Allium caspium subsp. *baissunense* (Lipsky) F.O. Khass. & R.M. Fritsch, Allium cepa L., *Allium giganteum* Regel, *Allium karataviense* Regel, *Allium oschaninii* O. Fedtsch., *Allium pskemense* B. Fedtsch., *Allium ramosum* L., *Allium rosenbachianum* Regel, *Allium sarawschanicum* Regel, *Allium sativum* L., *Allium stipitatum* Regel, *Allium suworowii* Regel, *Allium tschimganicum* B. Fedtsch. - AMARYLLIDACEAE

Olim K. Khojimatov and Rainer W. Bussmann

***Allium caspium* subsp. *baissunense* (Lipsky) F.O. Khass. & R.M. Fritsch**
Synonyms: *Allium baissunense* Lipsky; *Allium rhodanthum* Vved.

***Allium cepa* L.**
Synonyms: *Allium angolense* Baker; *Allium aobanum* Araki; *Allium ascalonicum var. condensum* Millán; *Allium ascalonicum var. fertile* Millán; *Allium ascalonicum var. sterile* Millán; *Allium cepaeum* St.-Lag.; *Allium esculentum* Salisb.; *Allium napus* Pall. ex Kunth; *Allium pauciflorum* Willd. ex Ledeb.; *Allium salota* Dostál; *Ascalonicum sativum* P. Renault; *Cepa alba* P. Renault; *Cepa esculenta* Gray; *Cepa pallens* P. Renault; *Cepa rubra* P. Renault; *Kepa esculenta* Raf.; *Porrum cepa* (L.) Rchb.

O. K. Khojimatov
Tashkent Botanical Garden named after Academician F. N. Rusanov at Institute of Botany of Uzbek Academy of Sciences, Tashkent, Uzbekistan
e-mail: olimchik@mail.ru

R. W. Bussmann (✉)
Department of Ethnobotany, State Museum of Natural History, Karlsruhe, Germany

Department of Ethnobotany, Institute of Botany and Bakuriani Alpine Botanical Garden, Ilia State University, Tbilisi, Georgia
e-mail: rainer.bussmann@smnk.de; rainer.bussmann@iliauni.edu.ge

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Allium giganteum Regel

***Allium karataviense* Regel**
Synonyms: *Allium cabulicum* Baker; *Allium karataviense* var. *granitovii* Priszter; *Allium karataviense* subsp. *henrikii* Rukšans; *Allium singulifolium* Rech.f.

***Allium oschaninii* O.Fedtsch.**

***Allium pskemense* B.Fedtsch.**

***Allium ramosum* L.**
Synonyms: *Aglitheis tatarica* (L. f.) Raf.; *Allium beckerianum* Regel; *Allium diaphanum* Janka; *Allium lancipetalum* Y.O. Hsu; *Allium odorum* L.; *Allium potaninii* Regel; *Allium ramosum* Georgi; *Allium senescens* Miq.; *Allium tataricum* L. f.; *Allium umbellatum* Haller f. ex Steud.; *Allium weichanicum* Palib.; *Butomissa tatarica* (L.f.) Salisb.; *Moly odorum* (L.) Moench

***Allium rosenbachianum* Regel**

***Allium sarawschanicum* Regel**
Synonyms: *Allium pseudoseravschanicum* Popov & Vved.

***Allium sativum* L.**
Synonyms: *Allium arenarium* Sadler ex Rchb.*; Allium controversum* Schrad. ex Willd.; *Allium longicuspis* Regel; *Allium pekinense* Prokhanov; *Allium sativum* subsp. *asiae-mediae* Kazakova; *Allium sativum f. sagittatum* Kazakova; *Allium sativum f. vulgare* Kazakova; *Allium scorodoprasum var. multibulbillosum* Y.N. Lee; *Porrum ophioscorodon* (Link) Rchb.; *Porrum sativum* (L.) Rchb.

***Allium stipitatum* Regel**
Synonyms: *Allium hirtifolium* Boiss.

***Allium suworowii* Regel**

***Allium tschimganicum* B. Fedtsch.**
Synonyms: *Allium motor* Kamelin & Levichev

Local Names

Allium caspium: **Russian**: Лук каспийский (Luk kaspiyskiy); **Uzbek**: Tog piyoz; **Tadjik**: Piyoz

Allium cepa: **Russian**: Лук репчатый (Luk repchatiy); **Uzbek**: Piyoz; **Tadjik**: Piyoz; **English**: Onion

Allium giganteum: **Russian**: Лук гигантский (Luk gigantskiy); **Uzbek**: Piyoz; **Tadjik**: Piozikalon

Allium karataviense: **Russian**: Лук каратавский (Luk karatavskiy); **Uzbek**: Chuchka piyoz; **Tadjik**: Modelak; Khurok

Allium oschaninii: **Russian**: Лук Ошанина (Luk Oshanina); **Uzbek**: Oshann piyoz; **Tadjik**: Piozikalon

Allium pskemense: **Russian**: Лук пскемский (Luk pskemskiy); **Uzbek**: Piskom piyozi

***Allium ramosum*: Russian**: Лук душистый (Luk dushistiy); **Uzbek**: Jusai; **Tadjik**: Roshicha molgul; **English**: Fragrant-flowered Garlic

Allium rosenbachianum: **Russian**: Лук Розенбаха (Luk Rozenbakha); **Uzbek**: Tog' pioyzi; **Tadjik**: Siyukh-alaf; Siaalaf

Allium sarawschanicum: **Russian**: Лук зеравшанский (Luk zeravshanskiy); **Uzbek**: Zarafshon piyozi; **Tadjik**: Modil

***Allium sativum*: Russian**: Чеснок посевной (Chesnok posevnoi); **Uzbek**: Sarimsoq; **Tadjik**: Sir; **English**: Garlic

***Allium stipitatum*: Russian**: Лук стебельчатый (Luk stebelchatiy); **Uzbek**: Anzur piyozi; **Tadjik**: Modari siyokhalaf

***Allium suworowii*: Russian**: Лук Суворова (Luk Suvorova); **Uzbek**: Anzur piyozi; **Tadjik**: Anzur; Ansul

***Allium tschimganicum*: Russian**: Лук чимганский (Luk tschimganskiy); **Uzbek**: Mador; Motor piyozi

Botany and Ecology

Allium caspium: Perennial; bulb globose, 2–4.5 mm in diameter; tunics papery, nearly 276 black; scape stumpy, 10–30 cm long; leaves 1–3, ranging from linear or linear-lanceolate to broadly lanceolate, 5–25 mm broad, not exceeding the scape, the cartilaginous margin scabrous or smooth; spathe one-third as long as the umbel; umbel fasciculate, often hemispherical or spherical, rather loosely many-flowered; pedicels 2–4 or more times the length of perianth segments, up to 15 cm long, ebracteolate; segments of the campanulate perianth dingy greenish-violet or rarely whitish, 5–11 mm oblong to oblong-oval, rarely lanceolate, obtuse, the inner sometimes crenate, up to half as broad again as the outer, not changing after anthesis; filaments violet or rarely white, half as broad again as perianth segments, toothless, at base connate and adnate to perianth, subequal, linear-subulate from enlarged base: ovary smooth, short-stipitate; capsule obovoid, ca. 4 mm in diameter. Sandy deserts and sands in areas of mottled outcrops. – Central Asia: Aral-Caspiy, Kyzil Kum, Kara Kum, Mtn. Turkmenistan. (Kushkinskii River), Syr Darya, Amu Darya, Pamir - Alai (SW). Endemic (Komarov 1935) (Figs. 1 and 2).

