

Chapter 50

Chara uzbekistanica



Roman Romanov and Liubov Zhakova

Scientific name: *Chara uzbekistanica* Hollerb. in Bot. Mater. Otd. Sporov. Rast. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 102. 1960

Holotype (Hollerbach, 1960: 102): [Uzbekistan] Uzbekistania, delta fl. Amu-Darja, lacus Sudoczje (in parte lacus centrali)/24 July 1951/R. S. Denjgina (LE).

Local names: RUSSIAN: Хара узбекистанская, UKRAINIAN: Хара узецька.

50.1 Morphology

See Figs 50.1 and 50.2.

Habitus: Plants are green to grey-brownish-green, more or less evenly, slightly incrustated, small or moderately high, rough to touch, scarcely branching with a smooth appearance due to short stipulodes, spine cells and bract-cells, completely-corticate branchlets and obvious branchlet nodes, mostly easily seen with the naked eye because of visible bract-cells.

Size: Moderately small to medium plant, from 10 to 30 cm high, up to 120 cm (Tkachenko, 2005).

Main axis: The main axis is (280)400–700 μm in diameter, flaccid, completely-corticate. The internodes are two or more times longer than the branchlets at the

R. Romanov (✉)

Nišice Ujtin Potok b.b., Dobra Voda, 85356 Bar, Montenegro

e-mail: streptophytes@gmail.com

L. Zhakova

Laboratory of Brackish Water Biology, Zoological Institute of the Russian Academy of Science, University Embankment, 1, 199034 St. Petersburg, Russia

