Allium carolinianum DC.
Allium griffithianum Boiss.
Allium humile Kunth
Allium jacquemontii Regel
Allium oreoprasum Schrenk
Amaryllidaceae

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Synonyms

***Allium carolinianum* DC.:** *Allium aitchisonii* Baker, *Allium aitchisonii* Regel, *Allium blandum* Wall., *Allium obtusifolium* Klotzsch, *Allium platyspathum* var. falcatum Regel, *Allium platystylum* Regel, *Allium polyphyllum* Kar. & Kir., *Allium thomsonii* Baker.
***Allium griffithianum* Boiss.:** *Allium rubellum* var. *grandiflorum* Boiss.
***Allium humile* Kunth:** *Allium govanianum Wall. ex Baker, Allium nivale* Jacquem. ex Hook. f. & Thomson.

Local Names

***Allium carolinianum*: Pashto:** jangli wezai; **Baltistan:** broq chong; chong; **North-west Pakistan:** khokhai; **Jammu:** arum, kotse, skiche; **Kashmir:** praan, gogcheegma.

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***Allium griffithianum*: Kurram:** payazaki.
***Allium humile*: Garhwal:** pangri.
***Allium jacquemontii*: Kurram:** zangali, payaz.
***Allium oreoprasum*: Nepali:** lungho.
***Allium sativum*: Pashto:** woga; **Khyber Pakhtunkhwa:** werzenu; **Kashmir:** gande, gundh, rohun, gand, rhoon, rohan, ruhan; **Jammu:** pyaaz, ganda, thoom, **Ladakh:** tsong, gogps, sgogpa, skokpa.
***Allium cepa*: Pashto:** payz.

Botany and Ecology

***Allium carolinianum*:** Bulbs usually paired, ovoid to ovoid-cylindric, 1–2.5 cm in diameter; tunic brown to yellowish-brown, leathery, apex separated, usually fibrous. Leaves broadly linear, usually falcate, shorter than scape, (3–)5–15-mm wide, flat, smooth, apex obtuse. Scape 20–40(−60) cm, terete, covered with leaf sheaths for about half its length. Spathe 2-valved, persistent. Umbel globose, densely many flowered. Pedicels subequal, slightly shorter than to twice as long as perianth, bracteolate or ebracteolate. Perianth pale red to purple-red or white; segments oblong to narrowly so, (4.5–)6–8(−9.4) × 1.5–3 mm, apex obtuse, sometimes retuse; inner ones subequaling to slightly longer than outer. Filaments subulate, slightly shorter than to twice as long as perianth segments, connate at base and adnate to perianth segments for about 1 mm; inner ones wider than outer at base. Ovary subglobose, with concave nectaries at base. Style exserted. Flowering and fruiting June to September (Wu et al. 1994-2013).
***Allium griffithianum*:** Plants up to 40 cm tall. Bulb ovoid, outer coats coriaceous, fibrous grayish-black; inner coats membranous; bulblets present, few, large. Leaves 2–3, linear, semicylindrical, fistular, grooved, 1–2 mm broad, glabrous. Umbels hemispherical, dense flowered. Pedicels very unequal, 5–20 mm long. Tepals broadly lanceolate to oval, 6–7-mm long, white to light pink or light purple, acute to obtuse, veins prominent; inner tepals shorter than the outer, distinctly gibbous at the base. Filaments entire, about 1/3 the length of the tepals, about 2/3 of the filaments united, upper 1/3 free; inner filaments broad, ovate, outer narrower, triangular. Flowering March to April. Central Asia, Afghanistan, India, and Pakistan. A very common species (Ali and Qaiser 1995-2020).
***Allium humile*:** Bulb solitary, cylindric; tunic brown, reticulate or subreticulate. Leaves 4–7, linear, 4–5-mm wide, flat, solid, fleshy, apex obtuse. Scape 5–15 cm, slightly compressed, covered with leaf sheaths only at base. Umbel hemispheric, many flowered. Pedicels subequal, 1.5–2 times as long as perianth. Perianth broadly exposed, white; segments with yellowish-green midvein, lanceolate, 7–8 (−10) × about 2 mm. Filaments equal, about 1/2 as long as perianth segments. Ovary obconical-globose. Style short; stigma slightly three-cleft. Flowering June (Wu et al. 1994-2013).
***Allium jacquemontii*:** Plants 15–35 cm tall. Bulb ovoid, 0.5–1.2 cm broad; outer coats coriaceous, striate, black-brown; inner membranous. Scapes slender, glabrous.

