ungernia tadschicorum* Vved. ex Artjush.; in the middle layer – *Spiraea pilosa* Franch., *Cotoneaster* sp., total projective cover 85 %, species cover: ~1 %.

General distribution: endemic to Tajikistan (Kochkareva, 1986). This is a rare species for Tajikistan.

Republic of Kazakhstan

Astragalus astrachanicus Sytin et Laktionov: “Republic of Kazakhstan, Atyrau Region, Inder District, eastern shore of Lake Inder, sandy desert, on stabilized sands, 48°25′44.5″N, 52°00′42.8″E. 2 V 2023. S. G. Akhmedenova, A. P. Laktionov” (LE 01309004) (Fig. 1). – This species, endemic to the sandy deserts of the Northern Caspian region, was described relatively recently. Previously, for Kazakhstan it had only been reported in the West Kazakhstan Region (Sytin, Laktionov, 2007).

This is the first documented record of the species for the flora of the Atyrau Region.

General distribution: endemic to the North Caspian region.

A. sareptanus A. K. Becker.: “Republic of Kazakhstan, West Kazakhstan Region, Akzhaik District, upper part of a karst sinkhole slope, 48°35′45.8″N, 51°47′47.8″E. 5 VI 2024. S. G. Akhmedenova, M. S. Knyazev, A. P. Laktionov” (LE 01309003); “Republic of Kazakhstan, Atyrau

Region, Inder District, western slope of a karst hill, 48°27′58.6″N, 52°02′51.8″E. 2 V 2023. S. G. Akhmedenova, A. P. Laktionov” (LE 01308999). – This Eastern European-Kazakh species was previously recorded from the Akmola, Kostanay, and Aktobe regions of Kazakhstan, as well as from the Ulytau mountain massif and the Kokshetau Hills (Knyazev, 2022).

Our findings thus constitute new records for the floras of West Kazakhstan and Atyrau Regions.

Jurinea persimilis Iljin.: “Republic of Kazakhstan, Atyrau Region, Inder District, eastern shore of Lake Inder, clay desert near karst hills, 48°27′26.8″N, 52°00′48.7″E. 2 V 2023. S. G. Akhmedenova, A. P. Laktionov” (LE 01308998); “Republic of Kazakhstan. West Kazakhstan Region, Akzhaik District, near the dirt road between the villages of Inderborsky and Sarman, 48°36′18.0″N, 51°48′38.3″E. 1 V 2023. S. G. Akhmedenova, A. P. Laktionov” (LE 01309002) (Fig. 2). – An Eastern Caspian petrophilous-desert species, the range of which includes the Caspian part of western Kazakhstan, Turkmenistan, and Uzbekistan. In the Inder Solyanokupolnyy Province, this species occurs in an isolated part of its disjunct range at the northwestern boundary. The nearest known locality is in the Mangystau Region of Kazakhstan. The insular nature of its occurrence is likely connected to the Khvalynian transgression of the Caspian Sea.

It is a new record for the floras of the Atyrau and West Kazakhstan Regions.

General distribution: endemic to the western Turanian Lowland (Cherneva, Tsukervanik, 1993).

Matthiola superba Conti.: “Republic of Kazakhstan, Atyrau Region, Inder District, southeastern shore of Lake Inder, slopes of a karst hill, 48°26′51.4″N, 52°01′05.6″E. 4 XI 2024. M. S. Knyazev, S. G. Akhmedenova, A. P. Laktionov” (LE 01309000) (Fig. 3). – A Kazakh-South Siberian, southern steppe and semi-desert species, *Matthiola superba* has an isolated portion of its disjunct range within the Inder Solyanokupolnyy Province, on its westernmost boundary. The locality we discovered is relict, significantly separated from the main range and associated with karst elevations in the Inder Solyanokupolnyy Province, which were island refugia 12–25 thousand years ago during the Khvalynian transgression of the Caspian Sea.

It is a new record for the floras of West Kazakhstan Regions.

Note. A georeferenced occurrence record for this species from the Atyrau Region is available in GBIF (*Matthiola superba*, 2026); however, this record is



Fig. 1. A flowering specimen of *Astragalus astrachanicus* (Photo by A. P. Laktionov).



Fig. 2. A flowering specimen of *Jurinea persimilis* (Photo by A. P. Laktionov).