Fig. 1 *Allium caspium* (Amaryllidaceae), Surkhandariya region, Uzbekistan. (Photo N.Yu. Beshko)

Fig. 2 *Allium caspium* (Amaryllidaceae), Surkhandariya region, Uzbekistan. (Photo N.Yu. Beshko)

Allium cepa: Biennial glabrous herb, usually grown as an annual from seed or bulbs, up to 100 cm tall; real stem very short, formed at the base of the plant in the form of a disk, with adventitious roots at base; bulbs formed by the thickening of leaf-bases a short distance above the true stem, solitary or in clusters, depressed globose to ovoid or oblate, up to 20 cm in diameter, variously colored. Leaves 3–8, distichously alternate, glaucous, with tubular sheath; blade D-shaped in cross section, hollow, up to 50 cm long, acute at apex. Inflorescence a spherical umbel up to 8 cm in diameter, on a long, erect, terete, hollow scape up to 100 cm long, usually inflated below the middle; umbel initially surrounded by a membranous spathe splitting into 2–4 papery bracts. Flowers bisexual, stellate; pedicel slender, up to 4 cm long; tepals 6, in 2 whorls, free, ovate to oblong, 3–5 mm long, greenish white to purple; stamens 6; ovary superior, 3-celled, style shorter than stamens at anthesis, later elongating. Fruit a globular capsule 4–6 mm in diameter, splitting loculicidally, up to 6-seeded. Seeds 6 mm × 4 mm, black. *Allium cepa* probably originates from

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

Central Asia where some of its relatives still grow in the ild. The closest among them are *Allium vavilovii* Popov & Vved. from southern Turkmenistan and northern Iran, and *Allium asarense* R.M. Fritsch & Matin from Iran (Macbride and Weberbauer 1936–1995) (Fig. 3).

Allium giganteum: Perennial; bulb ovoid, 4–6 cm thick; tunics rather numerous, grayish-brown, splitting; scape robust, 80–150 cm long, rather inconspicuously nerved; leaves lorate, glaucous, 5–10 cm broad, smooth, one-third to one-half as long as the scape; spathe half as long as the umbel, short-beaked; umbel spherical, densely many-flowered; pedicels subequal, 5 times the length of perianth, ebracteolate; segments of the stellate perianth, light violet, obscurely nerved, 5 mm long, elliptic, obtuse, not changing after anthesis; filaments about half as long again as perianth segments, at base connate and adnate to perianth, subulate from triangular base, the base of inner filaments half as broad again; ovary subsessile, scabrous; capsule subglobose, ca. 4 mm in diameter. April–May. Loose-textured slopes in the lower mountain zone. – Central Asia: Mtn. Turkmenistan, Pamir – Alai (Komarov 1935) (Figs. 4 and 5).

Allium karataviense: Perennial; bulb globose, 2–6 cm thick; tunics blackish or grayish, papery; scape stumpy, 10–25 cm long, sometimes buried in the soil up to the middle, shorter than the leaves; leaves commonly 2, rarely 1 or 3, lanceolate or often oblong or subelliptic, 3–15 cm broad, smooth-margined; spathe two-thirds as long to slightly shorter than the umbel, short-acuminate; umbel spherical, densely many-flowered; pedicels equal, 3–4 times the length of perianth, ebracteolate; segments of the stellate perianth light rosy-violet, with a darker nerve, 5–7 mm long, linear, obtuse, at length recurved and twisted; filaments slightly exceeding the perianth segments; at base connate and adnate to perianth, united higher up, subulate

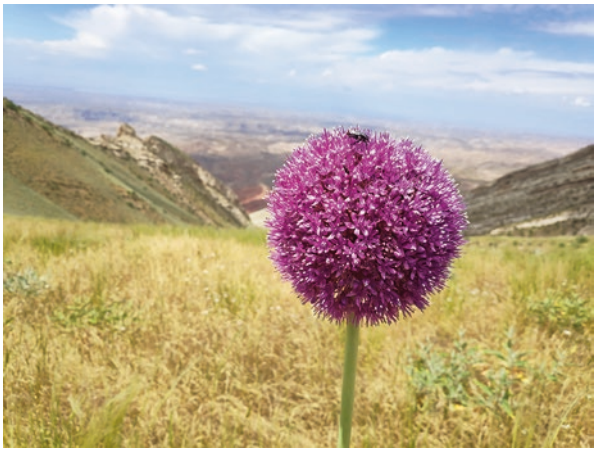

Fig. 4 *Allium giganteum* (Amaryllidaceae), Surkhandariya region, Uzbekistan. (Photo N.Yu. Beshko)

Fig. 5 *Allium giganteum* (Amaryllidaceae), Surkhandariya region, Uzbekistan. (Photo N.Yu. Beshko)

from triangular base, the base of inner filaments half as broad again; ovary stipitate, scabrous; capsule obcordiform, ca. 8 mm in diameter. April – May. Loose calcareous screes in the lower mountain zone. – Central Asia: Pamir– Alai. (Alai Range), Tien Shan. (West Tien Shan). Endemic (Komarov 1935) (Figs. 6 and 7).

Allium oschaninii: Perennial; bulbs 1–3, attached to rhizome, ovoid, 2.5–4 cm thick; tunics reddish-brown, coriaceous, entire; scape robust, 45–100 cm long, hollow, inflated below the middle, covered at base with subdistant smooth leaf sheaths; leaves 4 or 5, cylindric, attenuate toward apex, fistulous, glaucescent, erect, 4–15-(40) mm broad, one-third the length of the scape; spathe about equaling the umbel; umbel spherical, densely many-flowered; pedicels 3–4 times as long as perianth; bracteolate; segments of the stellate 199 perianth white, with a green nerve, 4–5 mm

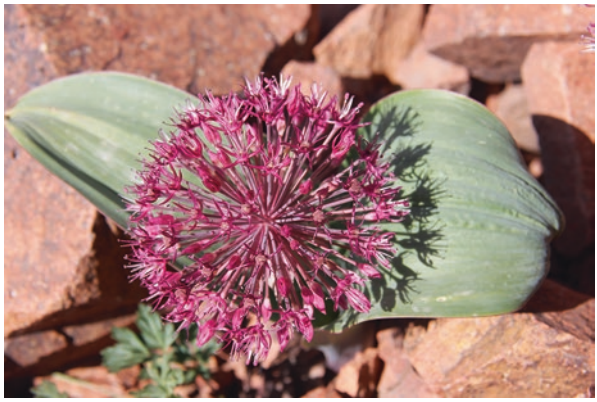

Fig. 6 *Allium karataviense* (Amaryllidaceae), Surkhandariya region, Uzbekistan. (Photo N.Yu. Beshko)

Fig. 7 *Allium karataviense* (Amaryllidaceae), Surkhandariya region, Uzbekistan. (Photo N.Yu. Beshko)

long, equal, linear-oblong to oblong-lanceolate, obtuse; filaments one -fourth as long again as perianth, at base connate and adnate to perianth, the outer subulate, the inner at base twice as broad as the outer and slightly broader than perianth segments, subulate from a broadly ovate obtusely 2 -toothed base; style shorter than the capsule; capsule globose-trigonous, ca. 5 mm in diameter. June. Rock crevices and stony slopes. – Central Asia: Pamir Alai, Tien Shan (Mogol-tau). Endemic (Komarov 1935) (Figs. 8 and 9).