e-mail: luba_zhakova@mail.ru

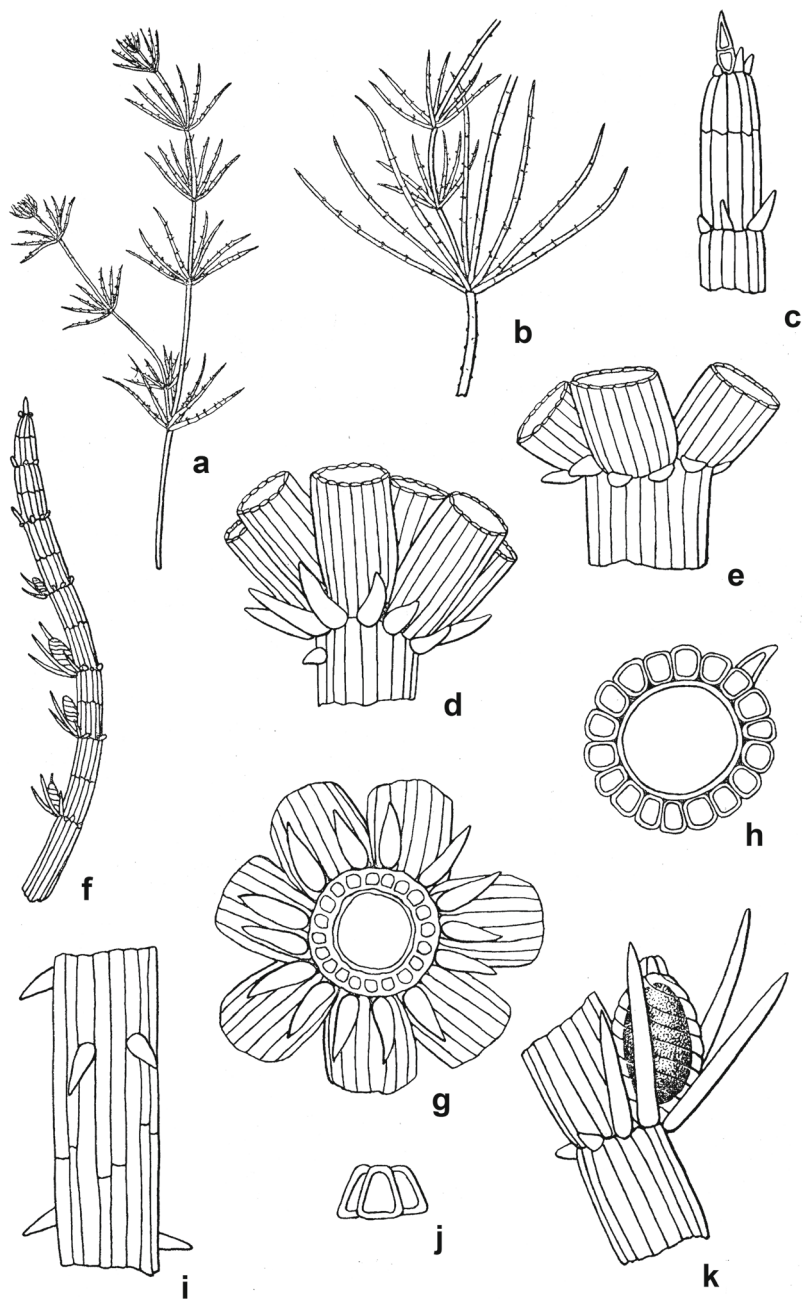


Fig. 50.1 *Chara uzbekistanica*. **a** Upper part of plant; **b** Lower part of plant; **c** End of branchlet; **d** Typical arrangement of the base of branchlet whorl; **e** The base of branchlet whorl at lower part of plant; **f** Female branchlet; **g** Stipulodes from below; **h** Cross-section of the main axis; **i** Main axis cortex; **j** Coronula; **k** Fertile node of a female branchlet. Drawings: Hollerbach and Krassavina (1983)



Fig. 50.2 General appearance of male plant of *Chara uzbekistanica* from Lower Don Region. Photograph: Liubov Zhakova

lower and middle sections of the plants, up to 40 mm at lowest one, 15–30 mm in middle, equal or somewhat shorter than branchlets near the apex.

Cortex: Regularly triplostichous and isostichous.

Spine-cells: Spine-cells are always solitary, sparse, papillose and pointed to subulate, usually not exceeding 30% (50%) of the main axis diameter.

Stipulodes: Diplostephanous but appearing haplostephanous because the upper row of cells is mostly well developed, subulate or pointed papillose, elongate, slightly curved upward or adpressed to branchlets and rudimentary cells in the lower row (type specimen, checked by R. Romanov).

Branchlets: 6(7)–8 in a widely spreading whorl, slightly sigmoid or somewhat arcuate, nearly 1 cm long in the middle part of the plant, up to 2 cm in the lowest parts, consisting of 5–8, (mostly 6–7) corticate segments and a very short, narrow and pointed, 1 or 2-celled terminal ecorticate segment.

Bract-cells: Short at sterile nodes, well developed at fertile nodes only, 8–9 (incl. bracteoles), posterior ones invariably short, papillose and pointed, anterior bract-cells are somewhat shorter than the oogonium. All bract-cells are rudimentary at nodes with antheridia (Tkachenko, 2005).

Bracteoles: Longer than oogonium, up to almost 2-times.

Bractlets: Nearly equal to bracteoles.

Sexuality: Dioecious. Gametangia are always solitary, at the lowest 3 or 4 nodes of the branchlet.

Oogonia: Ellipsoid, 455–575(750) μm in length without coronula and 315–400(500) μm in width (holotype; Hollerbach, 1960) or 480–960 \times 180–660 μm (Tkachenko, 2005), with (8)9–10 convolutions of spiral cells. The coronula is 72–85(140, rarely up to 200) μm in length and 145–155(185, rarely up to 270) μm in width (holotype, Hollerbach, 1960) or 200–300 \times 144–300 μm (Tkachenko, 2005), regular, thick-set, cone-like and narrowing toward the apex. Gyrogonites are unknown.

Oospores: Ellipsoid, 514–600 μm in length and 285–340 μm in width, with 11–12 spiral ridges.