Leaves 2–3, linear, fistular, 0.5–1.5 mm broad, glabrous. Umbels dense flowered, about 3 cm across. Pedicels filiform, about 15-mm long. Tepals rose colored, about 5–mm long, oval, acute. Filaments about 2/3 the length of the tepals, entire, inner broader, triangular; anthers dark violet colored. Style included; stigma capitate. Flowering March to April: Central Asia, Afghanistan, Pakistan, and India. A common species in the plains and the foothills (Ali and Qaiser 1995-2020).

***Allium oreoprasum*:** Bulbs clustered, narrowly ovoid-cylindric, 0.5–1 cm in diameter; tunic yellowish-brown, reticulate. Leaves narrowly linear, shorter than (sometimes half as long as) scape, 1–3(−4)-mm wide. Scape 11–30(−40) cm, terete, covered with leaf sheaths only at base. Spathe 1- or 2-valved, persistent. Umbel fascicled to hemispheric, few flowered. Pedicels subequal, 1.5–3 times as long as perianth, bracteolate. Perianth pale red to white; segments with dark purple midvein, obovate-elliptic to broadly so, 4.2–7 × 2.5–4 mm, apex with a conduplicate and reflexed point; inner ones usually shorter and wider than outer. Filaments 1/2–3/4 as long as perianth segments, connate at base and adnate to perianth segments for 1.2–1.5 mm; outer ones narrowly triangular, slightly shorter than inner and about half as wide at base; inner ones broadly triangular. Ovary subglobose, without concave nectaries at base. Style not exserted; stigma slightly three-cleft. Flowering and fruiting June to August (Wu et al. 1994-2013).

Local Medicinal Uses

Many species of wild onion with garlic scent are widely used in folk medicine. The tincture has antimicrobial properties and is used in atherosclerosis, colitis, and diarrhea. Fresh or cooked onions are applied topically for certain skin diseases (abrasions, sores). Fresh juice from the leaves and bulbs with sugar is used for the treatment of diseases of the upper respiratory tract. Onion improves vision; onion juice prevents the development of cataracts in the early stages. Alcohol tinctures regulate blood pressure and improve the elasticity of capillaries (Bussmann 2017; Fayvush et al. 2017).

Allium carolinianum serves to remedy diabetes (Ullah et al. 2019), as appetite stimulant and tonic and to treat jaundice and skin and eye inflammations (Pawera et al. 2015). It is also used for joint pain and gastrointestinal disorders (Abbas et al. 2016). In Jammu, Kashmir, and Ladakh, it is used for constipation, female ailments, joint pain, indigestion, and swollen joints (Gairola et al. 2014).

Allium griffithianum serves to remedy colic and vomiting (Muhammad et al. 2019).

***Allium jacquemontii*:** Fresh leaves are plucked though they are bitter in taste, but when eaten raw or cooked along with other pot herbs, it is a good remedy for gastrointestinal disorders especially stomachache (Jan et al. 2017). Rhizome is used for stomach disorder (Muhammad et al. 2019), unequal mammary glands and hypertension (Ahmad et al. 2015), as well as stomach disorders (Muhammad et al. 2019).

***Allium oreoprasum*:** In Nepal it is used to treat colds, cough, and sore throat. The species showed antiviral properties (Rajbhandari et al. 2007).