Allium pskemense: Perennial; bulbs in a cluster of several, attached to rhizome, elongate-ovoid, 4–6 cm thick; tunics reddish-brown, subcoriaceous, entire; scape robust, 40–80 cm long, hollow, obliquely inflated below the middle, covered at base with smooth leaf sheaths; leaves 3, cylindric, attenuate toward apex, fistulous, erect, 2–3 cm thick, half as long as the scape; spathe about equaling the umbel; umbel spherical, densely many-flowered; pedicels equal, 3–4 times as long as perianth, subtended by bracteoles; segments of the stellate perianth white, obscurely nerved, ca. 6 mm long, equal, 198 oblong, obtuse; filaments slightly exceeding the perianth segments, at base connate and adnate to perianth, slightly connate in a ring higher

Fig. 8 *Allium oschaninii* (Amaryllidaceae), Tashkent Botanical Garden, Tashkent, Uzbekistan. (Photo N.Yu. Beshko)

Fig. 9 *Allium oschaninii* (Amaryllidaceae), Tashkent Botanical Garden, Tashkent, Uzbekistan. (Photo N.Yu. Beshko)

up, the outer subulate, the inner about 3 times as broad at base as the outer and much broader than the perianth segments, subulate above the 2 – toothed base; style shorter than the capsule; capsule globose -trigonous. August. Rock crevices and stony places. – Central Asia: Tien Shan. (Tashkent AlaTau, Chatkal Range). Endemic (Komarov 1935) (Figs. 10 and 11).

***Allium ramosum*:** Perennial; bulbs 1–3, rarely more, attached to a horizontal rhizome, narrowly cylindric- conical, obsolescent; tunics rufous -brown, reticulate; scape (l5)-30–50 cm long, slightly ribbed; leaves 2 or 3, narrowly linear, (l.5)-2–4 mm broad, approximate at scape base, slightly shorter than the scape; spathe short -acuminate, one-half to two-thirds as long as the umbel, persistent; umbel fasciculate or

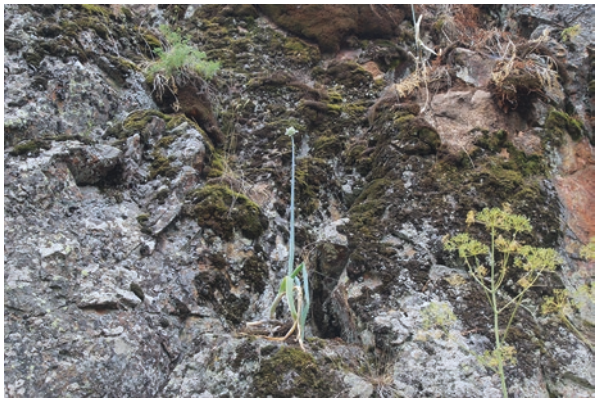

Fig. 10 *Allium pskemense* (Amaryllidaceae), Pskem valley, Tashkent region, Uzbekistan. (Photo Ulugbek Kodirov)

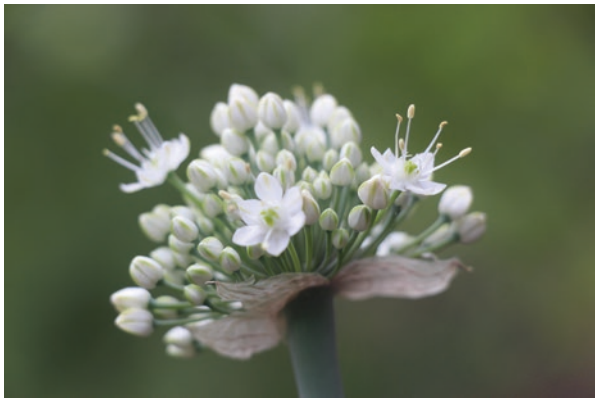

Fig. 11 *Allium pskemense* (Amaryllidaceae), Pskem valley, Tashkent region, Uzbekistan. (Photo Ulugbek Kodirov)

fasciculately hemispherical, rather many-flowered, dense; pedicels equal, 2–3 times as long as perianth, bracteolate at base; segments of the substellate perianth white with a greenish nerve, 6–9 mm long, subequal, lanceolate or elliptic, obtuse to acutish; filaments two-thirds as long as perianth, connate and adnate to perianth for 1/4 their length, entire, subulate from a slightly enlarged base; style not exserted; capsule 5 mm long. July–August. Meadows, solonetz soils, and slopes, rarely as a weed. Cultivated in the Far East. – W. Siberia: Irt. (E.), Alt.; E. Siberia: Lena-Kol., Ang.- Say., Dau.; Far East: Ze.-Bu., Uss.; Centr. Asia (advent.): Pamir – Alai 164 (Roshan), Tien Shan. (Aleksandrovskii Range). Gen. distr.: Ind.-Him., Japan - China, Tibet. (Komarov 1935) (Figs. 12 and 13).

Allium rosenbachianum: Perennial; bulb globose, 1.5–2.5 cm thick; tunics blackish, papery; scape 50–70 cm long, ribbed by prominent nerves; leaves 2 or 3, linear-lanceolate to broadly linear, (0.5)–1.5 cm broad, nearly smooth-margined, much shorter than the scape; spathe short-acuminate, one-half to two-thirds as long as the umbel; umbel spherical, loosely many-flowered; pedicels unequal, the central to half as long again, 3–9 times the length of perianth, ebracteolate; segments of the

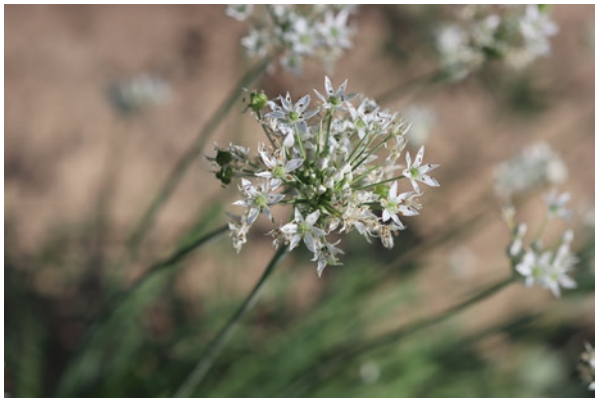

Fig. 12 *Allium ramosum* (Amaryllidaceae), cultivated in Tashkent, Tashkent, Uzbekistan (Photo O.K.Khojimatov)

Fig. 13 *Allium ramosum* (Amaryllidaceae), cultivated in Tashkent, Tashkent, Uzbekistan (Photo O.K.Khojimatov)

stellate perianth dark violet, with a darker nerve, narrowly linear, gradually attenuate from base, acute, 7–10 mm long, at length recurved and twisted; filaments as long as perianth segments, adnate at base to perianth, united above into a ring, subulate from triangular base, the inner half as broad again; anthers violet; ovary short-stipitate, scabrous; capsule applanate-globose, ca. 5 mm in diameter. May. Loose-textured terraces in the middle mountain zone, in the shade of rocks and trees. – Central Asia: Pamir-Alai (SW). Endemic (Komarov 1935).

Allium sarawschanicum: Perennial; bulb globose, 1–2 cm thick; tunics blackish, papery; scape (20)–30–50–(70) cm long, ribbed by prominent nerves; leaves 1 or 2, linear-lanceolate, 1–4 mm broad, scabrous-margined, much shorter than the scape; spathe half as long as to slightly shorter than the umbel, short-acuminate; umbel spherical or subspherical, densely many-flowered; pedicels unequal, the central slightly longer, 2–3 times the length of perianth, ebracteolate; segments of the stellate perianth light rosy-violet, with a darker nerve, 6–8 mm long, linear, gradually attenuate from the middle, acute., at length recurved and twisted; filaments slightly shorter than perianth segments, subulate, adnate at base to perianth, united above

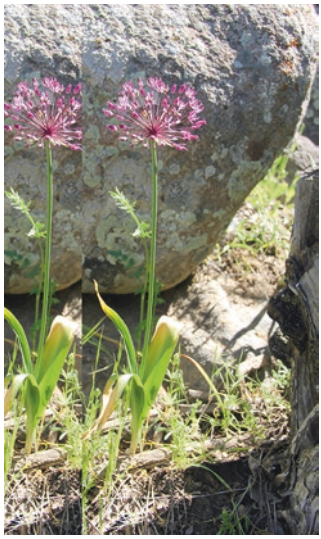

Fig. 14 *Allium sarawschanicum* (Amaryllidaceae), Kashkadariya region, Uzbekistan. (Photo N.Yu. Beshko)

Fig. 15 *Allium sarawschanicum* (Amaryllidaceae), Tashkent Botanical Garden, Tashkent, Uzbekistan. (Photo N.Yu. Beshko)

into an entire-margined ring; ovary short-stipitate, smooth, with 6 crests; capsule subglobose, ca. 4 mm in diameter. May–June. Shady places. – Central Asia: Mtn. Turkmenistan. Endemic (Komarov 1935) (Figs. 14 and 15).