Fig. 3. Flowering and fruiting individual of *Matthiola superba* on the upper slope of a karst elevation (Photo by A. P. Laktionov).

not accompanied by a description of the habitat, community composition, or biogeographical context. The present account provides this information for the first time, documenting the relict and refugial nature of the locality in relation to the Khvalynian transgression of the Caspian Sea.

Rorippa wolgensis Fursajev, Laktionov et Mavrodiev: "Republic of Kazakhstan, West Kazakhstan Region, Akzhaik District, wet depression between the Ural River and the Inder Solyanokupolniiy elevation. 48°36'48.8"N, 51°49'25.3"E. 5 V 2023. S. G. Akhmedenova, A. P. Laktionov" (LE 01309007). – The species range includes southern Russia and western Kazakhstan (Laktionov, Mavrodiev, 2013). In most earlier records, it was cited as *Rorippa brachycarpa* (C. A. Mey.) Hayek.

This is a new record for the flora of the West Kazakhstan Region.

Zygophyllum ovigerum Fisch. et C. A. Mey. ex Bunge: "Republic of Kazakhstan, West Kazakhstan Region, Akzhaik District, small depression with outlets of mineralized water, 48°34'35.5"N,

51°48'59.8"E. 4 V 2023. S. G. Akhmedenova, A. P. Laktionov" (LE 01309005). – The locality reported here represents one of the northernmost points in the Irano-Turanian range of the species.

It is a new record for the flora of the West Kazakhstan Region.

Republic of Dagestan, Russian Federation

* ***Digitalis ferruginea*** subsp. ***schischkinii*** (K. V. Ivanina) K. Werner: "Republic of Dagestan, Tsuntinsky District, near the Mushak Pass, forest edge, southern slope, 2100 m, 42°02'50.8"N, 46°05'40.4"E, 15 VII 2020, R. Murtazaliev" (DAG, LE 01268164). – The genus *Digitalis* was not previously recorded for Dagestan, but in recent years, two new species have been identified for the region: *D. nervosa* Steud. et Hochst. ex Benth. (Murtazaliev et al., 2012) and *D. ciliata* Trautv. (Timukhin, Tuniyev, 2018). *Digitalis ferruginea* subsp. *schischkinii* is also recorded for Dagestan for the first time and is currently only known from the aforementioned locality, where the population consists of several dozen individuals over an area of about 1 hectare (Murtazaliev, 2020). It grows among shrub thickets, along forest edges, and in light forests in the upper mountain belt at altitudes of 1700–2300 m above sea level. The nearest known locality of this species is on the southern macroslope of the Greater Caucasus in Georgia and Azerbaijan. Outside Dagestan, this taxon is found in the Krasnodar Territory, Republics of Adygea and Karachay-Cherkessia (Litvinskaja, Murtazaliev, 2009; Shilnikov, 2010).

General distribution: the overall range of the taxon covers the Western Caucasus, Western and Central Transcaucasia, and the Black Sea region of Turkey in the Pontic Mountains.

* ***Tanacetum macrophyllum*** (Waldst. et Kit.) Sch. Bip.: "Republic of Dagestan, Tsuntinsky District, near the Khupri village, along the road to the Kodori Pass, eastern slope, subalpine tall-grass meadow, 2200 m, 42°10'23.8"N, 45°46'28.2"E. 15 VII 2019. R. Murtazaliev" (DAG, LE01268168); "Republic of Dagestan, Tsuntinsky District, forest edge opposite the Khutrakh village, northern slope, 1800 m, 42°12'39.8"N, 45°47'26.4"E, 16 V 2019, R. Murtazaliev" (DAG). – This species is a new record for the flora of Dagestan and had not been previously reported for the region (Murtazaliev, 2009). A review of herbarium material from the Komarov Botanical Institute of the RAS revealed one specimen collected in Dagestan by R. Yelenievsky in 1940: Dagestan, Khupri village–Kodori Pass, tall-

grass meadows among park-like maples with *Acer trautvetteri*, 2200 m, 29 VIII 1940, R. Yelenievsky (LE). The nearest known locality of this species is on the southern macroslope of the Greater Caucasus in the Kakheti Region (Georgia), In the subalpine region of Mount Choczal-dagh, 26 VII 1898, A. Fomin (LE). This species is not listed in the “Caucasian flora conspectus” (Khanjyan, 2008). In Russia, it is known in the Krasnodar Territory, mainly on the southern macroslope of the Greater Caucasus (Zernov, 2006).

