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# Flora and vegetation of the Oytagh Valleys: Phytogeography of an isolated coniferous mountain forest in arid Central Asia (Western Kunlun Shan, China)

UBBO WÜNDISCH  
W. BERNHARD DICKORÉ  
& GEORG MIEHE

## ABSTRACT

WÜNDISCH, U., W. B. DICKORÉ & G. MIEHE (2003). Flora and vegetation of the Oytagh Valleys: Phytogeography of an isolated coniferous mountain forest in arid Central Asia (Western Kunlun Shan, China). *Candollea* 58: 215-269. In English, English, French and German abstracts.

An annotated list of flowering plants and ferns from the westernmost fringe of the Kunlun Shan Mountains and adjacent Chinese Eastern Pamir, and an overview on the vegetation of the upper Oytagh Valleys is presented. In total, 431 species of vascular plants (4 *Pteridophyta*, 3 *Coniferae*, 3 *Gnetopsida*, 321 *Dicotyledoneae*, 100 *Monocotyledoneae*) are reported with their respective altitudinal range, autecological and distributional features. A list of mosses (31 *Musci*, 1 *Hepaticae*) and lichens (27 species) is appended. The phytogeographical position and differentiation of the area, phytodiversity and utilisation properties of the natural resources are discussed.

## RÉSUMÉ

WÜNDISCH, U., W. B. DICKORÉ & G. MIEHE (2003). Flore et végétation des vallées d'Oytagh: phytogéographie d'une forêt isolée de conifères d'une montagne d'Asie Centrale (Kunlun Shan occidentale, Chine). *Candollea* 58: 215-269. En anglais, résumés anglais, français et allemand.

Les auteurs présentent un bref aperçu des unités végétales de la haute vallée d'Oytagh et une liste commentée des plantes vasculaires du Kunlun Shan occidentale et du Pamir oriental chinois. 431 espèces de plantes vasculaires (4 *Pteridophyta*, 3 *Coniferae*, 3 *Gnetopsida*, 321 *Dicotyledoneae*, 100 *Monocotyledoneae*) sont listées avec leur distribution selon l'altitude et leurs caractéristiques autécologiques et chorologiques. Une liste des mousses (31 *Musci*, 1 *Hepaticae*) et des lichens (27 espèces) est ajoutée. La position phytogéographique et la différenciation du territoire de recherche, ainsi que la phytodiversité et les potentiels d'utilisation des ressources naturelles sont discutés.

## ZUSAMMENFASSUNG

WÜNDISCH, U., W. B. DICKORÉ & G. MIEHE (2003). Flora und Vegetation der Oytagh-Talschaft: Zur Phytogeographie isolierter Berg-Nadelwälder in Zentralasien (West-Kunlun Shan, China). *Candollea* 58: 215-269. In Englisch, englische, französische und deutsche Zusammenfassungen.

Neben einem kurzen Überblick über die Vegetationseinheiten der oberen Oytagh-Talschaft wird eine erläuterte Artenliste von Farn- und Blütenpflanzen für den westlichsten Kunlun Shan und den angrenzenden chinesischen Ost-Pamir vorgelegt. Insgesamt werden 431 Kormophyten-Arten (4 *Pteridophyta*, 3 *Coniferae*, 3 *Gnetopsida*, 321 *Dicotyledoneae*, 100 *Monocotyledoneae*) mit ihrer

jeweiligen Höhenverbreitung sowie autökologischen und chorologischen Daten dokumentiert. Eine Liste der Moose (31 *Musci*, 1 *Hepaticae*) und Flechten (27 Arten) ist beigelegt. Die phytographische Stellung und deren Differenzierung im Untersuchungsgebiet wird im Hinblick auf die Phytodiversität und im Zusammenhang mit den derzeitigen Nutzungsmustern und -potentialen der natürlichen Ressourcen diskutiert.

*KEY-WORDS:* Forest fragmentation – Oytagh – Kunlun Shan – China – Central Asia..

## 1. Introduction and Objectives

The Kunlun Shan is the largest mountain range of Central Asia and extends, for over 2200 km, almost half-way through China. The crest of the Kunlun Mountains, with average altitudes above 5000 m, fringes and separates the Tibetan Plateau from the Tarim Basin to the North, and connects the High Pamir Plateau on the Tadzhik / Uzbek border to the mountains of Qinghai. The Kunlun Mountains are arid throughout and desert vegetation occupies all altitudes between 74° and 100° E (HOU, 1979).

The “Alps of Qungur” (Kongur), the westernmost massif of Kunlun Shan, became known for their isolated outposts of *Picea schrenkiana* forests (SKRINE, 1925, 1926). Except for a plant list presented by PERSSON (1938), and scattered floristic information incorporated in supraregional floras, almost nothing seems to be known outside China about the flora of the western Kunlun Shan forests. Few and usually small or accidental botanical collections are reported from adjacent Eastern Pamirs and the Western Kunlun Shan: de Poncins in 1894 (FRANCHET, 1896), ALCOCK (1898), DEASY (1901), de Lacoste 1906 (DANGUY, 1908), HEDIN (1922). GRUBOV (1963-1994) cites material of various families collected mainly by Russian explorers and stored in the St. Petersburg herbarium (LE). FLORA XINJIANGENSIS and *Flora tadzhikistana* (OVCZINNIKOV, 1957-1986), both incomplete, and *Flora xizangica* (WU, 1980-1986) serve for a general floristic framework. DICKORÉ (1995), monocotyledons only, refers to specimens recently collected in the area by G. & S. Miehe.

The existence of isolated forest stands in the Oytagh Valleys recently attracted the interest of a multidisciplinary research group. Ecological and phytogeographical studies were carried out in order to elucidate the ecology and environmental history of these relictary vegetation formations. The present paper is part of our ongoing studies into the “Flora Karakorumensis” (DICKORÉ, 1995) and an additional series of floristic monographs covering areas marginal to the Karakorum mountains which present the most apparent spatial species turn-over in relation to the flora of the Karakorum, respectively (DICKORÉ, 1991; DICKORÉ & NÜSSER, 2000; DICKORÉ & MIEHE, 2002).

## 2. Material and Methods

The bulk of the plant specimens discussed below (ca. 2200 numbers) was collected in course of phyto-ecological investigations by U. Wündisch from 1998-06-20 to 1998-09-07, partly together with G. Miehe. Smaller collections were made during reconnaissance trips by G. & S. Miehe from 1991-07-21 to 1991-07-23, and from 1992-07-12 to 1992-07-15 (ca. 320 numbers), and by M. Richter (in 1996, RICHTER & al., 1999). All these collections are presently kept at GOET. A small fraction of the collections made by Wu Sugong & al. (at KUN), was also investigated for the present study.

An annotated species list is intended to cover, as completely as possible, the floristic inventory of the Oytagh Valleys and adjacent areas. Species numbers per altitude classes (100 m intervals) were calculated, assuming continuous distribution between the lowest and highest record. Life forms (MUELLER-DOMBOIS & ELLENBERG, 1974) and geo-elements (DICKORÉ &

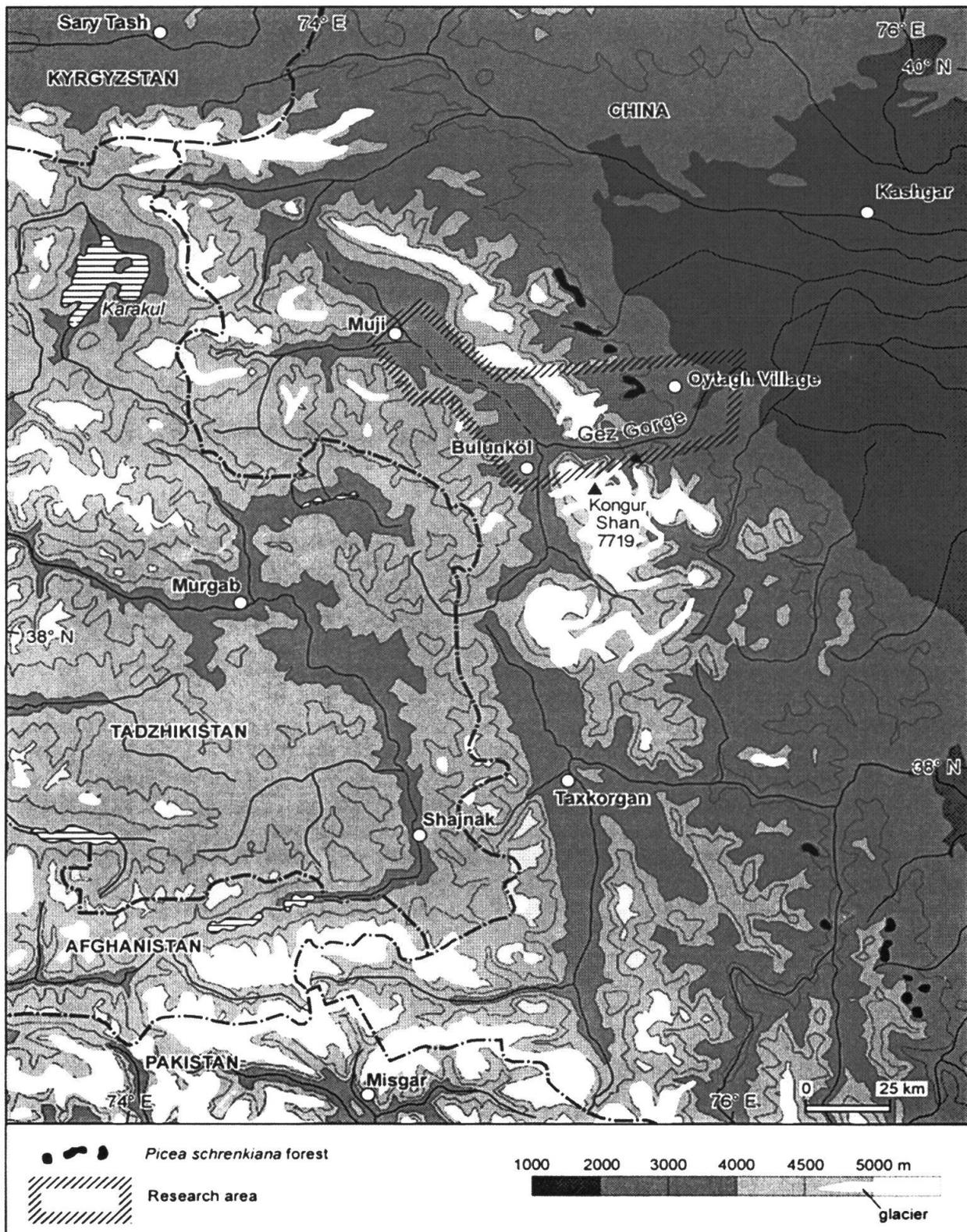


Fig. 1. – Research area, location of climate stations and scattered *Picea schrenkiana* forest stands.

NÜSSER, 2000) were defined for all taxa, combining literature and herbarium information. Main published data sources are for vascular plants: NASIR & ALI (1970-1991), DICKORÉ (1995), GRUBOV (1963-1994), KOMAROV (1934-1964), OVCZINNIKOV (1957-1986); for lichens: NIMIS (1993), WIRTH (1995); and for mosses: FRAHM & FREY (1992).

The evaluation of ca. 70 phytosociological relevés carried out in 1998, according to the semiquantitative method of J. Braun-Blanquet (KENT & COKER, 1992), revealed the vegetation units described below. Structural elements are summarised as follows: upper tree layer (T, 8–10 m), lower tree layer (t, 6–8 m), shrub layer (S, 1–4 m), dwarf-shrub layer (s, <1 m) and herb (moss/lichen) layer (H, M, L, 0–0.5 m). Due to the small extension of forest and scrub communities, recommended homogeneous minimum areas were generally not found. On average, 25 m<sup>2</sup> plots were examined here. In dwarf-scrub, pasture, meadow, and turf communities ca. 12 m<sup>2</sup> homogenous plots seemed to be appropriate.

Precipitation data were obtained by HELLMANN rain gauges (from 1998-06-20 to 1998-09-06). Soil temperatures were measured automatically by HOT DOG dataloggers from 1998-06-26 to 1999-07-31.

Miscellaneous information on recent developments in land use, i.e. forestry, agriculture and livestock keeping, were obtained by interviewing local people during the fieldwork in 1998, by Dr M. Friederich (University of Erlangen).

### 3. Research Area

The research area (Fig. 1) extends between 38°54'N, 74°26'E and 39°00'N, 75°31'E in southwestern Xinjiang Autonomous Region, PR China. It is centered in the Kongur (Qungur) or Kashgar Range (SKRINE, 1925), approximately 80 km SSW of Kashgar (Kashi).

#### 3.1 Natural regions, topography

The research area comprises three distinct natural regions, respectively W Kashgaria, Kongur, and E Pamir (DICKORÉ, 1995, delimitations altered).

##### 3.1.1 W Kashgaria

The desert area on the fringe of the Tarim Basin, below 2100 m, has been assigned to W Kashgaria, according to GRUBOV (1963). Within the research area, this region comprises the lower section of Oytagh Valley and the lower part of the Gez Gorge. The Gez and Yarkand rivers drain towards the interior Tarim basin. Seasonal variation of run-off is high, due to the continental climate. The lower Oytagh Valley ascends for about 12 km in a westerly direction from the junction with the Gez Valley (38°59'N, 75°31'E, 1800 m) to Oytagh Village (38°58'N, 75°25'E, 2100 m). The outer foothills towards the Tarim Basin are a per-arid environment, with dominant aeolian processes and wide-spread deflation pavements ("gobi") and sand dunes. Wide dry gravel banks and large scree fans descending from the adjacent wadis characterise the lower Oytagh Valley.

##### 3.1.2 Kongur

Kongur here denotes the northeastern (outer) declivity of the northwesternmost projection of the Kunlun Shan towards the Tarim Basin, above 2100 m, and from south of the Tadjik-Alai depression to the Yarkand River. In contrast to the delimitation of DICKORÉ (1995), we assign the inner (southwest) section of these mountains to the eastern rim of the Pamir Plateau (E Pamir). Three valley sections can be distinguished:

The middle Oytagh Valley ascends in a westerly direction from Oytagh Village to the confluence with the Atojnak Valley (2260 m) and further (SW direction) to the deposits of a large rock-fall at 2500–2600 m, leading to upper Oytagh. This part of the wide U-shaped trough



Photo 1. – Head of Oytagh Valley with the confluence of Oytagh (1) and Bül Ush (2) glaciers. Lateral moraines (3) with *Picea schrenkiana* forest in N- and pastures (and very open forest, respectively) in S-exposures. Foreground: intensively grazed forest clearing. (G. Miehe 1998-08-09, upper Oytagh Vy., 3200 m a.s.l., WNW).

valley (18 km long) is characterised by permanent settlements (Pilal, Oytagh) and irrigated fields on the surrounding valley bottom, filled with glacio-fluvial sediments, tills and loess.

The upper Oytagh Valley comprises the centre of the research area. It ascends for about 10 km in a NE – SW direction from a scree fan at 2600 m to the spectacular steep ice-fall of the light-coloured Oytagh Glacier (Photo 1). A NW tributary, the Bül Ush Glacier, pushes its black ice into the snout of the Oytagh Glacier. The combined glacier snout is situated at 2750 m (38°54'N, 75°12'E). The glaciers of the upper Oytagh Valley originate from the highest summit of the Chakragil Massif (SKRINE, 1926), towering at 6678 m. Close to the glacial headwaters, diurnal run-off variation is apparent.

The Atojnak Valley (38°57'N, 75°10'E), a E-W running tributary of almost the same size as the main valley, joins the middle Oytagh. Ascending through a deep gorge, the valley opens at about 2900 m. Here, the landscape aspect is similar to the upper Oytagh Valley but the relief is more gentle. The head of the Atojnak Valley is marked by two broad, comparatively even glaciers with no ice-falls.

### 3.1.3 E Pamir

The Gez Gorge separates the Chakragil and Kongur Massifs (WARD, 1983) and leads to extended alluvial fans, moraines and glacial lake sediments of a broad intramontane basin at its upper end. The unpaved road on the northern shoreline of the Bulunköl (angle lake) leads to the small Kirghiz settlement and Chinese People's Liberation Army checkpoint Muji (39°00'N, 74°26'E, 3400 m). The contrast between the comparatively rich grazing grounds of the damp

wide valley bottom and the nearly unvegetated surrounding slopes is the most striking feature in this area.

### **3.2 Geology and soils**

The research area comprises parts of the NW Kunlun Shan and of the E Pamir Plateau, is in so far part of the Eurasian Tarim plate. It is situated almost due north of the western promontory of the Indian shield (Nanga Parbat syntaxis), on the northern rim of the area heavily transformed by the Miocene collision and continuing subduction of the Indian plate under Eurasia. Strong neotectonics are related to the upheaval of the Himalayas, the Karakorum mountains and the plateaus of Pamir and Tibet. Because of complex paleozoic structures underlying the Kunlun Shan and Tian Shan systems are heretofore speculative. Complex fault systems project from approximately the Khunjerab Pass of the western Karakorum to the N (Taxkorgan) and W (Reshun fault, Wakhan / Chitral), and through the E Pamirs (Rushan-Pshart fault) (SEARLE, 1991). The Tadjik / Alai Depression separates the Pamirs from the Tian Shan to the north.

The main ridge of the NW – SE running fringe of the W Kunlun Shan (King Tau, Kashgar Range, Kongur) is mainly composed of highly metamorphosed mica-schists, sloping towards the Tarim Basin with a series of less transformed paleozoic sediments. On account of the relief features, the Valley of Muji, situated west of the main range of Kunlun Shan, is part of the E Pamir plateau (BRUNEL & al., 1994). This area and Muztagh Ata to the S form the northwesternmost extension of the Karakorum (Aghil formation: paleozoic/mesozoic sediments, dominating carboniferous limestone, shales) (SEARLE, 1991). Except for the extremely steep slopes, most of the petrographic structure is hidden under a thick cover of loess, alluvial / fluvio-glacial gravel accumulations, tills, and occasional glacial lake sediments.

In the Oytagh Valleys, a thick loess layer covers the ground almost everywhere. In the lower reaches the loess is nearly unaffected by pedogenic processes and very sensitive to deflation and water erosion, especially in the course of occasional thunderstorms. Piping in the loess cover (i.e. the subsurface erosion of loess at the contact zone of bedrock or moraine and the loess cover forming pipes) leads to karst-like doline breaks. In upper Oytagh and Atojnak Valleys cambisols are developed in the loess while regosols prevail on younger moraines, screes and along the braided river system.

### **3.3 Climate and weather**

The climate of the research area is typical for the mountains of Central Asia, as revealed by the climatic diagrams of Bulunköl, Oytagh Village, Kashgar, Murgab, Shajnak and Taxkorgan (Fig. 2). High annual temperature amplitudes, low precipitation with a maximum in summer, and high evaporation rates are characteristic (BOHNET & al., 1998). MIEHE & al. (1996) designate areas with a pronounced arid period of at least 5 months to eu-arid climate. This applies to Murgab (High Pamir, 5 months), Taxkorgan (N Karakorum, 7 months), Oytagh Village (W Kunlun Shan, 8 months) and Kashgar (Tarim Basin, 9 months). Bulunköl and Shajnak (E Pamir) show sub-arid climate in this respect.

Increase of precipitation and decrease of temperature with altitude are considerable in the higher reaches of upper Oytagh and Atojnak (sub-humid climate, as indicated by vegetation cover, according to MIEHE & al., 1996). Summer precipitation measured in upper Oytagh (1998-06-20 to 1998-09-06) increased from 193 mm in 2610 m (NE-exposure) to 242 mm in 3370 m (W-exposure).

The preliminary evaluation of soil temperatures (1998-06-26 to 1999-07-31) suggest more or less continuous winter snow cover above 2700 m in upper Oytagh. In SE-exposure, depth and duration of snow cover increased from 2750 m (early January, end March to early April) to 3670 m (end October, early January, early March to early May). In NE-exposure, depth and duration of snow cover increased from 2610 m (no persisting snow cover) to 3390 m (mid October

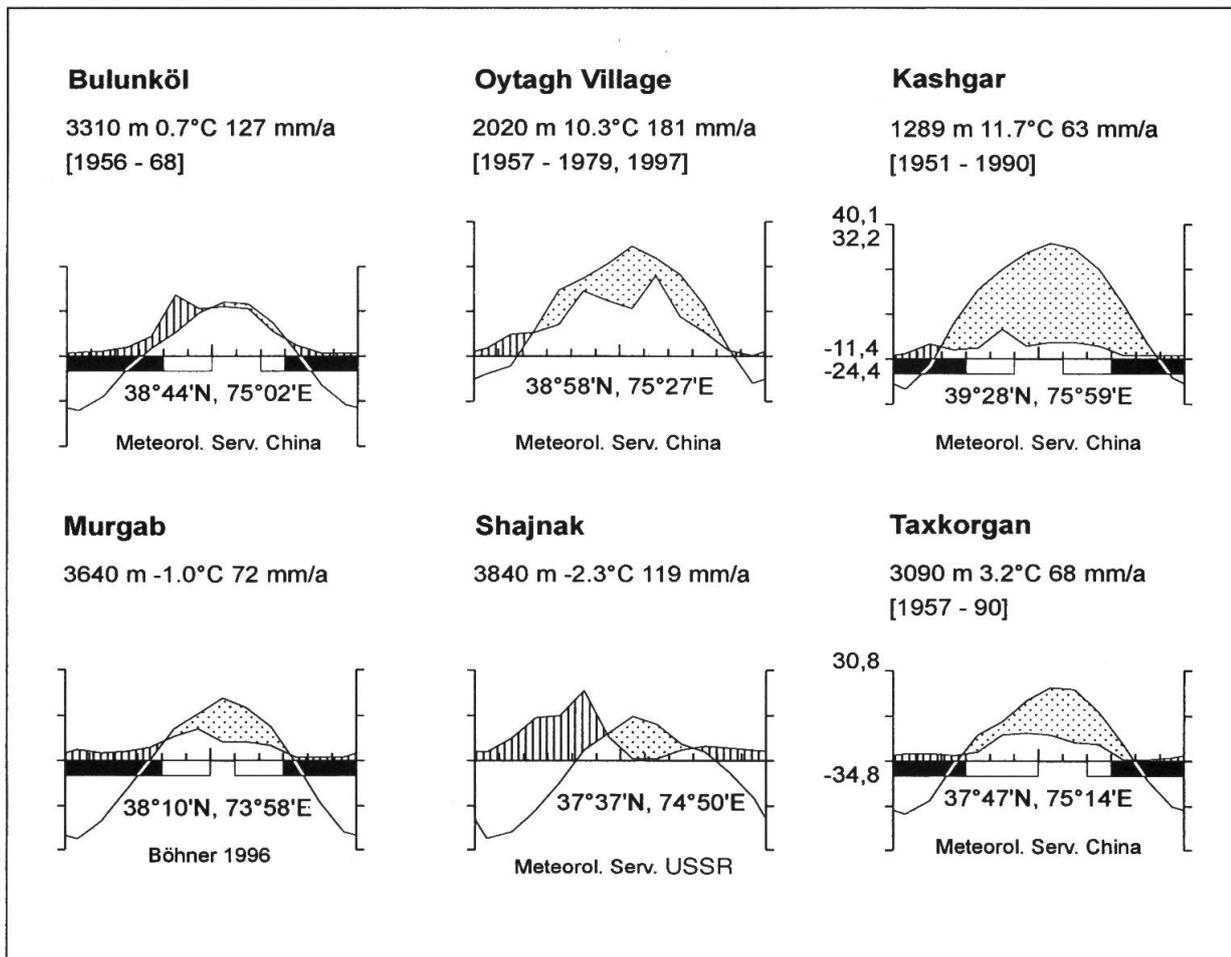


Fig. 2. – Climate diagrams: Bulunköl, Kashgar, Oytagh, Murgab, Shajnak, Taxkorgan.

to mid May). A slight decrease in 3750 m (mid October to mid November, early January to mid May) may be the effect of deflation by heavy winds. In W-exposure there seems to be no significant relationship between altitude and snow cover at least between 3020 m (end October to early November, early January to early February, early March to early May) and 3370 m (end October to early November, early to mid January, early March to mid May). However, occasional snowfall as far down as 3900 m may occur even in summer.

The typical diurnal summer weather scenario of upper Oytagh can be summarised as follows: After a clear sunrise with cold catabatic winds descending from the Oytagh and Bül Ush glaciers, the higher peaks are hidden behind a few *Cumulus humilis* clouds during late morning. Around noon the downvalley winds change to the opposite direction, bringing up warm and dusty air from the Tarim Basin. The confluence of cold downvalley and warm upvalley winds result in strong thermic convections that lead to a closed *Cumulus congestus* cloud cover by early afternoon. Consequently, light rain falls almost every afternoon. At the same time the eastern horizon over the Tarim Basin is still cloudless, but the air is filled with loess dust by then. These local weather features, corresponding quite well with the observations of RICHTER & al. (1999), are modified by prevailing strong westerly winds in high altitudes. During low pressure periods, a cover of *Nimbostratus* clouds and drizzle or light but constant rain seems to be characteristic.

The climate of the intramontane basin of Bulunköl and Muji, sheltered by the Kongur ridge from the thermic convections that bring rain to the outer declivity, is apparently drier than corresponding altitudinal levels of the outer slopes. This is indicated by sand dunes at Bulunköl and (semi-)desert vegetation of the surrounding slopes (for discussion on desert /semi-desert vegetation see HARTMANN, 1995). During the short period of time spent in E Pamir (1998-08-14 to 08-17), rain fell almost constantly throughout day and night, however. The proximity of the High Pamir Plateau probably also contributes to considerably lower winter temperatures, and a more pronounced continentality.

### 3.4 Land use

Due to poor availability of water for irrigation, the lower Oytagh is not suitable for cultivation, except for small gardens around single farm houses. According to administrative plans, maize is cultivated on irrigated fields in the lower reaches of middle Oytagh. Apricot-gardens surround the houses below 2300 m, poplars are grown in irrigated plantations for fuel and timber. Barley is the traditional crop of the upper reaches (up to 2500 m). Attempts to extend tillage up to 2700 m and in cultivating wheat failed in the 1970s. Irrigated hay meadows on the higher terraces serve for winter forage.

The muslim Uighur-speaking local inhabitants with their sheep, goats, cattle, donkeys and yaks (very few) move upvalley from the permanent settlements Pilal and Oytagh to the summer-grazing grounds by end of April. During summer up to end of September, the people live in round felt tents called aq-oi (white house) or very simple huts. Each aq-oi contains a small dairy where the women make yoghurt and a kind of sour cheese. Similar features are to be observed in Atojnak Valley, traditionally inhabited by Khirgiz people (here, camels are kept for transport).

In the valleys of Bulunköl and Muji, parts of the damp and more or less saline valley bottom are fenced for haying. Unfenced areas serve as winter grazing grounds. During summer, the Kirghiz herdsmen of this area move with their livestock to higher grazing areas in the surrounding mountains.

## 4. Flora

Taxonomic lists continue to be indispensable tools for studies in biodiversity and natural resources. Little information on the flora of Oytagh and adjacent areas is published. It is, therefore, intended to present a list of species collected in this and adjacent areas, as comprehensive as possible. The research area comprises a transect from the Tarim Basin (W Kashgaria) across the W Kunlun Shan (Kongur) to the interior high mountain valleys (E Pamir). The annotated list presented here may serve as an initial base for subsequent investigations into floristic dynamics.

The enumeration of vascular plants contains the following elements:

- Full citation of accepted species (including subspecific taxa) with relevant synonymy.
- Altitudinal distribution for the 3 subregions W Kashgaria, Kongur, E Pamir. —
- minimum – maximum altitude (m a.s.l.) /
- aspect ;
- vegetation formations: *dominants* /
- *life form* [therophytes: *T caesp*, *T ros*, *T scand*, *T scap*, *T sem*; hemicryptophytes: *H caesp*, *H rep*, *H ros*, *H scand*, *H scap*, *H sem*, *H stol*; geophytes: *G bulb*, *G rad*, *G rhiz*; chamaephytes: *C frut*, *C pulv*, *C scand*, *C suff*; nanophanerophytes: *P caesp*, *P scand* and phanerophytes: *P scap*] /
- (regional distribution in the adjacent Karakorum Mountains) [CN (Central North), CS (Central South), E (East), N (North), S (South), W (West)]
- general distribution [political and/or orographical] :

- geo-element as denoting geographical concentration [cosmopolitan (COSMO), circumpolar (CIRCPOL), Eurasiatic (EURAS), Central Asiatic (C AS), Irano-Turanian (IRAN), Pamiran (PAMIR), W Himalayan (W HIMAL), Himalayan (HIMAL), Tibetan (TIBET), subtropical (SUBTROP) elements and endemics (ENDEM)].

Mosses and lichens were collected in the course of phytosociological relevés and records are thus mainly restricted to upper Oytagh and Atojnak Valleys. The list contains the elements mentioned above, without information about life forms and regional distribution in the Karakorum.

## Systematic Enumeration

### **PTERIDOPHYTA**

#### **ATHYRIACEAE**

*Cystopteris dickieana* R. Sim, Gard. Farm. J. 2(20) 308. 1848

*Kongur*: Oytagh Vy. Upper 3450 m. — 3450 m / NE; scrub: *Juniperus* / *G rhiz* / (CN, W, S) Europe, Asia, N America: CIRCPOL.

#### **EQUISETACEAE**

*Equisetum arvense* L., Sp. Pl. 1061. 1753

*Kongur*: Oytagh Vy. Upper 2770-3360 m; *E Pamir*: Bulunköl – Muji 3270 m. — 2770-3360 m / N, NNE, S, SE, W; open forest, scrub, swamp, tall forbs, turf: *Hippophae*, *Juniperus*, *Picea* / *G rhiz* / (W) Europe, Asia, N America: CIRCPOL.

*Equisetum ramosissimum* Desf., Fl. Atlant. 2: 398. 1799

*W Kashgaria*: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae* / *G rhiz* / (CS, N, W) Europe, Africa, Asia, N & C. America: EURAS.

#### **OPHIOGLOSSACEAE**

*Botrychium lunaria* (L.) Sw., J. Bot. 1800(2): 110. 1802

*Kongur*: Oytagh Vy. Upper 3000-3480 m. — 3000-3480 m / N, NE, NNE, SE; open forest, scrub, turf: *Juniperus*, *Picea* / *G rhiz* / (W) Europe, Asia, N America: CIRCPOL.

### **CONIFERAE**

#### **CUPRESSACEAE**

*Juniperus pseudosabina* Fisch. & C. A. Mey., Index Sem. Horti Petrop. 65. 1841

*Kongur*: Oytagh Vy. Upper 2700-3620 m; *E Pamir*: Gez Gorge Upper 3000-3300 m. — 2700-3620 m / E, NE, S, SE, SSE, W; dwarf-scrub, gravel, moraine, open forest, pasture, scrub: *Artemisia*, *Juniperus* / *P caesp* / (–) Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, W China, Mongolia: C AS.

*Juniperus semiglobosa* Regel, Acta Horti Petropol. 6: 487. 1880 (*J. excelsa* auct., non M. Bieb.)

*Kongur*: Oytagh Vy. Upper 2500-3340 m, Atojnak Vy. 2700-2750 m. — 2500-3340 m / N, NW, S; open forest, scrub: *Hippophae*, *Juniperus* / *P scap* / (CN, CS, W, S) Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, W China, W Tibet, Afghanistan, Kashmir, N India, W Nepal (Tian Shan, Pamir, W Kunlun Shan, S & W Karakorum, Hindukush, W Himalaya): PAMIR.

#### **PINACEAE**

*Picea schrenkiana* Fisch. & C. A. Mey., Bull. Sci. Acad. Petersb. 10: 253. 1842 (*P. tianschanica* Rupr., *P. schrenkiana* subsp. *tianschanica* (Rupr.) Bykov)

*Kongur*: Oytagh Vy. Upper 2750-3250 m. — 2750-3250 m / E, NNW; dwarf-scrub, open forest: *Artemisia*, *Picea* / *P scap* / (–) Kazakhstan, Kyrgyzstan, W China: PAMIR.

**GNETOPSIDA****EPHEDRACEAE**

**Ephedra fedtschenkoae** Paulsen, Bot. Tidskr. 26: 254. 1905

*Kongur*: Oytagh Vy. Upper 3570 m, Atojnak Vy. 3200 m; *E Pamir*: Bulunköl – Muji 3850 m. — 3200-3850 m / N; scrub, desert: *Chenopodiaceae*, *Hippophae* / *C frut* / (CN, N) Kazakhstan, Tajikistan, W China, Mongolia: C AS.