Allium sativum: Bulbous herb growing to about 60 cm tall. Bulb rounded, composed of up to 15 smaller cloves. Leaves 4–12, sword-shaped attached to an underground stem. Flowers borne in a dense, spherical cluster on a spike up to 25 cm long. The young flower head is enclosed in a long-beaked pair of enclosing bracts, which become papery and split to reveal the flowers. Individual flower stalks arise

Fig. 16 *Allium sativum* (Amaryllidaceae), garden, Chicani, Bolivia. (Photo R.W. Bussmann & N.Y. Paniagua-Zambrana)

from a common point. Flowers greenish-white or pinkish about 3 mm long. Bulbils are often interspersed among the flowers. Garlic was domesticated long ago and is mentioned in ancient Egyptian, Greek, Indian, and Chinese writings. Garlic bulbs from about 1500 BC were found in the tomb of Tutankhamen, and garlic is mentioned in the Bible and Qur'an. Garlic is believed to originate from Central Asia (Kazakhstan, Uzbekistan and western China) (Macbride and Weberbauer 1936–1995) (Fig. 16).

Allium stipitatum: Perennial; bulb applanate -globose, 3–6 cm thick; tunics blackish, almost papery, enclosing a solitary large smooth bulblet; scape 60–150 cm long smooth; leaves 4–6, lorate, 2–4 cm broad, smooth-margined, hairy 268 beneath, rarely glabrate; pedicels subequal, 3–6 times the length of perianth, ebracteolate; segments of the stellate perianth lilac, distinctly nerved, 9 mm long, gradually attenuate from base, acute, at length recurved and twisted; filaments as long as perianth segments, adnate at base to perianth, united above into a ring, rather gradually subulate from triangular base, the base of inner filaments twice as broad; ovary short-stipitate, scabrous; capsule applanate-globose, ca. 5 mm in diameter. May – June. Loosely – textured slopes in the middle mountain zone. – Central Asia: Pamir – Alai. Endemic (Komarov 1935) (Figs. 17 and 18).

***Allium suworowii*:** Perennial; bulb ovoid, 2–3 cm in diameter; tunics subcoriaceous, grayish, splitting, clasping the scape base; scape 30–100 cm long, inconspicuously nerved; leaves 2–6, lorate, 5–20 mm broad, scabrous-margined, glaucescent, much shorter than the scape; spathe short-acuminate, two-thirds as long as the umbel; umbel hemispherical or spherical, densely many-flowered; pedicels equal, 2–5 times the length of perianth, ebracteolate; segments of the stellate perianth rosy-violet, with a darker nerve, ca. 4 mm long, linear, obtuse, at length recurved and twisted; filaments slightly shorter and slightly longer than perianth

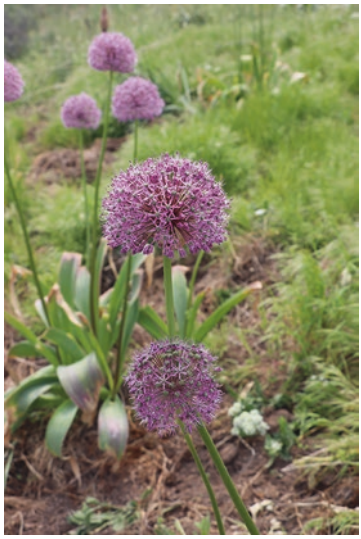

Fig. 17 *Allium stipitatum* (Amaryllidaceae), Tashkent region, Uzbekistan. (Photo N.Yu. Beshko)

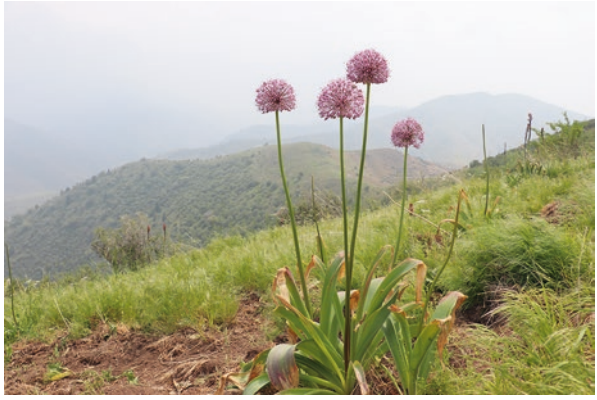

Fig. 18 *Allium stipitatum* (Amaryllidaceae), Tashkent region, Uzbekistan. (Photo N.Yu. Beshko)

segments adnate to perianth at base, distinct above, subulate from enlarged base, subequal; ovary subsessile, smooth; capsule broadly ovoid, ca. 5 mm in diameter. May. Loosely textured soils in foothills, chiefly as weed in oases. – Central Asia: Mtn. Turkmenistan (Kushkinskii River), Syr Darya, Pamir-Alai, Tien Shan (Komarov 1935) (Figs. 19 and 20).

***Allium tschimganicum*:** Perennial; bulb globose, 1–2 cm thick; tunics grayish, papery; scape 35–85 cm long, furrowed by prominent nerves; leaves (l)–2–3, linear to linear-lanceolate, 5–20 mm broad, scabrous-margined, much shorter than the scape; spathe half as long as the umbel, short -acuminate; umbel hemispherical or rarely spherical, rather densely many-flowered; pedicels subequal, half as long again as the perianth, ebracteolate segments of the stellate perianth rose, with a violet nerve, ca. 4 mm long, linear, obtusish, at length recurved and twisted;

Fig. 19 *Allium suworowii* (Amaryllidaceae), Tashkent region, Uzbekistan. (Photo N.Yu. Beshko)

Fig. 20 *Allium suworowii* (Amaryllidaceae), Tashkent region, Uzbekistan. (Photo N.Yu. Beshko)

filaments slightly shorter than to equaling the perianth, adnate to perianth at base, distinct above, subulate from triangular base, the base of inner filaments 2–3 times as broad; ovary short-stipitate; scabrous; capsule subglobose to ovoid, ca. 4 mm in diameter. June. Gravelly slopes. – Central Asia: Tien Shan (West Tien Shan). Endemic (Komarov 1935) (Figs. 21 and 22).

Phytochemistry

Bulbs contain 8–14% sugars (fructose, sucrose, maltose, inulin polysaccharide), proteins (1.5–2%), vitamins (ascorbic acid), flavonoid quercetin, enzymes, saponins, mineral salts of potassium, phosphorus, iron, etc., phytoncides. Yellow, purple

Fig. 21 *Allium tschimganicum* (Amaryllidaceae), Tashkent region, Uzbekistan. (Photo N.Yu. Beshko)

Fig. 22 *Allium tschimganicum* (Amaryllidaceae), Tashkent region, Uzbekistan. (Photo N.Yu. Beshko)

and white onion Green leaves of onions contain sugars, proteins, ascorbic acid. In the bulbs and leaves there is an essential oil that gives them a specific smell and sharp taste, sulfur-containing compounds, iodine, organic acids (malic and citric), mucus, pectin substances, glycosides (Komarov 1935).