Antheridia: 700–800 μm in diameter (holotype; Hollerbach, 1960) or 324–960 μm (Tkachenko, 2005).

Bulbils: Unknown.

50.2 Phenology and Reproduction

Unknown.

50.3 Habitat Conditions and Ecology

Habitat type: *Chara uzbekistanica* is known from fresh and brackish shallow standing waters, including marginal lakes, generally in deltas of large rivers (Volga, Amu-Darya, Ili), and in water bodies in arid and semiarid environments (Kostin, 1982; Kostin and Shoyakubov, 1974; Tkachenko, 2005; Zhivoglyad and Krivonosov, 1982). This species is frequent in shallow parts of the open subaqueous parts of the delta of the Volga River (Zhivoglyad and Krivonosov, 1982) and in the northern part of

Volga-Akhtuba floodplain at intermediate stages of aquatic plant community succession (Klinkova and Zhakova, 2014; Klinkova et al., 2012), rare in the water bodies of the western and eastern margins of delta (Zhivoglyad and Krivonosov, 1982). In addition, a few localities are known from lakes and swamps in Iran (Dogadina et al., 2007), fishponds and lakes near the delta of the Danube River in Ukraine (Hollerbach and Palamar-Mordvitseva, 1991; Tkachenko, 2005) and floodplain lakes of the Ili River in Kazakhstan (Kostin, 1982), as well as in the cooling reservoir (Tsimlyanskoe Reservoir) at the Don River (L. Zhakova unpubl. data). This species is able to withstand periodic desiccation of the at (habitat) (Zhivoglyad and Krivonosov, 1982).

Sediment: *Chara uzbekistanica* grows in silty (Denjgina, 1957), silty-sandy (Tkachenko, 2005) to sandy bottom sediments with gravel and stones (L. Zhakova unpubl. data).

Nutrient conditions and water chemistry: Few data are available. This species is known at salinities from 0.3 g per L⁻¹ (Klinkova et al., 2012), 0.385–1.6 g per L⁻¹ (Kostin and Shoyakubov, 1974), 1 g per L⁻¹ (Zhakova unpubl. data) and up to 5–7 g per L⁻¹ (Kostin, 1987); the habitat pH is usually slightly above 8, Cl⁻ has been measured at 4.6 g per L⁻¹ in the type locality during sampling of original material (Denjgina, 1957); as well as in waters with sulphates, hydrocarbonates and sodium as main ions in Tsimlyanskoe Reservoir (L. Zhakova unpubl. data).

Depth range: *Chara uzbekistanica* is known from shallow water, up to 0.45 m, but mainly 1–2.5 m, and up to 2 m in the lower Ili region and neighboring Lake Balkhasch (Kostin, 1982). High water level in seaside lakes in combination with less heating of the water favours mass development of the species possibly due to suppression of flowering plants (Tkachenko, 2005).

Associated species: *Chara uzbekistanica* grows in association with big species of *Characeae*: *Chara globata*, *C. tomentosa*, *Nitellopsis obtusa* or with different species of flowering plants (Denjgina, 1957; Tkachenko, 2005; R. Romanov unpubl. data). It occurs frequently in monodominant stands in the Volga Delta (Zhivoglyad and Krivonosov, 1982).

50.4 Variability and Risk of Confusion

Chara uzbekistanica is very similar in general appearance with *C. connivens* and *C. virgata* but can be easily differentiated in the fertile state from the latter, being dioecious in contrast with monoecious *C. virgata*. The elongated upper stipulodes that are usually not rudimentary allow it to be distinguished from *C. connivens*, which has short diplostephanous stipulodes. This difference seems to be not so crucial. The pointed elongated spine cells of *C. uzbekistanica* vs. short papillose ones of *C. connivens* can also be useful for separation, but they are only formed sometimes. *Chara uzbekistanica* is mainly a Central-Asian species but can be locally abundant

in the Volga delta. In addition, three distant populations are also known in Europe, i.e., two in Ukraine and single one in Russia.

