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TAXONOMIC COMPOSITION OF THE FLORA OF THE TAMDY RELICT MOUNTAINS

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Abstract. This article analyses the taxonomic composition of the flora of the Tamdy relict mountains, the ratios among the major taxonomic groups, the spectra of leading families and genera, and the similarities to and differences from the floras of adjacent regions, based on comprehensive floristic surveys conducted in 2022–2026. The study shows that the flora comprises 45 families, 191 genera, and 388 species; that angiosperms predominate; and that desert and montane floristic components coexist.

Keywords: Tamdy relict mountains, Kyzylkum, flora, taxonomic composition, leading families, leading genera, monotypic genera, ecotonal flora.

Introduction. Determining the taxonomic composition of a flora provides a scientific basis for characterising a region's biological diversity, assessing its phytogeographic features, and conserving its natural resources. The Tamdy relict mountains, located in the Kyzylkum Desert, have long remained insufficiently studied as a distinct, fully inventoried floristic object. By synthesising field research conducted in 2022–2026, the scientific literature, and historical material in herbarium collections, we compiled the first comprehensive conspectus of the area's flora.

Materials and methods. The analysis was based on field research data, published scientific sources, and historical specimens from herbarium collections. In arranging the taxonomic units, the sequence of families followed the APG IV (2016) classification system. We analysed taxonomic spectra using comparative floristic methods developed by Tolmachev (1974), Malyshev (1972), and Khokhryakov (2000).

Results and discussion. The comprehensive inventory identified vascular plants

comprising 45 families, 191 genera, and 388 species in the flora of the Tamdy relict mountains. Among the major taxonomic groups, angiosperms (Angiospermae) are clearly dominant, with 383 species (98.7% of the total flora). Gnetopsida is represented by 5 species (1.3%). Within the angiosperms, 324 species (83.5%) were eudicots and 59 (15.2%) were monocots.

The eudicot-to-monocot ratio is approximately 5.5:1, indicating a marked predominance of eudicots. The overall taxonomic proportion in the family:genus:species sequence is 1:4.2:8.6. This composition reflects floristic features adapted to the arid conditions of the Kyzylkum; however, the orographic and microecological conditions of the relict mountains have also allowed foothill and montane elements to persist.

Compared with the floras of the Southwestern Kyzylkum (795 species), Southeastern Kyzylkum (781 species), Karakum (757 species), and Karakalpakstan (876 species), the flora is considerably less species-rich and similar in size to the flora of Bukantau (350 species). The number of species per family (8.6) is lower than in other Kyzylkum floras (10.4–11.7), indicating a relatively even distribution of species among families in this flora (Table 1).

Table 1. Comparative analysis of the flora of the Tamdy relict mountains and of the floras of the Turanian Province

Flora	Families	Genera	Species	Species per family
Tamdy relict mountains (Fayzulloyev, 2026)	45	191	388	8.6
Southwestern Kyzylkum (Esanov, 2023)	68	346	795	11.69
Sultan Uvays Mountain (Yesemuratova, 2022)	55	257	526	9.56

Southeastern Kyzylkum (Batoshov, 2016)	69	355	781	11.32
Bukantau (Serekeeva, 2012)	44	196	350	7.95
Karakum (Geldikhanov, 1995)	73	321	757	10.37
Northwestern Kyzylkum (Turemuratov, 1978)	78	322	830	10.64
Karakalpakstan (Yerezhepov, 1978)	78	383	876	11.23

In the family spectrum, Asteraceae ranks first with 52 species (13.4%), Amaranthaceae second with 48 species (12.4%), and Brassicaceae third with 42 species (10.8%). Fabaceae follows with 31 species (8.0%), Boraginaceae with 29 species (7.5%), and Poaceae with 28 species (7.2%). Together, the ten leading families account for 285 species (73.5% of the flora), while the remaining 35 families represent 103 species (26.5%). At the same time, only 1–3 species occur in each of 27 families, indicating an uneven distribution of species richness among families (Table 2). The first three families of the spectrum link the flora to the Holarctic Region, while the high position of Amaranthaceae is characteristic of the Turanian desert floras. Of the 48 species of Amaranthaceae, 40 are annuals, and of the 42 species of Brassicaceae, 35 are therophytes; this reflects an adaptation strategy to arid conditions. At the same time, the high proportion of families with a broad ecological amplitude, such as Asteraceae, Brassicaceae, and Fabaceae, indicates a connection with montane and foothill floras. This confirms the intermediate character that P.K. Zakirov (1971) identified as typical of relict mountain floras.