Local Medicinal Uses

Allium caspium bulbs are used inwardly as an anti-helminthic agent; porridge from fresh grated bulbs is externally used for arthritis and bruises (Dadabaeva 1996).

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, for blood cleansing, diabetes, rheumatism, asthma and cough. Fresh bulbs are used to treat cough. In Peru used for cough and bronchial problems (Paniagua Zambrana et al. 2020). In Jammu, Kashmir and Ladakh used for hair health (Gairola et al. 2014). In popular Colombian 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 (Díaz 2003; García Barriga 1974; Pérez Arbeláez 1996). Bolivia**:** Fresh bulbs are used to treat high blood pressure, varicose veins, for blood cleansing, diabetes, rheumatism, asthma and cough (Bussmann et al. 2016a). Ecuador**:** Fresh bulbs are used to treat cough (Béjar et al. 2002; Bussmann and Sharon 2006a, 2007a). In Peru used for cough and bronchial problems (Monigatti et al. 2013).

Allium giganteum bulbs in the form of a patch are used for furuncles and bruises, as a wound healing agent (Dadabaeva 1996).

Decoction of bulbs ***Allium karataviense*** is used in the treatment of bronchopnevonia (Sakhobiddinov 1948a, b). Bulbs boiled in milk for gastralgia, enterocolitis, colitis; a patch of bulbs in a mixture with cotton oil is used for carbuncles, furuncles (Dadabaeva 1996).

A patch of shredded ***Allium oschaninii*** bulbs in warm form is applied at furuncles; bulbs fried in oil are eaten for gastralgia, colitis, enterocolitis and chronic constipation. Baked bulbs of ***Allium pskemense*** are used to treat rotting wounds by applying them to the affected parts of the skin, and decoction of fresh bulbs is used for various inflammatory diseases of the lungs and bronchial tubes (Khojimatov 2008).

Porridge from bulbs of ***Allium ramosum*** is used inwardly as an anti-helminthic agent; pebbled stems are used in epilepsy (Dadabaeva 1996).

A decoction of ***Allium rosenbachianum*** bulbs is used for hysteria, neurosis, pulmonary tuberculosis, and bronchiectasis. Toasted bulbs for gastralgia; bulbs boiled in milk are used as a laxative.

Allium sarawschanicum bulbs are used for asthenia, colitis, enteritis, rhinitis, neuralgia and stroke; softened stems in toothache (Dadabaeva 1996).

Allium sativum: 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 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 improve the elasticity of capillaries (Bussmann 2017; Fayvush et al. 2017; Isotova et al. 2010; Gabrielyan 2001). 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 used for the treatment of diseases of the upper respiratory tract (Gammarman and Grom 1976; Grossheim 1952; Gubanov et al. 1976; Tsaturyan and Gevorgyan 2014; Turova and Sapojnikova 1982; Zolotnitskaya 1958–1965). According to the Armenian medieval healers (Amirdovlat 1927; Harutyunyan 1990; Mardjanyan 2008; Nosal and Nosal 1991; Vardanyan 1979) onion improves vision, onion juice prevents the development of cataracts in the early stages. Alcohol tinctures regulate blood pressure improve the elasticity of capillaries. *Allium sativum* is used in Pakistan to treat blood pressure and menopausal problems and as aphrodisiac (Sher et al. 2016), for indigestion and goiter (Reang et al. 2016). Commonly used in Colombia against intestinal worms, to reduce blood pressure, reduce blood sugar, as an antispasmodic, to lower levels of cholesterol in the blood and for intestinal diseases. It is usually used raw, as a disinfectant and as 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, cure hemorrhoids, varicose veins, gastrointestinal infections and dysentery (Díaz 2003; Fonnegra-Gómez and Villa-Londoño 2011; Fonnegra Gómez et al. 2012; García Barriga 1974; Ministerio de Protección Social 2008; Pérez Arbeláez 1996). The whole plant is used for witchcraft and good luck; fresh bulbs are used to treat arthritis, rheumatism, for blood cleansing, high blood pressure, diabetes, high cholesterol, hemorrhage, bronchitis, cough, gastritis, intestinal infections, liver problems, cancer and as analgesic, circulatory stimulant, tonic and vermifuge (Bussmann et al. 2018a, b). Bolivia: Fresh bulbs are use to treat high blood pressure, cough, tonsilitis, hemorrhage and for cultural illnesses (e.g. that the kari kari (a spirit) stays away and to stay young) (Bussmann et al. 2016a, 2018a, b). Peru: Fresh bulbs are used to treat cough, bronchitis and colds and other respiratory disorders (Bussmann and Sharon 2006b, 2007b; Bussmann et al. 2010a, 2011; Monigatti et al. 2013). Its antibacterial activity has been confirmed.

Fresh leaf juice of ***Allium stipitatum*** is used inside for diarrhea enteritis, gastric ulcer, neurosis, epilepsy; fresh bulbs for gastralgia, gingivitis, stomatitis; externally baked bulbs in furunculous; bulb juice in dermatomycosis (Sakhobiddinov 1948a, b).

Allium suworowii marinated bulbs are used for acute respiratory infections, initial stages of tuberculosis, broncho-pneumonia, laryngitis, epilepsy neurosis, stroke and concussion. Leaves juice are used against angina pectoris and atherosclerosis (Dadabaeva 1996).

The local population of the Parkent district of the Tashkent region massively procures the aboveground mass of ***Allium tschimganicum*** in the spring, considering it a good general strengthening agent, after winter vitamin deficiency and long-term illness. It increases blood pressure in hypotension and contributes to an increase in the overall tone of the body (Khojimatov 2008; Egamberdieva).

Medicinal Uses of Other Species

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

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

Allium jaquemontii: Fresh leaves are plucked though they are bitter in taste, but when are eaten raw or cooked along with other pot herbs 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 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, for abscess and women's diseases. The plant us 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 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, 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 used for lung problems. The decoction of bulbs is used in traditional medicine for pulmonary diseases and strong shortness in breath (Bussmann et al. 2020).

Allium odorum is used in Peru for bronchitis, asthma, bruises (Bussmann and Sharon 2006b).

Allium proliferum: In Jammu, Kashmir and Ladakh used for joint health (Gairola et al. 2014).

Allium ramosum is used in Peru for bronchitis, asthma, bruises (Bussmann and Sharon 2006b).

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 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, for abscess and women's diseases. The plant us used raw in scurvy (Grossheim 1942, 1943). *Allium* species are used as anthelminthic.

Allium victorialis is used for Infectious diseases: Used in the fresh form as antimicrobial and anthelmintic remedy.

Allium przewalskianum: In Jammu, Kashmir and Ladakh given to women after delivery to improve strength, for dysentery, stomach-ache, abdominal gas, hypertension, stomach pain (Gairola et al. 2014).

Allium rubellum: In Jammu, Kashmir and Ladakh used for earache, as expectorant, for giddiness, insect bites and respiratory troubles (Gairola et al. 2014).

Allium consanguineum: In Jammu, Kashmir and Ladakh used as aphrodisiac and stimulant (Gairola et al. 2014).

Allium odorum is used in Peru for bronchitis, asthma, bruises (Paniagua Zambrana et al. 2020).

Allium sativum: Commonly used against intestinal worms, to reduce blood pressure, reduce blood sugar, as an antispasmodic, to lower levels of cholesterol in the blood and for intestinal diseases. It is usually used raw, as a disinfectant and as 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, cure hemorrhoids, varicose veins, gastrointestinal infections and dysentery. The whole plant is used for witchcraft and good luck; fresh bulbs are used to treat arthritis, rheumatism, for blood cleansing, high blood pressure, diabetes, high cholesterol, hemorrhage, bronchitis, cough, gastritis, intestinal infections, liver problems, cancer and as analgesic, circulatory stimulant, tonic and vermifuge. Fresh bulbs are use to treat high blood pressure, cough, tonsilitis, 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). Used in Pakistan to treat blood pressure and menopausal problems and as aphrodisiac (Sher et al. 2016), for indigestion and goiter (Reang et al. 2016).