50.5 Distribution

The European distribution of *Chara uzbekistanica* is limited to South-Eastern Europe (Fig. 50.3): seaside lakes at vicinity of the Danube Delta, fishponds in vicinity of Kiev (Ukraine), the Lower Don Region (Rostov Oblast), the Lower Volga Region—almost entirely restricted to the Volga floodplain, the Volga Delta (Russia); in Central Asia: Kazakhstan—the Ili Delta, Uzbekistan—the Amu-Darya Delta and in Western Asia: Iran (Borisova et al., 2016; Dogadina et al., 2007; Hollerbach, 1960; Hollerbach and Krassavina, 1983; Hollerbach and Palamar-Mordvintseva, 1991; Klinkova and Zhakova, 2014; Kostin, 1987; Tkachenko, 2005; LE!). The total number of its localities in the world does not exceed 30, including a few recent records from Iran, Ukraine, and Russia (Dogadina et al., 2007; Tkachenko, 2005; LE!; L. Zhakova unpubl. data).

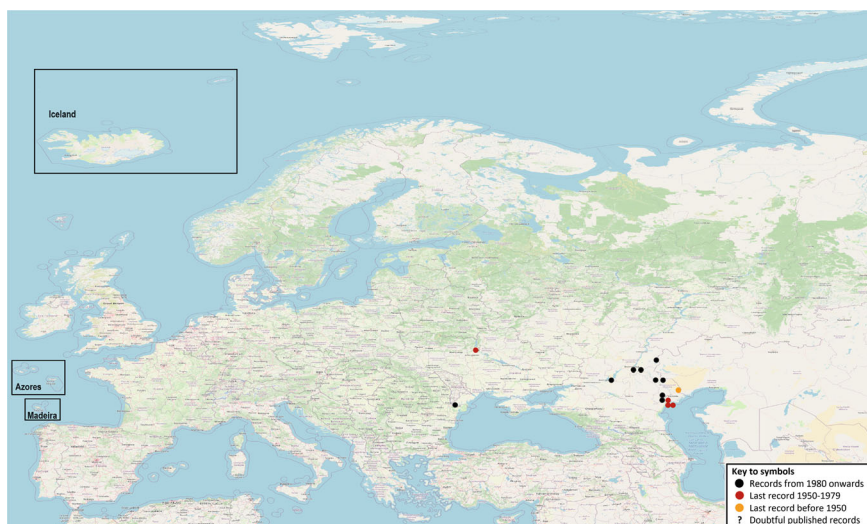


Fig. 50.3 Distribution of *Chara uzbekistanica* in Europe. Black dots are records from 1980 on, red dots from 1950 to 1979 and yellow dots before 1950; unconfirmed/doubtful published records (if applicable) are marked with “?” superimposed. Map prepared by Heiko Korsch

50.6 Status and Threats

Chara uzbekistanica has been assessed as DD (Data Deficient) in the European Red List (see Chap. 9). It has been suggested for the inclusion in the Red Data Book of the Russian Federation as a rare stenobiont species at the edge of its distribution range (Romanov, 2015).