Allium ursinum is used for wound healing in the form of a decoction, gargle, and applications as disinfectant and wound healing remedy in diseases of the skin and women's diseases and for abscess. The plant is used raw in scurvy. *Allium* species are used as anthelminthic (Bussmann 2017; Fayvush et al. 2017).
Allium victorialis is used for infectious diseases: Used in the fresh form as antimicrobial and anthelmintic remedy (Bussmann 2017; Fayvush et al. 2017). In Jammu and Kashmir, it is used for toothache and diarrhea (Gairola et al. 2014).
Allium giganteum**:** During the spring people use its fresh leaves in traditional foods such as Ugro, Oshi Burida, Otala, Hirik, Oshi tupa, and Mastoba. It provides a unique taste, and people believe it has health benefits (nutraceutical). Local people also dry its leaves and use it in different traditional foods as a spice during winter times. The bulbs are collected and pickled. Onion pickles are very popular in Tajikistan (Bussmann et al. 2020).
Allium karataviense**:** In Middle Asia it is used for lung problems. The decoction of bulbs is used in traditional medicine for pulmonary diseases and strong shortness of breath (Bussmann et al. 2020).
Allium proliferum**:** In Jammu, Kashmir, and Ladakh, it is used for joint health (Gairola et al. 2014).
Allium stipitatum**:** Used as ornamental, in traditional medicine, and as a vegetable. The plants are applied in folk medicine against skin diseases. Plants are baked or cooked in honey and used against several diseases. The bulbs have disinfectant properties and are used to treat rheumatism and high blood pressure and as a booster in the digestive tract (Bussmann et al. 2020).
Allium cepa**:** In popular medicine it is considered as a great disinfectant, and in this way it is used in the form of plasters on the affected part and in cases of bites and insect bites. The onion is also considered effective to reduce inflammation and disinfect the respiratory tract: it is used especially to treat hoarseness, sore throats, and inflammation of the nasal mucosa. Consuming it as juice or broth mixed with a little sugar and drunk in glasses, combined with the application of plasters, is used successfully to treat inflammations, wounds, boils, abscesses, and fistulas. Fresh bulbs are used to treat high blood pressure, varicose veins, diabetes, rheumatism, asthma, and cough for blood cleansing. Fresh bulbs are used to treat cough. In Peru it is used for cough and bronchial problems (Paniagua-Zambrana et al. 2020). In Jammu, Kashmir, and Ladakh, it is used for hair health (Gairola et al. 2014).
Allium przewalskianum**:** In Jammu, Kashmir, and Ladakh, it is given to women after delivery to improve strength and is used for dysentery, stomachache, abdominal gas, hypertension, and stomach pain (Gairola et al. 2014).
Allium rubellum**:** In Jammu, Kashmir, and Ladakh, it is used for earache, giddiness, insect bites, and respiratory troubles and as expectorant (Gairola et al. 2014).
Allium consanguineum**:** In Jammu, Kashmir, and Ladakh, it is used as aphrodisiac and stimulant (Gairola et al. 2014).
Allium odorum is used in Peru for bronchitis, asthma, and bruises (Paniagua-Zambrana et al. 2020).
Allium sativum**:** Commonly used against intestinal worms, to reduce blood pressure and blood sugar, as an antispasmodic, to lower levels of cholesterol in the blood, and

for intestinal diseases. It is usually used raw and as a disinfectant and a tonic for the pituitary gland. It is a plant that also relieves diabetes and rheumatism in general. Garlic is also used to regulate liver function and cure hemorrhoids, varicose veins, gastrointestinal infections, and dysentery. The whole plant is used for witchcraft and good luck. Fresh bulbs are used for blood cleansing; to treat arthritis, rheumatism, high blood pressure, diabetes, high cholesterol, hemorrhage, bronchitis, cough, gastritis, intestinal infections, liver problems, and cancer; and as analgesic, circulatory stimulant, tonic, and vermifuge. Fresh bulbs are used to treat high blood pressure, cough, tonsillitis, and hemorrhage and for cultural illnesses (e.g., that the kari kari (a spirit) stays away and to stay young). Fresh bulbs are used to treat cough, bronchitis and colds, and other respiratory disorders. Its antibacterial activity has been confirmed (Paniagua-Zambrana et al. 2020). It is used in Pakistan to treat blood pressure and menopausal problems, as aphrodisiac (Sher et al. 2016), and for indigestion and goiter (Reang et al. 2016).
Allium gilgiticum serves to treat pain and headache (Wali et al. 2019).