Allium gilgiticum serves to treat pain and headache (Wali et al. 2019).

Local Food Uses

Allium cepa*, *A. pskemense*, *A. ramosum and ***A. sativum*** are used as a seasoning and as a food (Béjar et al. 2002; Díaz 2003; García Barriga 1974; Pérez Arbeláez 1996; Dadabaeva 1996; Khojimatov 2021). Canned bulbs of *Allium stipitatum* and *Allium suworowii* are a favorite treat of the population (https://iqmena.livejournal.com/168890.html). In spring, the aboveground part of ***A. tschimganicum*** is widely used by the local population of the Parkent district of the Tashkent region in the preparation of green somsa (fried pies). It is believed that this product has the vitamin and general strengthening properties of the human body (Khojimatov 2008) (Figs. 23, 24, 25, 26, 27, and 28).

Fig. 23 *Allium cepa* (Amaryllidaceae), on Parkent market, Tashkent, Uzbekistan. (Photo Z.S. Bagirova)

Fig. 24 *Allium ramosum* (Amaryllidaceae), on Parkent market, Tashkent, Uzbekistan. (Photo Z.S. Bagirova)

Fig. 25 *Allium ramosum* (Amaryllidaceae), on Parkent market, Tashkent, Uzbekistan. (Photo O.K. Khojimatov)

Fig. 26 *Allium sativum* (Amaryllidaceae), on Parkent market, Tashkent, Uzbekistan. (Photo Z.S. Bagirova)

Fig. 27 *Allium stipitatum* (Amaryllidaceae), harvested onions, Sukhandarya region, Uzbekisan. (Photo O.T. Turginov)

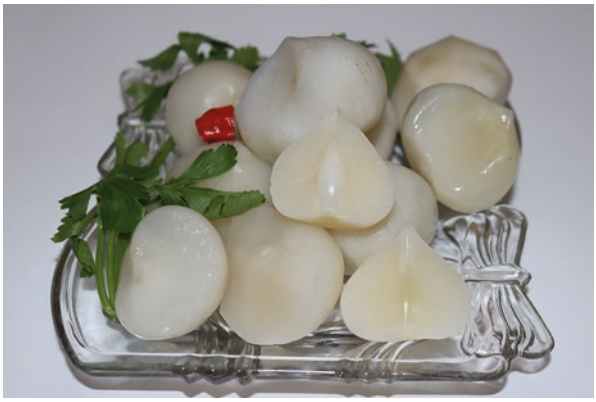

Fig. 28 *Allium stipitatum* (Amaryllidaceae), pickled onions, Samarkand region, Uzbekisan. (Photo A.N. Khujanov)

Food Uses of Other Species

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

Allium humile and ***Allium stacheyi:*** Used as food in Gharwal (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* fried thoroughly in oil with onions, with either walnuts or eggs added in some regions) is eaten and eat 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 1994a, b). Leaves and bulbs are widely used in traditional foods such as Oshi burida, Oshi tuppa, 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, 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, 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, Mastoba (Bussmann et al. 2020).

Lots of ***Allium*** species serve as seasoning for the Naxi in Yunnan (Zhang et al. 2016).

Allium gilgiticum as vegetable in Gilgit-Baltistan (Wali 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 (Grossheim 1952; Gubanov et al. 1976; Tsaturyan and Gevorgyan 2007). 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 victorialis has a very strong garlic taste. It is used fresh, fermented and salted (Flora of Azerbaijan 1950–1961). *Allium ursinum* is used raw and in the form of a marinade with salt and vinegar (Flora of Azerbaijan 1950–1961). Hallyar (young leaves of *Allium ursinum* fried thoroughly in oil with onions, with either walnuts or eggs added in some reginos) is eaten and eat with yoghurt. The consumption of leaves of *Allium ursinum* and *A. victorialis* is widespread in Georgia: *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 et al. 2014, 2016c, b, c; Javakhishvili 1986; Makalatia 1933; Oshoradze 1969; Sujashvili and Pitskheliauri 2005) or boiled and prepared in a form of "mkhali" (a meal of boiled, squashed and chopped herbs) (Bussmann et al. 2014, 2016b, c, d; Javakhishvili 1986; Makalatia 1933; Makalatia 1934; Oshoradze 1969). There were also various ways of "mkhali" (a mixture of herbs prepared as spread) preparation: in alpine regions melted butter was mixed with boiled, squashed and chopped leaves (Bussmann et al. 2014, 2016b, c, d; Javakhishvili 1986; Makalatia 1933), while in the lowlands oil was used instead of butter and vinegar was also added (Bussmann et al. 2014, 2016b, c, d; Javakhishvili 1986). Greens as cilantro, mint, summer savory, and basil were added to "mkhali" (Javakhishvili 1986). Sometimes chopped and boiled leaves were mixed with curds, wrapped in pastry and boiled (Oshoradze 1969). Pickles were sometimes not only eaten raw, but rather used for "ketseuli" – a pie filled with herbs and sometimes mixed with cheese (Bussmann et al. 2014,

2016b, c, d). Leaves were also stored for winter dried or salted in pots (Makalatia 1933; Oshoradze 1969). In Khevi leaves were eaten raw (Makalatia 1934). Bulbs were used as garlic substitute in Svan salt (Bussmann et al. 2014, 2016b, c, d). In Khevi bulbs were eaten as garlic (Sujashvili and Pitskheliauri 2005). Leaves and stems are also pickled.

Local Handicraft and Other Uses

Allium ramosum and ***Allium sativum*** are used in Peru for bad air / mal aire and to cleanse the house of spirits (Bussmann and Sharon 2006b; Bussmann et al., 2010a; Bussmann and Sharon 2015a, b), always in mixture with other species (Bussmann et al. 2010).

Local Handicraft and Other Uses of Other Species

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; Fritsch 2016; Boboev et al. 2015).

Allium trautvetterianum: 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 used to treat hepatitis in livestock.

Allium gilgiticum as forage (Wali et al. 2019).

References

Abbas Z, Mulk Khan S, Mehmood Abbasi A, Pieroni A, Ullah Z, Iqbal M, Ahmad Z (2016) Ethnobotany of the Balti community, Tormik valley, Karakorum range, Baltistan, Pakistan. Abbas et al. J Ethnobiol Ethnomed 12:38. https://doi.org/10.1186/s13002-016-0114-y

Abbas Z, Alam J, Muhammad S, Bussmann RW, Mulk Khan S, Hussain M (2019) Phyto-cultural diversity of the Shigar valley Central Karakorum Baltistan, Northern Pakistan. Ethnobot Res Appl 1832. https://doi.org/10.32859/era.18.31.1-18

Ahmad L, Semotiuk A, Zafar M, Ahmad M, Sultana S, Liu QR et al (2015) Ethnopharmacological documentation of medicinal plants used for hypertension among the local communities of DIR lower, Pakistan. J Ethnopharmacol 175:138–146

Amirdovlat A (1927) Angitats anpet, Vienna. (in Armenian)

Béjar E, Bussmann RW, Roa C, Sharon D (2002) Medicinal herbs of southern Ecuador – Hierbas Medicinales del Sur Ecuatoriano., 340p. Latino Herbal Press, San Diego

Boboev T, Boboev MT, Qullaev S, Yoqubov S (2015) Rastanihoi gizoi va rohhoi parvarishi onho, Kulob. 27 p [In Tajik]