General distribution: countries of Transcaucasia and adjacent regions of Turkey in the eastern part of the Pontic Mountains.

Republic of Kalmykia, Russian Federation

* *Poacynum sareptanum* Mavrodiev, Laktionov et Yu. E. Alexeev: “Republic of Kalmykia, Yashkulsky District, 255th kilometer of the Astrakhan–Elista highway, near the bridge over the Chernozemelsky Canal; anthropogenically transformed forb-grassland community. Abundance: cop 2. 46°15'653"N, 44°58'057"E. 20 IX 2007. Collected by A. Kuvaev, N. Stepanova. Determined by N. Stepanova” (MHA0190809). – A re-identified herbarium specimen is housed in the Herbarium of the Main Botanical Garden of RAS: *Trachomitum sarmatiense* Woodson (= *Apocynum sarmatiense* (Woodson) O. Wissjul.). Previously, *Poacynum sareptanum* was only known from the Astrakhan and Volgograd regions (Mavrodiev et al., 2015). This is a new record for the flora of Kalmykia.

Astrakhan Region, Russian Federation

* *Grindelia squarrosa* (Pursh) Dunal: In 2024, it was collected twice in the Krasnoyarsky District: first, on 12 VII 2024, “roadside of an asphalt road 40 m north of the railway crossing at the Astrakhan Gas Complex; 46°46'30.4"N, 48°02'50.2"E. 12 VII 2024. V. E. Afanasyev” (LE 01308995); “Roadside of the Astrakhan – Aksaraysk highway, 300 m north of the bridge over the Buzan River; 46°41'24.0"N, 48°04'28.2"E. 24 IX 2024. V. E. Afanasyev” (LE 01308996, LE 01308997). – At the collection site on 12 VII 2024, one flowering plant was observed. At the collection site on 24 IX, the plant was documented in the flowering and fruiting stage.

A North American invasive weed, has spread across Europe and the Russian Far East. In the neighboring Volgograd Region, this species is transforming anthropogenically disturbed dry steppe landscapes and is actively spreading along

roadsides (Onistratenko, 2022). Previously, it had not been recorded in the Astrakhan Region.

General distribution: North America (to the north: extending from the Canadian provinces of British Columbia and Manitoba; to the east: reaching the New England region and the province of Quebec; to the south: extending to the Mexican state of Chihuahua and American states of Texas, Arizona, and California); secondary range: widely distributed in the countries of Eastern and Central Europe (including Austria, Belarus, Belgium, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, and Ukraine), the Caucasus, Kazakhstan (Northern, Central, and Eastern), the Far East, and Australia (*Grindelia squarrosa*, 2026).

Republic of Armenia

Delphinium ochroleucum Steven ex DC.: “Armenia, Aragatsotn province, near the Davtashen village, meadow, 1752 m. 40°36'1932"N; 43°96'5757"E, 24 VI 2023. A. Achoyan” (ERE 202410). – The species was first discovered in the Shirak floristic region. Previously in Armenia, it was known only from the Upper Akhuryan and Lori floristic regions (Takhtajan, 1954).

General distribution: Caucasus.

Digitaria ciliaris (Retz.) Koeler: “Yerevan city, roadside vegetation, 40°12'44.6"N, 44°31'23.9"E. 14 IX 2023. A. Rudov, H. Kosyan” (ERE 202538). – This species has previously been known only from gardens and ruderal communities of the Meghri Floristic (Gabrieljan, 2009). We report this species for the first time from the Yerevan floristic region, where it occurs together with other C_4 ruderals, *Amaranthus retroflexus* L., *Cynodon dactylon* (L.) Pers and *Tribulus terrestris* L., as roadside vegetation in highly urbanized areas of Yerevan.

General distribution: native to tropical and subtropical areas of the Old World. Widely introduced globally as a weed.