**Ephedra intermedia** Schrenk & C. A. Mey., Mém. Acad. Sci. St.-Pétersb., sér. 6, 5: 278. 1846

*Kongur*: Oytagh Vy. Upper 2850 m. — 2850 m / W; open ground / *C frut* / (CN, CS, N, W, S) Siberia, SW & C. Asia, W, N & C. China, Mongolia, Pakistan (Karakorum, W Himalaya): C AS.

**Ephedra regeliana** Florin, Svensk. Vet.-Akad. Handl. ser. 3, 12 (1): 17. 1933

*Kongur*: Oytagh Vy. Upper 2610 m. — 2610 m / NNE; open forest: *Juniperus* / *C frut* / (CN, CS, N, S) Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, W China, Afghanistan, Pakistan, N India: C AS.

**ANGIOSPERMAE****Dicotyledoneae****APOCYNACEAE**

**Apocynum venetum** L., Sp. Pl. 213. 1753

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / ruderal / *G rad* / (CS, W, S) Europe, Russia, W Siberia, SW & C. Asia, W & N China, Mongolia, Pakistan, N India: EURAS.

**ASCLEPIADACEAE**

**Cynanchum acutum** L., Sp. Pl. 212. 1753

*W Kashgaria*: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae* / *G rad* / (CS, W, S) S Europe, N Africa, SW Asia, Russia, Kazakhstan, Turkmenistan, W, N & C. China, Mongolia, Afghanistan, Pakistan, Kashmir (Karakorum, W Himalaya): EURAS.

**BERBERIDACEAE**

**Berberis heteropoda** Schrenk in Fisch. & C. A. Mey., Enum. Pl. Nov. 1: 102. 1941

*Kongur*: Oytagh Vy. Upper 2500-3160 m, Atojnak Vy. 3200 m. — 2500-3200 m / ESE, N, NW, S, SE, W; open forest, open ground, pasture, scrub: *Hippophae*, *Juniperus* / *P caesp* / (–) C. Asia, W China, NW Mongolia: C AS.

**Berberis ulicina** Hook. f. & Thomson, Fl. Ind. 227. 1855 (*B. kaschgarica* Rupr.)

*Kongur*: Oytagh Vy. Upper 2500-2900 m, Atojnak Vy. 2700 m; *E Pamir*: Gez Gorge Upper 3500 m, Bulunköl – Muji 3950 m. — 2000-3950 m / ESE, N, S; pasture, scrub, desert: *Chenopodiaceae*, *Hippophae*, *Juniperus* / *C frut* / (CN, CS, N, W, S, E) Kashmir, N India, W Tibet (Tian Shan, E Pamir, W Kunlun Shan, N & C. Karakorum): PAMIR.

**BETULACEAE**

**Betula tianschanica** Rupr., Mém. Acad. Sci. Pétersb. sér. 7, 14 (4): 72. 1869

*Kongur*: Oytagh Vy. Upper 2700-3200 m, Atojnak Vy. 3100-3200 m. — 2700-3200 m / N, NNW, W; forest, open scrub, scrub: *Hippophae*, *Picea* / *P scap* / (–) Kyrgyzstan, Tajikistan, W China: PAMIR.

**BORAGINACEAE**

**Arnebia euchroma** (Royle) I. M. Johnst., Contr. Gray Herb., n. s., 73: 49. 1924

*E Pamir*: Gez Gorge Upper 3500 m. — 3500 m / meadow / *H sem* / (CS, N, W, S) Iran, Afghanistan, Tazhikistan, W China, N Pakistan, NW India, Nepal: IRAN.

**Arnebia guttata** Bunge, Ind. Sem. Horti Dorpat 1840: 7. 1840 (*Lithospermum guttatum* (Bunge) I. M. Johnst., *Arnebia tibetana* Kurz)

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *Kongur*: Oytagh Vy. Middle 2100-2300 m; *E Pamir*: Bulunköl – Muji 3750 m. — 1830-3750 m / N; ruderal, scrub, desert: *Chenopodiaceae*, *Hippophae* / *H caesp* / (CN, CS, N, W, S, E) W Siberia, C. Asia, W, N & C. China, Mongolia, Afghanistan, Pakistan, NW India (Karakorum, NW Himalaya): C AS.

**Asperugo procumbens** L., Sp. Pl. 138. 1753

*Kongur*: Oytagh Vy. Upper 2750 m. — 2750 m / SE; ruderal / *T scand* / (CS, W, S) Europe, N Africa, Caucasus, W & E Siberia, SW & C. Asia, W, N & C. China, Mongolia, Kashmir, N India, Nepal: EURAS.

**Eritrichium pamiricum** B. Fedtsch. ex O. Fedtsch., Acta Horti Petrop. 21: 153. 1903

*Kongur*: Oytagh Vy. Upper 3180-3200 m. — 3180-3200 m / S, SE; scrub: *Juniperus / H caesp / (-)* Tajikistan, W China, NE Afghanistan (E Pamir, W Kunlun Shan, Wakhan, E Hindukush): ENDEM.

**Lappula barbata** (M. Bieb.) Gürke in Engl. & Prantl, Nat. Pflanzenfam. 4, 3a: 107. 1893

*Kongur*: Oytagh Vy. Middle 2200 m, Oytagh Vy. Upper 2500-3280 m, Atojnak Vy. 2970 m. — 2200-3280 m / E, ESE, N, NE, NNE, S, SE, WNW; dwarf-scrub, meadow, open forest, pasture, ruderal, scrub, desert: *Artemisia, Caragana, Chenopodiaceae, Hippophae, Juniperus / T sem / (CS, W, S)* Asia Minor, Caucasus, Turkmenistan, Iran, Kashmir (W Himalaya): IRAN.

**Lappula consanguinea** (Fisch. & C. A. Mey.) Gürke in Engl. & Prantl, Nat. Pflanzenfam. 4, 3a: 107. 1893

*Kongur*: Oytagh Vy. Upper 2740-3200 m. — 2740-3200 m / N, S, SE; dwarf-scrub, open forest, pasture: *Artemisia, Juniperus / T caesp / (W)* SE Europe, Caucasus, W & E Siberia, C. Asia, W China, Mongolia: EURAS.

**Lappula patula** (Lehm.) Asch. ex Gürke in Engl. & Prantl, Nat. Pflanzenfam. 4, 3a: 107. 1893

*Kongur*: Oytagh Vy. Upper 2770-3220 m, Atojnak Vy. 3300 m. — 2770-3300 m / E, N, NW, W; dwarf-scrub, gravel, moraine, pasture, scrub: *Artemisia, Juniperus, Salix / T caesp / (CS, S)* E Europe, W & E Siberia, C. Asia, W, N & C. China, Mongolia, Pakistan, Kashmir, N India: C AS.

**Lindelofia stylosa** (Kar. & Kir.) Brand, Pflanzenr. 4, 252: 85. 1921

*Kongur*: Oytagh Vy. Upper 3400 m; *E Pamir*: Bulunköl – Muji 3380-3800 m. — 3380-3800 m / N; open forest, desert, swamp: *Chenopodiaceae, Picea / H sem / (CS, N, W, S)* C. Asia, W & N China, Mongolia, Afghanistan, Pakistan, Kashmir, N India (Tian Shan, Pamir, S Karakorum, W Himalaya): PAMIR.

**Rochelia disperma** (L. f.) C. Koch, Linnaea 22: 649. 1849 (*Lithospermum disperma* L., *R. incana* Kar. & Kir., *R. leiocarpa* Ledeb., *R. peduncularis* Boiss., *R. stellulata* Boiss.)

*Kongur*: Oytagh Vy. Upper 2500-3200 m. — 2500-3200 m / S, SE; dwarf-scrub, pasture: *Artemisia / T caesp / (CS, W)* Mediterranean, Asia Minor, Caucasus, C. Asia, Iran: IRAN.

#### CAMPANULACEAE

**Adenophora himalayana** Feer, Bot. Jahrb. 12: 618. 1890

*Kongur*: Oytagh Vy. Upper 2770-3470 m, Atojnak Vy. 2950-3300 m; *E Pamir*: Gez Gorge Upper 3000-3300 m. — 2770-3470 m / E, ESE, N, NE, NNE, NW, S, SE, W, W; dwarf-scrub, gravel, moraine, meadow, open forest, open ground, pasture, scrub, tall forbs, turf: *Artemisia, Juniperus, Picea / H scap / (W)* C. Asia, China, N India, Himalayas: PAMIR.

**Codonopsis clematidea** (Schrenk) C. B. Clarke, Fl. Brit. India 3: 433. 1881 (*Codonopsis ovata* Benth. var. *cuspidata* Chipp, *Glossocomia clematidea* Fisch., *Wahlenbergia clematidea* Schrenk)

*Kongur*: Oytagh Vy. Upper 2800-2970 m. — 2800-2970 m / ESE, NNW; meadow, open scrub: *Picea / G rhiz / (CS, W, S)* C. Asia, W China, Iran, Afghanistan, N India (Tian Shan, Pamir, W Himalaya): PAMIR.

#### CAPPARIDACEAE

**Capparis spinosa** L., Sp. Pl. 503. 1753

*W Kashgaria*: Kashgar S 1840 m, Oytagh Vy. Lower 1850 m; *Kongur*: Oytagh Vy. Middle 2100 m. — 1840-2100 m / N; desert: *Chenopodiaceae / C suff / (CS, W, S)* Africa, Mediterranean, Asia Minor, Caucasus, C. Asia, W China, Iran: SUB-TROP.

#### CAPRIFOLIACEAE

**Lonicera asperifolia** (Decne.) Hook. f. & Thomson, J. Linn. Soc. London (Bot.) 2: 166. 1858 (*L. semenovii* var. *nuristanica* Kitam., *Xylosteum asperifolium* Decne. in Jacquem.)

*Kongur*: Oytagh Vy. Upper 3000-3210 m. — 3000-3210 m / NNW, W; pasture, scrub: *Juniperus / P caesp / (CN, CS, N, W, S)* Afghanistan, W China (Tian Shan, Pamir, Hindukush, Himalaya): PAMIR.

**Lonicera heterophylla** Decne. in Jacquem., Voy. Inde Bot. 4: 80, t. 88. 1844

*Kongur*: Oytagh Vy. Upper 3000-3610 m, Atojnak Vy. 3030 m, *W-802* (juv.); 3100-3390 m. — 3000-3610 m / N, NNW, S, W; open forest, pasture, scrub: *Juniperus, Picea / P caesp / (CS, W, S)* Pakistan, W China (SW Karakorum, W Himalaya): W HIM.

**Lonicera microphylla** Willd. ex Roem. & Schult., Syst. Veg. 5: 258. 1819

*Kongur*: Oytagh Vy. Upper 2500-3280 m, Atojnak Vy. 2700-3200 m; *E Pamir*: Gez Gorge Upper 3000-3300 m. — 2500-3300 m / N; gravel, moraine, open forest, scrub: *Hippophae, Picea / C frut / (CS, W, S)* C. Asia (Hindukush, Karakorum, W Himalaya): C AS.

**Lonicera semenovii** Regel, Acta Horti Petropol. 5: 608. 1878 (*L. glauca* Hook. f. & Thomson, non Hill)

*Kongur*: Oytagh Vy. Upper 3500-3800 m. — 3500-3800 m / NE; turf / *C frut* / (CN, CS, W, S) C. Asia, W & C. China, Afghanistan, Pakistan (Pamir, Hindukush, Karakorum, W Himalaya): PAMIR.

#### CARYOPHYLLACEAE

**Arenaria serpyllifolia** L., Sp. Pl. 423. 1753

*Kongur*: Oytagh Vy. Upper 2920-3200 m. — 2920-3200 m / N, NW, S; open forest, pasture: *Picea* / *T caesp* / (CS, W, S) Europe, Asia, China, Japan, N America: CIRC POL.

**Cerastium cerastioides** (L.) Britton, Mem. Torrey Bot. Club 5: 150. 1894 (*C. trigynum* Vill.)

*Kongur*: Oytagh Vy. Upper 3050-3750 m. — 3050-3750 m / NE; pasture / *H caesp* / (CS, N, W, S, E) Europe, Asia, N America (Himalaya): CIRC POL.

**Cerastium falcatum** Bunge, Mem. Pres. Acad. Sci. Petersb. 2, 6: 37. 1835

*Kongur*: Oytagh Vy. Upper 2810-3800 m. — 2810-3800 m / N, WNW; pasture, scrub: *Juniperus* / *H caesp* / (–) C. Asia, W China (Pamir-Alai, Tian Shan, Altai): C AS.

**Cerastium thomsonii** Hook. f., Fl. Brit. India 1: 228. 1874

*Kongur*: Oytagh Vy. Upper 2750-3760 m. — 2750-3760 m / N, NNE, NNW, W; open forest, pasture, scree, tall forbs, turf: *Picea* / *H caesp* / (CS, N, W, S) Afghanistan, Pakistan, NW India (Karakorum, W Himalaya): W HIM.

**Gymnocarpus przewalskii** Maxim., Bull. Acad. Sci. Petersb. 26: 502. 1880

*W Kashgaria*: Kashgar S 1370 m. — 1370 m / desert / *C frut* / (–) C. Asia, Mongolia: C AS.

**Gypsophila cephalotes** (Schrenk) F. N. Williams, J. Bot. 77: 323. 1889

*Kongur*: Oytagh Vy. Upper 3050 m, Atojnak Vy. 3100 m. — 3050-3300 m / ESE, N; pasture, scrub: *Salix* / *H scap* / (N) W Siberia, C. Asia: C AS.

**Minuartia biflora** (L.) Schinz & Thell., Bull. Herb. Boissier sér. 2, 7: 404. 1907 (*Arenaria biflora* L.)

*Kongur*: Oytagh Vy. Upper 3170-3900 m. — 3170-3900 m / N, NNE; turf / *C pulv* / (CS, W) Greenland, Europe, Asia, W Himalaya: EURAS.

**Silene bungei** Bocquet & Baehni, Candollea 12: 15. 1967

*Kongur*: Oytagh Vy. Upper 3150-3770 m. — 3150-3770 m / W; tall forbs / *H caesp* / (W, S) Siberia, Kazakhstan, Kyrgyzstan, W China, Pakistan (Altai, Tian Shan, Kunlun Shan, ?Pamir, W Karakorum, ?NW Himalaya): C AS.

**Silene gonosperma** (Rupr.) Bocquet, Candollea 12: 7. 1967

*Kongur*: Oytagh Vy. Upper 3050-3760 m. — 3050-3760 m / N, NE, NNE; gravel, moraine, pasture, turf / *H caesp* / (CN, CS, N, W, S, E) C. Asia, W China, W Tibet, Afghanistan, Pakistan, N India (Tian Shan, Pamir-Alai, Kunlun Shan, Karakorum, Tibet, Himalaya): C AS.

**Silene tenuis** Willd., Enum. Hort. Berol. 1: 474. 1809

*Kongur*: Oytagh Vy. Upper 2610 m-3220 m, Atojnak Vy. 3100-3200 m. — 2610-3220 m / N, NNE, W; open forest, pasture, scrub: *Hippophae*, *Juniperus* / *H caesp* / (CS, N, W, S) C. Asia, N Pakistan, NW India, N & W China, Mongolia (W Himalaya, Pamir-Alai, Tian Shan, Altai): C AS.

**Stellaria graminea** L., Sp. Pl. 422. 1753

*Kongur*: Oytagh Vy. Upper 3000 m-3620 m. — 3000-3620 m / NE, NNW, W; open forest, pasture, scrub, tall forbs: *Juniperus*, *Picea* / *H rep* / (CS, N, W, S) Europe, W & C. Asia, Siberia (Pamir-Alai, S Karakorum, W Himalaya): EURAS.

#### CHENOPODIACEAE

**Atriplex sibirica** L., Sp. Pl., ed. 2: 1493. 1763 (*A. centralasiatica* Iljin)

*E Pamir*: Bulunköl – Muji 3550-3800 m. — 3550-3800 m / gravel, desert: *Chenopodiaceae* / *T caesp* / (N) W & E Siberia, C. Asia, China, Mongolia, Japan: C AS.

**Atriplex tatarica** L., Sp. Pl. 1053. 1753

*Kongur*: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2740-2800 m, Atojnak Vy. 2300-2900 m. — 2100-2900 m / E, N, SE; pasture, ruderal, desert: *Chenopodiaceae* / *T caesp* / (CS, W, S) C. & E Europe, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, W China, Tibet, Mongolia, Iran, N India, Himalayas: EURAS.

**Bassia hyssopifolia** (Pall.) O. Kuntze, Revis. Gen. Pl. 2: 547. 1891

*W Kashgaria*: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae* / *T scap* / (–) C. & E Europe, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, W China, Mongolia, Iran: EURAS.

**Chenopodium album** L., Sp. Pl. 219. 1753

*W Kashgaria*: Oytagh Vy. Lower 1850 m; *Kongur*: Oytagh Vy. Upper 2590-2750 m. — 1850-2750 m / N, SE; ruderal, scrub, desert: *Chenopodiaceae*, *Hippophae* / *T scap* / (CS, W, S) cosmopolitan: COSMO.

**Chenopodium botrys** L., Sp. Pl. 219. 1753

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / N; desert: *Chenopodiaceae* / *T scap* / (CS, W, S) E Europe, N Africa, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, China, Mongolia, Iran, N India, Himalayas (Karakorum, Himalaya): EURAS.

**Chenopodium foliosum** (Moench) Asch., Prodr. Fl. Brandenb. 1: 572. 1864

*Kongur*: Atojnak Vy. 2900 m. — 2900 m / N; ruderal / *T caesp* / (CS, W, S) Europe, N Africa, Asia Minor, Caucasus, W & E Siberia, C. Asia, W China, Tibet, Mongolia, Iran, N India, Himalayas (Karakorum, Himalaya): EURAS.

**Chenopodium iljinii** Golosk., Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 13: 65. 1950

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / N; desert: *Chenopodiaceae* / *T caesp* / (–) E Siberia, Altai, Tian Shan, Dzungaria, Kashgaria: C AS.

**Chenopodium karoii** (Murr) Aellen, Feddes Repert. 26: 149. 1929 (*Ch. prostratum* Bunge)

*Kongur*: Oytagh Vy. Upper 2740-3200 m; *E Pamir*: Bulunköl – Muji 3800 m. — 2740-3800 m / N, S, SE; dwarf-scrub, pasture: *Artemisia* / *T scap* / (N, W, S) W & E Siberia, C. Asia, W China, Tibet, Mongolia (Tian Shan, Pamir, N Hindukush, Karakorum, Tibet, Himalaya): C AS.

**Halogeton arachnoideus** Moq. in DC., Prodr. 13 (2): 205. 1849 (*Micropeplis arachnoidea* (Moq.) Bunge)

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *E Pamir*: Bulunköl – Bulunköl – Muji 3450-3550 m. — 1830-3550 m / N; gravel, scrub, desert: *Chenopodiaceae*, *Hippophae* / *T caesp* / (CN, CS, N, W, S, E) C. Asia, W China, Tibet, Mongolia: C AS.

**Halogeton glomeratus** (M. Bieb.) C. A. Mey. in Ledeb., Fl. Alt. 1: 378. 1829 (*Anabasis glomerata* M. Bieb., *H. tibeticus* Bunge, *H. kashmirianus* Grey-Wilson & Wadhwa)

*W Kashgaria*: Kashgar S 1370 m, Oytagh Vy. Lower 1850-1970 m. — 1370-1970 m / N; desert: *Chenopodiaceae* / *T caesp* / (CS, N, W, S) E Europe, W Siberia, C. Asia, China, Mongolia, Afghanistan, Kashmir, NW India (Tian Shan, Pamir, Karakorum, W Himalaya): C AS.

**Haloxylon ammodendron** (C. A. Mey.) Bunge, Reliq. Lehmann. 293. 1852

*W Kashgaria*: Kashgar S 1370 m. — 1370 m / desert / *C frut* / (–) C. Asia: Kazakhstan – Mongolia, Dzungaria, Kashgaria, Zaidam: C AS.

**Iljinia regelii** (Bunge) Korovin, Tr. Sredneaz. univ., ser. 8b, 29: 23. 1935

*W Kashgaria*: Kashgar S 1370-1840 m. — 1370-1840 m / desert / *C suff* / (–) C. Asia: Kazakhstan, W China (Dzungaria, Kashgaria), W Mongolia: C AS.

**Kalidium cuspidatum** (Ung.-Stemb.) Grubov, Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 19: 10. 1959

*W Kashgaria*: Oytagh Vy. Lower 1850-1900 m; *Kongur*: Atojnak Vy. 2250-2500 m. — 1850-2300 m / N; desert: *Chenopodiaceae* / *C suff* / (N) Kyrgyzstan, N, W & C. China, Mongolia (Altai, Tian Shan, E Pamir): C AS.

**Kochia melanoptera** Bunge, Acta Horti Petrop. 6: 417. 1879

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / N; desert: *Chenopodiaceae* / *T scap* / (–) C. Asia, W China, Tibet, Mongolia: C AS.

**Kochia prostrata** (L.) Schrad., Neues J. Bot. Schrad. 3: 85. 1809

*Kongur*: Oytagh Vy. Upper 2660-3050 m, Atojnak Vy. 2970 m. — 2660-3050 m / N, NNW, S, SE; dwarf-scrub, meadow, pasture: *Artemisia* / *C suff* / (CS, W, S) C. & E Europe, Mediterranean, Asia Minor, Caucasus, W & E Siberia, C. Asia, W China, Tibet, Mongolia, Iran, N India, Himalayas: EURAS.

**Krascheninnikovia ceratoides** (L.) Gueldenst., Novi Comm. Acad. Sci. Petrop. 16: 555. 1772 (s.l.)

*Kongur*: Oytagh Vy. Upper 2660-2920 m, Atojnak Vy. 2950 m; *E Pamir*: Gez Gorge Upper 3500 m, Bulunköl – Muji 3400-3800 m. — 2660-3800 m / N, NNW, S, WNW; dwarf-scrub, gravel, open ground, pasture, scrub, desert: *Artemisia*, *Chenopodiaceae*, *Juniperus* / *C frut* / (CN, CS, N, W, S, E) N Africa, C. Spain, SE Europe, W & C. Asia, W China, Pakistan – Nepal (Pamir, Kunlun Shan, Wakhan, Karakorum, Himalaya): C AS.

Notes: The specimens may be referable to *Krascheninnikovia pungens* (Pazij) Podlech, a usually narrow-leaved, rather small squarrose shrub, though doubtfully distinct from *K. ceratoides*.

**Salsola paulsenii** Litv., Isv. Turkest. Otd. Russk. Geogr. Obsch. 4, 5: 28. 1905

*W Kashgaria*: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae* / *T caesp* / (N) ?SE Europe, ?Caucasus, C. Asia: C AS.

**Suaeda acuminata** Moq., Ann. Sci. Nat. ser. 1, 23: 306. 1831

*Kongur*: Oytagh Vy. Middle 2100 m, Atojnak Vy. 2300 m. — 2100-2300 m / N; desert: *Chenopodiaceae* / *T scap* / (–) W Siberia, C. Asia, W China: C AS.

**Suaeda olufsenii** Paulsen, Kjoeb. Vidensk. Meddel. 194. 1903

Kongur: Oytagh Vy. Upper 2750 m; E Pamir: Bulunköl – Muji 3400-3800 m. — 2750-3800 m / N, SE; open ground, steppe, swamp: *Stipa / T caesp* / (N, S, E) Tajikistan, W China (Pamir): PAMIR.

**Sympegma regelii** Bunge, Bull. Acad. Sci. St.-Petersb. 25: 351. 1879

W Kashgaria: Oytagh Vy. Lower 1850-1900 m; Kongur: Oytagh Vy. Middle 2100-2130 m, Atojnak Vy. 2300-2500 m; E Pamir: Gez Gorge Upper 3000-3300 m, Bulunköl – Muji 3400-3510 m. — 1850-3510 m / N, S; gravel, moraine, desert: *Chenopodiaceae / C frut* / (N) C. Asia, W China: C AS.

## COMPOSITAE

**Acroptilon repens** (L.) DC., Prodr. 6: 603. 1838

Kongur: Oytagh Vy. Middle 2100 m, Atojnak Vy. 2300 m. — 2100-2300 m / ruderal, desert: *Chenopodiaceae / H caesp* / (S) SE Europe, Asia Minor, Caucasus, C. Asia, Iran, Afghanistan, Pakistan: EURAS.

**Anaphalis nubigena** DC., Prodr. 6: 272. 1838

Kongur: Oytagh Vy. Upper 2800-3300 m. — 2800-3300 m / E, NE, S; gravel, moraine, rock crevice / *H caesp* / (CS, W, S) W, SW & C. China, Afghanistan, Kashmir, N India, Himalayas (SW Karakorum, Himalaya, SE Tibet): HIMAL.

**Anaphalis virgata** Thomson ex C. B. Clarke, Comp. Ind. 107. 1876

Kongur: Atojnak Vy. 2700 m. — 2700 m / scrub: *Hippophae / C suff* / (CS, W, S) C. Asia, W China, W Tibet, Iran, E Afghanistan, N India, Nepal (SW Karakorum, W Himalaya): W HIM.

**Artemisia brevifolia** Wall. ex DC., Prodr. 6: 103. 1838 (*Seriphidium brevifolium* (Wall. ex DC.) Ling & Y. R. Ling)

Kongur: Oytagh Vy. Upper 2500-3280 m, Atojnak Vy. 2900-3300 m. — 2500-3300 m / E, ESE, N, NE, NNE, NNW, S, SE, WNW; dwarf-scrub, meadow, open forest, pasture, ruderal: *Artemisia, Caragana, Juniperus / C suff* / (CS, N, W, S) NE Afghanistan, Pakistan, N India: W HIM.

**Artemisia compacta** Fisch. ex DC., Prodr. 6: 102. 1838 (*Seriphidium brevifolium* (Fisch. ex DC.) Poljakov)

E Pamir: Gez Gorge Upper 3500 m, Bulunköl – Muji 3510-3850 m. — 3500-3850 m / N; scrub, desert: *Chenopodiaceae, Juniperus / C suff* / (CN, CS, N, S) W Siberia, C. Asia, W China: C AS.

**Artemisia dracunculus** L., Sp. Pl. 849. 1753

Kongur: Oytagh Vy. Middle 2530-2590 m. — 2530-2590 m / NE; ruderal, scrub: *Hippophae / C suff* / (W, S) C. Europe, Asia Minor, W Siberia, C. Asia, N China, Mongolia, ?N America: EURAS.

**Artemisia kaschgarica** Krasch., Acta Inst. Bot. Acad. Sci. URSS ser. 1, 3: 350. 1937

E Pamir: Bulunköl – Muji 3450 m. — 3450 m / gravel / *C suff* / (–) C. Asia, W China: ENDEM.

**Artemisia macrocephala** Jacquem. ex Besser, Bull. Soc. Nat. Mosc. 9: 28. 1836

Kongur: Atojnak Vy. 2950 m; E Pamir: Bulunköl – Muji 3400-3800 m. — 2950-3800 m / S; gravel, ruderal, desert: *Chenopodiaceae / T scap* / (CN, CS, N, S, E) W Siberia, C. Asia, Tibet, Mongolia, Iran, Afghanistan, Himalayas: C AS.

**Artemisia pamirica** C. Winkler, Trans. Bot. Gard. Petersb. 11(10): 329. 1890

Kongur: Atojnak Vy. 2950 m; E Pamir: Bulunköl – Muji 3450-3950 m. — 2950-3950 m / N, S; dwarf-scrub, gravel, desert: *Artemisia, Chenopodiaceae / C suff* / (CN, CS, N, W) C. Asia, W China: PAMIR.

**Artemisia rutaefolia** Stephan ex Spreng., Syst. Veg. 3: 488. 1826

Kongur: Oytagh Vy. Upper 2500-2850 m; E Pamir: Bulunköl – Muji 3450 m. — 2500-3450 m / gravel, scrub: *Hippophae / C suff* / (CS, N, W, S) W & E Siberia, C. Asia, W China, Tibet, Mongolia, W Himalayas: C AS.

**Artemisia santolinifolia** Turcz. ex Krasch. in Krylov, Fl. Zap. Sibir. 11: 2791. 1949 (*Artemisia gmelinii* auct. non Web. ex Stech., *A. sacrorum* auct., non Ledeb.)

Kongur: Oytagh Vy. Upper 2790-3390 m., Atojnak Vy. 3300 m. — 2790-3390 m / E, NW, SE, SSW, W; dwarf-scrub, open forest, pasture, scrub: *Artemisia, Juniperus / C suff* / (CN, CS, N, W, S, E) E Europe, W & E Siberia, C. Asia, Mongolia, NW India (W Himalaya): EURAS.

**Artemisia scoparia** Waldst. & Kit., Pl. Hungar. 1: 66, t. 65. 1802 (*A. capillaris* Thunb. var. *scoparia* (Waldst. & Kit.) Pamp., *A. trichophylla* Wall. ex DC.)

W Kashgaria: Oytagh Vy. Lower 1850 m; Kongur: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2590-2910 m, Atojnak Vy. 2700 m. — 1850-2910 m / N; scrub, desert: *Chenopodiaceae, Hippophae / C suff* / (CS, W, S) Europe, Asia Minor, Caucasus, W Siberia, C. Asia: EURAS.

**Artemisia vulgaris** L., Sp. Pl. 848. 1753 (s.l.)

W Kashgaria: Oytagh Vy. Lower 1850 m; Kongur: Oytagh Vy. Middle 2530, Atojnak Vy. 2300-2950 m. — 1850-2950 m / NE, S; meadow, ruderal / *H scap* / (–) Scandinavia, Europe, Mediterranean, Asia Minor, Caucasus, W & E Siberia, C. Asia, W China, Mongolia, N America: CIRCIPOL.

Notes: Taxonomy uncertain, possibly referable to *A. mongolica* Fisch. ex Bess. The closely related *A. roxburghiana* Bess. occurs in SW Karakorum and Himalaya.

**Aster flaccidus** Bunge, Mém. Acad. Sci. Pétersb. 2: 599. 1835 subsp. **flaccidus** (*A. heterochaeta* C. B. Clarke, *A. tibeticus* Hook. f.)

Kongur: Oytagh Vy. Upper 2850-3830 m. — 2850-3760 m / N, NE, W; forest, scree, turf: *Picea* / *H sem* / (CN, CS, N, W, S) Tibet, W Pakistan, Kashmir, N India, Nepal (Tibet, Himalaya): C AS.

**Aster limonifolius** (Less.) B. Fedtsch., Rastit. Turkest. 731. 1915 (*Krylovia eremophila* (Bunge) Schischkin in Krylov)

Kongur: Atojnak Vy. 2700-3200 m. — 2700-3200 m / N; pasture, scrub: *Hippophae* / *C suff* / (N) W Siberia, C. Asia, W China, Mongolia: C AS.

**Brachyactis roylei** (DC.) Wendelbo, Nytt Mag. Bot., Oslo 1: 62. 1952 (*B. umbrosa* (Kar. & Kir.) Benth., *Conyza roylei* DC.)

Kongur: Oytagh Vy. Upper 2800-3430 m. — 2590-3430 m / E, ESE, S, SE, SSW; dwarf-scrub, pasture, scrub, tall forbs: *Artemisia*, *Hippophae* / *T sem* / (CS, W, S) C. Asia, W China, Iran, Afghanistan, Pakistan, N India, Nepal (Karakorum, W Himalaya): W HIM.

**Chondrilla graminea** M. Bieb., Fl. Taur.-Cauc. 2: 244. 1808 (*C. piptocoma* Fisch., C. A. Mey. & Ave-Lall.)

Kongur: Oytagh Vy. Middle 2200 m, Atojnak Vy. 2300 m. — 2200-2300 m / N; desert: *Chenopodiaceae* / *C suff* / (CS, N, W, S, E) Siberia, C. Asia: C AS.

**Cicerbita azurea** Beauverd, Bull. Soc. Bot. Genève ser. 2, 2: 123. 1910

Kongur: Oytagh Vy. Upper 3160-3360 m, Atojnak Vy. 3200-3300 m. — 3160-3360 m / N, NNE, NNW, W; open forest, scrub, tall forbs, turf: *Hippophae*, *Picea*, *Salix* / *H scap* / (–) Siberia, W China, NW Mongolia (Tian Shan, Altai): C AS.

**Cirsium arvense** (L.) Scop., Fl. Carniol. ed. 2, 2: 126. 1772

W Kashgaria: Oytagh Vy. Lower 1830 m; Kongur: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2590-3090 m, Atojnak Vy. 2950 m. — 1830-3090 m / E, S, WNW; dwarf-scrub, pasture, ruderal, scrub: *Artemisia*, *Hippophae* / *G rad* / (CN, CS, N, W, S) Europe, Asia: EURAS.

**Cirsium esculentum** C. A. Mey., Mem. Acad. Sci. Petersb. 6: 42. 1849

Kongur: Oytagh Vy. Upper 2760-2800 m. — 2760-2800 m / E; forest, swamp: *Picea* / *G rad* / (–) E Europe, Siberia, C. Asia, W China, Afghanistan: EURAS.