Table 2. Spectrum of the leading families and genera of the flora of the Tamdy relict mountains

Family	Species	%	Genus	Species	%
Asteraceae	52	13.4	*Astragalus*	22	5.7
Amaranthaceae	48	12.4	*Cousinia*	10	2.6
Brassicaceae	42	10.8	*Lappula*	9	2.3
Fabaceae	31	8.0	*Halimocnemis*	8	2.1
Boraginaceae	29	7.5	*Allium*	7	1.8
Poaceae	28	7.2	*Artemisia*	7	1.8
Liliaceae	14	3.6	*Bromus*	7	1.8
Ranunculaceae	14	3.6	*Delphinium*	7	1.8
Caryophyllaceae	14	3.6	*Gagea*	7	1.8
Lamiaceae	13	3.4	*Strigosella*	7	1.8
10 families: 285 species		73.5	10 genera: 91 species		23.5

In the genus spectrum, *Astragalus* (22 species; 5.7%) ranks first, higher than in the floras of the Southwestern Kyzylkum (4.03%), Bukantau (4.2%), and the Kyzylkum as a whole (4.02%). The high abundance of genera such as *Cousinia* (10 species), *Lappula* (9 species), *Allium, Delphinium*, *Gagea*, and *Tulipa* indicates the persistence of montane floristic components. In contrast, Halimocnemis, *Artemisia*, and *Strigosella* indicate links to the desert flora of the Kyzylkum. In the Southwestern Kyzylkum, typical desert genera such as *Calligonum*, *Tamarix*, *Climacoptera*, and

Caroxylon lead the spectrum, whereas in the Tamdy flora they do not occupy top positions. Conversely, the spectrum resembles the floras of the relict mountains of the Southeastern Kyzylkum (Batoshov, 2016) and the Nurata Nature Reserve (Beshko, 2000).

The flora is characterised not only by high taxonomic concentration but also by high differentiation: 60% of families (27) are represented by only 1–3 species, and 118 genera (61.8%) are monotypic. According to Tolmachev (1974), the low mean number of species per genus (2.0) indicates a strong role for migration and intrusive elements in florogenesis. Among monotypic genera, species characteristic of montane elements (28; 23.7%) outnumber those of desert elements (20; 16.95%), which indicates the orographic isolation and refugial character of the relict mountains. Montane elements are preserved particularly on Mount Oqtog‘ (974 m) (*Cotoneaster nummularius*, *Prunus spinosissima*, *Nepeta saturejoides*, *Onosma dichroantha*), whereas on Mount Shushaktog‘ (405 m) the desert element *Haloxylon ammodendron* ascends to 378 m. Thus, the persistence of montane elements depends not on elevation alone but on the combined effects of relief, exposure, substrate, and microclimate.

Conclusion. The taxonomic composition of the flora of the Tamdy relict mountains comprises 45 families, 191 genera, and 388 species. Angiosperms predominate, accounting for 98.7%, and the ten leading families account for 73.5% of species. The high species richness of the genus *Astragalus*, together with the fact that monotypic genera make up 61.8% of all genera, defines the flora's structural features. The co-occurrence of the desert-associated genera Halimocnemis, Artemisia, and Strigosella and the foothill–montane genera Astragalus, Cousinia, Allium, Delphinium, and Gagea supports the conclusion that the flora of the Tamdy relict mountains is complex, mosaic, and transitional (ecotonal).

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