Ferula dseghica Nersesyan: “Yerevan, steppe in not cultivated areas of the Yerevan Botanical Garden, 40°12'32.9"N, 44°33'11.9"E. 14 V 2024. A. Rudov” (ERE 202537). – This species has been recently described from mountain steppes and gorges edges of the Lori and Aragatsotn regions of Armenia (Nersesyan, 2023). Here we report a new locality of the species from Yerevan. Several individuals of *F. dseghica* have been recorded by us in untouched steppe vegetation, on a west facing slope in the territory of the Yerevan Botanical Garden, an area

that had previously not been used for cultivation. Unfortunately, this area was completely deprived of vegetation in December 2024 due to the works related to the creation of a new park facility. Additional individuals of *F. dseghica* have been observed on very steep stony East-facing slopes along the Getar Canyon, just 900 m southwards (40°11'55.5"N, 44°33'02.2"E). These findings suggest a wider distribution of the species in Armenia.

General distribution: Armenia (endemic species).

Ferula rigidula Fisch. ex DC.: "Syunik region, North of Karchevan village in the surroundings of Karchevan open mine, on red clayey hill, 38°54'10.2"N, 46°11'37.8"E. 03 VII 2024. A. Rudov, M. Dehghani" (ERE 202536); "Syunik region, Southwest Karchevan village, on a greyish, gravelly, East-facing slope, 38°53'30.2"N, 46°11'15.6"E. 04 VII 2024. A. Rudov, M. Dehghani" (ERE 202539). – Previously in Armenia it was known from the Upper Akhuryan, Shirak, Aparan, Yerevan, Darelegis and Zangezur floristic regions (Menitskij, 2008). This is the first record of *F. rigidula* in the Meghri floristic region, in the very south of Armenia, about 6 km from the Armenian-Iranian border. The species here occurs on slopes within *Paliurus spina-christi* Mill. shrublands, on a variety of substrates, ranging from red clayey marls to grey gravel. Our search along the border area did not result in the finding of further localities, except for few individuals found in two localities around Karchevan village.

General distribution: Armenia, Azerbaijan, Turkey and NW Iran.

Monotropa hypopitys L.: "Gegharkunik Marz, Sevan pass, slope W of the northern tunnel entrance, 1970 m a. s. l. 40°40'24"N, 44°52'52"E. 18 VII 2017. R. Karl. 17-0978; det. Karl. Est! A. Elbakyan, 2024" (ERE 202782). – This species is reported for the first time for the Sevan floristic region. Previously in Armenia it was known from the Lori and Zangezur floristic regions (Takhtajan, 1973).

General distribution: Caucasus, Europe, Siberia, Central and Middle Asia, Far East, China, Korea, Japan, N. America.

Myriophyllum spicatum L.: "Armenia, Tavush province, lake Gosh, 1140 m, 39°58'25"N, 44°41'46"E. 09 VIII 2023. M. Sargsyan, A. Safaryan; det. M. Sargsyan" (ERE 202266, ERE 202260). – The species was first discovered in northern Armenia (Ijevan floristic region). Previously in Armenia it was known only from the Lori and Yerevan floristic regions (Avetisyan, 1973). The species grows in up to medium mountain zone, in stagnant and slow-flowing waters.

General distribution: North America, Europe, Mediterranean, North Africa, Caucasus, Transcaucasus, Middle, Eastern, and Western Asia, Turkey.

Parnassia palustris L.: "Armenia, Syunik province, between the villages Shenatagh and Svarants, 2428 m, 39°20'40.85"N, 46°10'22.81"E. 17 VIII 2024. I. Gabrielyan, M. Sargsyan, N. Sargsyan; det. M. Sargsyan" (ERE 202406, ERE 202407). – The species was first discovered in southern Armenia (Zangezur floristic region). It grows in damp and marshy meadows, along the banks of streams. Previously, it was known only from the Upper Akhuryan, Sevan, and Darelegis floristic regions (Mulkidjanian, 1958).

General distribution: N. America, Europe, Mediterranean, Balcan, Siberia, Middle Asia, Transcaucasus, Iran, Iraq, Turkey.