**Cirsium sairamense** (Winkl.) O. & B. Fedtsch., Perech. Rast. Turk. 6: 286. 1911

Kongur: Oytagh Vy. Upper 2800 m. — 2800 m / forest: *Picea* / *G rad* / (–) C. Asia, W China (Tian Shan: ENDEM.

**Cousinia pannosa** C. Winkler, Acta Horti Petrop. 10: 578. 1887

Kongur: Oytagh Vy. Upper 2800 m, Atojnak Vy. 3100 m; E Pamir: Gez Gorge Upper 3000-3300 m. — 2800-3300 m / N, SE; pasture, ruderal / *H caesp* / (–) C. Asia (Pamir-Alai): PAMIR.

**Crepis flexuosa** (DC.) Benth. & Hook. f., Gen. Pl. 2(2): 515. 1873 (*Barkhausia flexuosa* DC., *C. glauca* auct. non Benth.: Hook. f., *Youngia glauca* Edgew.)

Kongur: Oytagh Vy. Middle 2200 m, Oytagh Vy. Upper 2700-2850 m, Atojnak Vy. 2700-3200 m; E Pamir: Bulunköl – Muji 3400-3450 m. — 2200-3450 m / N, S, SE; forest, gravel, scrub, desert: *Chenopodiaceae*, *Hippophae*, *Picea* / *H caesp* / (CN, CS, N, W, S, E) C. Asia, N India, Himalayas (Karakorum, Himalaya): C AS.

**Crepis multicaulis** Ledeb., Icon. Pl. Fl. Ross. 1: 9. 1829

Kongur: Oytagh Vy. Upper 2850 m. — 2850 m / moraine / *H sem* / (CS, W, S) / N Europe, Siberia, C. Asia, Mongolia, Iran, Afghanistan, Pakistan (Himalaya): EURAS.

**Crepis oreades**, Schrenk in Fisch. & C. A. Mey., Enum. Pl. Nov. 2: 32. 1842

Kongur: Oytagh Vy. Upper 3000-3080 m. — 3000-3080 m / NNW, NW; pasture / *H sem* / (–) C. Asia, Afghanistan (Tian Shan, Pamir-Alai): PAMIR.

**Erigeron acer** L., Sp. Pl. 863. 1753

Kongur: Oytagh Vy. Upper 2590-3000 m, Atojnak Vy. 3200-3300 m. — 2590-3300 m / ESE, N, NNE, NNW, NW, SE; gravel, meadow, open forest, pasture, scrub: *Hippophae*, *Juniperus*, *Picea*, *Salix* / *H sem* / (CS, W, S) Scandinavia, Europe, Mediterranean, Asia Minor, Caucasus, W & E Siberia, C. Asia, China, Mongolia, N America: CIRC POL.

**Erigeron aurantiacus** Regel, Gartenfl. 289. 1879

Kongur: Oytagh Vy. Upper 3400 m. — 3400 m / N; turf / *H sem* / (–) C. Asia, W China (Tian Shan, Pamir-Alai): PAMIR.

**Erigeron uniflorus** L., Sp. Pl. 864. 1753 (*E. alpinus* var. *uniflorus* (L.) Hook. f., *E. alpinus* auct. non L., *E. wightii* DC., *E. patentisquama* J. F. Jeffrey)

Kongur: Oytagh Vy. Upper 3300-3900 m. — 3300-3900 m / E, NE, NNE, NNW; rock crevice, turf / *H sem* / (CS, N, W, S, E) Europe, Mediterranean, Asia Minor, Caucasus, Asia, N America: CIRC POL.

**Gnaphalium stewartii** C. B. Clarke in Hook. f., Fl. Brit. India 3: 289. 1881 (*Gnaphalium afghanicum* Rech. f.)

*Kongur*: Oytagh Vy. Upper 3170 m. — 3170 m / N; turf / *H caesp* / (CS, W) Asia Minor, Caucasus, N India (SW Karakorum, W Himalaya): IRAN.

**Heteropappus altaicus** (Willd.) Novopokr., in Sched. ad Herb. Fl. Ross. 8: 193. 1922 (*Aster altaicus* Willd., *Aster spartioides* C. B. Clarke, *Calimeris canescens* Nees, *Galatella juncea* Lindley ex Royle)

*Kongur*: Oytagh Vy. Middle 2200 m. — 2200 m / N; desert: *Chenopodiaceae* / *H caesp* / (CS, W, S) W & E Siberia, C. Asia, Mongolia, Iran, Afghanistan, Himalayas (Karakorum, Himalaya): C AS.

**Inula rhizocephala** Schrenk, Enum. Pl. Nov. 51. 1841

*Kongur*: Oytagh Vy. Upper 2750-3200 m. — 2750-3200 m / N, S; open ground, scree / *H ros* / (W, S) C. Asia, W China, Iran: PAMIR.

**Lactuca tatarica** (L.) C. A. Mey., Verz. Pfl. Casp. Meer 56. 1831 (*Mulgedium tataricum* (L.) DC.)

*Kongur*: Oytagh Vy. Middle 2100-2530 m, Atojnak Vy. 2300-2950 m. — 2100-2950 m / N, NE, S; meadow, ruderal, desert: *Chenopodiaceae* / *H scap* / (CN, CS, N, W, S) N & E Europe, Caucasus, Iran, Afghanistan, Pakistan, W Siberia, Mongolia, China: EURAS.

**Launaea polydichotoma** (Ostenf.) Amin ex N. Kilian, Englera 17: 166. 1997

*W Kashgaria*: Kashgar S 1370 m. — 1370 m / desert / *G rad* / ( - ) W China (Takla Makan, Kashgaria): ENDEM. (cf. Kilian 1997: map 47)

**Leontopodium campestre** (Ledeb.) Hand.-Mazz. in Schröt., Pflanzenl. Alp. ed. 2, 505. 1924 (*L. brachyactis* Gandoger)

*Kongur*: Oytagh Vy. Upper 2610-3500 m, Atojnak Vy. 3100 m; *E Pamir*: Gez Gorge Upper 3500 m. — 2610-3500 m / E, ESE, N, NE, NNE, NNW, NW, S, SE.; dwarf-scrub, meadow, open forest, pasture, ruderal, scrub, turf: *Artemisia*, *Juniperus*, *Picea* / *H sem* / (CS, N, W, S) W & E Siberia, C. Asia, W China, Mongolia, Pakistan, NW India (Altai, Tian Shan, Pamir, SW Karakorum, W Himalaya): C AS.

**Leontopodium leontopodium** (DC.) Hand.-Mazz., Beih. Bot. Centralbl. 44: 119, fig. 4. 1928 (*Antennaria leontopodina* DC., *L. ochroleucum* Beauv.)

*Kongur*: Oytagh Vy. Upper 3750-3900 m; *E Pamir*: Bulunköl – Muji 3800 m. — 3750-3900 m / pasture, desert: *Chenopodiaceae* / *H sem* / (CN, CS, N, W, S, E) W & E Siberia, C. Asia, W China, Tibet, Mongolia, Pakistan, NW India (Tian Shan, Pamir, Karakorum, W Himalaya): C AS.

**Ligularia alpigena** Pojark., Bot. Mat. Gerb. Bot. Inst. Akad. Nauk. SSSR 7: 313. 1950

*Kongur*: Oytagh Vy. Upper 3570 m; *E Pamir*: Bulunköl – Muji 3550 m. — 3550-3570 m / gravel / *H scap* / (N, W) C. Asia, W China (Tian Shan, Pamir-Alai): PAMIR.

**Saussurea lacostei** Danguy, J. Bot. (Paris) 21: 52. 1908

*Kongur*: Oytagh Vy. Upper 2400-2800 m, Atojnak Vy. 2700 m; *E Pamir*: Gez Gorge Upper 3000-3300 m. — 2400-3300 m / SE; gravel, moraine, meadow, scrub: *Hippophae* / *H sem* / ( - ) W China (Kunlun Shan): ENDEM.

**Saussurea ovata** Benth. in G. Hend. & Hume, Lahore to Yarkand 325. 1873.

*Kongur*: Oytagh Vy. Upper 2800 m, Atojnak Vy. 3200 m. — 2800-3200 m / N; forest, scrub: *Hippophae*, *Picea* / *G rhiz* / ( - ) Kyrgyzstan, W China, Pakistan: PAMIR.

**Saussurea salsa** (Pall.) Spreng., Syst. Veg. 3: 381. 1826

*E Pamir*: Bulunköl – Muji 3400 m. — 3400 m / swamp / *H sem* / ( - ) E Europe, Caucasus, W & E Siberia, Kazakhstan, Uzbekistan, Kyrgyzstan, W China, Mongolia, ?Iran, Afghanistan: C AS.

**Senecio krascheninnikovii** Schischkin, Inst. Bot. Acad. Sci. URSS 15: 410. 1953

*Kongur*: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2590 m, Atojnak Vy. 2700 m. — 2100-2700 m / N; scrub, desert: *Chenopodiaceae*, *Hippophae* / *T sem* / (CS, N, W, S) C. Asia, W China, Tibet, Iran, Afghanistan, W Himalayas (Tian Shan, Pamir, Karakorum, W Himalaya): C AS.

**Senecio paulsenii** O. Hoffm. in Paulsen, Vidensk. Meddel. Dansk Naturhist. Foren. Kjöbenhavn 1903: 152. 1903 subsp. **paulsenii**

*E Pamir*: Gez Gorge Upper 3000-3300 m. — 3000-3300 m / gravel, moraine / *H sem* / ( - ) NE Afghanistan, NW Pakistan (Chitral, Tian Shan, Pamir-Alai): ENDEM.

**Serratula procumbens** Regel, Bull. Soc. Nat. Moscou 40(2): 165. 1867

*Kongur*: Oytagh Vy. Upper 2780-3080 m, Atojnak Vy. 2950 m; *E Pamir*: Gez Gorge Upper 3000-3300 m. — 2780-3300 m / S; dwarf-scrub, gravel, moraine, ruderal: *Artemisia* / *G rhiz* / (N) Kyrgyzstan, Tajikistan, W China, NE Afghanistan, Pakistan: PAMIR.

**Sonchus arvensis** L., Sp. Pl. 793. 1753

*W Kashgaria*: Oytagh Vy. Lower 1850 m; *Kongur*: Oytagh Vy. Middle 2100-2300 m. — 1850-2300 m / ruderal / *G rad* / (S) Europe, Sibiria: EURAS.

**Sonchus oleraceus** L., Sp. Pl. 764. 1753

*Kongur*: Atojnak Vy. 2700 m. — 2700 m / scrub: *Hippophae* / *T scap* / (W, S) cosmopolitan (tropics rare): COSMO.

**Tanacetum pyrethroides** (Kar. & Kir.) Schultz-Bip., Pollichia 20/21: 441. 1863 (*Richteria pyrethroides* Kar. & Kir.)

*Kongur*: Oytagh Vy. Upper 3150-3900 m, Atojnak Vy. 3200 m. — 3150-3900 m / N, NE; gravel, moraine, scrub, turf: *Hippophae* / *H caesp* / (CN, CS, N, W, S, E) C. Asia, NE Afghanistan, W Himalayas (Karakorum, W Himalaya): C AS.

**Tanacetum tenuifolium** Jacquem. in DC., Prodr. 6: 129. 1838

*Kongur*: Oytagh Vy. Upper 2800-2900 m. — 2800-2900 m / S; gravel, moraine / *H scap* / (N, E) W & C. China (Kunlun Shan): TIBET.

**Tanacetum tibeticum** Hook. f. & Thomson ex C. B. Cl, Comp. Ind. 154. 1876

*Kongur*: Oytagh Vy. Upper 3000 m, Atojnak Vy. 3200 m; *E Pamir*: Gez Gorge Upper 3000-3300 m, Bulunköl – Muji 3800 m. — 3000-3800 m / N, NE; gravel, moraine, scrub, desert: *Chenopodiaceae*, *Hippophae* / *C suff* / (CN, CS, N, W, S, E) C. Asia, Tibet, NE Afghanistan, Himalayas: TIBET.

**Taraxacum brevirostre** Hand.-Mazz., Monogr. Gatt. Tarax. 46. 1907

*Kongur*: Oytagh Vy. Upper 2610-3220 m, Atojnak Vy. 3300 m. — 2610-3300 m / N, NNE, W; open forest, pasture, scrub: *Juniperus*, *Salix* / *H ros* / (CN, N, W, S) Tajikistan, W China, N Iran, Afghanistan, Pakistan, NW India (Pamir, Karakorum, W Himalaya): PAMIR.

**Taraxacum butkovii** S. Koval., Bot. Mat. Gerb. Inst. Bot. Akad. Nauk. UzbSSR 17: 8. 1962

*Kongur*: Oytagh Vy. Upper 3430-3760 m, Atojnak Vy. 3390 m. — 3390-3760 m / ESE, NNE, W; pasture, tall forbs, turf / *H ros* / (–) C. Asia (Pamir-Alai): ENDEM.

**Taraxacum gnezdilloi** Kovalevsk., Bot. Mater. Gerb. Inst. Bot. Akad. Nauk. Uzb. SSR 17: 7.1962

*Kongur*: Oytagh Vy. Upper 3200 m. — 3200 m / NNE; tall forbs / *H ros* / (–) C. Asia (Pamir-Alai): ENDEM.

**Taraxacum kok-saghyz** Rodin, Acta Inst. Bot. Acad. Sci. URSS, ser. 1, 1: 187. 1933

*Kongur*: Oytagh Vy. Upper 2770 m, Atojnak Vy. 2900 m; *E Pamir*: Bulunköl – Muji 3270 m. — 2770-3270 m / N, SE; meadow, scrub, swamp: *Hippophae* / *H ros* / (–) C. Asia, W China (Tian Shan): ENDEM.

**Taraxacum leucanthum** (Ledeb.) Ledeb., Fl. Rossica 2: 815. 1844

*Kongur*: Oytagh Vy. Upper 2800-3600 m, Atojnak Vy. 2930 m; *E Pamir*: Bulunköl – Muji 3400 m. — 2800-3600 m / NE, NNE, NW; swamp, turf / *H ros* / (CN, CS, N, W, S, E) W China, Tibet, NW India (Kunlun Shan, Tibet, W Himalaya): C AS.

**Taraxacum luridum** Haglund in Persson, Bot. Not. 1938: 307. 1938

*Kongur*: Oytagh Vy. Upper 2800-3160 m. — 2800-3160 m / N, NNE, NNW, SE, WNW; meadow, pasture, tall forbs / *H ros* / (–) W China, Afghanistan, N Pakistan, N Kashmir: W HIM.

**Taraxacum minutilobum** M. Popov ex Kovalevsk., Bot. Mater. Gerb. Inst. Bot. Akad. Nauk. Uzb. SSR 17: 6. 1962

*Kongur*: Oytagh Vy. Upper 2610-3370 m. — 2610-3370 m / E, ESE, N, NE, NNE, NW, S, SE; dwarf-scrub, meadow, open forest, pasture, turf: *Artemisia*, *Juniperus* / *H ros* / (–) C. Asia (Pamir-Alai): ENDEM.

**Taraxacum pseudoatratum** Orazova, Fl. Kazakhst. 9: 491. 1966 (*T. atratum* Schischk.)

*Kongur*: Oytagh Vy. Upper 3360 m. — 3360 m / W; tall forbs / *H ros* / (–) C. Asia (Dzhung. Alatau): ENDEM.

## CONVOLVULACEAE

**Convolvulus arvensis** L., Sp. Pl. 153. 1753

*Kongur*: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2800 m. — 2100-2800 m / SE; meadow, ruderal / *G rad* / (CS, N, W, S) cosmopolitan: COSMO.

**Convolvulus fruticosus** Pall., Reise 2, Anhang 734. 1773

*W Kashgaria*: Kashgar S 1370 m. — 1370 m / desert / *C frut* / (–) W Siberia, C. Asia, W & N China, Mongolia, Iran: C AS.

**Cuscuta campestris** Yuncker, Mem. Torrey Bot. Club 18: 138. 1932

*W Kashgaria*: Oytagh Vy. Lower 1850 m. — 1850 m / ruderal / *T scand par* / (W) N America, introduced: Europe, Asia: COSMO.

**Cuscuta planiflora** Tenore, Fl. Napolit. 3: 250, t. 220. f. 3. 1824-9 (*C. approximata* Babington, *C. europaea* auct. non L.)

*Kongur*: Oytagh Vy. Middle 2100-2530 m, W-532, Oytagh Vy. Upper 2860 m, Atojnak Vy. 2700-2950 m. — 2100-2950 m / N, NE, S, WNW; dwarf-scrub, pasture, ruderal, scrub, desert: *Artemisia*, *Chenopodiaceae*, *Hippophae* / *T scand par* / (CS, W, S) S Europe, N Africa, Mediterranean, SW Asia: SUBTROP.

## CRASSULACEAE

**Hylotelephium ewersii** (Ledeb.) H. Ohba, Bot. Mag. Tokyo 90 (1017): 50. 1977 (*Sedum ewersii* Ledeb.)

*Kongur*: Oytagh Vy. Upper 2860-3280 m, Atojnak Vy. 3200 m. — 2860-3280 m / N, S, WNW; pasture, scree, scrub: *Hippophae*, *Juniperus* / *C suff* / (CS, W, S) W Siberia, C. Asia, W China, Afghanistan, Pakistan, W Himalayas (Altai, Tian Shan, Pamir, S Karakorum, W Himalaya): C AS.

**Orostachys thyrsoiflora** Fisch., Cat. Hort. Gorenk. 1808: 33. 1808

*Kongur*: Oytagh Vy. Upper 2620 m, Atojnak Vy. 2700 m; *E Pamir*: Gez Gorge Upper 3000-3300 m. — 2620-3300 m / ESE; dwarf-scrub, gravel, moraine, scrub: *Caragana*, *Hippophae* / *H scap* / (CS, N) E Europe, W Siberia, C. Asia, W China, Tibet, Mongolia: C AS.

**Rhodiola fastigiata** (Hook. f. & Thomson) Fu, Acta Phytotax. Sin., Addit. 122. 1965 (*Sedum fastigiatum* Hook. f. & Thomson)

*Kongur*: Oytagh Vy. Upper 3300 m, Atojnak Vy. 3230-3300 m. — 3230-3300 m / E, SE; dwarf-scrub, rock crevice, scree: *Artemisia* / *C suff* / (CN, CS, N, W) C. Asia, W & SW & C. China, Afghanistan, Himalayas (Pamir, Karakorum, Himalaya SE Tibet): TIBET.

**Rhodiola gelida** (Kar. & Kir.) Schrenk in Fisch. & C. A. Mey., Enum. Pl. Nov. 1: 67. 1841

*Kongur*: Oytagh Vy. Upper 3600-3900 m. — 3600-3900 m / NE, W; open ground, scree / *C suff* / (CS, N, W, S, E) C. Asia, W Mongolia: C AS.

**Rhodiola litwinowii** A. Bor., Fl. SSSR 9: 473. 1939

*Kongur*: Oytagh Vy. Upper 3600 m. — 3600 m / NE; turf / *C suff* / (–) C. Asia, W China, W Mongolia, Pamir-Alai, Tian Shan) / C AS.

## CRUCIFERAE

**Arabidopsis mollissima** (C. A. Mey.) N. Busch, Fl. Sib. & Or. Extr. 1: 136. 1913

*Kongur*: Oytagh Vy. Upper 2860-3390 m. — 2860-3390 m / E, S, SE, SSW, WNW; dwarf-scrub, pasture: *Artemisia* / *T sem* / (CS, W, S) Afghanistan, Pakistan: W HIM.

• **Brassica campestris** L., Sp. Pl. 1: 666. 1753

*Kongur*: Oytagh Vy. Middle 2100-2300 m. — 2100-2300 m / cultivated / *T scap* / (CS, N, S) Europe, Asia, N America (temp.) / cult.

**Braya pamirica** (Korsh.) O. Fedtsch., Acta Horti Petrop. 21: 48. 1903

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / desert: *Chenopodiaceae* / *H sem* / (N) Kyrgyzstan, Tajikistan, W China (Pamir-Alai): PAMIR.

**Braya rosea** (Turcz.) Bunge, Delect. Sem. Hort. Bot. Dorpat. 7. 1839

*Kongur*: Oytagh Vy. Upper 2850-3780 m. — 2850-3780 m / N, NE, NNW, S, SSW, W; gravel, moraine, open ground, pasture, turf / *H sem* / (CN, CS, N, W, S) W & E Siberia, C. Asia, W China, Tibet, Mongolia: C AS.

**Capsella bursa-pastoris** (L.) Medicus, Pflanzengatt. 85. 1792

*Kongur*: Oytagh Vy. Upper 2800-3500 m. — 2800-3500 m / NE; forest, gravel, moraine, scree: *Picea* / *T sem* / (W, S) cosmopolitan (except tropics): COSMO.

**Cardaria draba** (L.) Desv., J. Bot. Agric. 3: 163. 1815

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / ruderal / *G rhiz* / (N, W) Europe, Mediterranean, Asia Minor, Caucasus, W & E Siberia, C. Asia: EURAS.

**Chorispora sibirica** (L.) DC., Syst. 2: 437. 1821

*Kongur*: Oytagh Vy. Upper 2610-3190 m. — 2610-3190 m / N, NNE, SE; dwarf-scrub, forest, gravel, open forest, pasture: *Artemisia*, *Juniperus*, *Picea* / *T sem* / (CS, W, S) W & E Siberia, C. Asia, W China, Mongolia: C AS.

**Chorispora tenella** (Pall.) DC., Reg. Veg. Syst. Nat. 2: 435. 1821

*Kongur*: Oytagh Vy. Upper 2800 m. — 2800 m / E; ruderal / *T scap* / (–) E Europe, Asia Minor, Caucasus, W Siberia, C. Asia, W China, Mongolia, Iran, Himalayas: C AS.

**Christolea crassifolia** Camb. in Jacquem., Voy. Inde Bot. 4: 17, t. 17. 1844

*E Pamir*: Bulunköl – Muji 3400-3800 m. — 3400-3800 m / S; desert: *Chenopodiaceae* / *G rad* / (CN, CS, N, S, E) C. Asia, W Tibet: PAMIR.

**Descurainia sophia** (L.) Webb & Berth., Pflanzenfam. 3(2): 192. 1891

*Kongur*: Oytagh Vy. Upper 2590-2800 m. — 2590-2800 m / E, SE; ruderal, scrub: *Hippophae* / *T scap* / (W, S) Europe, N Africa, Mediterranean, Asia Minor, Caucasus, W & E Siberia, C. Asia, China, Mongolia, Iran, N America: EURAS.

**Draba altaica** (C. A. Mey.) Bunge, Del. Sem. Hort. Dorpat. 8. 1841 (*D. fladnitzensis* var. *homotricha* Hook. f. & Anders., *D. rupestris* R. Br. var. *altaica* C. A. Mey.)

*Kongur*: Oytagh Vy. Upper 3480-3770 m. — 3480-3770 m / NE, NNE; scree, turf / *H sem* / (CN, CS, N, W, S, E) W Siberia, C. Asia, W China, Tibet, Mongolia, Himalayas (Tibet, Himalaya): C AS.

**Draba lanceolata** Royle, Ill. Bot. Himal. 1: 72. 1834 (*D. incana* Hook. f. & Thomson, non L.)

*Kongur*: Oytagh Vy. Upper 2800-3060 m. — 2800-3060 m / N, SE; forest, open forest: *Juniperus*, *Picea* / *H sem* / (CN, CS, N, W, S) W & E Siberia, C. Asia, W China, Tibet, Himalayas, N America (Tian Shan, Pamir, SW Karakorum, W Himalaya): C AS.

**Draba nemorosa** L., Sp. Pl. 643. 1753

*Kongur*: Oytagh Vy. Upper 3190 m. — 3190 m / SE; dwarf-scrub: *Artemisia* / *H sem* / (W) Scandinavia, Europe, Asia Minor, Caucasus, W & E Siberia, C. Asia, China, Mongolia, Japan, N America: CIRC POL.

**Draba oreades** Schrenk in Fisch. & C. A. Mey., Enum. Pl. Nov. 2: 56. 1842 (*D. algida* Kar. & Kir., *D. alpina* auct. non L.: Hook. f., *D. glacialis* auct. non Adams: Duthie)

*Kongur*: Oytagh Vy. Upper 3600 m. — 3600 m / NE; scree / *H caesp* / (CS, N, W, S, E) W Siberia, C. Asia, W China, Tibet (Altai, Dzhung. Alatau, Tian Shan, Pamir-Alai, Tibet, Himalaya): C AS.

**Draba stenocarpa** Hook. f. & Thomson, J. Linn. Soc. London (Bot.) 5: 153. 1861 (*D. linearis* Hooker & Anders. (non Boiss.))

*Kongur*: Oytagh Vy. Upper 3150 m. — 3150 m / pasture / *T sem* / (CS, N, W, S) C. Asia, W China, Tibet, Pakistan, NW India (Karakorum, W Himalaya): C AS.

**Erysimum altaicum** C. A. Mey., Fl. Alt. 3: 153. 1831

*E Pamir*: Gez Gorge Upper 3000-3300 m. — 3000-3300 m / gravel, moraine / *T sem* / (–) Siberia, N Mongolia: C AS.

**Euclidium syriacum** (L.) R. Br. in Aiton, Hort. Kew ed. 2, 4: 74. 1812

*Kongur*: Oytagh Vy. Upper 2800 m, Atojnak Vy. 2930 m. — 2800-2930 m / E; gravel, ruderal / *T caesp* / (S) SE Europe, E Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, Iran: IRAN.

**Hymenolobus procumbens** (L.) Nutt. ex Torr. & Gray, Fl. No. Amer. 1: 117. 1838

*Kongur*: Oytagh Vy. Upper 2750 m. — 2750 m / SE; steppe: *Stipa* / *T caesp* / (CN, S) C. & E Europe, N Africa, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, Tibet, Mongolia, Iran: EURAS.

**Lepidium apetalum** Willd., Sp. Pl. ed. 3, 439. 1800

*Kongur*: Oytagh Vy. Middle 2100-2590 m; *Pamir*: Bulunköl – Muji 3380-3550 m. — 2100-3550 m / E, N, NNE, SE; gravel, open forest, pasture, ruderal, scrub, desert, swamp: *Chenopodiaceae*, *Hippophae*, *Juniperus* / *T caesp* / (CS, N, W, S) E Europe, W & E Siberia, C. Asia, China, Mongolia, Korea (Karakorum, Tibet): C AS.

**Lepidium latifolium** L., Sp. Pl. 644. 1753

*Kongur*: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2750 m, Atojnak Vy. 2300-2950 m. — 2100-2950 m / S, SE; dwarf-scrub, meadow, ruderal: *Artemisia* / *G rad* / (CS, N, W, S) Scandinavia, Europe, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, Tibet, Iran, Himalayas: EURAS.

**Leptaleum filifolium** (Willd.) DC., Syst. 2: 511. 1820

*Kongur*: Oytagh Vy. Upper 2500-3080 m. — 2500-3080 m / SE, SSE; open forest: *Juniperus* / *T caesp* / (CS, S) SE Europe, E Mediterranean, Caucasus, C. Asia, Iran: IRAN.

**Malcolmia africana** (L.) R. Br. in Aiton, Hort. Kew., ed. 2 4: 121. 1812 (*Hesperis africana* L.)

*Kongur*: Oytagh Vy. Upper 2500-3280 m. — 2500-3280 m / E, ESE, N, NE, S, SE, SSE; dwarf-scrub, gravel, moraine, meadow, open forest, ruderal: *Artemisia*, *Juniperus* / *T scap* / (CS, N, W, S, E) S Europe, N Africa, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, W China, Iran: EURAS.

**Neotorularia korolkowii** (Regel & Schmalh.) Hedge & J. Léonard, Bull. Jard. Bot. Nat. Belg. 56 (3-4): 394. 1986

*Kongur*: Oytagh Vy. Upper 2800-3900 m. — 2800-3900 m / ESE, N, NW, S, SE, W; gravel, moraine, open forest, pasture, tall forbs: *Juniperus*, *Picea* / *T caesp* / (CS, N, S, E) C. Asia (Pamir-Alai): PAMIR.

**Neotorularia sulphurea** (Korsh.) S. S. Ikonnikov, Spis. Rast. Gerb. Fl. Ross. Sopred. Gosud 28: 103. 1993 (*Sisymbrium sulphureum* Korsh., *Torularia sulphurea* (Korsh.) O. E. Schulz)

*E Pamir*: Bulunköl – Muji 3550-3800 m. — 3550-3800 m / gravel, desert: *Chenopodiaceae* / *T caesp* / (N) C. Asia, W China (Pamir-Alai, Tian Shan): ENDEM.

**Leiospora pamirica** (Botsch. & Vved.) Botsch. & Pachomova, Bot Zhurn. 57: 669. 1972 (*Parrya pamirica* Botsch. & Vved., *Parrya exscapa* auct. non C. A. Mey. in Ledeb., Fl. Alt. 3: 38. 1831)

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / desert: *Chenopodiaceae* / *C pulv* / (CN, CS, N, W, S, E) W Siberia, Kazakhstan, Kyrgyzstan, Tajikistan, W China, W Tibet (Altai, Tian Shan, Pamir-Alai, Karakorum, W Tibet): C AS.

**Sisymbriopsis mollipilia** (Maxim.) Botsch., Nov. Syst. Pl. Vasc. 1966: 122. 1966 (*Sisymbrium mollipilum* Maxim., *Torularia mollipilia* (Maxim.) O. E. Schulz)

Kongur: Oytagh Vy. Upper 3000 m. — 3000 m / N; open forest: *Picea / T caesp* / (N, W) C. Asia, W & C. China (Pamir-Alai, Tian Shan, Tibet): C AS.

**Sisymbrium brassiciforme** C. A. Mey. in Ledeb., Fl. Alt. 3: 129. 1831

Kongur: Oytagh Vy. Middle 2200 m, Atojnak Vy. 2300 m. — 2200-2300 m / N; desert: *Chenopodiaceae / H scap* / (CS, W, S) C. Asia, Afghanistan, W Pakistan: C AS.

**Taphrospermum altaicum** C. A. Mey. in Ledeb., Fl. Alt. 3: 173. 1831

Kongur: Oytagh Vy. Upper 2800-3770 m. — 2800-3770 m / NE, W; forest, pasture, scree, tall forbs: *Picea / T caesp* / (—) W Siberia, Kazakhstan, Kyrgyzstan, Tajikistan, W China (Altai, Tian Shan, Pamir-Alai): C AS.

**Tetracme quadricornis** (Stephan) Bunge, Delect. Seminum Hort. Bot. Dorpat. 1836: 7. 1836 (*Tetracme pamirica* Vass.)

Kongur: Atojnak Vy. 2250 m. — 2520 m / N; desert: *Chenopodiaceae / T caesp* / (CS, S, W) C. Asia, W China, Mongolia, Afghanistan, N Pakistan: C AS.

### CYNOMORIACEAE

**Cynomorium songaricum** Rupr., Mém. Acad. Sci. Pétersb. sér. 7, 14 (4): 73. 1869

Kongur: Atojnak Vy. 2520 m. — 2520 m / N; open forest: *Populus / G bulb par* / (—) C. Asia, W & N China, Mongolia, Iran, Afghanistan: C AS.

### ELAEAGNACEAE

• **Elaeagnus angustifolia** L., Sp. Pl. 121. 1753

W Kashgaria: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae / P scap* / (W, S) SE Europe, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, China, Mongolia, Japan, Iran, N India, NW India (W Himalaya) / cult.

**Hippophae rhamnoides** L. subsp. *turkestanica* Rousi, Ann. Bot. Fenn. 8 (3): 208. 1971

W Kashgaria: Oytagh Vy. Lower 1830 m; Kongur: Oytagh Vy. Middle 2100-2590 m, Atojnak Vy. 2700 m. — 1830-2700 m / ruderal, scrub: *Hippophae / P caesp* / (CS, N, W, S) C. Asia, W China, Mongolia (Pamir, Karakorum, Himalaya, S Tibet): C AS.

### GENTIANACEAE

**Comastoma azureum** (Bunge) V. V. Zuev, Bot. Zhurn. 75 (9): 1304. 1990 (*Gentianella azurea* (Bunge) Holub)

Kongur: Oytagh Vy. Upper 3170-3600 m. — 3170-3600 m / N, NE, NNE; turf / *T caesp* / (CN, CS, N, W) W & E Siberia, Kazakhstan, Kyrgyzstan, W, N & C. China, Mongolia, Bhutan: C AS.