Bussmann RW (ed) (2017) Ethnobotany of the Caucasus. Springer International Publishing XXVII. 746p. (ISBN 978-3-319-49411-1)

Bussmann RW, Sharon D (2006a) Traditional plant use in Loja province, southern Ecuador. J Ethnobiol Ethnomed 2:44

Bussmann RW, Sharon D (2006b) Traditional plant use in Northern Peru: tracking two thousand years of healing culture. J Ethnobiol Ethnomed 2:47

Bussmann RW, Sharon D (2007a) Plants of longevity - The medicinal flora of Vilcabamba. Plantas de longevidad - La flora medicinal de Vilcabamba. Arogya, Honolulu (ISBN 978-0-9789962-2-2)

Bussmann RW, Sharon D (2007b) Plants of the four winds - the magic and medicinal flora of Peru. Plantas de los cuatro vientos - La flora mágica y medicinal del Perú, Arogya, Honolulu. isbn:978-0-9789962-3-9

Bussmann RW, Sharon D (2015a) Medicinal plants of the Andes and the Amazon – the magic and medicinal flora of Northern Peru. William L. Brown Center, MBG, St. Louis. isbn:978-0-9960231-2-2

Bussmann RW, Sharon D (2015b) Plantas medicinales de los Andes y la Amazonía – La flora mágica y medicinal del Norte de Peru. William L. Brown Center, MBG, St. Louis. isbn:978-0-9960231-3-9

Bussmann RW, Glenn A, Meyer K, Rothrock A, Townesmith A (2010) Herbal mixtures in traditional medicine in Northern Peru. J Ethnobiol Ethnomed 6(10)

Bussmann RW, Sharon D, Glenn A (2010a) Healing the body, healing the soul. Traditional remedies for "magical" ailments, nervous system and psychosomatic disorders in Northern Peru. Afr J Pharm Pharmacol 4(9):580–629

Bussmann RW, Glenn A, Sharon D, Chait G, Díaz D, Pourmand K, Jonat B, Somogy S, Guardado G, Aguirre C, Meyer K, Rothrock A, Townesmith A (2011) Antibacterial activity of Northern Peruvian medicinal plants. Ethnobot Res Appl 9:67–96

Bussmann RW, Paniagua-Zambrana NY, Sikharulidze S, Kikvidze Z, Kikodze D, Jinjikhadze T, Shanshiashvili T, Chelidze D, Batsatsashvili K, Bakanidze N (2014) Wine, beer, snuff, medicine and loss of diversity – ethnobotanical travels in the Georgian Caucasus. Ethnobot Res Appl 12:237–313

Bussmann RW, Paniagua Zambrana NY, Moya Huanca LA, Hart RE (2016a) Changing markets – medicinal plants in the markets of La Paz and El Alto, Bolivia. J Ethnopharmacol 193:76–95. https://doi.org/10.1016/j.jep.2016.07.074

Bussmann RW, Paniagua Zambrana NY, Sikharulidze S, Kikvidze Z, Kikodze D, Tchelidze D, Batsatsashvili K, Hart RE (2016b) Medicinal and food plants of Svaneti and Lechkhumi, Sakartvelo (Republic of Georgia), Caucasus. Medicinal and Aromatic Plants 5:266. https://doi.org/10.4172/2167-0412.1000266

Bussmann RW, Paniagua Zambrana NY, Sikharulidze S, Kikvidze Z, Kikodze D, Tchelidze D, Khutsishvili M, Batsatsashvili K, Hart RE (2016c) A comparative ethnobotany of Khevsureti, Samtskhe-Javakheti, Tusheti, Svaneti, and Racha-Lechkhumi, Republic of Georgia (Sakartvelo), Caucasus. J Ethnobiol Ethnomed 12:43. https://doi.org/10.1186/s13002-016-0110-2

Bussmann RW, Paniagua Zambrana NY, Sikharulidze S, Kikvidze Z, Kikodze D, Tchelidze D, Khutsishvili M, Batsatsashvili K, Hart RE (2016d) Plant and fungal use in Tusheti, Khevsureti and Pshavi, Sakartvelo (Republic of Georgia), Caucasus. Acta Soc Bot Pol 86(2):3517. https://doi.org/10.5586/asbp.3517

Bussmann RW, Paniagua Zambrana NY, Romero C, Hart RE (2018a) No consensus in "traditional" medicine - medicinal plants and their uses in the markets of Bogotá (Colombia), La Paz/El Alto (Bolivia) and Trujillo/Chiclayo (Perú). Indian J Tradit Knowl 17(3):494–498

Bussmann RW, Paniagua Zambrana NY, Sikharulidze S, Kikvidze Z, Kikodze D, Tchelidze D, Batsatsashvili K, Hart RE (2018b) Unequal brothers – plant and fungal use in Guria and Racha, Sakartvelo (Republic of Georgia), Caucasus. Indian J Tradit Knowl 17(1):7–33

Bussmann RW, Batsatsashvili K, Kikvidze Z, Boboev M, Ghorbani A, de Boer H, Kool A, Liu B, Zhao L, Ma Z (2020) *Allium* giganteum Regel; *Allium karataviense* Regel.*; Allium rosenbachianum* Regel; *Allium stipitatum* Regel*; Allium suworowii* Regel; *Allium trautvetterianum* Regel. In: Batsatsashvili K, Kikvidze Z, Bussmann RW (eds) Ethnobotany of mountain regions Central Asia and Altai. Springer International Publishing International Publishing. https://doi.org/10.1007/978-3-319-77087-3_16-1

Dadabaeva O (1996) Dikorastushie lekarstvennie rastenia flori Tadjikistana – Khujand: Rakhim Djalil. – 585 p. (In Russian)

Díaz JA (ed) (2003) Informe Técnico. Caracterización del mercado colombiano de plantas medicinales y aromáticas. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Ministerio de Ambiente, Vivienda y Desarrollo Territorial. Bogotá, D.C., Colombia. 111 pp

Fayvush G, Aleksanyan A, Mehdiyeva N, Alizade V, Batsatsashvili K, Kikvidze Z, Khutsishvili M, Maisaia I, Sikharulidze S, Tchelidze D, Paniagua Zambrana NY, Bussmann RW (2017) *Allium paradoxum* (M. Bieb.) G. Don; *Allium ursinum* L.; *Allium victorialis* L. In: Bussmann RW (ed) Ethnobotany of the Caucasus. Springer International Publishing, Cham. https://doi.org/10.1007/978-3-319-49412-8_135

Flora of Azerbaijan, volumes. I–VIII. Baku, AS of Azerbaijani SSR; 1950–1961. (in Russian)

Fonnegra Gómez R, Alzate Guarín F, Orozco Castañeda C, Vásquez Londoño C, Suárez Quirós J, García López V, Roldán Palacio F, Correa Silva A, Vasco Correa C (2012) Medicina Tradicional en los Corregimientos de Medellín. Historias de vidas y plantas. Universidad de Antioquia - Alcaldía de Medellín, Medellín, 305 pp

Fonnegra-Gómez R, Villa-Londoño J (2011) Plantas medicinales usadas en algunas veredas de municipios del altiplano del oriente antioqueño, Colombia. Actual Biol 33(95):219–250

Fritsch RM (2016) A preliminary review of *Allium* subg. Melanocrommyum in Central Asia

Gabrielyan E (2001) Herbal medicine national register. Yerevan. (in Armenian)

Gairola S, Sharma J, Singh BY (2014) A cross-cultural analysis of Jammu, Kashmir and Ladakh (India) medicinal plant use. J Ethnopharmacol 155:925–986

Gammarman A, Grom I (1976) Wild medicinal plants of the USSR, Moscow. (in Russian)