Veronica officinalis L.: "Armenia, Tavush province, near the Teghut village, forest. 1110 m, 41°05'51"N, 44°49'50.7"E. 08 VIII 2024. M. Sargsyan" (ERE 202408, ERE 202409). – This species was first discovered in northern Armenia (Ijevan floristic region) in the vegetation of the oak-bochu forest, among mosses. Previously, it was known only from the Zangezur floristic region of Armenia. The species was first collected from Armenia in 1979 by M. Hovhannisyan in southern Armenia. It was not included in the 8th volume of the flora of Armenia (Gabrieljan et al., 1987), because the herbarium specimen was not yet determined. In 2007, it was determined by A. Yelenevskiy as *Veronica officinalis* L.: "Armenia, v. Tsav, mountain Navs, 1900 m, oak-hornbeam forest. 04 VII 1979. Leg. M. Hovhannisyan; det. A. Elenevskiy, 08 VII 2007" (ERE 167274, ERE 167275, ERE 167276); "Armenia, Kapan region, v. Tsav, m. Navs, 2000 m, oak-hornbeam forest, to the Akhnaberd. 04 VII 1979. M. Hovhannisyan; det. A. Elenevskiy, 08 VII 2007" (ERE 167277).

General distribution: Europe to E. Siberia, North Caucasus, Transcaucasus, Turkmenistan, N. Iran, Turkey.

Xeranthemum cylindraceum Smith: "Vayots Dzor province, SW of Yeghegnadzor, road Mozrov–Gnishik, above Mozrov; 1840 m a. s. l.; steppe with rocks and screes 39°41'31"N, 45°18'5"E. 12 VI 2007. M. Oganessian, H. Ter-Voskanyan, E. Vitek. 07-0120; det. A. Elbakyan, 25 I 2024" (ERE 202307); "Vayots'Dzor province, area c. 18 km ENE of Vayk. c. 9 km SSW of Jermuk, road Gndevaz-Vorotan pass, more or less humid meadow 39°45'06-10"N, 45°39'19-21"E; 2130 m a. s. l.

39°45'08"N, 45°39'20"E. 17 VI 2009. M. Oganessian, H. Ter-Voskanyan, K. Kugler, E. Vitek. 09-1217; det. E. Vitek, A. Elbakyan, 2024" (ERE 202308); "Kotayk province, valley of Gokht River, below Geghard Monastery, SW of Goght, dry slope; 1635 m a. s. l.; 40°8'7"N, 44°43'13"E. 23 V 2006. K. Tamanyan, E. Vitek, 06-0406 Est! A. Elbakyan 26 I 2024" (ERE 202311); "Ararat province, SE Yerevan, Erah mountains, SE Narek, S of road to Khosrov reserve, *Artemisia* steppe and rocks 40°00'05"N, 44°21'05"E, 39°59'57"N, 44°42'19"E, 1185–1270 m a. s. l. 40°0'1"N, 44°2'12"E. 21 V 2006. K. Tamanyan, E. Vitek, 06-0353; det. A. Elbakyan 26 I 2024" (ERE 202312); "Ararat province, besides main road between Araks river plain and Tukh manuk-pass, between Yeraskhavan (= Eraskh) and Tigranashen, roadside and dry meadow; 1020 m a. s. l.; 39°45'16"N, 44°52'45"E. 13 V 2006. G. Fayvush, K. Tamanyan, E. Vitek, 06-0062; det. Fayvush, 2006 Est! A. Elbakyan, 2024" (ERE 202309); "Ararat province, road Vedi to Lusashogh, 2.6 km SE of Shaghap, 1420 m a. s. l., 39°51'56"N, 44°54'58"E. 17 V 2017. E. Vitek, M. Oganessian, M. Sargsyan, A. Khachatryan. 17-0763; det. A. Elbakyan, 06 II 2024" (ERE 202303); "Ararat Marz, Urts Range, track from Shaghap to Surb Karapet, around former surface quarry, mountain shrubland, 39°50'51"N, 44°54'33"E, 1880 m to 39°50'55"N, 44°54'43"E, 1840 m a. s. l. with an exactness of 140 m. 06 VI 2018. P. Escobar Garcia, E. Vitek, G. Fayvush. 18–0599; det. A. Elbakyan, 25 I 2024" (ERE 202305). – We report this species for the first time for the Dareleghis and Yerevan floristic regions. Previously in Armenia it was known from the Ijevan, Aparan, Zangezur floristic regions at the altitude 700–1200 m a. s. l. (Gabrielyan, 1995).

General distribution: Caucasus, Centr. and Atl. Europe, Mediterranean, Crimea, Asia Minor, W. Syria, Iraq, N.-W. Iran (Gabrieljan, 1995).