**Comastoma falcatum** (Turcz.) Toyokuni, Bot. Mag. (Tokyo) 74: 198. 1961 (*Gentianella falcata* (Turcz.) H. Smith)

Kongur: Oytagh Vy. Upper 3600 m. — 3600 m / NE; scree / *T caesp* / (CN, CS, N, W, S, E) W & E Siberia, Kyrgyzstan, Tajikistan, W, N & C. China, Mongolia, Kashmir, N India, Nepal: C AS.

**Comastoma pedunculatum** (Royle ex G. Don) Holub, Folia Geobot. & Phytotax. Praha 3: 218. 1968 (*Gentianella pedunculata* (Royle) H. Smith)

E Pamir: Bulunköl – Muji 3550 m. — 3550 m / meadow / *T caesp* / (W, S) W, N & C. China, Kashmir, N India, Nepal, Sikkim, Bhutan: HIMAL.

**Gentiana aquatica** L., Sp. Pl. 229. 1753

Kongur: Oytagh Vy. Upper 3300 m, Atojnak Vy. 2930 m; E Pamir: Bulunköl – Muji 3550-3850 m. — 2930-3850 m / NNW; gravel, swamp, turf / *T caesp* / (CN, CS, W, S) Caucasus, W & E Siberia, Kazakhstan, Tajikistan, W China, W Tibet, Mongolia: C AS.

**Gentiana leucomelaena** Maxim., Diagn. Pl. Nov. Asiat. 8: 33. 1893

Kongur: Oytagh Vy. Upper 2750-3000 m; E Pamir: Bulunköl – Muji 3270-3800 m. — 2750-3800 m / E, N, NNW; pasture, scrub, swamp: *Hippophae / T caesp* / (W, S, E) W & E Siberia, Kazakhstan, Tajikistan, W China, W, N & C. China, N Mongolia, Pakistan, Kashmir, Nepal, Sikkim: C AS.

**Gentiana prostrata** Haenke in Jacq., Collect. 2: 66. 1788

Kongur: Oytagh Vy. Upper 2800-3900 m, Atojnak Vy. 3300 m; E Pamir: Bulunköl – Muji 3800 m. — 2800-3900 m / E, N, NE, NNE, NNW, W; gravel, open forest, pasture, scrub, tall forbs: *Picea, Salix / T caesp* / (CN, CS, N, W, S, E) C. Europe, Caucasus, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, W, N & C. China, Mongolia, Nepal, N America: CIRC-POL.

**Gentianella pygmaea** (Regel & Schmalh.) H. Smith in S, Grana Palyn. 7 (1): 144. 1967

*Kongur*: Oytagh Vy. Upper 2800-3780 m, Atojnak Vy. 3390 m; *E Pamir*: Bulunköl – Muji 3800 m. — 2800-3800 m / NE, NNE, W; gravel, open ground, pasture, scrub, tall forbs, turf: *Juniperus* / *T caesp* / (CN, CS, N, W) Kyrgyzstan, Tajikistan, W, N & C. China, N India, Sikkim: TIBET.

**Gentianella turkestanorum** (Gandoger) Holub, Folia Geobot. Phytotax. 2: 118. 1967 (*Gentianella aurea* L. s.l.)

*Kongur*: Oytagh Vy. Upper 2700-3760 m, Atojnak Vy. 2900 m. — 2700-3760 m / ESE, N, NE, NNE, NNW, NW, S, SE; meadow, open forest, open scrub, pasture, scree, scrub, tall forbs, turf: *Juniperus*, *Picea* / *T scap* / (CN, CS, W, S) W Siberia, Kazakhstan, Tajikistan, W China, Mongolia: C AS.

**Gentianopsis vvedenskyi** (Grossh.) V. V. Pisyaukova, Fl. Tadzhiksoi SSR 7: 292. 1984

*Kongur*: Oytagh Vy. Upper 3000-3430 m, Atojnak Vy. 2900-3390 m. — 2900-3430 m / ESE, N, NNW, W; meadow, pasture, tall forbs / *T scap* / (CN, CS, N, W) Kazakhstan, Kyrgyzstan, W, N & C. China, Mongolia, Japan, NE Afghanistan, Pakistan (Tian Shan, Pamir, W Kunlun Shan, Karakorum): C AS.

**Lomatogonium carinthiacum** (Wulfen) A. Br., Flora I, 13: 221. 1830

*Kongur*: Oytagh Vy. Upper 3000-3750 m, Atojnak Vy. 2900 m; *E Pamir*: Bulunköl – Muji 3850 m. — 2900-3850 m / E, N, NE, NNE, NNW; meadow, open forest, swamp, turf: *Picea* / *T scap* / (CS, N, W, S) Europe, Caucasus, W & E Siberia, Kyrgyzstan, Tajikistan, W, N & C. China, Mongolia, Japan, Afghanistan, Pakistan, N India: EURAS.

**Lomatogonium thomsonii** (C. B. Clarke) Fernald, Rhodora 21: 197. 1919

*E Pamir*: Bulunköl – Muji 3270-3800 m. — 3270-3800 m / gravel, meadow, pasture, scrub: *Hippophae* / *T scap* / (CN, CS, N, W, S) C. Asia: C AS.

## GERANIACEAE

**Geranium collinum** Steph. ex Willd., Sp. Pl. 3: 705. 1800

*Kongur*: Oytagh Vy. Middle 2300 m, Oytagh Vy. Upper 2700-2770 m, Atojnak Vy. 2520 m. — 2300-2770 m / N, SE; open forest, ruderal, swamp: *Populus* / *H caesp* / (CS, W, S) E Europe, Caucasus, W Siberia, C. Asia, W China, Iran: C AS.

**Geranium pratense** L., Sp. Pl. 681. 1753

*Kongur*: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2770-3480 m, Atojnak Vy. 3200-3390 m. — 2100-3480 m / E, ESE, N, NE, NNE, NNW, NW, S, ; meadow, open forest, open scrub, pasture, ruderal, scrub, tall forbs, turf: *Hippophae*, *Juniperus*, *Picea* / *H caesp* / (W, S) Europe, Asia (temp.): EURAS.

## GROSSULARIACEAE

**Ribes meyeri** Maxim., Bull. Acad. Petersb. 19: 260. 1874

*Kongur*: Oytagh Vy. Upper 3300 m. — 3300 m / E; rock crevice / *P caesp* / (–) W Siberia, C. Asia, W China: C AS.

**Ribes orientale** Desf., Hist. Arb. 2: 88. 1809

*Kongur*: Oytagh Vy. Upper 2790-3210 m. — 2790-3210 m / NW, S, W; open forest, scrub: *Juniperus* / *P caesp* / (CN, CS, N, S) E Mediterranean, Asia Minor, Caucasus, C. Asia, Iran, Pakistan: C AS.

## HIPPURIDACEAE

**Hippuris vulgaris** L., Sp. Pl. 4. 1753

*E Pamir*: Bulunköl – Muji 3400 m. — 3400 m / swamp / *G rhiz hel* / (W, S, E) Europe, Asia, N America (temp.): CIRC-POL.

## LABIATAE

**Dracocephalum heterophyllum** Benth., Lab. Gen. & Sp. 738. 1835-6

*Kongur*: Atojnak Vy. 3300 m; *E Pamir*: Gez Gorge Upper 3500 m, Bulunköl – Muji 3450-3800 m. — 3300-3800 m / SE; dwarf-scrub, gravel, meadow, desert: *Artemisia*, *Chenopodiaceae* / *H rep* / (CN, CS, N, S, E) Russia, C. Asia, W, N & C. China, N India, Himalayas: C AS.

**Dracocephalum imberbe** Bunge, Verz. Altai Pfl. 50. 1836

*Kongur*: Oytagh Vy. Upper 2850-3760 m, Atojnak Vy. 3100-3300 m. — 2850-3760 m / N, NNE, W; open forest, scrub, turf: *Picea*, *Salix* / *H caesp* / (–) W & E Siberia, Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, W China: C AS.

**Dracocephalum integrifolium** Bunge, Fl. Altaic. 2: 387. 1830

*Kongur*: Oytagh Vy. Upper 2860-3120 m, Atojnak Vy. 3100 m. — 2860-3180 m / N, WNW; open forest, pasture: *Picea* / *C suff* / (–) W Siberia, Kazakhstan, Kyrgyzstan, W China: C AS.

**Dracocephalum stamineum** Kar. & Kir., Bull. Soc. Nat. Mosc. 15: 423. 1842

*Kongur*: Oytagh Vy. Upper 2590-3000 m, Atojnak Vy. 3200 m. — 2590-3200 m / N, NE, S; gravel, moraine, scrub: *Hippophae* / *H caesp* / (CN, CS, N, W, S, E) Kazakhstan, Kyrgyzstan, Tajikistan, W China, W Tibet, NE Afghanistan, Pakistan, NW India (Pamir-Alai, Kunlun Shan, Karakorum, W Tibet, W Himalaya): C AS.

**Elsholtzia densa** Benth., Lab. Gen. & Sp. 714. 1835

*Kongur*: Oytagh Vy. Upper 2790 m, Atojnak Vy. 2900 m. — 2790-2900 m / N, SE; meadow, ruderal / *T caesp* / (CS, W, S) Tajikistan, W, N & C. China, Mongolia, Afghanistan, Pakistan, N India, Nepal: C AS.

**Phlomis oreophila** Kar. & Kir., Bull. Soc. Imp. Nat. Moscou 15: 426. 1842

*Kongur*: Oytagh Vy. Upper 2970-3450 m. — 2970-3450 m / ESE, NE, NNE, NNW, S, W; open scrub, scrub, tall forbs: *Juniperus*, *Picea* / *H sem* / (–) W Siberia, Kazakhstan, Kyrgyzstan, Tajikistan, W China, Mongolia: C AS.

**Scutellaria paulsenii** Briq., Bot. Tidskr. 28: 233. 1908

*Kongur*: Oytagh Vy. Upper 3300-3760 m, Atojnak Vy. 3200 m. — 3200-3760 m / E, N, W; rock crevice, scrub: *Hippophae* / *H caesp* / (W) Kyrgyzstan, W China, Pakistan (Tian Shan, Pamir, W Kunlun Shan, W Karakorum): PAMIR.

**Stachyopsis lamiiflora** (Rupr.) Popov & Vved., Trudy Turkestansk. Naucn. Obsc. 2: 122. 1923

*Kongur*: Oytagh Vy. Upper 3000-3360 m. — 3000-3360 m / NNE, NNW, W; pasture, tall forbs / *H sem* / (–) Kazakhstan, Kyrgyzstan, W China: PAMIR.

## LEGUMINOSAE

**Astragalus alpinus** L., Sp. Pl. 760. 1753 [§ *Komaroviella*]

*Kongur*: Oytagh Vy. Upper 2770-3390 m, Atojnak Vy. 3030-3300 m. — 2770-3300 m / E, N, NE, NNE, NNW, W, WNW, SSW; light forest, meadow, pasture, scrub: *Artemisia*, *Picea*, *Salix* / *H scap* / (–) E Europe, Caucasus, C. Asia, Siberia, W & N China, Mongolia: EURAS.

**Astragalus beketovii** (Krasn.) B. Fedtsch., Bull. Herb. Boissier, ser. 2, 5: 316. 1905 [§ *Hemiphragmium*]

*Kongur*: Atojnak Vy. 3200 m. — 3200 m / N; gravel, scrub: *Hippophae* / *G rhiz* / (N) Tajikistan, W China (E Pamir, N Karakorum, W Kunlun Shan): PAMIR.

**Astragalus kuschakewiczii** B. Fedtsch. ex O. Fedtsch., Fl. Pamir. 78. 1903 [§ *Komaroviella*]

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / desert: *Chenopodiaceae* / *C pulv* / (–) C. Asia, W China: C AS.

**Astragalus melanocarpus** Bunge, Astrag. 1: 51. 1868 [§ *Hypoglottei*] (non Richardson: *Astragalus atrifructus* Greuter & Burdet, Willdenowia 16: 108. 1986)

*Kongur*: Oytagh Vy. Upper 3600-3760 m. — 3600-3760 m / NE; scree / *H rep* / (N) Pamir-Alai: PAMIR.

**Astragalus nematodes** Bunge ex Boiss., Fl. Orient. 2: 425. 1872 [§ *Corethrum*]

*Kongur*: Oytagh Vy. Upper 2500-2920 m, Atojnak Vy. 2970 m; *E Pamir*: Gez Gorge Upper 3500 m. — 2500-3500 m / NE, S, SE, WNW; dwarf-scrub, meadow, open forest, pasture, scrub: *Artemisia*, *Juniperus* / *C suff* / (–) Kyrgyzstan, W China (Tian Shan, Kunlun Shan): PAMIR.

**Astragalus nivalis** Kar. & Kir., Bull. Soc. Nat. Mosc. 15: 341. 1842 [§ *Hypsophilus*]

*Kongur*: Oytagh Vy. Upper 2610 m, Atojnak Vy. 3200 m; *E Pamir*: Gez Gorge Upper 3500 m. — 2610-3500 m / meadow / *C pulv* / (CN, CS, N, S) Kazakhstan, Tajikistan, W China, Afghanistan (Pamir-Alai, Tian Shan, Tibet): PAMIR.

**Astragalus pamirensis** Franchet, Bull. Mus. Hist. Nat. Paris 2: 344. 1896 [§ *Caprini*]

*Kongur*: Oytagh Vy. Upper 2800-3100 m, Atojnak Vy. 2750 m; *E Pamir*: Gez Gorge Upper 3500 m. — 2800-3500 m / SE; dwarf-scrub, meadow, scrub: *Artemisia*, *Juniperus* / *H caesp* / (N) Tajikistan, W China (E Pamir): PAMIR.

**Astragalus tecti-mundi** Freyn, Bull. Herb. Boissier, ser. 2, 4: 456. 1904 (*A. frigidus* auct. non (L.) A. Gray) [§ *Cenantrum*]

*Kongur*: Oytagh Vy. Upper 2970-3620 m, Atojnak Vy. 3390 m. — 2970-3620 m / NE, NNW, W; open forest, pasture, scrub: *Juniperus*, *Picea* / *G rhiz* / (CS, W, S) Tajikistan, W China, SE Tibet, Pakistan (Pamir, SW Karakorum, W Himalaya, SE Tibet): PAMIR.

**Astragalus tibetanus** Benth. ex Bunge, Astrag. 1: 52. 1868 (*A. chadjanensis* Franchet) [§ *Hypoglottei*]

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *Kongur*: Oytagh Vy. Middle 2200 m, Oytagh Vy. Upper 2590-3430 m, Atojnak Vy. 2700-3390 m; *E Pamir*: Gez Gorge Upper 3000-3500 m, Bulunköl – Muji 3270-3550 m. — 2200-3550 m / —, E, ESE, N, NE, NNE, NNW, NW, S; dwarf-scrub, gravel, moraine, meadow, open forest, pasture, ruderal, scrub: desert, steppe, tall forbs, turf: *Artemisia*, *Chenopodiaceae*, *Hippophae*, *Juniperus*, *Picea*, *Salix*, *Stipa* / *H rep* / (CN, CS, N, W, S) W Siberia, C. Asia, NE Afghanistan, Pakistan, Kashmir, NW India, W & C. China (Altai, Dzhung. Alatau, Tian Shan, Pamir-Alai, Karakorum, W Tibet): C AS.

Notes: Plants with adpressed indumentum, apparently representing *A. chadjanensis* Franchet, dominate in the Outer Ranges. The distinction to the typical, patently hairy plant, however, does not seem to follow a regular pattern.

**Caragana jubata** (Pall.) Poir. in Lam., Encycl. Méth., Suppl. 2: 89. 1811

Kongur: Oytagh Vy. Upper 3350 m. — 3350 m / N; forest: *Picea / C frut* / (N) Russia (arctic), E Siberia, C. Asia, W China, NW Tibet, Mongolia: C AS.

**Caragana laeta** Kom., Monogr. in A. H. P. 29, 2: 215. 1909

Kongur: Oytagh Vy. Upper 2000-2900 m. — 2000-2900 m / NE; dwar-scrub, pasture / *C frut* / (–) C. Asia, W China (Pamir-Alai, Tian Shan): ENDEM.

**Glycyrrhiza uralensis** Fisch. in DC., Prodr. 2: 248. 1825

Kongur: Oytagh Vy. Middle 2300 m, Atojnak Vy. 2300 m. — 2300 m / meadow, ruderal / *C suff* / (–) W & E Siberia, C. Asia, China, Mongolia, Japan: C AS.

**Hedysarum krasnovii** B. Fedtsch., Bull. Herb. Boissier ser. 2, 4: 916. 1904

Kongur: Oytagh Vy. Middle 2300 m, Atojnak Vy. 2700 m. — 2300-2700 m / ruderal, scrub: *Hippophae / C suff* / (–) Kyrgyzstan, W China (Tian Shan, endemic): PAMIR.

**Hedysarum minjanense** Rech. f., Symb. Afghan. 3: 191, t. 228-9. 1957 (*H. cephalotes* Franchet, non Roxb.)

Kongur: Oytagh Vy. Upper 2900-3080 m, Atojnak Vy. 2900-3300 m. — 2900-3300 m / N, SE; dwarf-scrub, meadow: *Artemisia / C suff* / (W) Kyrgyzstan, Tajikistan, W China, Afghanistan (Tian Shan, Pamir-Alai): PAMIR.

**Lotus krylovii** Schischkin & Serg., Animadv. Syst. Herb. Univ. Tomsk 7: 5. 1932

W Kashgaria: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae / H caesp* / (–) SE Europe, Caucasus, W Siberia, C. Asia, Iran, N India, Himalayas: EURAS.

**Medicago lupulina** L., Sp. Pl. 779. 1753

W Kashgaria: Oytagh Vy. Lower 1830 m; Kongur: Oytagh Vy. Middle 2100 m. — 1830-2100 m / ruderal, scrub: *Hippophae / T caesp* / (CS, W, S) Europe, Asia, N America (introduced): CIRC POL.

• **Medicago** × **varia** Martyn, Fl. Rust. 3: 87. 1792-95 (*M. falcata* × *sativa*, *M. ladak* Vass.)

W Kashgaria: Oytagh Vy. Lower 1830 m; Kongur: Oytagh Vy. Middle 2100-2590 m. — 1830-2590 m / N, NE; ruderal, scrub, desert: *Chenopodiaceae*, *Hippophae / H scap* / (CS, W, S) cultivated / cult.

**Melilotus officinalis** (L.) Desr. in Lam., Encycl. Meth. Bot. 4: 62. 1796

Kongur: Oytagh Vy. Middle 2100 m. — 2100 m / ruderal / *H scap* / (CS, W, S) Europe, Asia, N America (temp.): CIRC-POL.

**Oxytropis biflora** P. C. Li, Acta Phytotax. Sin. 18 (3): 369. 1980

Kongur: Oytagh Vy. Upper 3150-3900 m. — 3150-3900 m / N; gravel, moraine / *H rep* / (–) W China: ENDEM.

**Oxytropis glabra** DC., Astrag. 95. t. 8. 1802

W Kashgaria: Oytagh Vy. Lower 1830 m; Kongur: Atojnak Vy. 2300 m. — 1830-2300 m / meadow, scrub: *Hippophae / H rep* / (CN, CS, N, W, S) W & E Siberia, C. Asia, Mongolia: C AS.

**Oxytropis humifusa** Kar. & Kir., Bull. Soc. Nat. Mosc. 15: 535. 1842

Kongur: Oytagh Vy. Upper 2610-3770 m. — 2610-3770 m / N, NE, NNE; open forest, pasture, turf: *Juniperus*, *Picea / C pulv* / (CN, CS, N, W, S) C. Asia, W China, W Tibet, Afghanistan, Pakistan, Kashmir, NW India (Tian Shan, Pamir, Karakorum, W Himalaya): PAMIR.

**Oxytropis hypoglottoides** (Baker) Ali, Kew Bull. 28 (2): 306. 1973

E Pamir: Bulunköl – Muji 3270-3850 m. — 3270-3850 m / pasture, scrub, swamp: *Hippophae / H rep* / (N, W, S) C. Asia, W China: ENDEM.

**Oxytropis lapponica** (Wahlenb.) Gay, Correspondence Flora 30. 1827

Kongur: Oytagh Vy. Upper 2740-3760 m. — 2740-3760 m / ESE, N, NNE, NNW; meadow, pasture, turf / *H caesp* / (CS, W, S, E) Europe, Caucasus, W Siberia, C. Asia, Tibet, Himalayas, N America (W & S Himalaya): CIRC POL.

**Oxytropis microphylla** (Pall.) DC., Astrag. 83. 1802

E Pamir: Gez Gorge Upper 3500 m, Bulunköl – Muji 3450-3800 m. — 3450-3800 m / gravel, desert: *Chenopodiaceae / C pulv* / (CN, CS, N, W, S, E) Siberia, Mongolia: C AS.

**Oxytropis pagobia** Bunge, Mem. Acad. Petersb. ser. 7, 22: 27. 1874

Kongur: Oytagh Vy. Upper 2610-3900 m, Atojnak Vy. 3200 m; E Pamir: Bulunköl – Muji 3550-3800 m. — 2610-3900 m / E, ESE, N, NE, NNE, NW, S, SE, S; gravel, meadow, open forest, pasture, ruderal, scree, scrub, desert, turf: *Chenopodiaceae*, *Hippophae*, *Juniperus*, *Picea / H caesp* / (CN, CS, N, W) C. Asia, W China: PAMIR.

**Oxytropis platysema** Schrenk, Bull. Acad. Sci. Petersb. 10: 254. 1842

Kongur: Oytagh Vy. Upper 3750-3900 m. — 3750-3900 m / NE; turf / *H rep* / (CS, N, W) C. Asia: TIBET.

**Oxytropis poncinsii** Franchet, Bull. Mus. Hist. Nat. Paris 2: 343. 1896

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / desert: *Chenopodiaceae* / *C pulv* / (CN, CS, N, W) Kyrgyzstan, Tajikistan, W China (Tian Shan, Pamir-Alai): PAMIR.

**Sophora alopecuroides** L., Sp. Pl. 373. 1753

*W Kashgaria*: Oytagh Vy. Lower 1850 m; *Kongur*: Oytagh Vy. Middle 2100 m. — 1850-2100 m / ruderal / *C frut* / (CS, W, S) SE Europe, Asia Minor, Caucasus, W Siberia, C. Asia, W China, Iran: EURAS.

**Thermopsis alpina** (Pall.) Ledeb., Fl. Alt. 2: 112. 1830

*Kongur*: Oytagh Vy. Upper 3160-3430 m, Atojnak Vy. 3230 m. — 3160-3430 m / E, ESE, NNE, S; scree, tall forbs / *G rhiz* / (N) W & E Siberia, C. Asia, W China, Mongolia: C AS.

#### LINACEAE

**Linum corymbulosum** Reichenb., Fl. Germ. Excurs. 834. 1832

*Kongur*: Atojnak Vy. 2300 m. — 2300 m / meadow / *T caesp* / (CS, W, S) SE Europe, N Africa, Mediterranean, Asia Minor, Caucasus, C. Asia, W China, Iran, Afghanistan: IRAN.

#### MORACEAE

• **Morus alba** L., Sp. Pl. 986. 1753

*W Kashgaria*: Oytagh Vy. Lower 1850 m. — 1850 m / cultivated / *P scap* / (W) C. & SE Europe, Mediterranean, Asia Minor, Caucasus, C. Asia, China, Japan / cult.

#### ONAGRACEAE

**Epilobium latifolium** L., Sp. Pl. 347. 1753

*Kongur*: Atojnak Vy. 3200 m. — 3200 m / N; scrub: *Hippophae* / *H scap* / (CN, CS, W, S) Europe, Asia, N America: CIRC-POL.

#### OROBANCHACEAE

**Orobanche cernua** Loefl., It. Hispan. 152. 1758

*E Pamir*: Gez Gorge Upper 3000-3300 m. — 3000-3300 m / gravel, moraine / *G bulb par* / (CS, W, S) N Africa, W Europe, Caucasus, Asia Minor, Iran, Afghanistan, Pakistan, W Himalaya: SUBTROP.

#### PAPAVERACEAE

**Corydalis kaschgarica** Rupr., Mém. Acad. Sci. Pétersb. sér. 7, 14 (4): 38. 1869

*Kongur*: Atojnak Vy. 2700 m. — 2700 m / scrub: *Hippophae* / *C suff* / (–) C. Asia, W China: ENDEM.

**Corydalis stricta** Steph. in DC., Syst. 2: 123. 1821

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / desert: *Chenopodiaceae* / *H caesp* / (S) W Siberia, C. Asia, Tibet, Mongolia: C AS.

#### PARNASSIACEAE

**Parnassia laxmannii** Pall. ex Schult., Syst. Veg. 6: 696. 1820

*Kongur*: Oytagh Vy. Upper 3200-3480 m, Atojnak Vy. 3300-3390 m; *E Pamir*: Bulunköl – Muji 3550 m. — 3200-3550 m / N, NE, NNE, NNW, S, W; meadow, pasture, scrub, tall forbs, turf: *Juniperus*, *Salix* / *H sem* / (CS, N, W, S) W & E Siberia, C. Asia, China, Mongolia: C AS.

#### PLANTAGINACEAE

**Plantago depressa** Willd., Enum. Pl. Hort. Berol. Suppl. 8. 1813 (*P. tibetica* Hook. f. & Thomson)

*Kongur*: Oytagh Vy. Upper 2740-3360 m, Atojnak Vy. 2900 m. — 2740-3360 m / N, NNE, NW, S, SE; dwarf-scrub, meadow, pasture: *Artemisia* / *H ros* / (W, S) W & E Siberia, C. Asia, Mongolia, China, Japan, Himalayas (Tian Shan, Pamir, Himalaya): C AS.

**Plantago gentianoides** Sibth. & Smith subsp. **griffithii** (Decne.) Rech. f., Fl. Iran. 15: 9. 1965

*Kongur*: Oytagh Vy. Upper 2610-3390 m, Atojnak Vy. 2750-2970 m; *E Pamir*: Gez Gorge Upper 3000-3300 m, Bulunköl – Muji 3800 m. — 2610-3800 m / ESE, N, NE, NNE, NNW, NW, S, SE.; dwarf-scrub, gravel, moraine, meadow, open forest, pasture, desert: *Artemisia*, *Chenopodiaceae*, *Juniperus*, *Picea* / *H ros* / (N, W, S) C. Asia, W China, Iran., Afghanistan, Pakistan, Kashmir, NW India (Pamir, Karakorum, W Himalaya): PAMIR.

**Plantago major** L., Sp. Pl. 112. 1753

W Kashgaria: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae* / *H ros* / (W, S) cosmopolitan (temp.): COSMO.

**Plantago minuta** Pall., Reise 3: 716. 1776

Kongur: Atojnak Vy. 2250 m. — 2250 m / N; desert: *Chenopodiaceae* / *T ros* / (CS) E Europe, Caucasus, C. Asia, W China: C AS.

#### PLUMBAGINACEAE

**Acantholimon diapiensoides** Boiss. in DC., Prodr. 12: 624. 1848

E Pamir: Bulunköl – Muji 3800 m. — 3800 m / desert: *Chenopodiaceae* / *C pulv* / (N, W) Tajikistan, W China, Iran, E Afghanistan, Pakistan: PAMIR.

**Acantholimon hedinii** Ostenf. in Hedin, S. Tibet 4(3): 48. 1922

Kongur: Oytagh Vy. Upper 2800-2920 m, Atojnak Vy. 3300 m; E Pamir: Gez Gorge Upper 3500 m. — 2800-3500 m / NE, SE; dwarf-scrub, meadow, open forest, pasture: *Artemisia*, *Juniperus* / *C pulv* / (–) Kyrgyzstan, Tajikistan, W China (E Pamir-Alai): PAMIR.

**Limonium lacostei** (Danguy) R. Kamelin, Novon 3(3): 261. 1993 (*Statice lacostei* Danguy)

W Kashgaria: Kashgar S 1840 m. — 1840 m / desert / *H caesp* / (N) C. Asia, W China: ENDEM.

#### POLYGALACEAE

**Polygala hybrida** DC., Prodr. 1: 325. 1824

Kongur: Oytagh Vy. Upper 2800-2900 m, Atojnak Vy. 3200 m. — 2800-3200 m / N, S, SE; forest, gravel, moraine, open forest, scrub: *Hippophae*, *Picea* / *H caesp* / (–) E Europe, W & E Siberia, C. Asia, W China, Mongolia: C AS.

#### POLYGONACEAE

**Bistorta vivipara** (L.) S. F. Gray, Nat. Arr. Brit. Pl. 2: 268. 1821 (*Polygonum viviparum* L.)

Kongur: Oytagh Vy. Upper 2750-3780 m, Atojnak Vy. 3000-3390 m. — 2750-3780 m / E, N, NE, NNE, NNW, W; open ground, open scrub, pasture, rock crevice, scree, scrub, tall forbs, turf: *Picea*, *Salix* / *H sem* / (CS, N, W, S) Europe, Asia, N America: CIRC POL.

**Calligonum mongolicum** Turcz., Bull. Soc. Nat. Mosc. 5: 20. 1832

W Kashgaria: Kashgar S 1370 m. — 1370 m / desert / *C frut* / (–) W & N China, N Mongolia: C AS.

**Knorringia pamirica** (Korsh.) Tzvelev, Nov. Sist. Vyssh. Rast. 24: 76. 1987 (*Polygonum pamiricum* Korsh.)

E Pamir: Bulunköl – Muji 3270-3400 m. — 3270-3400 m / scrub, swamp: *Hippophae* / *G rhiz* / (N, S, E) Kyrgyzstan, Tajikistan, W China, Tibet (Tian Shan, Pamir): TIBET.

**Oxyria digyna** (L.) Hill, Hort. Kew. 158. 1769 (*Rumex digynus* L.)

Kongur: Oytagh Vy. Upper 2750-3500 m, Atojnak Vy. 3200 m. — 2750-3500 m / N, NE; scree, scrub: *Hippophae* / *H sem* / (CS, W, S) Europe, Asia, N America (arctic): CIRC POL.

**Polygonum argyrocoleum** Steudel ex O. Kuntze, Linnaea 20: 17. 1847

Kongur: Oytagh Vy. Upper 2760 m. — 2760 m / E; swamp / *H rep* / (–) Asia Minor, Caucasus, C. Asia: IRAN.

**Polygonum molliaeforme** Boiss., Diagn. Pl. Or. Nov. sér. 1, 7: 84. 1846

Kongur: Oytagh Vy. Upper 2900 m. — 2900 m / S; gravel, moraine / *T scand* / (CS, N, S) C. Asia, Iran: C AS.

**Polygonum patulum** M. Bieb., Fl. Taur.-Cauc. 1: 304. 1808

Kongur: Atojnak Vy. 2930 m; E Pamir: Bulunköl – Muji 3400 m. — 2930-3400 m / gravel / *H rep* / (–) Europe, Mediterranean, Asia Minor, Caucasus, W Siberia, C. Asia, W China, Iran: IRAN.

**Polygonum polycnemoides** Jaub. & Spach, Ill. Pl. Or. 2: 30, t. 120, 121. 1845

Kongur: Oytagh Vy. Upper 2910-3280 m; E Pamir: Bulunköl – Muji 3380 m. — 2910-3380 m / S, SE; dwarf-scrub, pasture, swamp: *Artemisia* / *T caesp* / (CS, W, S) Asia Minor, Caucasus, C. Asia, Iran: IRAN.

**Rheum spiciforme** Royle, Ill. Bot. Himal. t. 78, 318. 1836, 1839

Kongur: Oytagh Vy. Upper 3300-3780 m. — 3300-3780 m / E, W; open ground, rock crevice / *G rhiz* / (CN, CS, N, W, S) C. Asia, W China, W Tibet, Pakistan, W Himalayas (Pamir, W Kunlun Shan, Karakorum, W Tibet, W Himalaya): PAMIR.

**Rumex angulatus** Rech. f., Candollea 12: 51. 1949

Kongur: Oytagh Vy. Middle 2300 m, Oytagh Vy. Upper 2750 m. — 2300-2750 m / SE; ruderal / *H caesp* / (N, S) W China, E Afghanistan, Kashmir: HIMAL.

**PRIMULACEAE**

**Androsace flavescens** Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 32: 506. 1888

*Kongur*: Oytagh Vy. Upper 2750-3780 m; *E Pamir*: Bulunköl – Muji 3850 m. — 2750-3850 m / N, NE, NNE, NNW, S, W; open ground, pasture, scree, scrub, swamp, tall forbs, turf: *Juniperus* / *H stol* / (CN, N, W) W China (Kunlun Shan, N Karakorum): ENDEM.

**Androsace ovczinnikovii** Schischkin & Bobrov, Fl. SSSR 18: 729. 1952

*Kongur*: Oytagh Vy. Upper 3280-3450 m. — 3280-3450 m / pasture / *C suff* / (–) W Siberia, C. Asia, W. Mongolia (Altai): C AS.