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References

- Borisova, E. V. (2016). Analysis of the flora of Charales (Charophyta) of Ukraine. *Algologia*, 26(4), 403–417. [in Russian]. <https://doi.org/10.15407/alg26.04.403>
- Denjgina, R. S. [Деньгина, Р. С.]. (1957). Материалы гидробиологических исследований озер северо-западной части дельты р. Аму-Дарьи [The materials of hydrobiological study of the lakes of north-western part of Amu-Darya Delta]. *Труды Лаборатории озерадения АН СССР* [Proceedings of the Laboratory of Limnology of the Academy of Sciences of USSR], 4, 269–305. [in Russian].
- Dogadina, T. V., Zarei Darki, B., & Gorbulin, O. S. (2007). *Algal flora of Iran*. V.N. Karazin Kharkiv National University.
- Hollerbach, M. M., & Palamar-Mordvintseva, G. M. [Голлербах, М. М. & Паламар-Мордвинцева, Г. М.]. (1991). *Визначник прісноводних водорослей України. IX. Харові водорослі (Charophyta)* [The identification manual of freshwater algae of Ukraine: IX. Charophytes (Charophyta)]. Naukova dumka. [in Ukrainian].
- Hollerbach, M. M., & Krassavina, L. K. [Голлербах, М. М. & Красавина, Л. К.]. (1983). *Определитель пресноводных водорослей СССР. 14. Charophyta* [Determination key of freshwater algae of USSR. 14. Charophyta]. Nauka. [in Russian].
- Hollerbach, M. M. (1960). De speciebus novis generis *Chara* e sectione *Haplostephanae Triplostichae*. *Notulae Systematicae e Sectione Cryptogamica Instituti Botanici nomine V. L. Komarovii Academiae Scientiarum URSS – Botanicheskie Materialy Otdela Sporovykh Rasteniy*, 13, 101–107. (in Russian).
- Klinkova, G. Yu., Zhakova, L. V., Gorsky, K., & Gorelov, V. P. (2012). The algae of Charophyta within the territory of “The Volga-Akhtuba Floodplain”. *Byulleten Glavnogo Botanicheskogo Sada*, 3, 52–58. [in Russian].
- Klinkova, G. Yu., & Zhakova, L. V. (2014). New and rare species of Charales in the flora of the Lower Volga Region. *Byulleten MOIP. Otdel biologicheskii* [Bulletin of Moscow Society of Naturalists. Biological series], 119, 61–66. [in Russian].
- Kostin, V. A., & Shoyakubov, R. Sh. [Костин, В. А. & Шоякубов, Р. Ш.]. (1974). Распределение и биомасса харовых водорослей в озере Балхаш [The distribution and biomass of charophytes in Lake Balkhash]. In *Пятая конференция по спорным растениям Средней Азии и Казахстана, 26–27 апреля 1974 г., ч. 1* [The fifth conference for cryptogamous plants of Central Asia and Kazakhstan, Apr 26–27, 1974. Abstracts, 1]. (pp. 182–183). [in Russian].
- Kostin, V. A. [Костин В. А.] (1982). Редкие и исчезающие виды харовых водорослей водоемов реки Или и озера Балхаш [The rare and endangered species of charophytes from water bodies of Ili River and Lake Balkhash]. *Ботанические материалы гербария Института ботаники Академии Наук Казахской ССР* [Botanicheskie Materialy Gerbariya Instituta Botaniki Akademii Nauk Kazakhsky SSR], 12, 114–118. [in Russian].

- Kostin, V. A. [Костин, В. А.] (1987). Материалы к изучению экологии харовых водорослей водоемов Или-Балхашского бассейна [Materials for the study of the ecology of charophytes in reservoirs of the Ili-Balkhash basin]. *Ботанические материалы гербария Института ботаники Академии Наук Казахской ССР* [Botanicheskie Materialy Gerbariya Instituta Botaniki Akademii Nauk Kazakhskoy SSR], 15, 128–133. [in Russian].
- Romanov, R. E. (2015). Charophytes in the Red Data Book of Russian Federation: new species proposed to inclusion. In *Problems of taxonomy and geography of aquatic plants: proceedings of International conference, Borok, Russia, Oct 21–24, 2015*. (pp. 65–66). Filigran. [in Russian].
- Tkachenko, F. P. (2005). The new location of rare species of Ukraine flora *Chara uzbekistanica* Hollerb. *Algologija*, 15(2), 230–235. [in Russian].
- Zhivoglyad, A. F., & Krivonosov, G. A. (1982). On the specific composition and the productivity of the Charophyta at the lower reaches of the Volga Delta and Northern Caspy. *Botanicheskii Zhurnal*, 67, 672–674. [in Russian].