Local Food Uses

Allium carolinianum is eaten as vegetable (Ahmad et al. 2015; Ullah et al. 2019) and used as condiment (Abbas et al. 2019).

Young leaves and stems of *Allium paradoxum* together with the bulbs in fresh or pickled form are used as seasoning for various dishes. The leaves and stems of *Allium paradoxum* together with bulbs are used as one of the ingredients for cooking the national dishes Dovga (a soup cooked from yogurt, various greens, a small amount of rice, and eggs. In some regions of the country, a small amount of peas is added to it. It is considered good for digestion and for treatment of intestinal cramps and has warming and diaphoretic effects), Kutab (various edible greens baked in a thin rolled dough. In some regions of the country, white cheese, or cottage cheese. Before it is eaten, the rolls are greased with butter, often mixed with yoghurt), and Kuku (an omelet with various greens, sometimes with added meat or fish, and often mixed with yoghurt. This food is believed to strengthen the organism and stimulates libido, especially if eaten with cinnamon and fried onions).
Allium humile and ***Allium stracheyi*****:** Used as food in Garhwal (Thakur et al. 2017).
Allium victorialis has a very strong garlic taste. It is used fresh, fermented, and salted (Bussmann 2017; Fayvush et al. 2017).
Allium ursinum is used raw and in the form of a marinade with salt and vinegar. Young leaves of *Allium ursinum* are fried thoroughly in oil with onions (with either walnuts or eggs added in some regions) and are eaten with yoghurt (Bussmann 2017; Fayvush et al. 2017).

The consumption of leaves of Allium ursinum and *A. victorialis* is widespread in the Caucasus. *A. ursinum* is consumed at lower and *A. victorialis* at higher altitudes. The use of the latter species is more frequent. It was customary to eat the leaves pickled (Bussmann 2017; Fayvush et al. 2017).

***Allium karataviense*:** In Tajikistan the whole plant is eaten (Sokolov 1994). Leaves and bulbs are widely used in traditional foods such as Oshi burida, Oshi tuppa, and Alafjush (Bussmann et al. 2020).
***Allium rosenbachianum*:** Local people use fresh leaves as well as dried leaves depending on the season in Tajik national dishes such as Oshi burida, Ugro, Umoch, Otalla, Birinjoba, and Hirik (Bussmann et al. 2020).
***Allium stipitatum*:** Young and undeveloped bulbs are pickled in aromatic vinegar (Tajik "pijozi anzur," Uzbek "anzur pijoz," Persian "mu-sir," Dari "toshi") and used as appetizer and with meals (Bussmann et al. 2020).
***Allium tenuissimum*:** A very widely used species. The inflorescence and seeds can be used as condiments. All kinds of livestock like to eat; it is an excellent forage plant. Zama is widely distributed, but most popular in Central Inner Mongolia, the Loess Plateau area. It comes from Mongolian phonetic translation, but after the spread of the Han people, it has become zemeng, zameng, and other similar names. This species has very fine and narrow leaves and is extremely drought-tolerant (Bussmann et al. 2020).
***Allium trautvetterianum*:** People use the leaves of this onion species fresh as well as dried depending the season. It is important in Tajik national foods, such as Modeloba, Oshiburida, Oshitupa, Umoch, Ugro, and Mastoba (Bussmann et al. 2020).
Allium cepa and ***A. sativum*** are used as a seasoning and as a food (Wali et al. 2019; Paniagua-Zambrana et al. 2020).

Lots of *Allium* species serve as seasoning for the Naxi in Yunnan (Zhang et al. 2016).
Allium gilgiticum is a vegetable in Gilgit-Baltistan (Wali et al. 2019).

Local Handicraft and Other Uses

***Allium giganteum*:** The plant produces a big umbel of flowers and is used in horticulture as an ornamental plant (Bussmann et al. 2020).
***Allium karavatiense*:** It is a highly appreciated ornamental plant for its beautiful inflorescence (Bussmann et al. 2020).
***Allium stipitatum*:** Piyozi anzur is used as ornamental plant because of its flower umbels. However, overharvesting of bulbs from natural populations for different uses has resulted in inclusion of this species in the Red Book of Tajikistan (Bussmann et al. 2020).
***Allium rosenbachianum*:** The plant is used as an ornamental (Bussmann et al. 2020).
***Allium trautvetterianum*:** This is very rarely offered as ornamental (Bussmann et al. 2020).
Allium odorum and ***Allium sativum*** are used in Peru for bad air/mal aire and to cleanse the house of spirits (Paniagua-Zambrana et al. 2020). In Ethiopia it is used to treat hepatitis in livestock (Yineger et al. 2007).
Allium gilgiticum can be used as forage (Wali et al. 2019) (Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, and 23).