**Androsace sericea** Ovcz., Fl. SSSR 18: 729. 1952

*Kongur*: Oytagh Vy. Upper 2660-2920 m, Atojnak Vy. 2970 m. — 2660-2970 m / NE, NNW, SE; dwarf-scrub, pasture: *Artemisia* / *C suff* / (–) C. Asia (Pamir-Alai): ENDEM.

**Androsace squarrosula** Maxim., Bull. Acad. St. Petersb. 32: 504. 1888

*E Pamir*: Gez Gorge Upper 3500 m. — 3500 m / meadow / *C pulv* / (–) C. Asia, W China: ENDEM.

**Cortusa brotheri** Pax ex Lipsky, Acta Horti Petropol. 18: 87. 1901

*Kongur*: Oytagh Vy. Upper 2750-3610 m, Atojnak Vy. 3390 m. — 2750-3610 m / N, NNE, NNW, W; forest, open forest, open scrub, pasture, scree, tall forbs, turf: *Picea* / *H sem* / (W) ?Europe, Russia, C. Asia, W & N China, Korea, W Himalayas: C AS.

**Glaux maritima** L., Sp. Pl. 207. 1753

*Kongur*: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 2750-2770 m, Atojnak Vy. 2930 m; *E Pamir*: Bulunköl – Muji 3270-3400 m. — 2100-3400 m / N, SE; ruderal, scrub, swamp: *Hippophae* / *H rep* / (CN, CS, N, W, S) Europe, Asia, N America: CIRC POL.

**Primula algida** Adam ex Weber & Mohr, Beitr. Naturk. 1: 46. 1805

*Kongur*: Oytagh Vy. Upper 3190-3760 m. — 3190-3760 m / N, NNE, W; open forest, tall forbs, turf: *Picea* / *H ros* / (CS, N, W) Caucasus, W Siberia, C. Asia, W China, N Mongolia, Afghanistan, N Iran: C AS.

**Primula capitellata** Boiss., Diagn. Pl. Or. Nov. sér. 1, 7: 64. 1846

*E Pamir*: Bulunköl – Bulunköl – Muji 3400 m. — 3400 m / swamp / *H ros* / (-) Iran: IRAN.

**Primula nutans** Georgi, Reise 1: 200. 1775 (*P. sibirica* L., *P. pamirica* Fedor.)

*Kongur*: Oytagh Vy. Upper 2750-2770 m; *E Pamir*: Bulunköl – Muji -3550 m. — 2750-3550 m / E, N, SE; meadow, scrub, swamp: *Hippophae* / *H ros* / (CN, CS, N, W, S, E) Siberia, N Mongolia, N America: CIRC POL.

**PYROLACEAE**

**Orthilia secunda** (L.) House, Am. Midl. Nat. 7: 134. 1921 (*Pyrola secunda* L., *Ramischia secunda* (L.) Garcke)

*Kongur*: Oytagh Vy. Upper 2970-3320 m, Atojnak Vy. 3000-3300 m. — 2970-3320 m / N, NNW, W; open forest, open scrub, scrub: *Picea*, *Salix* / *C suff* / (W, S) Europe, Asia, N America: CIRC POL.

**Pyrola rotundifolia** L., Sp. Pl. 396. 1753

*Kongur*: Atojnak Vy. 3000-3300 m. — 3000-3300 m / N; scrub: *Salix* / *C suff* / (CS, W, S) Europe, Asia, N America: CIRC POL.

**RANUNCULACEAE**

**Anemone protracta** (Ulbr.) Juzep., Fl. SSSR 7: 273. 1937

*Kongur*: Oytagh Vy. Upper 2900-3800 m. — 2900-3800 m / N, NNE, NNW; open forest, open scrub, turf: *Picea* / *H scap* / (–) Kyrgyzstan, Tajikistan, W China (Tian Shan, Pamir): PAMIR.

**Aquilegia atrovinosa** Popov ex Gamojun., Not. Syst. Herb. Inst. Bot. Acad. Sci. Kazakh. 2: 12. 1964

*Kongur*: Oytagh Vy. Upper 3160 m. — 3160 m / NNE; tall forbs / *H scap* / (–) Pamir-Alai: ENDEM.

**Callianthemum alatavicum** Freyn, Bull. Herb. Boissier 6: 882. 1898-99

*Kongur*: Oytagh Vy. Upper 3300-3780 m. — 3300-3780 m / E, ESE, N, NE, NNE, NNW, W; open forest, open ground, tall forbs, turf: *Picea* / *H ros* / (N, W) C. Asia, W China: PAMIR.

**Clematis orientalis** L., Sp. Pl. 543. 1753

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *Kongur*: Atojnak Vy. 2700 m. — 1830-2700 m / scrub: *Hippophae* / *P scand* / (CS, N, W, S, E) SE Europe, E Mediterranean, Asia Minor, Caucasus, C. Asia, China, Mongolia, Iran, Pakistan: C AS.

**Clematis sibirica** Miller, Gard. Dict. 8: 12. 1768 (*Clematis alpina* (L.) Miller var. *sibirica* (L.) O. Kuntze, *Atragene sibirica* L.)

Kongur: Oytagh Vy. Upper 2770-3150 m, Atojnak Vy. 3030 m. — 2770-3150 m / N, NW, S; open forest, pasture, scrub: *Juniperus*, *Picea* / *P scand* / (CS, W, S) N & E Europe, W & E Siberia, C. Asia, W China, Mongolia, Pakistan (Tian Shan, E Pamir, SW Karakorum): EURAS.

**Clematis songarica** Bunge, Del. Sem. Hort. Dorpat. 8. 1839

Kongur: Oytagh Vy. Middle 2100-2300 m; E Pamir: Gez Gorge Upper 3000-3300 m. — 2100-3300 m / N; gravel, moraine, ruderal, desert: *Chenopodiaceae* / *C suff* / (W) C. Asia, Mongolia: C AS.

**Clematis tangutica** Korsh., Bull. Acad. Sci. Petersb. 9: 575: 1898

Kongur: Oytagh Vy. Upper 2590 m; E Pamir: Bulunköl – Muji 3550 m. — 2590-3550 m / gravel, scrub: *Hippophae* / *C scand* / (N) C. Asia, W China, Mongolia: TIBET.

**Delphinium aktoense** W. T. Wang, Acta Phytotax. Sin. 37 (3): 215, 216. 1999

Kongur: Oytagh Vy. Upper 3430 m, Atojnak Vy. 3200 m. — 3200-3430 m / N; gravel, tall forbs, pasture, scrub: *Hippophae* / *H scap* / (–) W China: ENDEM.

**Delphinium zhangii** W. T. Wang, Acta Phytotax. Sin. 37 (3): 213, 214. 1999

E Pamir: Bulunköl – Muji 3550 m. — 3550 m / river bank / *H scap* / (–) W China: ENDEM.

**Halerpestes salsuginosa** (Pall.) Greene, Pittonia 4: 208. 1900 (*Ranunculus salsuginosus* Pall., *R. sarmentosus* Adams)

Kongur: Oytagh Vy. Upper 2750-2800 m; E Pamir: Bulunköl – Muji 3270-3800 m. — 2750-3800 m / N, NW; pasture, scrub, swamp: *Hippophae* / *H stol* / (CS, N, W, S, E) W & E Siberia, C. Asia, China, Mongolia, Japan, N India, Himalayas: C AS.

**Isopyrum anemonoides** Kar. & Kir., Bull. Soc. Nat. Mosc. 15: 135. 1842

Kongur: Oytagh Vy. Upper 2790-3400 m; E Pamir: Gez Gorge Upper 3500 m. — 2790-3500 m / N, NNW, NW, S, SE; open forest, pasture, scrub: *Juniperus*, *Picea* / *G rhiz* / (CS, N, W) C. Asia, W China, Tibet, Iran, N India, Himalayas: C AS.

**Oxygraphis glacialis** (Fisch.) Bunge, Verz. Fl. Alt., Suppl. 416. 1836

Kongur: Oytagh Vy. Upper 3740-3900 m. — 3740-3900 m / NNE; turf / *H ros* / (N) W & E Siberia, C. Asia, W China, Tibet, Mongolia: C AS.

**Ranunculus affinis** R. Br. in Parry, Voy. App. 1: 265. 1824

Kongur: Oytagh Vy. Upper 3200-3900 m. — 3200-3900 m / S; scrub: *Juniperus* / *H caesp* / (CS, N, W, S) Europe, Asia, N America: CIRC POL.

**Ranunculus albertii** Regel & Schmalh., Acta Horti Petrop. 5: 223. 1877

Kongur: Oytagh Vy. Upper 3300 m. — 3300 m / W; tall forbs / *H caesp* / (–) C. Asia, W China, Mongolia: C AS.

**Ranunculus pulchellus** C. A. Mey. in Ledeb., Fl. Alt. 2: 333. 1830

E Pamir: Bulunköl – Muji 3800 m. — 3800 m / pasture / *H caesp* / (CS, N, W, S, E) W & E Siberia, C. Asia, China, N Mongolia: C AS.

**Ranunculus rubrocalyx** Regel ex Komarov, Trav. Soc. Nat. Petersb. 26: 62. 1896

Kongur: Oytagh Vy. Upper 3160 m. — 3160 m / NNE; tall forbs / *H caesp* / (W, S) Kyrgyzstan, Tajikistan, W China (Tian Shan, Pamir-Alai): PAMIR.

**Ranunculus trautvetterianus** Regel ex Ovcz., Fl. SSSR 7: 403. 1937

Kongur: Oytagh Vy. Upper 3600 m. — 3600 m / NE; turf / *H caesp* / (–) C. Asia, W China: PAMIR.

**Thalictrum alpinum** L., Sp. Pl. 545. 1753

Kongur: Oytagh Vy. Upper 3050-3900 m. — 3050-3900 m / E, NE, NNE; pasture, turf / *H ros* / (N, W, S) Europe, Asia, N America (arctic): CIRC POL.

**Thalictrum foetidum** L., Sp. Pl. 545. 1753

Kongur: Oytagh Vy. Upper 3300 m. — 3300 m / E; rock crevice / *H caesp* / (CS, N, W, S) C. & E Europe, W Mediterranean, Asia Minor, Caucasus, W & E Siberia, C. Asia, W China, Tibet, Mongolia, Iran: EURAS.

**Trollius dschungaricus** Regel, Acta Horti Petrop. 7: 383. 1880

Kongur: Oytagh Vy. Upper 3160-3760 m, Atojnak Vy. 3390-3650 m. — 3160-3760 m / ESE, NNE, W; pasture, tall forbs, turf / *H scap* / (–) C. Asia, W China: PAMIR.

**ROSACEAE**

**Comarum salesovianum** (Steph.) Asch. & Graebner, Syn. 6: 863. 1904 (*Potentilla salesoviana* Steph.)

*Kongur*: Oytagh Vy. Upper 2700 m, Atojnak Vy. 3200 m; *E Pamir*: Bulunköl – Muji 3550 m. — 2700-3550 m / N; gravel, scrub: *Hippophae* / *C frut* / (CN, CS, N, W, S, E) W & E Siberia, C. Asia, Tibet, Mongolia, Himalayas: C AS.

**Dasiphora dryadanthoides** Juzep., Fl. URSS 10: 608. 1941 (*Potentilla fruticosa* L. var. *pumila* Hook. f., *P. dryadanthoides* (Juzep.) Viroshilov)

*Kongur*: Oytagh Vy. Upper 2610-2700 m, Atojnak Vy. 2700 m. — 2610-2700 m / NNE, SE; gravel, open forest, scrub: *Hippophae*, *Juniperus* / *C frut* / (CN, CS, N, W, S, E) C. Asia, W China, Tibet, Himalayas (Pamir, Karakorum, Tibet, Himalaya): TIBET.

**Potentilla agrimonoides** M. Bieb., Fl. Taur. Cauc. 1: 403. 1808

*Kongur*: Oytagh Vy. Upper 3170 m. — 3170 m / SE; dwarf-scrub: *Artemisia* / *H caesp* / (CS, N, S) Caucasus, C. Asia: C AS.

**Potentilla anserina** L., Sp. Pl. 495. 1753

*Kongur*: Oytagh Vy. Upper 2800 m, Atojnak Vy. 2930 m; *E Pamir*: Bulunköl – Muji 3270-3400 m. — 2800-3400 m / NW; scrub, swamp: *Hippophae* / *H stol* / (W, S) Europe, Asia, N & S America, Australia: COSMO.

**Potentilla bifurca** L. subsp. **orientalis** (Juz.) Soják

*Kongur*: Oytagh Vy. Upper 2610-3180 m, Atojnak Vy. 2970 m; *E Pamir*: Bulunköl – Muji 3800 m. — 2500-3800 m / E, ESE, NNE, S, SE, SSE; dwarf-scrub, meadow, open forest, pasture: *Artemisia*, *Juniperus* / *H rep* / (CN, CS, N, W, S, E) SE Europe, W & E Siberia, Mongolia / CAS.

**Potentilla desertorum** Bunge in Ledeb., Fl. Alt. 2: 257. 1830

*Kongur*: Oytagh Vy. Upper 3200 m. — 3200 m / NNE; tall forbs / *H caesp* / (CS, N, W, S) W Siberia, C. Asia, N Mongolia, NW India, W Himalayas: C AS.

**Potentilla longifolia** Willd. ex Schlecht., Mag. Ges. Natur. Fr. Berl. 7: 287. 1816

*Kongur*: Oytagh Vy. Upper 2800 m. — 2800 m / ESE; meadow / *H caesp* / (–) E Europe, W & E Siberia, C. Asia, China, Mongolia, Japan: C AS.

Notes: Doubtful identification.

**Potentilla multifida** L., Sp. Pl. 496. 1753

*Kongur*: Oytagh Vy. Upper 2610-3480 m, Atojnak Vy. 2930-3300 m; *E Pamir*: Bulunköl – Muji 3800 m. — 2610-3900 m / E, ESE, N, NNE, NNW, NW, S, SE, ; dwarf-scrub, gravel, moraine, meadow, open forest, pasture, ruderal, scrub, steppe, swamp, tall forbs, turf: *Artemisia*, *Juniperus*, *Picea*, *Salix*, *Stipa* / *H caesp* / (CN, CS, N, W, S, E) C. & E Europe, W & E Siberia, C. Asia, China, Mongolia, Japan, Iran, Afghanistan, N America: CIRCPO.

**Potentilla ornithopoda** Tausch, Hort. Canal. 1: t 10. 1823

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *Kongur*: Oytagh Vy. Middle 2300-2590 m. — 1830-2590 m / ruderal, scrub: *Hippophae* / *H caesp* / (CS, S) Siberia, C. Asia, W & N China, Mongolia, Pakistan, NW India: C AS.

**Potentilla pamirica** Th. Wolf, Acta Hort. Petrop. 31: 489. 1915

*Kongur*: Oytagh Vy. Upper 3050-3830 m. — 3050-3830 m / ESE, NE, NNE, S, SSW, W; open ground, pasture, scrub, turf: *Juniperus* / *C pulv* / (CN, CS, N, W, S, E) C. Asia, W China, Afghanistan, Pakistan (Tian Shan, Pamir, Hindukush, Karakorum, Kunlun Shan, W Tibet): PAMIR.

**Potentilla turczaninowiana** Stschegl., Bull. Soc. Nat. Mosc. 27: 164. 1854

*Kongur*: Oytagh Vy. Upper 2850-3900 m. — 2850-3900 m / N, NE, NNE; scree, turf / *H caesp* / (CN, CS, N, W, S) C. Asia, W China, Pakistan, NW India (Pamir, Tian Shan, Karakorum, W Himalaya): C AS.

**Potentilla virgata** Lehm., Monogr. Potent. 75. 1820

*E Pamir*: Bulunköl – Muji 3400-3800 m. — 3400-3800 m / desert, swamp: *Chenopodiaceae* / *H caesp* / (CN, N, W, S) C. Asia, W China, Afghanistan, Pakistan, NW India: C AS.

**Rosa albertii** Regel, Acta Hort. Petrop. 8: 278. 1883

*Kongur*: Oytagh Vy. Upper 2500-3150 m, Atojnak Vy. 2750-3200 m. — 2500-3200 m / N, NNW, NW, SE; gravel, open forest, pasture, scrub: *Hippophae*, *Juniperus*, *Picea* / *P caesp* / (–) W Siberia, Kazakhstan, Kyrgyzstan (Altai, Tian Shan (endemic): C AS.

**Rosa beggeriana** Schrenk, Enum. Pl. Nov. 73. 1841

*Kongur*: Atojnak Vy. 2700 m. — 2700 m / scrub: *Hippophae* / *P caesp* / (W) C. Asia, W China, Iran, Afghanistan, Pakistan: PAMIR.

**Sibbaldia tetrandra** Bunge, Enum. Pl. Altaica 17. 1835

*Kongur*: Oytagh Vy. Upper 3600-3750 m. — 3600-3750 m / NE, S; turf / *C pulv* / (CN, CS, N, W, S, E) W Siberia, C. Asia, Tibet, Himalayas: C AS.

**Sibbaldianthe adpressa** (Bunge) Juzep., Fl. URSS 10: 230. 1941 (*Sibbaldia adpressa* Bunge in Ledeb.)

*E Pamir*: Gez Gorge Upper 3500 m, Bulunköl – Muji 3550 m. — 3500-3550 m / gravel, meadow / *H rep* / (CN, N, S) W & E Siberia, C. Asia, China, N Mongolia, Japan: C AS.

**Sorbus tianschanica** Rupr., Mém. Acad. Sci. Pétersb. sér. 7, 14 (4): 46. 1869 (*Sorbus aucuparia* auct. non L.)

*Kongur*: Oytagh Vy. Upper 2900-3150 m, Atojnak Vy. 3150 m. — 2900-3150 m / N, NNW; forest, open forest: *Picea* / *P scap* / (W, S) C. Asia, W China, Pakistan, NW India (Tian Shan, Pamir, SW Karakorum, W Himalaya): PAMIR.

#### RUBIACEAE

**Galium boreale** L., Sp. Pl. 108. 1753

*Kongur*: Oytagh Vy. Upper 2810-3430 m. — 2810-3430 m / ESE, N, NNE; meadow, tall forbs / *H rep* / (W, S) Europe, Asia, N America (temp.): CIRC POL.

**Galium pauciflorum** Bunge, Enum. Pl. Chin. Bor. 35. 1831 (*G. aparine* auct. non L., *G. spurium* auct. non L.)

*Kongur*: Oytagh Vy. Upper 2950-3200 m, Atojnak Vy. 2700 m. — 2700-3200 m / N, S, SE; open forest, scrub, turf: *Juniperus*, *Picea* / *H scand* / (CS, W, S) N, W & C. China, N Pakistan, Kashmir: C AS.

#### SALICACEAE

**Populus nigra** L., Sp. Pl. 1034. 1753

*Kongur*: Atojnak Vy. 2520 m. — 2520 m / N; open forest: *Populus* / *P scap* / (W, S) Europe, N Africa, W & C. Asia: EURAS.

**Salix iliensis** Regel, Acta Horti Petropol. 6: 464. 1880

*Kongur*: Oytagh Vy. Upper 2960-3400 m, Atojnak Vy. 3300 m. — 2960-3400 m / N, NE, S; forest, open forest, scree, scrub: *Picea*, *Salix* / *P scap* / (W, S) S Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, W China, Afghanistan, Pakistan (Dzhung. Alatau, Tian Shan, Pamir-Alai, Kunlun Shan): PAMIR.

**Salix karelinii** Turcz. ex. Stscheegl., Bull. Soc. Natur. Moscou 27: 196. 1854 (*S. fedtschenkoi* Görz)

*Kongur*: Oytagh Vy. Upper 2850-3000 m. — 2850-3000 m / N; forest: *Picea* / *P scap* / (CS, W, S) Tajikistan, W China, Afghanistan (Tian Shan, Pamir-Alai (endemic)): PAMIR.

**Salix pycnostachya** N. J. Andersson, J. Linn. Soc. London (Bot.) 4: 44. 1860

*Kongur*: Atojnak Vy. 2520 m. — 2520 m / N; open forest: *Populus* / *P caesp* / (CS, N, W, S) Uzbekistan, Kyrgyzstan, Tajikistan, W China, W Tibet, Afghanistan, Pakistan, N India, Nepal, ?Bhutan: PAMIR.

**Salix schugnanica** Görz, Trudy Tadh. Bazy Akad. Nauk. 2: 173. 1936

*Kongur*: Oytagh Vy. Upper 3000 m. — 3000 m / N; open forest / *P caesp* / (CN, CS, W) C. Asia, W China, Afghanistan, Pakistan (Pamir-Alai, Kunlun Shan): PAMIR.

**Salix tianschanica** Regel, Acta Horti Petrop. 6: 471. 1880

*Kongur*: Atojnak Vy. 3150-3390 m. — 3150-3390 m / N, W; forest, pasture: *Picea* / *P caesp* / (–) Kazakhstan, Kyrgyzstan (Tian Shan, Pamir-Alai): PAMIR.

#### SAXIFRAGACEAE

**Saxifraga oppositifolia** L. subsp. *asiatica* (Hayek) Engl. & Irm. in Engl. Pflanzenr. 67, 69 (4. 117): 640. 1919

*Kongur*: Oytagh Vy. Upper 2850, Atojnak Vy. 3500-3750 m. — 2850-3750 m / N; moraine / *C pulv* / (CN, CS, N, W, S) Siberia, C. Asia, W China, Pakistan (Altai, Tian Shan, W Tibet, Karakorum): C AS.

**Saxifraga pulvinaria** H. Smith, Bull. Brit. Mus. (Nat. Hist.), Bot. 2 (4): 105. 1958 (*S. imbricata* Royle, non Lam.)

*Kongur*: Oytagh Vy. Upper 3150-3750 m. — 3150-3750 m / N, NE, NNE, NNW, S; gravel, moraine, open forest, scree, scrub, turf: *Juniperus*, *Picea* / *C pulv* / (CN, CS, N, W, S) Pakistan, Kashmir, N India, Nepal, Sikkim (Karakorum, Himalaya): W HIM.

Notes: *S. subsessiflora* Engl. & Irmisch. from Wuyitage (Oytagh Vy.), 3500 m, *WOWF-4838* (KUN), as reported by Ohba, Wu & Akiyama (1995) may belong here.

#### SCROPHULARIACEAE

**Dodartia orientalis** L., Sp. Pl. 633. 1753

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / ruderal / *C suff* / (–) Russia, C. Asia, W, N & C. China, Mongolia: C AS.

**Euphrasia pectinata** Ten., Fl. Nap. 1: 36. 1811-1813

*Kongur*: Oytagh Vy. Upper 2820-3600 m, Atojnak Vy. 2950-3390 m. — 2820-3600 m / N, NE, NNW, W; meadow, pasture, turf / *T caesp* / (W) E Europe, E Russia, W, N & C. & E China, Mongolia, Korea: EURAS.

**Lagotis decumbens** Rupr., Mém. Acad. Sci. Pétersb. sér. 7, 14 (4): 64. 1869

*Kongur*: Oytagh Vy. Upper 3700-3800 m. — 3700-3800 m / W; open ground / *G rhiz* / (CN, N, W, E) Kyrgyzstan, Tajikistan, W China, Tibet: PAMIR.

**Odontites vulgaris** Moench., Meth. Pl. 439. 1794

*Kongur*: Atojnak Vy. 2300-2950 m. — 2300-2950 m / meadow / *T sem* / (CS, S) Europe, Siberia, N China, Mongolia: EURAS.

**Pedicularis dolichorrhiza** Schrenk, Bull. Phys.-Math. Acad. Sci. Petersb. 1: 80. 1842

*Kongur*: Oytagh Vy. Upper 3000-3430 m. — 3000-3430 m / ESE, NNE, NNW; pasture, tall forbs / *H scap* / (W, E) Kazakhstan, Kyrgyzstan, Tajikistan, W China, Afghanistan, Pakistan, NW India: PAMIR.

**Pedicularis oederi** Vahl in Hornem., Dansk. Oek. Plant. ed. 2, 580. 1806

*Kongur*: Oytagh Vy. Upper 3160-3900 m, Atojnak Vy. 3390 m. — 3160-3900 m / E, N, NNE, SE, W; dwarf-scrub, forest, open forest, pasture, tall forbs, turf: *Artemisia, Picea* / *H sem* / (CS, S) N & C. Europe, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, W, N & C. China, Mongolia, Japan, Bhutan, N America: CIRCPO.

**Pedicularis rhinanthoides** Schrenk ex Fisch. & C. A. Mey., Enum. Pl. Nov. 1: 22. 1841

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / pasture / *H sem* / (CN, N, W, S, E) Russia, Kazakhstan, Kyrgyzstan, Tajikistan, W, N & C. China, Mongolia, N India: C AS.

**Pedicularis semenovii** Regel, Bull. Soc. Nat. Mosc. 41?: 108. 1868

*Kongur*: Oytagh Vy. Upper 2800-3060 m. — 2800-3060 m / N; open forest: *Picea* / *H sem* / (–) Kazakhstan, Kyrgyzstan, W China, Tibet, Afghanistan, N India: PAMIR.

**Scrophularia dentata** Royle ex Benth., Scroph. Ind. 19. 1835 (*S. koelzii* Pennell, *S. nudata* Pennell, *S. variegata* auct. non (M. Bieb.) Hook. f.)

*Kongur*: Oytagh Vy. Upper 2800-2850 m, Atojnak Vy. 3200 m; *E Pamir*: Bulunköl – Muji 3950 m. — 2800-3950 m / N, NE; gravel, scrub, desert: *Chenopodiaceae, Hippophae* / *H caesp* / (W, S, E) Tibet, E Afghanistan, Pakistan, NW India (W Himalaya): W HIM.

**Veronica biloba** Schreber in L., Mant. 172. 1771

*Kongur*: Oytagh Vy. Upper 2950-3770 m. — 2950-3770 m / NE, NW, S, SE; dwarf-scrub, open forest, pasture, scree: *Artemisia, Juniperus* / *T caesp* / (CS, W, S) Russia, SW & C. Asia, W, N & C. China, Mongolia, Afghanistan, Pakistan, Kashmir, N India, W Nepal (W Himalaya): IRAN.

## SOLANACEAE

**Lycium ruthenicum** Murray, Comm. Soc. Reg. Sci. Götting. 7: 9, t. 2. 1780

*W Kashgaria*: Oytagh Vy. Lower 1830 m, Kashgar S 1840 m; *Kongur*: Oytagh Vy. Middle 2100-2550 m, Oytagh Vy. Upper 2700 m. — 1830-2700 m / N; scrub, desert: *Chenopodiaceae, Hippophae* / *P caesp* / (CS, S) Europe, Russia, SW & C. Asia, W, N & C. China, Mongolia, Afghanistan, Pakistan: EURAS.

## TAMARICACEAE

**Myricaria elegans** Royle, Ill. Bot. Himal. 214. 1835 (*Tamaricaria elegans* (Royle) Qaiser & Ali, *Tamarix ladachensis* Baum)

*Kongur*: Oytagh Vy. Middle 2590 m. — 2590 m / scrub: *Hippophae* / *P caesp* / (CN, CS, N, W, S) W China, N Tibet, N India, N Pakistan (E Pamir, W Kunlun Shan, Karakorum, W Himalaya): PAMIR.

**Myricaria germanica** (L.) Desv. subsp. **alopecuroides** (Schrenk) Kitamura, Fl. Afgh. 272. 1960 (*M. bracteata* Royle)

*W Kashgaria*: Gez Gorge Lower 1700 m; *Kongur*: Oytagh Vy. Middle 2100 m, Atojnak Vy. 2700 m. — 1700-2700 m / ruderal, scrub: *Hippophae* / *P caesp* / (CN, CS, N, W, S, E) Siberia, China, Afghanistan, Pakistan, N India: C AS.

**Reaumuria soongorica** (Ehrenb.) Maxim., Fl. Tangut. 97. 1889

*W Kashgaria*: Kashgar S 1840 m, Oytagh Vy. Lower 1850-1900 m. — 1840-1900 m / N; desert: *Chenopodiaceae* / *C frut* / (N) W Siberia, C. Asia, W China, Mongolia: C AS.

**Tamarix chinensis** Lour., Fl. Cochinch. 1: 182. 1790

*W Kashgaria*: Gez Gorge Lower 1700 m, Oytagh Vy. Lower 1830 m. — 1700-1830 m / scrub: *Hippophae* / *P caesp* / (N) C. Asia: China, Mongolia: C AS.

**Tamarix ramosissima** Ledeb., Fl. Alt. 1: 424. 1829

*W Kashgaria*: Kashgar S 1840 m; *Kongur*: Oytagh Vy. Middle 2200 m. — 1840-2200 m / N; desert: *Chenopodiaceae* / *P caesp* / (N, W) SE Europe, Asia Minor, Caucasus, C. Asia, China, Mongolia, Korea, Japan, Iran, Afghanistan, Pakistan: EURAS.

#### UMBELLIFERAE

**Aegopodium kashmiricum** (R. R. Stewart ex Dunn) Pimenov, Bull. Soc. Nat. Mosc., div. biol. 97, 4: 114. 1992 (*Ae. tadshikorum* auct. non Schischkin, *Ae. alpestre* auct. non Ledeb.)

*Kongur*: Oytagh Vy. Upper 2750-3430 m. — 2750-3430 m / ESE, N, NNE, NNW, NW, S, SE, W; open forest, pasture, scrub, swamp, tall forbs, turf: *Juniperus*, *Picea* / *H scap* / (W, S) C. Asia, NW China, Pakistan, NW India/ C AS.

**Angelica brevicaulis** (Rupr.) B. Fedtsch., Consp. Fl. Turkestan. 3: 9. 1909

*Kongur*: Atojnak Vy. 3200 m. — 3200 m / N; scrub: *Hippophae* / *H scap* / (–) Kyrgyzstan, Tajikistan, W China (Tian Shan, Pamir Alai): PAMIR.

**Aulacospermum simplex** Rupr., Mem. Acad. Sci. Petersb. ser. 7, 14 (4): 49. 1869 (*Pleurospermum simplex* (Rupr.) Benth. & Hook. f.)

*Kongur*: Oytagh Vy. Upper 2800-3800 m. — 2800-3800 m / N, NE, NNE, NW, SE; open forest, pasture: *Picea* / *H sem* / (–) Kazakhstan, Kyrgyzstan, Tajikistan, W China (Dzhung. Alatau, Tian Shan, Pamir-Alai): PAMIR.

**Bupleurum densiflorum** Rupr., Mem. Acad. Sci. Petersb. ser. 7, 14(4): 47. 1869

*Kongur*: Oytagh Vy. Upper 2800 m, Atojnak Vy. 3200 m. — 2800-3200 m / N, NE; gravel, scrub: *Hippophae* / *H caesp* / (–) Kazakhstan, Kyrgyzstan, Tajikistan, W China (Dzhung. Alatau, Tian Shan, N Pamir-Alai): PAMIR.

**Carum carvi** L., Sp. Pl. 263. 1753

*Kongur*: Oytagh Vy. Upper 2750-2900 m, Atojnak Vy. 2900 m. — 2750-2900 m / E, N, WNW; meadow, open forest, pasture, ruderal, swamp: *Picea* / *H scap* / (CS, W, S) Europe, N Africa, Asia: EURAS.

**Ferula transiliensis** (Herder) Pimenov, Cherep. Sosud. Rast. SSSR 21. 1981

*Kongur*: Atojnak Vy. 2940 m. — 2940 m / NNW; open ground / *H scap* / (–) Kazakhstan, Kyrgyzstan, W China (Dzhung. Alatau, Tian Shan, W Kunlun Shan): PAMIR.

**Hymenidium nanum** (Rupr.) Pimenov & Kljuykov, Feddes Repert. 111, 7-8: 549. 2000 (*Hymenolaena nana* Rupr., *Pleurospermum lindleyanum* (Klotzsch) B. Fedtsch.)

*Kongur*: Oytagh Vy. Upper 3600 m, Atojnak Vy. 3200-3230 m. — 3200-3600 m / E, N, NE; scree, scrub, turf: *Hippophae* / *H scap* / (CN, N, W, S, E) Kirghizia, Tajikistan, NW China (Tian Shan): C AS.

**Schulzia albiflora** (Kar. & Kir.) Popov, Fl. Alma-At. Zapov. 35. 1940

*Kongur*: Oytagh Vy. Upper 3050-3830 m, Atojnak Vy. 2930 m. — 2930-3830 m / E, ESE, N, NE, NNE, NNW; pasture, swamp, turf / *H caesp* / (CS, N, W) Kazakhstan, Kyrgyzstan, Tajikistan, W China (Dzhung. Alatau, Tian Shan, N Pamir-Alai): PAMIR.