García Barriga H (1974) Flora Medicinal de Colombia. Botánica Médica. Tomo Primero. Instituto de Ciencias Naturales. Universidad Nacional. Bogotá, D.E. Colombia. 561 pp

Grossheim AA (1942) Medicinal plants of Azerbaijan. Publishing house of Azerbaijani Branch of AS, Baku. (in Russian)

Grossheim AA (1943) Herbs of the Caucasus. Azerbaijani Branch of AS of Azerbaijani SSR, Baku. (in Russian)

Grossheim AA (1952) Plant richness of the Caucasus, Moscow. (in Russian)

Gubanov I, Krilova I, Tikhonova V (1976) Wild useful plants of the USSR, Moscow. (in Russian)

Harutyunyan H (1990) Medieval armenian phytotherapy herbs, Yerevan. (in Armenian)

Isotova MA, Sarafakova NA, Mkscho BI, Ionova AA (2010) Great encyclopedia of traditional medicine, Moscow. (in Russian)

Jan HA, Wali S, Ahmad L, Jan S, Ahmad N, Ullah N (2017) Ethnomedicinal survey of medicinal plants of Chinglai valley, Buner district, Pakistan. Eur J Intern Med 13:64–74

Javakhishvili I (1986) Materials for history of household and crafts, vol. 5: Food and drinks. Tbilisi, "Metsniereba". (in Georgian)

Khojimatov OK (2008) Medicinal plants of South West Tien Shan (within the Republic of Uzbekistan). Thesis of Diss. of Doctor of Sciences. – Tashkent. – p 322
Khojimatov OK (2021) Medicinal plants of Uzbekistan (properties, use and sustainable use. Ma'naviyat, Tashkent, 328 p. (in Russian)
Komarov VL (1935) (English 1968) Flora of the USSR, Volume 4: Liliiflorae, Microspermae; Akademia Nauk, Leningrad. 586 p, 44 b/w plates, 2 maps
Macbride JF, Weberbauer A (1936–1995) Flora of Peru. Field Museum, Chicago
Makalatia S (1933) Tusheti. Tpilisi. (in Georgian)
Makalatia S (1934) Khevi. Tpilisi. (in Georgian)
Mardjanyan KS (2008) Stepanos Shahrimanyan's "Botany of Flora of Armenia", Yerevan. (in Russian)
Ministerio de Protección Social (2008) Vademécum Colombiano de Plantas Medicinales. Imprenta Nacional de Colombia. Bogotá, Colombia, 311 p
Monigatti M, Bussmann RW, Weckerle CS (2013) Medicinal plant use in two Andean communities located at different altitudes in the Bolivar Province, Peru. J Ethnopharmacol 145(2):450–464
Muhammad S, Hussain M, Abbas Z, Saqib Z, Bussmann RW, Shah GM (2019) An ethnomedicinal appraisal of the Kurram Agency, tribal area, Pakistan. Indian J Tradit Knowl (IJTK) 18(4):631–647
Nosal M, Nosal I (1991) Medicinal plants and methods for their use by people, Leningrad. (in Russian)
Oshoradze V (1969) Characteristic of mkali and other wild food plants and possibility of their introduction in agriculture. Candidate of Agrarian Sciences Dissertation, Tbilisi. (in Georgian)
Paniagua Zambrana NY, Bussmann RW, Romero ABOUT (2020) *Allium cepa* L.; *Allium fistulosum* L.; *Allium ramosum* L.; *Allium sativum* L. In: Paniagua Zambrana NY, Bussmann RW (eds) Ethnobotany of mountain regions – ethnobotany of the Andes. Springer International Publishing, Cham. https://doi.org/10.1007/978-3-319-77093-2_15-1
Pawera L, Verner V, Termote C, Sodombekov I, Kadanov A, Karabaev N, Skalicky M, Polesny Z (2015) Medical ethnobotany of herbal practitioners in the Turkestan Range, southwestern Kyrgyzstan. Acta Soc Bot Pol 85. https://doi.org/10.5586/asbp.3483
Pérez Arbeláez E (1996) Plantas útiles de Colombia, 5a edn. Bogotá, Fondo FEN Colombia, DAMA, Jardín Botánico de Bogotá José Celestino Mutis. 831 p
Rajbhandari M, Mentel R, Jha PK, Chaudhary RP, Bhattarai S, Gewali MB, Karmacharya N, Hipper M, Lindequist U (2007) Antiviral activity of some plants used in Nepalese traditional medicine. eCAM 6:1–6. https://doi.org/10.1093/ecam/nem156
Reang I, Goswami S, Pala NA, Kumar K, Bussmann RW (2016) Ethnoveterinary applications of medicinal plants by traditional herbal healers in Reang tribe of South district Tripura, India. Medicinal Aromat Plants:5–2
Sakhobiddinov SS (1948a) Dikorastushie lekarstvennie rastenia Srednei Asii. – Tashkent: Gosizdat UzSSR. – 216 p. (In Russian)
Sakhobiddinov SS (1948b) Dikorastushchie lekarstvennye rasteniya SredneyAzii, Tashkent
Sher H, Bussmann RW, Hart R, de Boer HJ (2016) Traditional use of medicinal plants among Kalasha, Ismaeli and Sunni groups in Chitral District, Khyber Pakhtunkhwa province, Pakistan. J Ethnopharmacol 188:57–69. https://doi.org/10.1016/j.jep.2016.04.059
Sokolov PD (ed) (1994a) Plant resources of Russia and adjacent states: flowering plants, their chemical composition, use, vol 8. Families Butomaceae – Typhaceae. Akademia Nauk, Leningrad, 271 p. (in Russian)
Sokolov PD (1994b) Rastitel'nye resursy Rossii i sopredel'nykh gosudarstv: Tsvetkovye rasteniya, ikh khimicheskij sostav, ispol'zovanie. Semejstva Butomaceae - Typhaceae. Tom 8. Sankt Peter-burg, Nauka, 271 pp. [In Russian]
Sujashvili N, Pitskheliauri I (2005) Khevian dictionary, Tbilisi. (in Georgian)
Thakur D, Sharma A, Uniyal SK (2017) Why they eat, what they eat: patterns of wild edible plants consumption in a tribal area of Western Himalaya. J Ethnobiol Ethnomed 13:70. https://doi.org/10.1186/s13002-017-0198-z

Tsaturyan T, Gevorgyan M (2007) Wild edible plants of Armenia, Yerevan. (in Armenian)
Tsaturyan T, Gevorgyan M (2014) Wild medicinal plants of Armenia, Yerevan. (in Armenian)
Turova A, Sapojnikova E (1982) Medicinal plants of the USSR and their use, Moscow. (in Russian)
Ullah M, Mehmood S, Ali M, Bussmann RW, Aldosari A, Ali Khan R, Ullah R, Hussain W, Rahman Shah MA (2019) An ethnopharmacological study of plants used for treatment of diabetes in the Southern and Tribal regions of Khyber Pakhtunkhwa province, Pakistan. Ethnobot Res Appl 18(8). https://doi.org/10.32859/era.18.8.1-20
Vardanyan S (1979) Pharmacology in ancient Armenia. Historic Philol J 2:179–194. (in Armenian)
Wali R, Rahman K, Raja NI, Qureshi R, Bussmann RW, Mashwani ZUR (2019) A quantitative medico botanical expedition of Fairy Meadows National Park, Diamir, Gilgit Baltistan, Pakistan. Ethnobot Res Appl 1835. https://doi.org/10.32859/era.18.35.1-30
Zhang L, Chai Z, Zhang Y, Geng Y, Wang Y (2016) Ethnobotanical study of traditional edible plants used by the Naxi people during droughts. J Ethnobiol Ethnomed 12
Zolotnitskaya S (1958–1965) Medicinal resources of the flora of Armenia, vol 1–2, Yerevan. (in Russian)