Fig. 1 *Allium cepa* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 2 *Allium fistulosum* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 3 *Allium fistulosum* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 4 *Allium fistulosum* (Amaryllidaceae), Pankisi gorge, Georgia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 5 *Allium fistulosum* (Amaryllidaceae), Pankisi gorge, Georgia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 6 *Allium victorialis* (Amaryllidaceae), Bakuriani, Georgia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 7 *Allium victorialis* (Amaryllidaceae), Bakuriani, Georgia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 8 *Allium victorialis* (Amaryllidaceae), pickled, Khevsureti, Georgia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 9 *Allium sativum* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 10 *Allium schoenoprasum* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 11 *Allium schoenoprasum* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 12 *Allium karataviense* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

Fig. 13 *Allium karataviense* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

Fig. 14 *Allium* sp. (Amaryllidaceae), Svaneti, Georgia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 15 *Allium rosenbachianum* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

Fig. 16 *Allium rosenbachianum* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

Fig. 17 *Allium cepa* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

Fig. 18 *Allium rosenbachianum* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

Fig. 19 *Allium stipitatum* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

Fig. 20 *Allium stipitatum* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

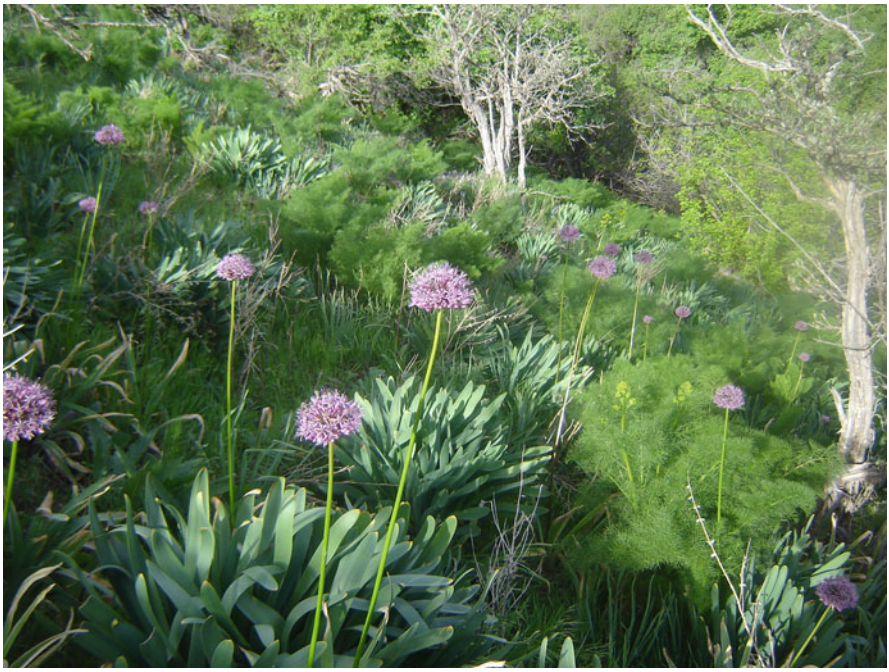

Fig. 21 *Allium stipitatum* (Amaryllidaceae), Tajikistan. (Photo M. Boboev)

Fig. 22 *Allium tenuissimum* (Amaryllidaceae), Local Mongolians grow Zama *Allium tenuissimum* on their roof, where no fierce competition with other species. (Photo Runkuan Liu & Shuanlian Pu)

Fig. 23 Wild semiarid habitat of *Allium tenuissimum* accompanied by Fabaceae sp. (Photo Runkuan Liu & Shuanlian Pu)

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