**Seseli mucronatum** (Schrenk) Pimenov & Sdobnina, Bjull. Mosk. Obssh. Isp. Prir. 78 (4): 139. 1973 (*Neogaya mucronata* (Schrenk), *Pachypleurum mucronatum* (Schrenk) Schischkin)

*Kongur*: Oytagh Vy. Upper 2790-3900 m, Atojnak Vy. 2900-3390 m; *E Pamir*: Bulunköl – Muji 3550 m. — 2790-3900 m / ESE, N, NE, NNE, NW, S, W; meadow, open forest, pasture, scrub, tall forbs, turf: *Juniperus*, *Salix* / *H sem* / (CS, N) Kazakhstan, Kyrgyzstan, Tajikistan, N & W & C. China: C AS.

**Seseli pelliottii** (H. Boissieu) Pimenov & Kljuykov, Bot. Zhurn. 85, 10: 105, fig. 2, E. 2000

*Kongur*: Oytagh Vy. Middle 2200 m, Oytagh Vy. Upper 2900-3080 m, Atojnak Vy. 2700 m. — 2200-3080 m / N; scrub, desert: *Chenopodiaceae*, *Hippophae* / *H scap* / (–) Khirghizia, NW China: ENDEM.

**Vicatia atosanguinea** (Kar. & Kir.) P. K. Mukh. & Pimenov, Feddes Repert. 102 (5-6): 377. 1991

*Kongur*: Oytagh Vy. Upper 2850-3760 m, Atojnak Vy. 3300-3500 m. — 2850-3760 m / N, NE, NNE, NNW, S, W; forest, open forest, pasture, scree, scrub, tall forbs, turf: *Juniperus*, *Picea*, *Salix* / *H sem* / (–) W Siberia, Kazakhstan, Kyrgyzstan, W China (Altai, Tian Shan): C AS.

#### VALERIANACEAE

**Valeriana fedtschenkoi** Coincy, Ecloga altera Pl. Hispan. 15. 1895

*Kongur*: Oytagh Vy. Upper 2970-3600 m. — 2970-3600 m / NE, NNW; open scrub, scree: *Picea* / *H scap* / (W) W Siberia, Kazakhstan, Kyrgyzstan, W China, Afghanistan, Pakistan (Altai, Dzhung. Alatau, Tian Shan): C AS.

**Valeriana jaeschkei** C. B. Clarke in Hook. f., Fl. Brit. India 3: 212. 1881

*Kongur*: Oytagh Vy. Upper 2750-3000 m. — 2750-3000 m / N; open forest, scree: *Picea* / *H scap* / (W, S) Kashmir: W HIM.

**VIOLACEAE**

**Viola biflora** L., Sp. Pl. 936. 1753

*Kongur*: Oytagh Vy. Upper 3150-3770 m. — 3150-3770 m / E, NNW, S; open forest, rock crevice, scrub: *Juniperus*, *Picea* / *H caesp* / (CN, CS, N, W, S) Europe, C. Asia, Pakistan, N India: EURAS.

**Viola thianschanica** Maxim., Bull. Acad. Petersb. 26: 427. 1880

*Kongur*: Oytagh Vy. Upper 3050-3830 m. — 3050-3830 m / ESE, NE, NNE, W; forest, pasture, scrub, tall forbs, turf: *Juniperus*, *Picea* / *H ros* / (N) C. Asia, W China (E Pamir, Tian Shan): ENDEM.

**ZYGOPHYLLACEAE**

**Nitraria schoberi** L., Syst. Nat. 10, ed. 2: 1044. 1759

*Kongur*: Oytagh Vy. Middle 2200 m, Atojnak Vy. 2300-2700 m. — 2200-2700 m / N; open forest, scrub, desert: *Chenopodiaceae*, *Hippophae*, *Populus* / *C frut* / (CN, CS, N) SE Europe, Asia Minor, Siberia, W China, Iran, Pakistan: EURAS.

**Peganum harmala** L., Sp. Pl. 444. 1753

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / ruderal / *G rad* / (CS, N, W, S) S Europe, N Africa, SW & C. Asia, W & C. China, Himalayas: SUBTROP.

**Zygophyllum gobicum** Maxim., Enum. Mong. 125. 1889

*W Kashgaria*: Kashgar S 1370 m. — 1370 m / desert / *G rad* / (–) Mongolia: C AS.

**Zygophyllum lehmannianum** Bunge, Arb. Natur. Ver. Riga 1 (2): 202. 1847

*W Kashgaria*: Oytagh Vy. Lower 1830-1850 m. — 1830-1850 m / N; scrub, desert: *Chenopodiaceae*, *Hippophae* / *T caesp* / (N) C. Asia, W China: C AS.

**Zygophyllum obliquum** M. Popov, Bull. SAGU 11: 113. 1925

*E Pamir*: Bulunköl – Muji 3450-3800 m. — 3450-3800 m / gravel, desert: *Chenopodiaceae* / *G rad* / (N) C. Asia, W & N China, Mongolia, Iran: C AS.

**Zygophyllum xanthoxylum** Engl. in Engl. & Prantl, Nat. Pflanzenfam. 3, 4: 81. 1890

*W Kashgaria*: Oytagh Vy. Lower 1900 m; *Kongur*: Oytagh Vy. Middle 2130 m. — 1900-2130 m / N; desert: *Chenopodiaceae* / *C frut* / (–) Mongolia: C AS.

**Monocotyledoneae****ALLIACEAE**

**Allium filifolium** Regel, Acta Horti Petropol. 10: 352. 1887

*Kongur*: Oytagh Vy. Upper 2700-2920 m, Atojnak Vy. 2700 m; *E Pamir*: Bulunköl – Muji 3550-3800 m. — 2700-3800 m / NE; gravel, open forest, pasture, scrub: *Hippophae*, *Picea* / *G bulb* / (CS, N, W) C. Asia, W China, NE Afghanistan, NW Pakistan (Tian Shan, Pamir-Alai, Kunlun Shan, Hindukush, NW Himalaya): C AS.

**Allium glomeratum** Prokhanov, Izv. Glavn. Bot. Sada SSSR 29: 560. 1930

*Kongur*: Oytagh Vy. Upper 2850-2900 m. — 2850-2900 m / N, W; open forest, open ground: *Picea* / *G bulb* / (N) Kazakhstan, Kyrgyzstan, Tajikistan, W China (Dzhung. Alatau, Tian Shan, E Pamir, W Kunlun Shan): PAMIR.

**Allium oreoprasum** Schrenk, Bull. Sci. Acad. Imp. Sci. Pétersb. 10: 354. 1842

*Kongur*: Atojnak Vy. 2250-2500 m; *E Pamir*: Gez Gorge Upper 3000-3300 m, Bulunköl – Muji 3450 m. — 2250-3450 m / N; gravel, gravel, moraine / *G bulb* / (CS, N, S) Kazakhstan, Kyrgyzstan, Tajikistan, W China, Pakistan (Dzhung. Alatau, Tian Shan, Pamir, Karakorum, Kunlun Shan): PAMIR.

**Allium pamiricum** Wendelbo, Bot. Not. 122: 32. 1969

*Kongur*: Oytagh Vy. Upper 2700-2780 m. — 2700-2780 m / S, SSE; dwarf-scrub, open forest: *Artemisia*, *Juniperus* / *G bulb* / (–) Tajikistan, NE Afghanistan (Pamir): PAMIR.

**Allium platyspathum** Schrenk, Enum. Pl. Nov. 1: 7. 1841

*Kongur*: Oytagh Vy. Upper 3770-3830 m. — 3770-3830 m / *G bulb* / (W) W Siberia, Kazakhstan, Kyrgyzstan, Tajikistan, W China, Pakistan (Altai, Dzhung. Alatau, Tian Shan, Pamir-Alai, Karakorum): C AS.

**Allium schoenoprasoides** Regel, Acta Horti Petropol. 5: 630. 1878

*Kongur*: Oytagh Vy. Upper 3080-3180 m; *E Pamir*: Gez Gorge Upper 3500 m. — 3080-3500 m, scrub: *Juniperus* / *G bulb* / (–) Tajikistan, W China, NE Afghanistan (E Pamir, W Kunlun Shan): PAMIR.

## CYPERACEAE

**Blysmus compressus** (L.) Panzer ex Link, Hort. Berol. 1: 278. 1827

*Kongur*: Oytagh Vy. Upper 2760-2770 m, Atojnak Vy. 2930 m; *E Pamir*: Bulunköl – Muji 3270-3400 m. — 2760-3400 m / E, SE; scrub, swamp: *Hippophae* / *G rhiz* / (CN, CS, N, W, S) Europe, N Africa, Asia: EURAS.

**Blysmus rufus** (Hudson) Link, Hort. Berol. 1: 278. 1827

*E Pamir*: Bulunköl – Muji 3400 m. — 3400 m / swamp / *G rhiz* / (S) Europe, N Africa, Asia: EURAS.

**Bolboschoenus maritimus** (L.) Palla in W. D. J. Koch, Syn. Deutsch. Schweiz. Fl. ed. 3, 2532. 1905

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *Kongur*: Oytagh Vy. Middle 2100 m. — 1830-2100 m / ruderal, scrub: *Hippophae* / *G rhiz* / (W) Europe, N Africa, Asia: EURAS.

**Carex alajica** Litv., Trav. Mus. Bot. Acad. Petersb. 7: 99. 1910

*Kongur*: Oytagh Vy. Upper 3120-3320 m. — 3120-3320 m / SE, W; open forest, scrub: *Juniperus*, *Picea* / *H caesp* / (–) Kyrgyzstan, Tajikistan, W China (Tian Shan, Pamir Alai, W Kunlun Shan): PAMIR.

**Carex alexeenkoana** Litv., Trav. Mus. Bot. Acad. Pétersb. 7: 98. 1910

*Kongur*: Oytagh Vy. Upper 3300-3900 m; *E Pamir*: Gez Gorge Upper 3500 m. — 3300-3900 m / E; meadow, rock crevice, scrub: *Juniperus* / *H caesp* / (CN, CS, N, W, S, E) Kyrgyzstan, Tajikistan, W China, Afghanistan, Pakistan, Kashmir, NW India (Tian Shan, Pamir Alai, W Kunlun Shan): PAMIR.

**Carex curaica** Kunth, Enum. pl. 2: 375. 1837

*E Pamir*: Bulunköl – Muji 3400 m. — 3400 m / swamp / *G rhiz* / (CN, N) W Siberia, Kazakhstan, Kyrgyzstan, Tajikistan, W China, Pakistan (Altai, Dzhung. Alatau, Tian Shan, E Pamir, N Karakorum): C AS.

**Carex divisa** Hudson, Fl. Angl. ed. 1, 348. 1762

*Kongur*: Oytagh Vy. Upper 2770 m. — 2770 m / SE; swamp / *G rhiz* / (–) Europe, N Africa, W Siberia, C. Asia (Tian Shan, Pamir-Alai, W Himalaya): EURAS.

**Carex melanantha** C. A. Mey. in Ledeb., Fl. Alt. 4: 216. 1833

*Kongur*: Oytagh Vy. Upper 3750-3760 m, Atojnak Vy. 2930 m.; *E Pamir*: Bulunköl – Muji 3800 m. — 2930-3800 m / E, NNE; pasture, swamp, turf / *H caesp* / (CS, N, W, S) W Siberia, C. Asia, W & N China, W Mongolia, E Afghanistan, Pakistan, N India, Nepal (Altai, Tian Shan, Pamir-Alai, Hindukush, Karakorum, W Himalaya): C AS.

**Carex orbicularis** Boott, Proc. Linn. Soc. 1: 254. 1845

*Kongur*: Oytagh Vy. Upper 2760-2770 m; *E Pamir*: Bulunköl – Muji 3400 m. — 2760-3400 m / E, SE; swamp / *H caesp* / (CN, CS, N, W, S, E) W Siberia, C. Asia, W China, Tibet, Mongolia, Afghanistan, Pakistan, Kashmir, N India, Nepal, Bhutan (Altai, Tian Shan, Pamir-Alai, Hindukush, Karakorum, W Himalaya): C AS.

**Carex pseudofotida** Kük., Bot. Tidsskr. 28: 225, pl. 1. 1908

*E Pamir*: Bulunköl – Muji 3400-3850 m. — 3400-3850 m / swamp / *G rhiz* / (CN, CS, N, W, S, E) W Siberia, C. Asia, W China, W Tibet, Mongolia, Afghanistan, Pakistan, Kashmir, NW India, Nepal (Altai, Tian Shan, Pamir-Alai, Hindukush, Karakorum, Himalaya): C AS.

**Carex stenocarpa** Turcz. ex V. Krecz., Fl. SSSR 3, addenda II: 607. 1935

*Kongur*: Oytagh Vy. Upper 3190-3900 m, Atojnak Vy. 3390 m. — 3190-3900 m / N, NNE, NNW, W; forest, open forest, pasture, tall forbs, turf: *Picea* / *H caesp* / (CN, CS, N, W, S) W Siberia, C. Asia, W & N China, Mongolia, NE Afghanistan, Pakistan, NW India, W Nepal (Altai, Dzhung. Alatau, Tian Shan, Pamir-Alai, W Kunlun Shan, Karakorum, W Himalaya): C AS.

**Carex stenophylla** Wahlenb., Kungl. Svenska Vet.-Akad. Handl. 24: 142. 1803

*Kongur*: Oytagh Vy. Upper 2800-3400 m; *E Pamir*: Bulunköl – Muji 3380-3550 m. — 2800-3550 m / N, SE; gravel, open forest, swamp: *Juniperus*, *Picea* / *G rhiz* / (CN, CS, N, W, S, E) SW, S & E Europe, SW & C. & E Asia: EURAS.

**Carex tangulashanensis** Y. C. Yang, Acta Phytotax. Sin. 18(3): 362. 1980

*Kongur*: Oytagh Vy. Upper 3450-3900 m. — 3450-3900 m / NE; pasture, scrub: *Juniperus* / *G rhiz* / (–) W China, E Tibet (Tangula Shan, E Tibet, C. Tian Shan, W Kunlun Shan): TIBET.

**Carex turkestanica** Regel, Acta Horti Petrop. 7: 570. 1880

*Kongur*: Oytagh Vy. Upper 2610-3600 m, Atojnak Vy. 2950-3000 m. — 2610-3600 m / E, ESE, N, NE, NNE, NNW, NW, S, SE.; dwarf-scrub, forest, meadow, open forest, open scrub, pasture, scree, scrub, tall forbs: *Artemisia*, *Juniperus*, *Picea* / *H caesp* / (–) W Siberia, C. Asia, W China, E Afghanistan (Altai, Dzhung. Alatau, Tian Shan, Pamir-Alai, W Kunlun Shan): C AS.

**Eleocharis quinqueflora** (F. X. Hartmann) O. Schwarz, Mitt. Thür. Bot. Ges. 1: 89. 1949

*Kongur*: Oytagh Vy. Upper 2760-2770 m, Atojnak Vy. 2930 m; *E Pamir*: Bulunköl – Muji 3270-3400 m. — 2760-3400 m / E, SE; scrub, swamp: *Hippophae* / *G rhiz* / (CN, CS, N, W, S) Europe, N Africa, Asia, N America, Chile: CIRC POL.

**Kobresia capillifolia** (Decne.) C. B. Clarke, J. Linn. Soc. London (Bot.) 20: 378. 1883

*Kongur*: Oytagh Vy. Upper 3050-3900 m, Atojnak Vy. 3300-3390 m; *E Pamir*: Bulunköl – Muji 3800 m. — 3050-3900 m / N, NE, NNE, NNW, W; pasture, scree, scrub, turf: *Salix* / *H caesp* / (CS, N, W, S) Caucasus, Siberia, C. Asia, W, N & C. China, E Afghanistan, Pakistan, N India, Nepal (?Caucasus; Pamir-Alai, Tian Shan, Altai, Karakorum, W Kunlun, W Himalaya, ?W & S & E Tibet): C AS.

**Kobresia karakorumensis** Dickoré, Stapfia 39: 77. 1995

*Kongur*: Oytagh Vy. Upper 3170-3900 m. — 3170-3900 m / N, NE, NNE, NNW, W, S; pasture, tall forbs, turf / *H caesp* / (CN, CS, N, W, S) E Pamir, NE Afghanistan, Pakistan, NW India, W Nepal (E Pamir, W Kunlun Shan, Karakorum, NW Himalaya, W Inner Himalaya): W HIM.

**Kobresia royleana** (Nees) Boeck., Linnaea 39: 8. 1875

*Kongur*: Oytagh Vy. Upper 3200 m; *E Pamir*: Bulunköl – Muji 3400-3800 m. — 3200-3800 m / W; forest, pasture, swamp: *Picea* / *H caesp* / (CN, CS, N, W, S, E) W Siberia, C. Asia, W China, Tibet, Qinghai, Sichuan, Afghanistan, Pakistan, Himalayas (Dzhung. Alatau, Tian Shan, Pamir-Alai, Kunlun Shan, Karakorum, Himalaya, Tibet): C AS.

**Kobresia schoenoides** (C. A. Mey.) Steudel, Syn. Pl. Glum. 246. 1855

*E Pamir*: Bulunköl – Muji 3400-3800 m. — 3400-3800 m / pasture, swamp / *H caesp* / (CS, N, W, S, E) Asia Minor, Caucasus, ?W Siberia, C. Asia, W & C. China, Afghanistan, Pakistan, Kashmir, N India, Nepal (Caucasus, Pamir-Alai, Tian Shan, ?Altai, Karakorum, Himalaya, Tibet): C AS.

**Trichophorum pumilum** (Vahl) Schinz & Thell., Viert. Naturf. Ges. Zürich 66: 265. 1921

*E Pamir*: Bulunköl – Muji 3400 m. — 3400 m / swamp / *G rhiz* / (CN, N, W, S, E) Europe, Asia, N America (temp.): CIRC POL.

## GRAMINEAE

**Agropyron cristatum** (L.) Gaertner, Nov. Comm. Petrop. 14: 540. 1770

*Kongur*: Oytagh Vy. Middle 2200-2500 m, Oytagh Vy. Upper 2620-2800 m, Atojnak Vy. 2970 m. — 2200-2970 m / ESE, N, NNW, S, SE; dwarf-scrub, meadow, open forest, pasture, desert: *Artemisia*, *Caragana*, *Chenopodiaceae*, *Juniperus* / *H caesp* / (–) C. Europe, Mediterranean, Asia Minor, Siberia, C. Asia, Iran, Afghanistan: EURAS.

**Agrostis gigantea** Roth, Tent. Fl. German. 1: 31. 1788

*Kongur*: Oytagh Vy. Middle 2200 m, Oytagh Vy. Upper 2590-3000 m, Atojnak Vy. 2300 m. — 2200-3000 m / N, NNE, NNW, NW; meadow, open forest, pasture, scrub, desert: *Chenopodiaceae*, *Hippophae*, *Juniperus* / *G rhiz* / (CS, W, S) Europe, Asia, Pakistan, Kashmir, NW India, introduced: N America, New Zealand: EURAS.

**Agrostis stolonifera** L., Sp. Pl. 62. 1753

*Kongur*: Oytagh Vy. Upper 2810-3200 m, Atojnak Vy. 2930 m. — 2810-3200 m / N, S; meadow, pasture, swamp / *H stol* / (CS, W, S) Europe, Asia, N America, introduced: Australia, New Zealand, Australia: CIRC POL.

**Alopecurus himalaicus** Hook. f., Fl. Brit. India 7: 238. 1896

*E Pamir*: Bulunköl – Muji 3450-3800 m. — 3450-3800 m / pasture / *H caesp* / (W, S) C. Asia, C. Iran, NE Afghanistan, Pakistan, Kashmir, NW India (Pamir-Alai, Karakorum, W Himalaya): W HIM.

**Avena fatua** L., Sp. Pl. 80. 1753

*Kongur*: Oytagh Vy. Middle 2200 m. — 2200 m / N; desert: *Chenopodiaceae* / *T caesp* / (CS, W, S) Europe, N Africa, Asia (temp.), introduced: N & S America: EURAS.

**Bromus inermis** Leysser, Fl. Halens. 16. 1761

*Kongur*: Oytagh Vy. Upper 2770-2810 m. — 2770-2810 m / ESE, N, NNE, NW; meadow, open forest: *Juniperus* / *G rhiz* / (–) Europe, Asia (temp.): EURAS.

**Bromus pectinatus** Thunb., Prodr. Fl. Cap. 1: 22. 1794

*Kongur*: Atojnak Vy. 2930-2950 m. — 2930-2950 m / S; gravel, ruderal / *T caesp* / (CS, W, S) Europe, S & E Africa, Arabia, Iran, Afghanistan, Pakistan, Kashmir, NW India, Nepal: EURAS.

**Bromus tectorum** L., Sp. Pl. 77. 1753

*E Pamir*: Bulunköl – Muji 3380 m. — 3380 m / swamp / *T caesp* / (W, S) Europe, Macaronesia, N Africa, Mediterranean, Asia Minor, Siberia, SW & C. Asia, China, Himalayas: EURAS.

**Calamagrostis anthoxanthoides** (Munro) Regel, Acta Horti Petropol. 7: 639. 1880

*Kongur*: Oytagh Vy. Upper 3480-3800 m. — 3480-3800 m / NNE; turf / *H caesp* / (CN, N, W) C. Asia, W China, Afghanistan, Pakistan (Tian Shan, E Pamir Alai, W Kunlun Shan, NE Hindukush, NW Karakorum): PAMIR.

**Calamagrostis pseudophragmites** (Haller f.) Koeler, Descr. Gram. 106. 1802

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *Kongur*: Oytagh Vy. Upper 2590-2750 m, Atojnak Vy. 3200 m; *E Pamir*: Bulunköl – Muji 3270 m. — 1830-3270 m / N; open ground, scrub: *Hippophae* / *G rhiz* / (CN, CS, N, W, S) Europe, Asia: EURAS.

**Calamagrostis tianschanica** Rupr., Mém. Acad. Sci. Pétersb. sér. 7, 14 (4): 34. 1869

E Pamir: Bulunköl – Muji 3400-3800 m. — 3400-3800 m / pasture, swamp / *H caesp* / (CN, N) C. Asia, W China, Pakistan (Tian Shan, Pamir, N Karakorum): PAMIR.

**Echinochloa crus-galli** (L.) P. Beauv., Ess. Agrost. 53. 1812

W Kashgaria: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae* / *T caesp* / (S) cosmopolitan (temp. – subtrop.): COSMO.

**Elymus batalinii** (Krasn.) A. Love, Feddes Repert. 95 (7-8): 473. 1984

Kongur: Oytagh Vy. Upper 2590-2610 m. — 2590-2610 m / NNE; open forest, scrub: *Hippophae*, *Juniperus* / *H caesp* / (–) C. Asia (Pamir-Alai, Tian Shan): ENDEM.

**Elymus dahuricus** Turcz. ex Griseb. in Ledeb., Fl. Ross. 4: 331. 1852

Kongur: Oytagh Vy. Upper 2590 m. — 2590 m / scrub: *Hippophae* / *H caesp* / (CS, W, S) Siberia, C. Asia, China, Mongolia, Japan, Afghanistan, N Pakistan, Kashmir, Himalayas: C AS.

**Elymus dentatus** (Hook. f.) Tzvelev, Spisok rast. Gerb. Fl. SSSR 18: 29. 1970

Kongur: Oytagh Vy. Upper 2620-3080 m; E Pamir: Gez Gorge Upper 3000-3500 m. — 2620-3500 m / ESE; dwarf-scrub, gravel, moraine, meadow: *Caragana* / *H caesp* / (CN, CS, N, W, S) S Siberia, C. Asia, W China (Altai, Pamir-Alai, W Kunlun Shan, Karakorum): C AS.

**Elymus jacquemontii** (Hook. f.) Tzvelev, Pl. As. Centr. 4: 221. 1968

Kongur: Atojnak Vy. 3000 m; E Pamir: Gez Gorge Upper 3500 m. — 3000-3500 m / meadow / *H caesp* / (CS, N, W, S, E) C. Asia, W China, Afghanistan, Pakistan (E Pamir, Karakorum, SW Tibet): TIBET.

**Elymus nutans** Griseb., Nachr. Ges. Wiss. Göttingen 3: 72. 1868

Kongur: Oytagh Vy. Upper 2790-3200 m, Atojnak Vy. 3300 m. — 2790-3300 m / NNE, NNW, NW, SE, WNW; dwarf-scrub, open forest, pasture, tall forbs: *Artemisia*, *Juniperus* / *H caesp* / (CN, CS, N, W, S, E) C. Asia, Pakistan, Himalayas (Karakorum, Himalaya): C AS.

**Elymus repens** (L.) Gould, Madroño 9: 127. 1947

Kongur: Oytagh Vy. Upper 2750-2820 m, Atojnak Vy. 2300 m. — 2300-2820 m / NNE, NW, SE; meadow, open forest, ruderal: *Juniperus* / *G rhiz* / (CS, W, S) Europe, Asia (temp.): EURAS.

**Elymus schrenkianus** (Fisch. & C. A. Mey.) Tzvelev, Not. Syst. (Leningrad) 20: 428. 1960

E Pamir: Bulunköl – Muji 3270-3800 m. — 3270-3800 m / gravel, pasture, scrub: *Hippophae* / *H caesp* / (CN, CS, N, W, E) C. Asia, Pakistan, Kashmir, Himalayas (Karakorum, Himalaya): C AS.

**Elymus thomsonii** (Hook. f.) Melderis in Hara, St. Enum. Fl. Pl. Nepal 1: 132. 1978

Kongur: Oytagh Vy. Upper 3120 m, Atojnak Vy. 3300 m. — 3120-3300 m / SE; dwarf-scrub: *Artemisia* / *H caesp* / ((Gen.:) Tajikistan, W China, Pakistan, Kashmir, NW India, Nepal (E Pamir, W Kunlun Shan, N Karakorum, W Himalaya): PAMIR.

**Elymus tschimganicus** (Drobov) Tzvelev, Rast. Central. Azii 4: 22. 1968 (“*E. czimganicus*”)

Kongur: Oytagh Vy. Upper 3220-3900 m. — 3220-3900 m / W; pasture / *H caesp* / (–) Kazakhstan, Kyrgyzstan, W China (Dzhung. Alatau, Tian Shan, Alai, ?E Pamir): PAMIR.

**Eragrostis minor** Host, Gram. Austr. 4: 15. 1809

W Kashgaria: Oytagh Vy. Lower 1830 m. — 1830 m / scrub: *Hippophae* / *T caesp* / (CS, W, S) Europe, Africa (trop.), Mediterranean, SW & C. & E Asia, introduced: America, Australia: COSMO.

**Eremopoa altaica** (Trin.) Roshev., Fl. SSSR 2: 431. 1934

E Pamir: Bulunköl – Muji 3380 m. — 3380 m / swamp / *T scap* / (N, W, S, E) Asia Minor, Caucasus, W Siberia, C. Asia, W China, Iran, Afghanistan, N Pakistan, Kashmir (S Ural, Altai, Tian Shan, Pamir-Alai, Himalaya): IRAN.

**Festuca alatavica** (St.-Yves) Roshev., Fl. SSSR 2: 528. 1934

Kongur: Oytagh Vy. Upper 2850-3780 m, Atojnak Vy. 3390 m. — 2850-3780 m / NNE, W; forest, pasture, turf: *Picea* / *H caesp* / (CS, CS, W, S) Kazakhstan, Kyrgyzstan, W China, Pakistan, NW India (Dzhung. Alatau, Tian Shan, Alai, W Kunlun Shan, S & W Karakorum, NW Karakorum): PAMIR.

**Festuca coelestis** (St.-Yves) V. Krecz. & Bobrov, Fl. SSSR 2: 514, 770. 1934

Kongur: Oytagh Vy. Upper 2900-3900 m, Atojnak Vy. 3300 m. — 2900-3900 m / N, NE, NNE, NNW, S, W; alpine turf, moraine, forest, pasture, scrub: *Juniperus*, *Picea*, *Salix* / *H caesp* / (CS, N, W) Dzung. Alatau, Tian Shan, Pamir Alai, W Kunlun Shan, W & S Karakorum, W Himalaya: C AS.

**Festuca olgae** (Regel) Krivot., Not. Syst. (Leningrad) 20: 56. 1960

Kongur: Oytagh Vy. Upper 2800-3770 m, Atojnak Vy. 3300 m; E Pamir: Gez Gorge Upper 3500 m. — 2800-3770 m / E, N, NE, SE, W, WNW; dwarf-scrub, forest, gravel, meadow, open forest, pasture, rock crevice: *Artemisia*, *Picea* / *H caesp* / (CN, CS, N, W, S) C. Asia, W China, NE Iran, E Afghanistan, Pakistan, NW India (Tian Shan, E Pamir, E Hindukush, Kunlun Shan, Karakorum, NW Himalaya): PAMIR.

**Festuca pamirica** Tzvelev, Not. Syst. (Leningrad) 422. 1960

*Kongur*: Oytagh Vy. Upper 2800 m. — 2800 m / SE; meadow / *H caesp* / (W, S) / E Iran, Pamir-Alai – SW Karakorum: PAMIR.

**Festuca rubra** L., Sp. Pl. 74. 1753

subsp. **arctica** (Hackel) Govor., Fl. Ural. 127. 1937.

*Kongur*: Oytagh Vy. Upper 3200-3360 m; *E Pamir*: Bulunköl – Muji 3800 m. — 3200-3800 m / NE, NNE, NNW, S, W; pasture, scrub, tall forbs, turf: *Juniperus* / *G rhiz* / (CS, N, W, S) Europe, Asia, N America: CIRC POL.

subsp. **rubra**

*Kongur*: Oytagh Vy. Upper 3160-3600 m. — 3160-3600 m / NE, NNE, NNW, S, W; pasture, scrub, tall forbs, turf: *Juniperus* / *G rhiz* / (W, S, E) Europe, Asia, N America: CIRC POL.

**Festuca valesiaca** Schleicher ex Gaudin subsp. **hypsochila** (St.-Yves) Tzvelev, Bot. Zhurn. 56(9): 1225. 1971

*Kongur*: Oytagh Vy. Upper 2660-3120 m, Atojnak Vy. 2970 m. — 2660-3080 m / NNE, S, W; forest, gravel, moraine, turf: *Picea* / *H caesp* / (N, W) Asia Minor, Caucasus, Siberia, C. Asia, W China, Mongolia, Iran, Afghanistan, NW Pakistan (Altai, Tian Shan, W Kunlun Shan, Karakorum): IRAN.

**Hordeum bogdanii** Wilensky, Izv. Saratovsk. Opyt. Stan. 1 (2): 13. 1918

*Kongur*: Oytagh Vy. Middle 2100 m, Atojnak Vy. 2300 m. — 2100-2300 m / meadow, ruderal / *H caesp* / (W, S) ?SE Europe, Caucasus, C. Asia, China, Mongolia, Afghanistan, Pakistan, Kashmir, NW India: C AS.

**Hordeum brevisubulatum** (Trin.) Link, Linnaea 17: 391. 1843

subsp. **nevsianum** (Bowden) Tzvelev, Nov. Syst. Pl. Vasc. 1971: 66. 1971

*Kongur*: Oytagh Vy. Middle 2100-2300 m, Oytagh Vy. Upper 2750-2810 m. — 2100-2810 m / E, N, SE; meadow, ruderal, steppe, swamp: *Stipa* / *H caesp* / (W, S) W Siberia, W China, Afghanistan, Pakistan, Kashmir, NW India, Nepal: C AS.

subsp. **turkestanicum** (Nevski) Tzvelev, Nov. Syst. Pl. Vasc. 1971: 66. 1971

*Kongur*: Oytagh Vy. Upper 3400 m, Atojnak Vy. 3100 m; *E Pamir*: Bulunköl – Muji 3400 m. — 3100-3400 m / N; pasture, swamp, turf / *H caesp* / (CN, CS, N, W, E) Kazakhstan, Kyrgyzstan, W China, NE Afghanistan, Pakistan, NW India, Nepal (Dzung. Alatau, Tian Shan, Pamir-Alai, W Himalaya): PAMIR.

• **Hordeum vulgare** L., Sp. Pl. 84. 1753

*Kongur*: Atojnak Vy. 2950 m. — 2950 m / S; ruderal / *T caesp* / cultivated / cult.

**Koeleria cristata** (L.) Pers., Syn. Pl. 1: 97. 1805 (*K. macrantha* (Ledeb.) Schult. & Schult. f.)

*Kongur*: Oytagh Vy. Upper 2780-2920 m. — 2780-2920 m / ESE, N, NE, S, SE; dwarf-scrub, meadow, pasture: *Artemisia* / *H caesp* / (CS, W, S) Europe, Asia, N America: CIRC POL.

**Koeleria litwinowii** Domin, Monogr. Bibl. Bot. H. 65: 116. 1879

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / swamp / *H caesp* / (–) C. Asia, W China (E Pamir, W Kunlun Shan): ENDEM.