Conclusions

The conducted research has significantly expanded our understanding of the floristic diversity of the Caspian macroregion and adjacent territories, revealing new data on the distribution of rare, endemic, and invasive species. In total, 40 new localities were documented for 24 plant species, including endemics, Red Data Book taxa, and species recorded for the first time in specific regions. The findings demonstrate the high floristic diversity of the study area and reveal considerable spatial heterogeneity in species distribution across the studied regions.

Key Highlights:

Tajikistan:

Four new populations of endemic species: *Nepeta subhastata*, *N. odorifera*, *N. gontscharovii* and *Eminium alberti* were discovered in the Eastern Gissar and Central Zeravshan subregions. The projected cover of endemics in plant communities varies from 1 % to 2 %, confirming their vulnerability and narrow ecological specialization.

Kazakhstan:

Seven species have been registered for the first time in the floras of West Kazakhstan and Atyrau Regions, including *Astragalus sareptanus*, *A. astrachanicus*, *Matthiola superba* and *Jurinea persimilis*. 80 % of the findings are associated with the karst landscapes of the Inder Uplands, emphasizing their role as refugia for rare taxa.

Russian Federation:

Dagestan: New regional records of *Tanacetum macrophyllum* and *Digitalis ferruginea* subsp. *schischkini* were identified, expanding their range eastward along the Greater Caucasus. **Kalmykia and Astrakhan Region:** Species *Poacynum sareptanum* and an invasive species *Grindelia squarrosa* were found for the first time; the latter shows active dispersal along transportation corridors.

Armenia:

Twelve new localities were documented for eight species, including one endemic *Ferula dseghica*, one relict *Monotropa hypopitys*, and one adventive *Digitaria ciliaris* species. 25 % of the findings are associated with urbanized and anthropogenically transformed habitats (e. g., *Ferula dseghica* in Yerevan), reflecting the influence of human activity on flora.

Ecological and Conservation Aspects:

Endemic species (*Nepeta* spp., *Ferula dseghica*) demonstrate strong habitat specificity (e. g., juniper scrub, steppe and steppe meadows), making them valuable indicators of ecological stability. Anthropogenic threats such as urbanization (e. g., destruction of *Ferula dseghica* population in Yerevan) and the spread of invasive species (*Grindelia squarrosa*) call for enhanced monitoring and the inclusion of rare and declining taxa in regional Red Data Books. The discovery of historical herbarium specimens (e. g., *Tanacetum macrophyllum* in Dagestan, collected in 1940) confirms the importance of revising archival data to reconstruct historical ranges.

Recommendations: Grant protected status to key habitats in the karst landscapes of Kazakhstan and subalpine meadows of Tajikistan; develop control

programs for invasive species in transboundary ecosystems (e. g., *Grindelia squarrosa* in the Caspian region). The results contribute to the global study of biodiversity and provide a foundation for updating regional floristic checklists and conservation strategies for vulnerable Caspian ecosystems.

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1. The flora of the Inder Solyanokupolnyy Province was studied within the framework of the state research assignments under R&D topics No. 1022040100468-6-1.6.11 and 1.6.20 of the Botanical Garden of the Ural Branch of the Russian Academy of Sciences, and within the framework of Grant No. BR28712767 of the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan ("Study of ecological, socio-demographic, economic-geographical, and paleobiogeographical aspects of the Urals region and assessment of its natural resource potential").

2. The flora of the Eastern Caucasus was studied within the framework of the state research assignment according to the thematic plan of the Caspian Institute of Biological Resources, Dagestan Federal Research Center of RAS (state registration No. 125020501449-5), under the topic: "Assessment of biodiversity and dynamics of terrestrial ecosystem components in the arid landscapes of the eastern part of the Caucasus".

3. The flora of the Republic of Tajikistan was studied within the framework of the state assignment project GR No. 01011TD065.

4. The work in Armenia was in part carried out within the framework of the scientific program 22rl-055, funded by the Committee on Higher Education and Science of the Ministry of Education, Science, Culture and Sports of the Republic of Armenia.

5. Floristic research was also conducted within the framework of the state assignment of the Komarov Botanical Institute of RAS No. 125020701739-5 "Taxonomy, flora and plant resources of vascular plants of Eurasia".

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