**Leymus secalinus** (Georgi) Tzvelev, Pl. As. Centr. 4: 209. 1968

*Kongur*: Oytagh Vy. Middle 2100 m, Oytagh Vy. Upper 3080-3090 m, Atojnak Vy. 2950 m; *E Pamir*: Bulunköl – Muji 3270-3800 m. — 2100-3800 m / E, NW; dwarf-scrub, meadow, pasture, ruderal, scrub, desert, swamp: *Artemisia*, *Chenopodiaceae*, *Hippophae* / *G rhiz* / (CN, CS, N, W, S, E) Siberia, C. Asia, N Pakistan, Kashmir, NW India (Altai, Tian Shan, Pamir-Alai, Karakorum, NW Himalaya, Inner Himalaya): C AS.

**Phragmites australis** (Cav.) Trin. ex Steudel, Nomencl. Bot., ed.2, 2: 324. 1841

*W Kashgaria*: Oytagh Vy. Lower 1850 m; *Kongur*: Atojnak Vy. 2520 m. — 1850-2520 m / N; open forest, ruderal: *Populus* / *G rhiz* / (CS, N, W, S) cosmopolitan (temp.): COSMO.

**Poa alpina** L., Sp. Pl. 67. 1753

*Kongur*: Oytagh Vy. Upper 3050-3900 m. — 3050-3900 m / ESE, N, NE, NNE, NNW, W; pasture, tall forbs, turf / *H caesp* / (CS, N, W, S, E) Europe, Mediterranean, Caucasus, C. Asia, W China, Afghanistan, N Pakistan, Kashmir, NW India, W Nepal, N America (Caucasus, Tian Shan, Pamir-Alai, W Kunlun Shan, W & S Karakorum, W Himalaya): CIRC POL.

**Poa attenuata** Trin., Mém. Acad. Sci. Pétersb. Sav. Étr. 2: 327. 1835 (*P. glauca* Vahl subsp. *litwinowiana* (Ovcz.) Tzvelev, *P. araratica* auct., non Trautv.)

*Kongur*: Oytagh Vy. Upper 3280-3900 m; *E Pamir*: Gez Gorge Upper 3000-3300 m, Bulunköl – Muji 3800 m. — 3000-3900 m / gravel, moraine, desert: *Chenopodiaceae* / *H caesp* / (CN, CS, N, W, S, E) Siberia, C. Asia, W & C. China, Mongolia, Pakistan, Himalayas (Altai, Tian Shan, Pamir-Alai, Kunlun Shan, Karakorum, Himalaya, Tibet): C AS.

**Poa calliopsis** Litv. ex Ovcz., Izv. Tadzhik. Bazy Bot. 1: 18. 1933

*E Pamir*: Bulunköl – Muji 3850 m. — 3850 m / swamp / *G rhiz* / (CS, N, S, E) Kyrgyzstan, Tajikistan, W China, Tibet, SW China, NE Afghanistan, Pakistan, Kashmir, N India, Nepal, Bhutan (Tian Shan, Pamir-Alai, Kunlun Shan, Karakorum, Himalaya, Tibet): TIBET.

**Poa lipskyi** Roshev., Bull. Jard. Bot. Pétersb. 30: 303. 1932

*Kongur*: Oytagh Vy. Upper 3090-3470 m, Atojnak Vy. 3390 m. — 3090-3470 m / E, NNW, W; dwarf-scrub, pasture, tall forbs, turf: *Artemisia* / *H caesp* / (CN, N) Kazakhstan, Kyrgyzstan, Tajikistan, W China, N Pakistan (Dzhung. Alatau, Tian Shan, Pamir-Alai, W Kunlun Shan, N Karakorum): PAMIR.

**Poa nemoralis** L., Sp. Pl. 69. 1753

*Kongur*: Oytagh Vy. Upper 3060 m. — 3060 m -;/: / *H caesp* / (W) Europe, Asia, N America (temp.): CIRCPOLE.

**Poa pratensis** L., Sp. Pl. 67. 1753

*Kongur*: Oytagh Vy. Upper 2910-3430 m. — 2910-3430 m / ESE, SE; pasture, tall forbs / *G rhiz* / ( ) Europe, N Asia, N America: CIRCPOLE.

subsp. **angustifolia** (L.) Gaudin, Agrost. Helv. 1: 214. 1811

*Kongur*: Oytagh Vy. Upper 2700-3110 m. — 2700-3110 m / ESE, N, NNE, NW, S, SE, SSE, WNW; meadow, open forest, pasture, scrub: *Juniperus*, *Picea* / *G rhiz* / (W, S) Europe, Asia, N America (temp.): CIRCPOLE.

subsp. **pratensis**

*Kongur*: Oytagh Vy. Upper 3000-3150 m. — 3000-3150 m / NNW; pasture / *G rhiz* / (CS, W, S) Europe, Asia, N America (temp.): CIRCPOLE.

subsp. **pruinosa** (Korotky) Dickoré, Stapfia 39: 173. 1995

*Kongur*: Oytagh Vy. Upper 2800-3280 m, Atojnak Vy. 3300 m. — 2800-3300 m / N, NE, SE; dwarf-scrub, gravel, scrub: *Artemisia*, *Salix* / *G rhiz* / (CS, N, W, S) Kyrgyzstan, Tajikistan, W China, Pakistan, Kashmir, NW India (Tian Shan, Pamir Alai, S Karakorum, W Himalaya): PAMIR.

**Poa sterilis** M. Bieb., Fl. Taur.-Cauc. 1: 62. 1808

*Kongur*: Oytagh Vy. Upper 2610-3450 m.; *E Pamir*: Gez Gorge Upper 3500 m. — 2610-3500 m / N, NNE, NE, E, ESE, SE, S, SSW, W, WNW; forest, meadow, open forest, scrub, dwarf-scrub, pasture, tall forbs: *Artemisia*, *Caragana*, *Juniperus*, *Picea* / *H caesp* / (CS, W, S) SE Europe, Caucasus, Pakistan, Kashmir, NW India: EURAS.

**Poa supina** Schrad., Fl. German. 1: 289. 1806

*Kongur*: Oytagh Vy. Upper 2850-3740 m. — 2850-3740 m / NE, NNE, S; gravel, moraine, pasture, turf / *H caesp* / (CS, W, S) Europe, Asia: EURAS.

**Polypogon monspeliensis** (L.) Desf., Fl. Atlant. 1: 67. 1798

*Kongur*: Oytagh Vy. Middle 2100 m. — 2100 m / ruderal / *T caesp* / (CS, W, S) S Europe, Africa, S Asia: EURAS.

**Puccinellia distans** (Jacq.) Parl., Fl. Ital. 1: 367. 1848

*Kongur*: Oytagh Vy. Upper 2750 m; *E Pamir*: Bulunköl – Muji 3400 m. — 2750-3400 m / N; open ground / *H caesp* / (W, S) Europe, Asia: EURAS.

**Puccinellia hackeliana** (V. Krecz.) V. Krecz. ex Persson, Bot. Not. 1938: 275. 1938

*Kongur*: Oytagh Vy. Upper 2750-2800 m. — 2750-2800 m / ESE, SE; meadow, steppe: *Stipa* / *H caesp* / (CN, W) Kyrgyzstan, Tajikistan, W China, ?Mongolia, Pakistan (?Altai, Tian Shan, E Pamir, W & C. Kunlun Shan): PAMIR.

**Puccinellia pamirica** (Roshev.) V. Krecz. ex Roshev., Fl. Kirgis. 2: 140. 1950

*E Pamir*: Bulunköl – Muji 3550-3800 m. — 3550-3800 m / gravel, desert: *Chenopodiaceae* / *H caesp* / (–) Kyrgyzstan, Tajikistan, W China (Tian Shan, Pamir-Alai): PAMIR.

**Puccinellia tenuiflora** (Griseb.) Scribner & Merr., Contr. U.S. Nat. Herb. 13: 78. 1910

*E Pamir*: Bulunköl – Muji 3400-3800 m. — 3400-3800 m / pasture, swamp / *H caesp* / (CN, N, W) C. Asia, Mongolia, China: C AS.

**Setaria viridis** (L.) P. Beauv., Ess. Agrost. 51, 171, 178. 1812

*W Kashgaria*: Oytagh Vy. Lower 1830 m; *Kongur*: Oytagh Vy. Middle 2200 m. — 1830-2200 m / N; scrub, desert: *Chenopodiaceae*, *Hippophae* / *T caesp* / (CS, W, S) Europe, N Africa, Asia, introduced: Australia, America: EURAS.

**Stipa breviflora** Griseb., Nachr. Ges. Wiss. Göttingen 1868: 82. 1868

*Kongur*: Oytagh Vy. Middle 2200 m. — 2200 m / N; desert: *Chenopodiaceae* / *H caesp* / (S) Kyrgyzstan, Tajikistan, W China, NW India, Nepal (Tian Shan, E Pamir, Inner Himalaya): PAMIR.

**Stipa caucasica** Schmalh., Ber. Deutsche Bot. Ges. 10 293. 1892

subsp. **caucasica**

*Kongur*: Oytagh Vy. Upper 2900-3080 m; *E Pamir*: Gez Gorge Upper 3500 m. — 2900-3500 m / meadow / *H caesp* / (CN, CS, N, W, S) Caucasus, Kyrgyzstan, Tajikistan, W China, N Iran, Afghanistan, Pakistan (Tian Shan, Pamir-Alai, W Kunlun Shan, W Karakorum): C AS.

subsp. **glareosa** (Smirnov) Tzvelev, Nov. Syst. Pl. Vasc. 11: 20. 1974

*E Pamir*: Bulunköl – Muji 3450-3950 m. — 3450-3950 m / N; gravel, desert: *Chenopodiaceae* / *H caesp* / (CN, N, S, E) Tajikistan, W China, W Tibet, Mongolia, Pakistan, NW India (E Pamir, Karakorum, W Himalayas, W Tibet): PAMIR.

**Stipa orientalis** Trin. in Ledeb., Fl. Altaica 1: 83. 1829

*E Pamir*: Gez Gorge Upper 3000-3300 m. — 3000-3300 m / gravel, moraine / *H caesp* / (CN, CS, N, S, E) Kazakhstan – E Siberia, Mongolia, China (Elburs, C. Hindukush, Tian Shan, Pamir-Alai, Karakorum, Inner Himalaya): C AS.

**Stipa splendens** Trin. in Spreng., Neue Entdeck. 2: 54. 1821

*Kongur*: Oytagh Vy. Middle 2100-2300 m, Oytagh Vy. Upper 2620-2800 m, Atojnak Vy. 2950 m. — 2100-2950 m / ESE, N, S, SE; dwarf-scrub, meadow, ruderal, desert, steppe: *Artemisia*, *Caragana*, *Chenopodiaceae*, *Stipa* / *H caesp* / (CN, CS, N, W, S) Caspian Sea, E Siberia, C. Asia, W China, C. Afghanistan, Pakistan (Tian Shan, Pamir, Kunlun Shan, Karakorum): C AS.

**Stipa subsessiliflora** (Rupr.) Roshev. in Fedtsch., Fl. Asiat. Ross. 12: 128. 1916

*E Pamir*: Bulunköl – Muji 3800 m. — 3800 m / : / *H caesp* / (CN, N, W, E) Kazakhstan, Kyrgyzstan, Tajikistan, W China, W Tibet, N Pakistan (Dzhung. Alatau, Tian Shan, E Pamir, Kunlun Shan, Karakorum, W Tibet): PAMIR.

**Stipa tianschanica** Roshev., Fl. Asiat. Ross. 12: 149. 1916

*Kongur*: Oytagh Vy. Upper 2620-2810 m, Atojnak Vy. 2950-3300 m. — 2620-3300 m / ESE, S, SE; dwarf-scrub: *Artemisia*, *Caragana* / *H caesp* / (S) Kyrgyzstan, Tajikistan, W China, W Tibet, Qinghai (Tian Shan, E Pamir, W Tibet): PAMIR.

**Trisetum altaicum** Roshev., Not. Syst. Hort. Petrop. 3: 85. 1922

*Kongur*: Oytagh Vy. Upper 2800-3160 m. — 2800-3160 m / NE, NNE, NW; gravel, pasture, tall forbs / *G rhiz* / (–) C. Asia, W & N China, Mongolia: C AS.

**Trisetum spicatum** (L.) K. Richter, Pl. Eur. 1: 59. 1890

*Kongur*: Oytagh Vy. Upper 2970-3760 m, Atojnak Vy. 3390 m. — 2970-3760 m / NNE, NNW, W; open scrub, pasture, tall forbs, turf: *Picea* / *H caesp* / (CS, N, W, S, E) C. Asia, W China, W Tibet, Pakistan, W Himalayas (E Pamir, Karakorum, W Himalaya, W Tibet): CIRC POL.

• **Triticum aestivum** L., Sp. Pl. 85.

*Kongur*: Oytagh Vy. Middle 2300 m. — 2300 m / ruderal / *T caesp* / cultivated / cult.

#### IRIDACEAE

**Iris loczyi** Kanitz, Fl. Exp. Szechny 58. 1891

*Kongur*: Oytagh Vy. Middle 2100-2300 m, Oytagh Vy. Upper 2680-3400 m; *E Pamir*: Gez Gorge Upper 3500 m. — 2100-3500 m / N, S, SE; desert-steppe, dwarf-scrub, meadow, open forest: *Artemisia*, *Picea* / *G bulb* / (–) C. Asia, NE Afghanistan, W China, Tibet (E Pamir, Kunlun Shan, N & S & E Tibet): C AS.

#### JUNCACEAE

**Juncus gerardii** Loisel., J. Bot. (Desveaux) 2: 284. 1809

*Kongur*: Oytagh Vy. Upper 2750-2770 m, Atojnak Vy. 2930 m. — 2750-2930 m / N, SE; swamp / *H caesp* / (–) Europe, W & C. Asia (W Kunlun Shan): EURAS.

#### JUNCAGINACEAE

**Triglochin maritima** L., Sp. Pl. 339. 1753

*E Pamir*: Bulunköl – Muji 3400 m. — 3400 m / swamp / *G rhiz* / (CN, N, S, E) Europe, N Africa, Asia, N & S America: CIRC POL.

**Triglochin palustre** L., Sp. Pl. 338. 1753

*Kongur*: Oytagh Vy. Upper 2750-2800 m; *E Pamir*: Bulunköl – Muji 3270-3800 m. — 2750-3800 m / E, N, NW; pasture, scrub, swamp: *Hippophae* / *G rhiz* / (CN, CS, N, W, S, E) Europe, N Africa, Asia, N & S America: CIRC POL.

#### LILIACEAE

**Gagea dshungarica** Rgl., A. H. P. 6: 513. 1879

*Kongur*: Oytagh Vy. Upper 3200 m. — 3200 m / S; scrub: *Juniperus* / *G bulb* / (–) C. Asia, W China (Pamir-Alai, Tian Shan): ENDEM.

#### ORCHIDACEAE

**Coeloglossum viride** (L.) C. J. Hartman, Hand. Skand. Fl. 329. 1820

*Kongur*: Oytagh Vy. Upper 3200-3760 m, Atojnak Vy. 3300 m. — 3200-3760 m / N, W; forest, scrub: *Picea*, *Salix* / *G bulb* / (CS, W, S) Europe, Asia, N America: CIRC POL.

**Dactylorhiza salina** (Turcz. ex Lindley) Soó, Ann. Univ. Sci. Budapest, Sect. Biol. 5: 340. 1962 (*D. umbrosa* auct. non (Kar. & Kir.) Nevski)

*Kongur*: Oytagh Vy. Middle 2300 m, Oytagh Vy. Upper 2770-2800 m, Atojnak Vy. 2900 m. — 2300-2900 m / N, SE; meadow, ruderal, swamp / *G bulb* / (N) Siberia – E Asia, N Mongolia, N China, Dzungaria, Kashgaria, Qinghai (Altai, Tian Shan, Kunlun Shan): C AS.

**Goodyera repens** (L.) R. Br. in Aiton, Hort. Kew., ed.2, 5: 198. 1813

*Kongur*: Oytagh Vy. Upper 2970 m. — 2970 m / NNW; open scrub: *Picea* / *G bulb* / (W) Europe, Asia, N America: CIRC-POL.

**Neottia camtschatea** (L.) Reichenb. f., Ic. Fl. Germ. 13, 14: 146. 1851

*Kongur*: Atojnak Vy. 3200 m. — 3200 m / N; scrub: *Hippophae* / *G bulb sapr* / (–) Siberia, N China, Mongolia, Kamtchatka, (Altai, Tian Shan, Dzhung. Alatau, Pamir-Alai): C AS.

#### TYPHACEAE

**Typha domingensis** Pers., Syn. Pl. 2: 532. 1807

*W Kashgaria*: Oytagh Vy. Lower 1820 m. — 1820 m / swamp / *G rhiz hel* / (W, S) Africa, Mediterranean, Asia, America (pantrop. – subtrop. – temp.): SUBTROP.

#### LICHENOPHYTA

**Alloctetraria madreporiformis** (Ach.) Kärnef. & Thell

*Kongur*: Oytagh Vy. Upper 3220-3480 m, Atojnak Vy. 3030 m. — 3030-3480 m / N, NNE, NNW, W / open forest, pasture, turf: *Artemisia*, *Picea* / Europe, Asia, N America: CIRC-POL.

**Arthroraphis citrinella** (Ach.) Poelt

*Kongur*: Oytagh Vy. Upper 3360 m. — 3360 m / W / pasture / arctic-alpine zones in Europe, Asia: EURAS.

**Buellia elegans** Poelt

*W Kashgaria*: Oytagh Vy. Lower 1970 m; *Kongur*: Oytagh Vy. Upper 2660-2920 m, Atojnak Vy. 2970 m. — 1970-2970 m / N, NE, NNW, S, SE / pasture, desert: *Artemisia*, *Stipa*, *Chenopodiaceae* / Europe, Alaska, Afghanistan: CIRC-POL.

**Caloplaca flavovirescens** (Wulfen) DT. & Sarnth.

*Kongur*: Oytagh Vy. Upper 2900 m. — 2900 m / NNE / open forest: *Juniperus*, *Picea* / boreal – mediterranean zones in Europe, Asia, N America: CIRC-POL.

**Caloplaca tominii** Savicz

*Kongur*: Oytagh Vy. Upper 2780-3370 m. — 2780-3370 m / NNW, NW, S, SE / dwarf-scrub, open forest, pasture, scrub: *Artemisia*, *Stipa*, *Juniperus*, *Picea* / N Europe, SE Russia: EURAS.

**Candelariella aurella** (Hoffm.) Zahlbr.

*Kongur*: Oytagh Vy. Upper 2900-3390 m, Atojnak Vy. 3030 m. — 2900-3390 m / N, NE, NNE, NNW, NW, S, SE, SSW, W / dwarf-scrub, open forest, pasture, scrub: *Artemisia*, *Juniperus*, *Picea* / arctic-alpine – mediterranean zones: COSMO.

**Catapyrenium squamulosum** (Ach.) Breuss

*W Kashgaria*: Oytagh Vy. Lower 1970 m; *Kongur*: Oytagh Vy. Upper 2610-2920 m, Atojnak Vy. 2970 m; *E Pamir*: Bulunköl – Muji 3510 m. — 1970-3510 m / ESE, N, NE, NNE, NNW, S, SE / dwarf-scrub, open forest, pasture, desert: *Artemisia*, *Stipa*, *Caragana*, *Chenopodiaceae*, *Juniperus* / temperate – mediterranean zones in Europe, Africa, Asia, N America: COSMO.

**Cladonia pyxidata** (L.) Hoffm. subsp. **pocillum** (Ach.) Dahl

*Kongur*: Oytagh Vy. Upper 2840-3300 m, Atojnak Vy. 3030 m. — 2840-3300 m / N, NNE, NNW / open forest, pasture, turf: *Juniperus*, *Picea* / arctic-alpine – mediterranean zones: COSMO.

**Collema cristatum** (L.) Weber ex Wigg.

*Kongur*: Oytagh Vy. Upper 3370 m. — 3370 m / S / pasture / boreal – mediterranean zones: CIRC-POL.

**Endocarpon pusillum** Hedwig

*W Kashgaria*: Oytagh Vy. Lower 1970 m; *Kongur*: Oytagh Vy. Upper 2610-3370 m. — 1970-3370 m / ESE, N, NE, NNE, NNW, S, SSE / dwarf-scrub, open forest, pasture, desert: *Artemisia*, *Stipa*, *Caragana*, *Chenopodiaceae*, *Juniperus*, *Picea* / boreal – mediterranean zones: COSMO.

**Fulgensia bracteata** (Hoffm.) Räsänen

*W Kashgaria*: Oytagh Vy. Lower 1970 m; *Kongur*: Oytagh Vy. Upper 2610-3760 m, Atojnak Vy. 2970 m. — 1970-3760 m / ESE, N, NNE, NNW, S, SE, SSE / dwarf-scrub, open forest, pasture, desert, turf: *Artemisia*, *Stipa*, *Caragana*, *Chenopodiaceae*, *Juniperus*, *Picea* / arctic-alpine – temperate zones: CIRC-POL.

**Gypsoplaca macrophylla** (Zahlbr.) Timdal

*Kongur*: Atojnak Vy. 2970 m; *E Pamir*: Bulunköl – Muji 3510 m. — 2970-3510 m / N, SE / desert: *Artemisia*, *Stipa*, *Chenopodiaceae* / xeric regions of C. Europe, China, Pakistan, NW Greenland, N America: CIRC POL.

**Lecanora crenulata** Hooker

*Kongur*: Oytagh Vy. Upper 3080-3150 m, Atojnak Vy. 3030 m. — 3030-3150 m / N, NNW, NW, S / open forest, pasture, scrub: *Artemisia*, *Juniperus*, *Picea* / arctic-alpine – mediterranean zones: CIRC POL.

**Lecanora dispersa** (Pers.) Sommerf.

*Kongur*: Oytagh Vy. Upper 3150 m. — 3150 m / NNW / open forest: *Picea* / arctic-alpine – mediterranean zones: CIRC POL.

**Lecanora hagenii** (Ach.) Ach.

*Kongur*: Oytagh Vy. Upper 3080-3150 m. — 3080-3150 m / NNW, NW, S / open forest, pasture, scrub: *Artemisia*, *Juniperus*, *Picea* / boreal – mediterranean zones: CIRC POL.

**Leptogium saturninum** (Dickson) Nyl.

*Kongur*: Oytagh Vy. Upper 2840-3360 m, Atojnak Vy. 3390 m. — 2840-3390 m / N, NNE, NNW, W / open forest, pasture, scrub, turf: *Juniperus*, *Picea*, *Salix* / boreal zones: COSMO.

**Mycobilimbia lobulata** (Sommerf.) Hafellner

*Kongur*: Oytagh Vy. Upper 3300-3750 m. — 3300-3750 m / E, NE, NNE, NNW / scrub, turf: *Juniperus* / arctic-alpine zones: CIRC POL.

**Peltigera ponojensis** Gyelnik

*Kongur*: Oytagh Vy. Upper 2810-2900 m, Atojnak Vy. 3030 m. — 2810-3030 m / N, NNE, SE, WNW / open forest, pasture: *Juniperus*, *Picea* / boreal – mediterranean (montane) zones in Europe, Asia, N America: CIRC POL.

**Peltigera rufescens** (L.) Willd.

*Kongur*: Oytagh Vy. Upper 2840-3450 m. — 2840-3450 m / N, NE, NNE, NNW, NW, W / open forest, pasture, scrub, turf: *Artemisia*, *Juniperus*, *Picea* / arctic-alpine – mediterranean zones: CIRC POL.

**Phaeophyscia kairamoi** (Vain.) Moberg

*Kongur*: Oytagh Vy. Upper 2900-3180 m, Atojnak Vy. 3030 m. — 2900-3180 m / N, NNE, NNW, S, SE / open forest, scrub: *Juniperus*, *Picea* / N & C. Europe, Asia, N America: CIRC POL.

**Psora decipiens** (Hedwig) Hoffm.

*W Kashgaria*: Oytagh Vy. Lower 1970 m; *Kongur*: Oytagh Vy. Upper 2660-2780 m, Atojnak Vy. 2970 m. — 1970-2970 m / N, NNW, S, SE, SSE / open forest, pasture, desert: *Artemisia*, *Stipa*, *Chenopodiaceae*, *Juniperus* / arctic-alpine – mediterranean zones: COSMO.

**Rinodina mucronulata** H. Magn.

*Kongur*: Oytagh Vy. Upper 3760 m. — 3760 m / NNE / turf / xeric regions of Europe, Greenland, Pakistan, Tadjikistan, N America: CIRC POL.

**Solorina bispora** Nyl. subsp. **bispورا**

*Kongur*: Oytagh Vy. Upper 3300-3470 m. — 3300-3470 m / NNW, W / scree, turf / arctic-alpine zones: CIRC POL.

**Squamarina lentigera** (Weber) Poelt

*Kongur*: Oytagh Vy. Upper 2620-2780 m. — 2620-2780 m / ESE, S / dwarf-scrub: *Artemisia*, *Stipa*, *Caragana* / temperate – mediterranean zones in C. Europe, N Africa, Asia, N America: CIRC POL.

**Teloschistes contorduplicatus** (Ach.) Clauzade & Rondon

*Kongur*: Oytagh Vy. Upper 2900-3280 m, Atojnak Vy. 2970-3030 m. — 2900-3280 m / N, NNE, NNW, S, SE / open forest, scrub: *Artemisia*, *Stipa*, *Juniperus*, *Picea* / C & S Europe, S Siberia, Afghanistan, Karakorum, Himalayas: EURAS.

**Toninia sedifolia** (Scop.) Timdal

*Kongur*: Oytagh Vy. Upper 2780-2840 m, Atojnak Vy. 2970 m. — 2780-2970 m / N, S, SE / dwarf-scrub, open forest: *Artemisia*, *Stipa*, *Picea* / (arctic-alpine) boreal – mediterranean zones (except Antarctica): COSMO.

**Xanthoria elegans** (Link) Th. Fr.

*Kongur*: Oytagh Vy. Upper 2610 m. — 2610 m / NNE / open forest: *Juniperus* / arctic-alpine – mediterranean zones: COSMO.

**BRYOPHYTA****Hepaticae****MARCHANTIACEAE****Preissia quadrata** (Scop.) Nees

*Kongur*: Oytagh Vy. Upper 3300-3360 m. — 3300-3360 m / NNE, NNW / turf / holarctic: CIRC POL.

**Musci****AMBLYSTEGIACEAE****Amblystegium serpens** (Hedw.) B.S.G.

*Kongur*: Oytagh Vy. Upper 2920 m. — 2920 m / NW / pasture / northern hemisphere, S Africa, S America, New Zealand: COSMO.

**Amblystegium varium** (Hedw.) Lindb.

*Kongur*: Oytagh Vy. Upper 2760-3280 m. — 2760-3280 m / E, S / scrub, swamp: *Juniperus* / northern hemisphere, S America, Australia: COSMO.

**BRACHYTHECIACEAE****Brachythecium salebrosum** (Web. & Mohr) B.S.G.

*Kongur*: Oytagh Vy. Upper 3170-3740 m, Atojnak Vy. 3390 m. — 3170-3740 m / N, NNE, NNW, W / pasture, turf: *Salix* / northern hemisphere, S Africa, Australia, New Zealand: COSMO.

**Cirriphyllum piliferum** (Hedw.) Grout

*Kongur*: Oytagh Vy. Upper 3300-3450 m, Atojnak Vy. 3390 m. — 3300-3450 m / NE, NNW, W / open forest, pasture, scrub, turf: *Juniperus*, *Picea*, *Salix* / northern hemisphere: CIRC POL.

**BRYACEAE****Bryum argenteum** Hedw.

*Kongur*: Oytagh Vy. Upper 2590-3190 m. — 2590-3190 m / E, N, SE / dwarf-scrub, pasture, scrub: *Artemisia*, *Hippophae* / cosmopolitan: COSMO.

**Bryum caespiticium** Hedw.

*Kongur*: Oytagh Vy. Upper 2920-3760 m. — 2920-3760 m / E, ESE, NE, NNE, SE, W / dwarf-scrub, pasture, turf: *Artemisia* / cosmopolitan: COSMO.

**Bryum capillare** Hedw.

*Kongur*: Oytagh Vy. Upper 3280 m. — 3280 m / S / scrub: *Juniperus* / cosmopolitan: COSMO.

**Bryum inclinatum** (Brid.) Bland.

*Kongur*: Oytagh Vy. Upper 2590-3760 m, Atojnak Vy. 2970 m. — 2590-3760 m / E, ESE, N, NE, NNE, NNW, NW, S, SE, SSW, W, WNW / dwarf-scrub, meadow, open forest, pasture, scrub, swamp, turf: *Artemisia*, *Hippophae*, *Juniperus*, *Picea*, *Stipa* / temperate zones northern/southern hemisphere: COSMO.

**Pohlia nutans** (Hedw.) Lindb.

*Kongur*: Oytagh Vy. Upper 3360 m. — 3360 m / W / pasture / cosmopolitan: COSMO.

**DISTICHACEAE****Distichum capillaceum** (Hedw.) B.S.G.

*Kongur*: Oytagh Vy. Upper 2840-3740 m, Atojnak Vy. 3030-3390 m. — 2840-3740 m / ESE, N, NE, NNE, NNW, S, SE, SSW, W, WNW / open forest, pasture, scrub, turf: *Artemisia*, *Juniperus*, *Picea*, *Salix* / cosmopolitan: COSMO.

**Distichum inclinatum** (Hedw.) B.S.G.

*Kongur*: Oytagh Vy. Upper 3190 m. — 3190 m / NNE / turf / Eurasia, N America: CIRC POL.

**DITRICHACEAE****Ceratodon purpureus** (Hedw.) Brid.

*Kongur*: Oytagh Vy. Upper 2620-3430 m, Atojnak Vy. 2970 m. — 2620-3430 m / E, ESE, NNW, S, SE, WNW / dwarf-scrub, open forest, pasture, scrub: *Artemisia*, *Stipa*, *Caragana*, *Juniperus*, *Picea* / cosmopolitan: COSMO.

**Ditrichum flexicaule** (Schwaegr.) Hampe

*Kongur*: Oytagh Vy. Upper 2840 m. — 2840 m / N / open forest: *Picea* / Europe, N Africa, N America: CIRC POL.

**ENCALYPTACEAE****Encalypta vulgaris** Hedw.

*Kongur*: Oytagh Vy. Upper 3080-3470 m. — 3080-3470 m / NNE, NNW, NW, SSW, W / open forest, pasture, turf: *Artemisia*, *Picea* / Europe, N Africa, Asia, N America: CIRC POL.

**ENTODONTACEAE****Entodon concinnus** (De Not.) Par.

*Kongur*: Oytagh Vy. Upper 3320 m. — 3320 m / W / open forest: *Picea* / northern hemisphere (subtropical): SUBTROP.

**HYPNACEAE****Ctenidium procerrimum** (Mol.) Lindb.

*Kongur*: Oytagh Vy. Upper 2840-3450 m. — 2840-3450 m / N, NE, NNE, NNW, W / open forest, pasture, scrub: *Juniperus*, *Picea* / northern hemisphere: CIRC POL.

**Hypnum lacunosum** (Brid.) Hoffm. ex Brid.

*Kongur*: Oytagh Vy. Upper 3160 m. — 3160 m / SE / scrub: *Juniperus* / northern hemisphere, S America, New Zealand: COSMO.

**LESKEACEAE****Leskeella nervosa** (Brid.) Loeske

*Kongur*: Oytagh Vy. Upper 3280 m. — 3280 m / S / scrub: *Juniperus* / northern hemisphere: CIRC POL.

**MNIACEAE****Mnium marginatum** (With.) Brid. ex P. Beauv.

*Kongur*: Oytagh Vy. Upper 3170-3740 m, Atojnak Vy. 3390 m. — 3170-3740 m / N, NE, NNE, NNW, S, W / open forest, pasture, scrub, turf: *Juniperus*, *Picea*, *Salix* / Eurasia, N America: CIRC POL.

**ORTHOTRICHACEAE****Orthotrichum affine** Brid.

*Kongur*: Oytagh Vy. Upper 2900 m. — 2900 m / NNE / open forest: *Juniperus*, *Picea* / northern hemisphere: CIRC POL.

**POTTIACEAE****Barbula reflexa** (Brid.) Brid.

*Kongur*: Oytagh Vy. Upper 3320 m. — 3320 m / W / open forest: *Picea* / holarctic: CIRC POL.

**Barbula vinealis** Brid.

*Kongur*: Oytagh Vy. Upper 3450-3470 m. — 3450-3470 m / NE, W / scrub, turf: *Juniperus* / N Africa, Europe, Asia, N America: CIRC POL.

**Gymnostomum aeruginosum** Sm.

*Kongur*: Oytagh Vy. Upper 3160-3320 m. — 3160-3320 m / N, SE, W / open forest, scrub, turf: *Juniperus*, *Picea* / Europe, Asia, America: CIRC POL.

**Tortella bambergeri** (Schimp.) Broth.

*Kongur*: Oytagh Vy. Upper 2790-3470 m. — 2790-3470 m / NW, S, SE, W / open forest, scrub, turf: *Juniperus*, *Picea* / Europe: EURAS.

**Tortula caninervis** (Mitt.) Broth.

*Kongur*: Oytagh Vy. Upper 2590-3370 m, Atojnak Vy. 2970 m. — 2590-3370 m / E, ESE, N, NE, NNE, S, SE, W, WNW / dwarf-scrub, meadow, open forest, pasture, scrub, turf: *Artemisia*, *Stipa*, *Caragana*, *Hippophae*, *Juniperus*, *Picea* / S Europe, Russia: EURAS.

***Tortula mucronifolia*** Schwaegr.

*Kongur*: Oytagh Vy. Upper 2590-3320 m. — 2590-3320 m / NNW, SE, W / open forest, pasture, scrub: *Hippophae*, *Juniperus*, *Picea* / boreo-alpine zones Eurasia, N America: CIRC POL.

***Tortula ruralis*** (Hedw.) Gärtn.

*Kongur*: Oytagh Vy. Upper 2660-3450 m, Atojnak Vy. 3030 m. — 2660-3450 m / N, NE, NNE, NNW, NW, S, SE / dwarf-scrub, open forest, pasture, scrub, turf: *Artemisia*, *Juniperus*, *Picea* / temperate zones northern/southern hemisphere: COSMO.

***Trichostomum crispulum*** Bruch

*Kongur*: Oytagh Vy. Upper 2810-2860 m. — 2810-2860 m / SE, WNW / open forest, pasture: *Juniperus*, *Picea* / Eurasia, N Africa: EURAS.

***Weisia controversa*** Hedw.

*Kongur*: Oytagh Vy. Upper 3090-3160 m. — 3090-3160 m / E, SE / pasture, scrub: *Artemisia*, *Juniperus* / cosmopolitan: COSMO.

**THUIDIACEAE*****Abietinella abietina*** (Hedw.) Fleisch.

*Kongur*: Oytagh Vy. Upper 3150 m. — 3150 m / NNW / open forest: *Picea* / northern hemisphere: CIRC POL.

**TIMMIACEAE*****Timmia bavarica*** Hessel.

*Kongur*: Oytagh Vy. Upper 3000-3450 m, Atojnak Vy. 3030 m. — 3000-3450 m / N, NE, NNW, W / open forest, pasture, scrub: *Juniperus*, *Picea* / Eurasia, N America: CIRC POL.

**5. Vegetation****5.1 W Kashgaria**

The outer slopes of the Kongur Massif towards the Tarim Basin and the lower and middle Oytagh and Atojnak Valleys up to 2500–2600 m, respectively, carry a thick loess cover with sparse and uniform desert vegetation. No difference in aspect is discernible. A few halophytic dwarf-shrubs dominate (*Reaumuria soongorica*, *Kalidium cuspidatum*) besides less frequent therophytes (*Halogeton glomeratus*, *Zygophyllum lehmannianum*). Lichens (*Endocarpon pusillum*, *Fulgensia bracteata*, *Psora decipiens*, *Catapyrenium squamulosum*, *Buellia elegans*) cover loess ground undisturbed by trampling. *Artemisia scoparia*, *Chondrilla piptocoma*, *Capparis spinosa*, *Stipa splendens*, and a few more species occasionally occur near the bottom of wadis, apparently depending on at least temporary water surplus conditions.

**5.2 Kongur**

Deposits of a large rock fall in the Oytagh Valley at around 2600 m, and the upper end of the Atojnak Gorge (2900 m) mark a considerable change in vegetation – indicated by the lowest specimens of *Juniperus semiglobosa* – towards the upper sections of Oytagh and Atojnak Valleys. Open stands of this tree inhabit the valley bottom and ascend the slopes up to 3000 m in N- and up to 3200 m in S-exposure.

In N-exposure, *Picea schrenkiana* forest patches ascend from 2800 up to the tree line at around 3350 m (Photo 2). Up to 3400 m the spruce – with increasing altitude reduced in height and frequency – constitutes a krummholz belt together with *Juniperus pseudosabina* which climbs up to 3500 m. Towards the glaciers, spruce stumps suggest a local tree line depression down to 3200 m.

Whereas *Picea schrenkiana* is dominating the shady slopes, *Juniperus semiglobosa* seems to play at least an equal role on sunny slopes up to 3200 m. Here, the altitude of the tree line is not to be clarified according to the occurrence of only scattered single spruce and juniper trees, but seems to be located at about 3400 m (a single spruce tree, ca. 8 m in height, was found in



Photo 2. – NE-facing slope with *Picea schrenkiana* forest dissected by avalanche tracks (arrows) and intermingled with pastures and *Juniperus pseudosabina* scrub (1). Heavy erosion and slope gliding (2) reduce the grazing area. The surroundings of the pasture settlement Altunchi (3), situated above the upper tree line (ca. 3350 m), are heavily overgrazed. At around 3900 m the closed *Bistorta vivipara*-*Carex stenocarpa* turf opens towards the subnival belt of free geli-solifluction (4). In the background the Büi Ush glacier (5) is towered by Chakragil peak (6678 m). (G. Miehe 1992-07-14, upper Oytagh Vy., 3100 m a.s.l., W).





Photo 3. – N-facing slope with very open *Picea schrenkiana* forest (i.e. spruce trees scattered on short grazed *Poa pratensis-Adenophora himalayana* pasture). Trees are heavily browsed, forest regeneration is inhibited by unsustainable pasture management. Foreground: destruction of vegetation cover leads to gully erosion. (G. Miehe 1992-07-14, upper Oytagh Vy., 3170 m a.s.l., WNW).

3550 m in E-exposure, however). The *Juniperus pseudosabina* krummholz is devastated and reduced to isolated patches (3200 – 3500 m) in the same manner as the montane forest below. In sheltered rock crevices the juniper climbs up to 3600 m.

Lower alpine turf vegetation with no obvious differences in aspect follows above the sub-alpine krummholz up to 3900 m where it opens towards the screes of the upper alpine belt with free gelifluction. Due to the rugged nature of the higher reaches, botanical investigations have been possible only up to the upper fringe of alpine turf at about 3900-4000 m. Sparse alpine and subnival vegetation on screes and rocks is expected to extend locally up to the snowline at approximately 4500 m.

Due to anthropo-zoogenous activities, open *Artemisia brevifolia* dwarf-scrub nowadays is the widely dominating montane vegetation formation of the upper Oytagh and Atojnak Valleys. It occupies southern exposures between the open, and often highly devastated forest patches. The anthropo-zoogenous forest-replacing formation on relatively moist and not too steep areas in all exposures is a short-grazed pasture dominated by rosette-plants like *Leontopodium campestre*, *Potentilla bifurca* and *Plantago gentianoides*.

#### 5.2.1 Forest and scrub communities

##### *Picea schrenkiana* forest

(Table 1, plots number 1-5, elevation belt: montane, aspect: mainly N, species number: 20-34 / 25 m<sup>2</sup>)

The spruce forest stands are usually very open (Photo 3). More dense, semi-natural stands were found only in less accessible areas in Atojnak Valley. The spruce dominates the upper and



Photo 4. – S-facing slope with *Juniperus pseudosabina* scrub. The subalpine krummholz belt is devastated and reduced to isolated patches in the same manner as the montane forest below. (G. Miehe 1992-07-13, upper Oytagh Vy., 3290 m a.s.l., NNE).

lower tree layers, and the shrub layer (up to 25, 60 and 10% cover, respectively). Trees older than approximately 50 years are absent, as are tree seedlings in the herb layer. A characteristic herbaceous flora of the forest floor (*Orthilia secunda*) is almost absent, due to heavy grazing. Apart from *Picea* and *Lonicera heterophylla* all other differential species are cryptogams, *Ctenidium procerrimum* being the most characteristic and common moss. An interesting feature is the epiphytic growth of the characteristic loess lichen *Candelariella aurella*. This probably indicates loess dust accumulation even on tree trunks and branches.

#### *Juniperus semiglobosa* forest

(Table 1, plots number 6-7, elevation belt: lower montane, aspect: all exposures, species number: 20-27 / 25 m<sup>2</sup>)

The juniper forest stands are, in general, opened by wood cutting and browsing. The upper tree layer covers around 10%, and the lower tree layer up to 50%. Due to heavy grazing, there are no tree seedlings or younger trees found in the dwarf-shrub and herb layers. The juniper tree (< 8 m), *Tortella bambergeri*, *Erigeron acer* and *Plantago gentianoides* serve as differential species.

#### *Juniperus pseudosabina* scrub

(Table 1, plots number 8-13, elevation belt: subalpine, aspect: all exposures, species number: 13-35 / 25 m<sup>2</sup>)

The shrub layer (60-95% cover) is built almost exclusively by *Juniperus pseudosabina*, which usually forms concentric patches, 1-2.5 (-4) m in height (Photo 4). The juniper rejuvenates in dense (but not too dark) stands sheltered from livestock. *J. pseudosabina*, *Artemisia santolinifolia*, *Carex alajica* and *Phlomis oreophila* are differentiating this community. A relatively

large species group with *Adenophora himalayana*, *Carex turkestanica* and *Isopyrum anemoides* connects the juniper tree with the juniper scrub community. *Androsace flavescens*, *Parnassia laxmannii* and *Mnium marginatum* relate the upper reaches of this community to the lower alpine turf.

### 5.2.2 Dwarf-scrub, pasture, meadow and turf communities

#### Malcolmia africana-Artemisia brevifolia dwarf-scrub and pastures

(Table 2, plots number 28-49, elevation belt: montane, aspect: mainly S, species number: 9-25 / 12 m<sup>2</sup>)

*Artemisia brevifolia* and the annual *Malcolmia africana* are the only species connecting all variants and subvariants of this community. Vegetation cover ranges from 40 to 98%, and is apparently negatively correlated with grazing pressure (especially soil lichens are extremely sensitive to trampling) and comprises open dwarf-scrub and short grazed pastures. Thus, two variants are conveniently distinguished in this community: The *Lappula barbata* dwarf-scrub variant with *Agropyron cristatum* and *Psora decipiens* is confined to altitudes below 3000 m. A *Stipa splendens* subvariant with *Puccinellia hackeliana* is almost restricted to SE-exposure, whereas a *Catapyrenium squamulosum* subvariant with *Stipa tianschanica*, *Astragalus nematodes* and *Kochia prostrata* does not seem to prefer a special exposure. The *Plantago depressa* pasture variant (Photo 5) with *Veronica biloba* and *Chenopodium karoii* is located in altitudes around 3000 m.



Photo 5. – S-facing slope with short grazed pasture dominated by rosette plants (*Malcolmia africana-Artemisia brevifolia* dwarf-scrub and pastures, *Plantago depressa* pasture variant). Scattered *Juniperus pseudosabina* shrubs are heavily browsed (arrows) and may indicate a formerly closed juniper scrub. (G. Miehe 1998-08-10, upper Oytagh Vy., 3120 m a.s.l., NW).





*Poa pratensis-Adenophora himalayana* pastures and meadows

(Table 2, plots number 15-27, elevation belt: montane-subalpine, aspect: all exposures, species number: 13-34 / 12 m<sup>2</sup>)

Phenotypically, this community includes short grazed pastures (Photo 3) and tall meadows fenced for haying or reforestation efforts. Several common species connect the community to the *Malcolmia africana-Artemisia brevifolia* dwarf-scrub (e. g. *Plantago gentianoides*, *Carex turkestanica*, *Potentilla bifurca*), as well as to the *Carex stenocarpa-Bistorta vivipara* turf (e. g. *Distichum capillaceum*, *Euphrasia pectinata*, *Gentianella turkestanorum*). *Oxytropis pagobia*, *Poa pratensis* and *Potentilla pamirica* connect the two variants distinguished here. *Erigeron acer* and *Bromus inermis* differentiate the *Agrostis gigantea* variant. *Juniperus pseudosabina* seedlings in the *Artemisia santolinifolia* variant probably indicate a relationship with the juniper scrub. It seems that the community as a whole occupies potential scrub or even forest habitats. This assumption is corroborated by the occurrence of the same species in adjacent scrub and forest patches (e. g. *Adenophora himalayana* commonly occurs also in *Juniperus pseudosabina* scrub, *Ctenidium procerrimum* in *Picea schrenkiana* forest, *Erigeron acer* in *Juniperus semiglobosa* forest).

*Bistorta vivipara-Carex stenocarpa* turf

(Table 2, plots number 1-14, elevation belt: subalpine-lower alpine, aspect: all exposures, species number: 10-42 / 12 m<sup>2</sup>)

*Bistorta vivipara*, *Kobresia karakorumsensis*, *K. capillifolia*, *Carex stenocarpa* and *Cerastium thomsonii* are more or less frequent differential species of this community.

The *Schulzia albiflora* variant occupies the upper reaches (mostly in N-exposure) with *Gentiana prostrata* and *Poa supina*. The *Androsace flavescens* variant with *Androsace flavescens* and *Parnassia laxmannii* locally descends below the treeline and shows the highest species numbers of all vegetation units encountered. *Geranium pratense*, *Seseli mucronatum* and *Cortusa brotheri* (also in *Picea schrenkiana* forest and *Juniperus pseudosabina* scrub) connect this variant with the *Poa pratensis-Adenophora himalayana* meadows and pastures.

**5.3. E Pamir**

Bare slopes with a scanty desert vegetation showing no obvious differences in aspect, and contrasting green, lush *Cyperaceae* swamps of the broad valley bottom characterise the intramontane basin of Bulunköl and Muji. *Krascheninnikovia ceratoides*, *Artemisia compacta* and *Sympegma regelii* are dominating dwarf-shrubs of loess and scree slopes, accompanied by the less frequent *Tanacetum tibeticum*, *Zygophyllum obliquum*, *Christolea crassifolia*, *Artemisia pamirica* and *Halogeton arachnoideus*. Total vegetation cover rarely exceeds 10%. Lichens (e. g. *Catapyrenium squamulosum*, *Gypsoplaca macrophylla*, *Aspicilia* spp.) occasionally cover stable loess slopes. The main constituents of the moist valley bottom *Cyperaceae* meadows (*Blysmus compressus*, *B. rufus*, *Carex curaica*, *C. orbicularis*, *C. pseudofoetida*, *Kobresia royleana*, *K. schoenoides*) and their companions (*Glaux maritima*, *Triglochin maritimum*, *T. palustre*, *Eleocharis quinqueflora*, *Trichophorum pumilum*) are obviously all salt-tolerant.

**6. Phytogeography and Diversity**

The present attempt of a phytogeographical analysis of the research area must be regarded as provisional, due to the still poorly known over-all distribution features of many taxa.

**6.1. Geo-elements**

The flora of the research area is principally Central Asiatic. Figure 3 demonstrates the dominance of Central Asiatic elements in all the three regions: W Kashgaria (47%), Kongur (34%) and E Pamir (45%). Eurasiatic (especially Eurosiberian) and circumpolar elements are well represented. Eurasiatic elements decrease noticeably from 28% (W Kashgaria) through 16% (Kongur) to 6% (E Pamir); circumpolar elements amount for 4, 11 and 9%, respectively. Cosmopolitan elements (mainly weeds) decrease from 13% in W Kashgaria to 2% in Kongur and

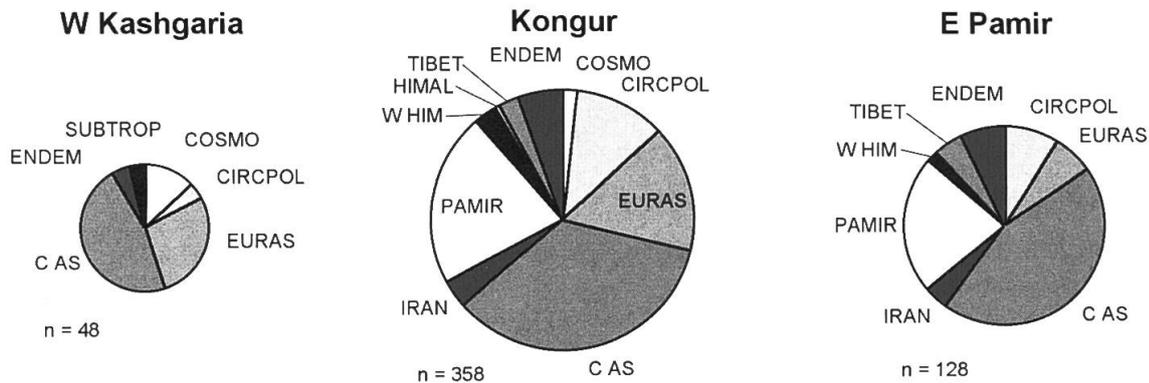


Fig. 3. – Distribution of geo-elements (vascular plants only) – i. e. cosmopolitan (COSMO), circumpolar (CIRC POL), Eurasiatic (EURAS), Central Asiatic (C AS), Irano-Turanian (IRAN), Pamiran (PAMIR), W Himalayan (W HIMAL), Himalayan (HIMAL), Tibetan (TIBET), subtropical (SUBTROP) elements and endemics (ENDEM) – in the floras of W Kashgaria (< 2100 m), Kongur (2100 – 3900 m) and E Pamir (3000 – 3900 m) (cultivated species omitted).

lack entirely in E Pamir. Subtropical elements are restricted to W Kashgaria (4%). Irano-Turanian, Pamiran, W Himalayan and Tibetan elements are absent in W Kashgaria but are almost evenly distributed in Kongur and E Pamir (3 and 4% in Irano-Turanian, 21 and 22% in Pamiran, 3 and 2% in W Himalayan, 3 and 5% in Tibetan elements, respectively). Himalayan elements are restricted to Kongur (1%).

The proportion of endemic species is low in all areas, accounting for 4% in W Kashgaria, 6% in Kongur and 7% in E Pamir. Similar, generally low values were found for the Monocotyledoneae of the Karakorum (DICKORE, 1995), and for the flora of Nanga Parbat (DICKORE & NÜSSER, 2000).

**6.2. Life forms**

Figure 4 shows almost evenly proportions for therophytes (23%), hemicryptophytes (17%), geophytes (21%), chamaephytes (24%), and nanophanerophytes (15%) in W Kashgaria. Phanerophytes are absent, however.

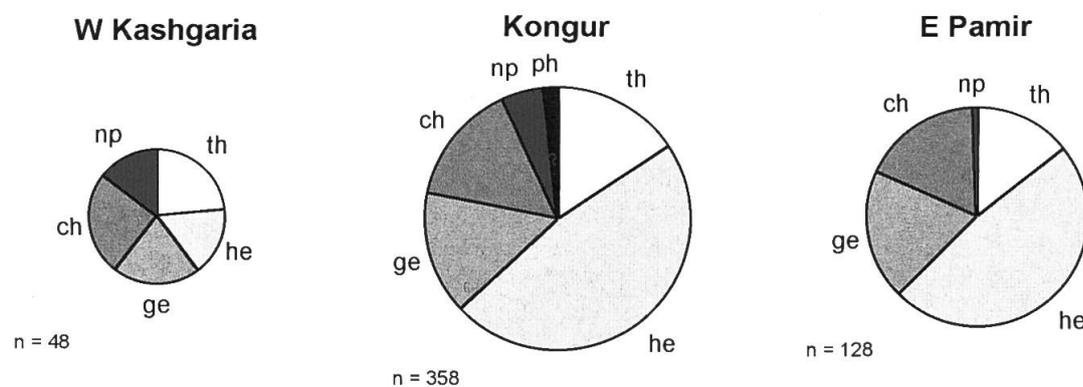


Fig. 4. – Distribution of life forms (vascular plants only) – i. e. th (therophytes: T caesp, T ros, T scand, T scap, T sem), he (hemicryptophytes: H caesp, H rep, H ros, H scand, H scap, H sem, H stol), ge (geophytes: G bulb, G rad, G rhiz), ch (chamaephytes: C frut, C pulv, C scand, C suff), np (nanophanerophytes: P caesp, P scand) and ph (phanerophytes: P scap) – in the floras of W Kashgaria (< 2100 m), Kongur (2100 – 3900 m) and E Pamir (3000 – 3900 m) (cultivated species omitted).

In Kongur and E Pamir hemicryptophytes amount for nearly half of all life forms (47 and 48%, respectively). Therophytes, geophytes, and chamaephytes are almost evenly distributed in both subregions (16 and 14%, 15 and 20%, 15 and 17%).

Nanophanerophytes amount for 5% in Kongur and only 1% in E Pamir, whereas phanerophytes are restricted to Kongur (2%).

### 6.3. Vegetation belts and species distribution

Figure 5 shows the altitudinal distribution of species numbers (per 100 m altitudinal class) in the three subregions. The curve including W Kashgaria and Kongur and the one representing E Pamir are basically hump-shaped. This seems to be a typical feature for mountains in arid climate (DICKORE & MIEHE, 2002).

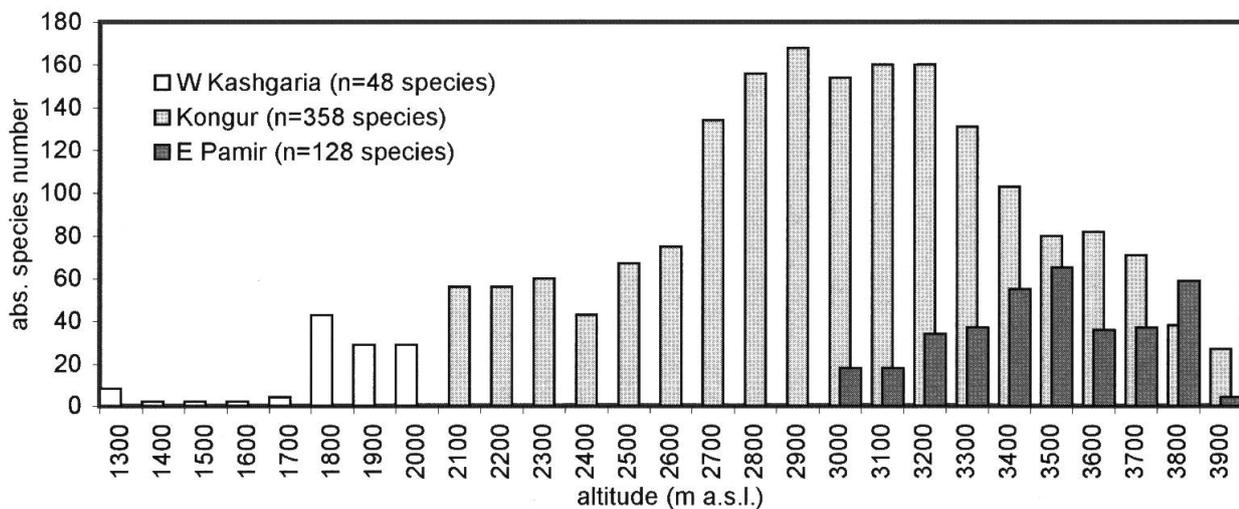


Fig. 5. – Regional and altitudinal distribution of species numbers (vascular plants only) in W Kashgaria, Kongur and E Pamir.

#### 6.3.1. W Kashgaria and Kongur

In correspondence with the steep orographical and climatic-ecological gradients, a high degree of altitudinal variation is a prominent feature of the flora and vegetation. Vegetation belts and formations of the Oytagh Valleys range from the temperate deserts of the Tarim Basin (colline belt: 1300 – 2100 m), through semi-desert and dwarf-scrub (submontane: 2100 – 2700 m), grassland, scrub and forest (montane: 2700 – 3300 m), up to the upper treeline with scrub (krummholz), dwarf-scrub and turf (subalpine: 3300 – 3600 m), and finally turf, open scree and rock (alpine: > 3600, investigated up to 3900 m). Higher up follow subnival habitats at the upper edge of phanerogamic vegetation (estimated at around 4500 m).

Due to incomplete sampling, especially the species of W Kashgaria are underrepresented below 1800 m. The peak at this altitude class is related to the Gez and Oytagh rivers' riparian habitats relatively rich in species compared to the dry surroundings. The doubling of species number at 2100 m (i. e. the transition lower – middle Oytagh Valley) is correlated to the transitions W Kashgaria – Kongur and colline – submontane belt as well.

Reaching up to 2600 m the submontane belt shows no considerable increase in species number. According to DICKORE & MIEHE (2002), this "plateau" is another typical feature of dry W High Asia. The slight decrease at 2400 m seems to be due to incomplete sampling.

The montane belt (2700 – 3300 m) comprises the mode of the curve and thus the altitudinal classes with the highest species numbers. It is characterised by a steep rise in species number compared to the submontane belt.

Subalpine (3300 – 3600 m) and lower alpine belt (3600 – 4000 m) follow a monotonical decrease in species number towards the upper limit of plant life at approximately 4500 m.

In a wider scope, however, the altitudinal distribution of flora and vegetation of W Kunlun Shan / E Pamir shows considerable variations.

### 6.3.2. *E Pamir*

Because of the time spent in this subregion being restricted to only 4 days, species records are rather incomplete here, which is assumed to be the reason for the sudden decrease between 3500 and 3600 m. The peak at 3800 m is (similar to the one at 1800 m in W Kashgaria) correlated to riparian habitats relatively rich in species. Data are just too incomplete to allow the delimitation of altitudinal belts here.

## 7. Discussion: Vegetation History and Dynamics

The probably relictary coniferous forest outposts of the Oytagh Valleys, in the centre of several small potentially wooded areas, represent the southeastern-most substantial traces of a humid montane forest belt along the northern rim of W Tibet. Nearly 2000 km to the east, the Kunlun Shan is almost completely devoid of any forest vegetation, right into Qinghai (Nan Shan), where there occurs *Picea asperata* Mast. (GRUBOV, 1971). The next occurrences of the West Himalayan *P. smithiana* (Wall.) Boiss. are known from the lower Hunza Valley, almost 300 km to the south across the Karakorum main ridge (SCHICKHOFF, 1995). According to BAJTENOV (1984), *P. schrenkiana* was much wider distributed during the pleistocene, and its area of distribution decreased during the xerothermic periods of the holocene. Desiccation of the Tibetan Plateau is evident at least since 4000 years (MIEHE & MIEHE, 2000).

SCHMIDT-VOGT (1977) delimits the distribution of *Picea schrenkiana* (s. str.) between 74° to 93° E and 42°15' to 47° N, whereas the W Central Asiatic spruce population to the south is assigned to the vicarious *P. tianschanica* Rupr. The *Picea* stands in the W Kunlun Shan from 38° to 39° N are, however, not mentioned at all. In the present paper, following FLORA XINJIANGENSIS, all W Central Asiatic spruces are thought to belong to *P. schrenkiana* (including *P. tianschanica*). This species is geographically well isolated from its next neighbours: *Picea obovata* Ledeb. (or *P. abies* (L.) H. Karsten var. *obovata* (Ledeb.) Fellm., sensu SCHMIDT-VOGT, 1977) in the north, *P. smithiana* in the south, and *P. asperata* in the east. *P. schrenkiana* is the only tree that builds up larger forest stands in the boreal zone of the Tian Shan mountains between 1400 and 3000 m (3600 m) (SCHROEDER, 1998). Depending on special climatic conditions, the spruce is confined to N-exposures with sufficient soil humidity (melt-water supply). Forest is absent in S-exposures of the Tian Shan. *Juniperus pseudosabina* scrub ascends up to 3000 m (SCHMIDT-VOGT, 1977).

The occurrence of forests in the arid W Kunlun Shan is considered to depend on the combination of micro- and mesoclimatic features. These factors include winter snow cover (melt-water supply), convective summer rain and relatively low rates of evapo-transpiration in higher altitudes as well as macroclimatic features, i. e. advective precipitation from the most eastern branches of atlantic low pressure disturbances (RICHTER & al., 1999). The small-scale mosaic of forest patches, scrub and deforested areas in upper Oytagh and Atojnak is very likely the result of anthropo-zoogeneous impact. Grazing pressure, indicated by junipers browsed to scurrilous habits, is a prominent landscape feature.

SKRINE (1925: 403) already indicated a certain grazing pressure by mentioning a “grassy ridge dotted with neat clumps of fir and juniper, very much like a well-laid-out park”. The old grown spruce trees the same author got excited about, however, have gone. Today apparently not

a single spruce tree exceeds an age of approximately 50 years. Reportedly, the “People’s Liberation Army” cut down almost all trees of any valuable size in the 1960s and 70s, in the course of Mao Zedong’s campaigns, respectively the “great leap forward” and the “cultural revolution”. According to information by elder inhabitants and widely distributed tree stumps in today’s pastures, the forest must have covered a much larger area around 40 years ago. Charcoal layers in soil profiles under pastures indicate forest fires in former times. Radiocarbon-dates are yet missing, however.

Due to clear-cutting, the pasture area increased at least since 40 years. Livestock numbers, accordingly, increased from ca. 4,000 in 1982 to ca. 12,000 in 1998 (local information, see also KREUTZMANN, 1995). Presently, grazing pressure seems to be too high for sustainable pasture utilisation. Overgrazing commonly leads to destruction of the protective plant cover, followed by soil loss and gully erosion. Many of the more easily accessible grazing grounds are reduced in size by slope gliding, especially where mica-schists form the bedrock.

According to SKRINE (1925: 401), all the glaciers on the eastern flanks of the Chakragil (topping upper Oytagh and Atojnak to the west) and Qungur (Kongur Shan) massifs were in “full retreat”. A comparison of a photograph of SKRINE (1926: 283) with the present (1998) situation indicates a retreat of the combined Oytagh and Bül Ush glaciers of at least 100 m in length during the last 75 years. These glaciers are mainly fed by avalanches. A retreat due to lower precipitation does not seem probable, because herdsmen in upper Oytagh reported summers becoming increasingly wet. Thus the retreat has to be correlated with increasing temperature.

## 8. Conclusion: Changes and Threats

The flora of the Oytagh Valleys is relatively rich (DICKORÉ & MIEHE, 2002) and associated with coniferous forests and their replacement communities. *Picea schrenkiana* is a key-stone species. Besides the spruce, many plant species confined to the more humid mountains of Central Asia occur in the area, often disjunct and on their southeastern limit of distribution (e.g. *Aquilegia atrovinosa*, *Carex turkestanica*, *Phlomis oreophila*, *Stachyopsis lamiiflora*, *Taphrospermum altaicum*, *Trollius dshungaricus*). The subhumid niches of the Oytagh Valleys thus probably represent the last remnants of a formerly continuous forest belt.

The boreal coniferous belt of the Oytagh Valleys is, furthermore, intimately linked to desert and steppe formations in all altitudinal belts. To the east, the coniferous belt tapers, leaving a narrow belt of *Juniperus pseudosabina* scrub at around 3000 m. East of 78°E, it disappears completely, and much of the Central Kunlun Shan is characterised by continuous desert vegetation through all altitudes and exposures. The differentiation of mainly Central Asiatic genera like *Krascheninnikovia*, *Reaumuria*, *Oxytropis*, which include some species in Northern Tibet, also indicate a certain spatial continuity of arid conditions. Some of the more spectacular vicariations (*Carex alajica* – *C. oligocarya*) and disjunctions (*C. tangulashanensis*) were discussed by DICKORÉ (1995).

The flora of the Oytagh Valleys is seriously devastated and further fragmented due to recent human activities. Without human impact, a more or less open forest is assumed to grow above 2500 m, gradually reducing its height towards the treeline (*Juniperus pseudosabina* krummholz belt, about 100 m wide) and opening towards subalpine turf in 3400 m (N-exposure) or 3500 m (S-exposure). Under natural conditions, *Juniperus semiglobosa* would be the dominating tree of the valley bottom, on shady slopes up to 3000 m and on sunny slopes up to 3200 m followed by the dominance of *Picea schrenkiana*. The recently deglaciated terrain of the combined Oytagh and Bül Ush glaciers, though sparsely vegetated, clearly shows the development towards an open *Juniperus semiglobosa* forest. The natural habitats of today’s “open area species” may be above the upper and below the lower treeline as well as on extrazonal stands within the forest belt, like avalanche, rock fall, and land slide tracks or on open substratum of moraines, screes and river gravels.

Assuming only the maintainance of the status quo, the loss of pastures due to erosion is expected to increase further. Due to the lack of rejuvenation, the days of spruce and juniper forest are numbered. The present forest administration's reforestation efforts are hampered by using *Picea schrenkiana* seedlings from the Tian Shan, about 600 km to the NE. These should rather rely on indigenous seeds. Effective management of grazing is, however, primarily important for a possible restoration of forests but is not necessarily in the scope of recent Chinese "deregulation politics". An integrated forest and pasture management programme seems to be the only promising effort towards a sustainable use of the Oytagh Valleys' natural resources and should be planned in cooperation with the local people.

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